Reliable measures of technical efficiency are of great interest because they can assist in addressing important issues. For instance, inefficient operation of firms - in the sense that if a firm is inefficient it does not produce at minimum cost - could lead to higher prices which could drive costumers to substitute away toward some other product or service. The purpose of this paper is the estimation of technical efficiency of Trolley Buses of Athens & Piraeus Area (T.B.A.P.A.), for each one of its twenty (20) lines for the year 2003. We apply the methodological framework of Stochastic Frontier Analysis (S.F.A.), by using the Cobb-Douglas specification of the production function. The dependent variable is the total kilometers that are covered by the vehicles of each line, while the independent variables include the fleet of the vehicles used, labor expanded and energy expanded. The data set consists of the monthly observations of the twenty (20) lines of the APTB. The results are compared to those from Data Envelopment Analysis (D.E.A.), a particularly widely used approach for efficiency measurement in the literature. Findings suggest that most lines were highly efficient, since technical efficiency ranged between 97% and 100%. The results obtained by means of the SFA approach are, in general terms, consistent with the DEA findings, despite the fact that DEA usually cannot discriminate between inefficiency and noise and tends to provide overestimated results.

Keywords:
Trolley Buses, Public Transportation, Technical Efficiency.
1. Introduction

The purpose of this paper is to estimate the technical efficiency of Trolley Buses of Athens and Piraeus Area (T.B.A.P.A.), for each one of its twenty (20) lines for the year 2003. This is a particularly appealing subject for many reasons. At first, because Athens is one of the very few European capitals in which trolley buses are used. Moreover, trolley busses were one of the main means of transportation in Athens in 2003, when the Athens metro network was still very limited. Besides, in the early 2000s, the Greek Department of Transportation (G.D.T.) in collaboration with the Athens Urban Transit Organization (A.U.T.O.), introduced certain reforms in order to promote competition and thus increase efficiency and productivity.

T.B.A.P.A. was found in 1970. It is a public Greek company, part of the general Athens Urban Transit Organization (A.U.T.O.), responsible for the operation of the Trolley Buses network. Its main task is to deliver transportation services via electrical buses, according to schedules and programs that are drafted by A.U.T.O. In 2008, T.B.A.P.A. had twenty-two (22) trolley bus lines which covered more than 350 kilometers in Athens and Piraeus. The fleet consisted of three hundred and sixty six (366) trolley buses, fifty one (51) of which were articulated. Twelve million (12,000,000) passengers use them every year. The company has one thousand and six hundred (1,600) employees, approximately (official T.B.A.P.A. site).

The estimation of technical efficiency is based on the so-called Stochastic Frontier Analysis (S.F.A.) and the results are compared to those form the deterministic approach of Data Envelopment Analysis (D.E.A.)

The paper is structured as follows: section 2 presents previous and/or related studies on the topic; section 3 sets out the methodological framework; section 4 describes the data and the variables; section 5 presents the empirical results; section 6 compares them with DEA; finally, section 7 concludes the paper.

2. Previous Studies

In this section, we make an attempt to review previous studies dealing with the performance of urban transportation, mainly in Europe. Asensio and Trillas (2006) measured technical efficiency in the Spanish suburban railway for eleven cities in Spain for the 2000-2004 time span, by means of DEA. Furthermore, they measured Total Factor Productivity (TFP) change with a Malmquist index, and decomposed it into its various sources.

The results indicated the importance that technical change has had as determinant of productivity improvements. While all cities in the sample experienced positive technical change, technical efficiency, on average, decreased during the period under investigation.
Roy and Yvrande-Billon (2007), using a panel data set consisting of 135 different French urban transport networks over the 1995-2002 time span, investigated the impact of ownership structure and contractual choices on technical efficiency in the French urban public transport sector, by means of SFA. The empirical results showed that technical efficiency depended on ownership structure and the type of contract governing their transactions. Specifically, private operators outperformed public ones and operators under cost-plus contracts exhibited a higher level of technical efficiency than operators under fixed price agreements.

De Borger and Kerstens (2006) provided a theoretical analysis of the performance of bus-transit operators. In fact, they summarized the known results about the economic performance of bus-transit operators, by focusing on productivity growth and efficiency. More importantly, they reviewed the most relevant technological, environmental and regulatory determinants of productivity growth and differences between efficiency levels between operators.

A first conclusion was that productivity growth of bus-transit operators was either negative or mildly positive. Second, substantial inefficiencies remained among bus operators, although there were huge differences over time and across the countries. Third, an important conclusion was that the ownership structure was not so crucial in explaining differences in efficiency between operators. Fourth, the impact of the network's environmental variables and characteristics on performance was clearly highlighted in a number of studies. Finally, although many uncertainties remain, deregulation was likely to improve performance in a number of different respects.

Tsamboulas (2006) presented a comprehensive approach for the ex-ante evaluation and identification of relevant impacts related to the implementation of Exclusive Bus Lanes (EBL). He proposed relevant indicators to measure the impacts related to key stakeholders, as the public transport operators, taxis, private vehicle drivers and passengers, as well as society regarding energy and the environment. The ex-ante evaluation method is based on Cost Benefit Analysis (CBA) and is designed to assist any decision regarding implementation of EBL by determining whether it is beneficial. An empirical application was provided for Athens, Greece where EBLs were introduced to accommodate traffic for the Olympic Games of 2004. The findings of the study showed that the costs and benefits depend on an area’s situation. Also, EBL facilities benefit low-income travelers while imposing costs on high-income travelers.

Walter and Cullmann. (2008), aimed to analyze potential gains from hypothetical mergers in local public transport, using DEA with bias corrections by means of bootstrapping in a sample of 41 public transport companies from North Rhine-Westphalia, the most densely populated
region in Germany. The mergers were into geographically meaningful, larger units that operated partially on a joint tram network. Merger gains were then decomposed into individual technical efficiency, synergy and size effects.

The findings suggested that the incorporation in rail-bound local public services was necessary, although they must be analyzed on a case-by-case basis. The impact on the population and network density is not substantial in an already densely populated area. Regarding the merger gains, they must be expected for bus, tram, and light railway mergers and smaller bus mergers, but for larger bus mergers further research is relevant.

3. Methodological Framework

3.1 Stochastic Frontier Analysis

In 1957, Farrell (1957) provided us with the definition of technical efficiency and until the late 1970s its empirical application was relatively limited. However, Aigner et al. (1977), introduced the stochastic frontier production function, and Meeusen and van den Broeck (1977) presented the Cobb-Douglas production function with a composed multiplicative disturbance term. Since then, Farrell’s idea became a useful tool for estimating technical (in)efficiency.

There are three main approaches for measuring technical efficiency: parametric (deterministic and stochastic), non-parametric based on D.E.A. and productivity indices based on growth accounting and index theory principles (Coelli et al., 1998). D.E.A. and S.F.A. are the most widely used methods for calculating the technical efficiency of a firm. The S.F.A. approach requires a functional form in order to estimate the frontier production function and is based on the idea that the data are contaminated with measurement errors and other noise (Bauer, 1990). The D.E.A. approach uses linear programming techniques to estimate a piece-wise frontier that envelops the observations and requires no specific functional form for the production function (Fried et al. 1993).

The specification of the adopted model starts with the assumption that the technology applied in the production process can be described by a twice differentiable production function which relates the flow of output with various inputs of production. In algebraic terms the stochastic production frontier (SPF) can be expressed as:

\[ y = f(X, \beta) \exp(\epsilon), \epsilon = (\nu-u), u \geq 0 \] (1)

where: \( y \) is the observed output quantity; \( f \) is the deterministic part of the frontier production function, \( X \) is a vector of the input quantities used by the firm, \( \beta \) is a vector of parameters to be estimated, \( \nu \) is a symmetrical random error and \( u \) is a one-sided non-negative random error term representing technical efficiency. It is assumed that \( f \) is finite for every \( X \),
and continuous for all nonnegative $y$ and $X$. The elements of $v$ represent the conventional normal distribution of random elements including measurement errors, minor omitted variables, and other exogenous factors beyond the firm’s control. The elements of $u$ indicate shortfalls of the firm’s production units from the efficient frontier.

Thus, technical efficiency is measured by the ratio:

$$TE = \frac{y}{f(X) \exp(v)} = \exp(-u)$$

and has a value between 0 and 1, with 1 defining a technically efficient firm. Given a parametric functional form for $f$ and distributional assumptions about $u$ and $v$, equation (1) can be estimated by Ordinary Least Squares (O.L.S.).

More specifically, equation (1) is written as:

$$\ln(y) = \ln[f(X)] + v - u$$  \hspace{1cm} (2a)

$$\ln(y) = -\mu + \ln[f(X)] + (v-u+\mu)$$  \hspace{1cm} (2b)

where: $\mu = E(u)>0$.

The estimation of the S.P.F. by O.L.S. leads to consistent estimators for all the parameters, $\mu$ included, under the assumption that $v$ is normally and $u$ is half-normally distributed. The rationale behind normality is simply convenience at the estimation stage plus the fact that we lack information upon which to base alternative stochastic specification assumptions.

Estimation of equation (2) by O.L.S. gives the residuals $e_i$, $i = 1, 2, \ldots, N$. The second and third central moments of the residuals, $m_2(e)$ and $m_3(e)$ respectively, are calculated, as follows:

$$m_2(e) = \frac{1}{N-k} \sum e_i^2$$  \hspace{1cm} (3a)

$$m_3(e) = \frac{1}{N-k} \sum e_i^3$$  \hspace{1cm} (3b)

where: $N$ is the number of observations and $k$ is the number of regressors, the constant term included. Then, we estimate $\sigma^2_u$ and $\sigma^2_v$ using the formulae (Georganta, 1993):

$$\sigma^2_u = \left[\frac{2}{\pi}\right]^{2/3} m_2(e)^{2/3}$$  \hspace{1cm} (4a)

$$\sigma^2_v = m_2(e) - \left[\frac{2}{\pi}\right] \sigma^2_u$$  \hspace{1cm} (4b)

Following Battese and Coelli (1988), the point measure of technical efficiency is:

$$TE_i = E(\exp{-u_i}/e_i) = \left[1 - F(\sigma^*-M_i^*/\sigma)\right]/\left[1 - F(-M_i^*/\sigma)\right] \exp[-M_i^* + (\sigma^2/2)]$$  \hspace{1cm} (5)

where $F$ denotes the distribution function of the standard normal variable. Also:

$$M_i^* = (-\sigma^2_v e_i)(\sigma^2_u + \sigma^2_v)^{-1}$$  \hspace{1cm} (6a)

$$\sigma^2 = \sigma^2_u \sigma^2_v (\sigma^2_u + \sigma^2_v)^{-1}$$  \hspace{1cm} (6b)
3.2 Data Envelopment Analysis

According to Poitras et al. (1996), Data Envelopment Analysis (D.E.A.) is an efficiency evaluation model based on mathematical programming techniques. In contrast to parametric approaches, D.E.A. optimizes each individual observation with the objective of calculating a discrete piecewise frontier determined by the set of Pareto efficient Decision Management Units (D.M.U.s). D.E.A. is based on the idea that the efficiency of a D.M.U. is determined by its ability to transform inputs into desired outputs. D.E.A. generalizes the single output/input technical efficiency measure to multiple outputs/inputs by constructing a relative efficiency measure based on a single "virtual" output and a single "virtual" input. The efficient frontier is then determined by selecting D.M.U.s which are most efficient in producing the virtual output from the virtual input.

Because D.M.U.s on the efficient frontier have an efficiency score equal to 1, inefficient DMUs are measured relative to the efficient D.M.U.s.

More formally, assume that there are \( n \) D.M.U.s to be evaluated. Each D.M.U.\( j \) consumes varying amounts of \( m \) different inputs to produce \( s \) different outputs. Specifically, DMU\( j \) consumes amounts \( X_j = \{x_{ij}\} \) of inputs (\( i = 1, \ldots, m \)) and produces amounts \( Y_j = \{y_{rj}\} \) of outputs (\( r = 1, \ldots, s \)). The \( s \times n \) matrix of output measures is denoted by \( Y \), and the \( m \times n \) matrix of input measures is denoted by \( X \). Also, assume that \( x_{ij} > 0 \) and \( y_{rj} > 0 \). Consider problem of evaluating the relative efficiency for any one of the \( n \) D.M.U.s, which will be identified as D.M.U.\( 0 \). Relative efficiency for D.M.U.\( 0 \) is calculated by forming the ratio of a weighted sum of outputs to a weighted sum of inputs, subject to the constraint that no D.M.U can have a relative efficiency score greater than unity. Symbolically:

\[
\max_{u,v} \quad \frac{\sum_r u_r y_{ro}}{\sum_r v_r x_{ro}} = \frac{u^T Y_0}{v^T X_0}
\]

where \( u = (u_1, \ldots, u_s)^T \), \( v = (v_1, \ldots, v_m)^T \)

Subject to:

\[
\frac{u^T Y_j}{v^T X_j} = \sum_r u_r y_{rj} \leq 1
\]

for \( j = 1, 2, \ldots, n \); \( u_r, v_i \geq 0 \) for \( r = 1, 2, \ldots, s \), \( i = 1, 2, \ldots, n \)

where: \( u \) and \( v \) are weights assigned to input \( r \) and output \( i \) respectively.

For this fractional programming problem with a potentially infinite number of optimal solutions, Charnes et al. (1978) were able to specify an
equivalent linear programming problem. This requires introduction of a scalar quantity ($\theta$) to adjust the input and output weights:

$$\theta = \frac{1}{\nu^T v}, \quad \mu^T = \theta u^T, \quad \omega = \theta v^T$$

Appropriate substitutions produce the linear programming problem:

$$\max_{\mu, \nu} \Lambda_0 = \sum_{r} \mu_r y_{r,0} = \mu^T Y_0$$

subject to:

$$\omega^T X_0 = \sum_{r} \omega_j x_{r,0} = 1, \sum_{r} \mu_r y_{r,0} - \sum_{j} \omega_j x_{r,0} \leq 0, \mu_r, \omega_j \geq 0$$

where the value of $\Lambda_0$ is the relative efficiency of D.M.U. 0 and $\epsilon$, is positive constant, called the non-Archimedian infinitesimal, which is introduced to facilitate solving of the linear programming problem. In D.E.A., this linear programming problem is known as the C.C.R.

4. Data

The data set consists of the monthly observations of the twenty (20) lines (see Table 1) of the T.B.A.P.A. in 2003. The numbering is not continuous because several lines were abolished and new ones created. Table 1 show that the Trolley Busses’ network covers a large surface of Athens and Piraeus, serving areas from the centre of Athens to Eastern Western and North Suburbs, Piraeus and its surroundings. However, the network does not serve the South Suburbs of Athens, as those areas became important centers many years after the network was developed.

Table 1: T.B.A.P.A.’ lines in 2003

<table>
<thead>
<tr>
<th>No.</th>
<th>Line</th>
<th>Rout way</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Line 1</td>
<td>Attikis Sq.- Moshato</td>
</tr>
<tr>
<td>2</td>
<td>Line 2</td>
<td>Kipseli - Pagrati - Kesariani</td>
</tr>
<tr>
<td>3</td>
<td>Line 3</td>
<td>Patisia - Girokomio</td>
</tr>
<tr>
<td>4</td>
<td>Line 4</td>
<td>Ano Kipseli - St. Artemios</td>
</tr>
<tr>
<td>5</td>
<td>Line 5</td>
<td>Lamprini - Koukaki (Gigifies)</td>
</tr>
<tr>
<td>6</td>
<td>Line 6</td>
<td>Athens - Kokkinos Milos</td>
</tr>
<tr>
<td>7</td>
<td>Line 7</td>
<td>Panepistimiou - Alexandras Av.</td>
</tr>
<tr>
<td>8</td>
<td>Line 8</td>
<td>Alexandras Av. - Akadimia</td>
</tr>
<tr>
<td>9</td>
<td>Line 9</td>
<td>Ano Kipseli - Zappio</td>
</tr>
<tr>
<td>10</td>
<td>Line 11</td>
<td>Koliatsou - N. Pagrati - N. Helvetia</td>
</tr>
<tr>
<td>11</td>
<td>Line 12</td>
<td>Zappio - Peristeri - (St. Ierotheos)</td>
</tr>
<tr>
<td>12</td>
<td>Line 13</td>
<td>Lamprini - Papadiamantis Sq. - N. Psihiko</td>
</tr>
<tr>
<td>13</td>
<td>Line 14</td>
<td>Papadiamanti Sq. - Alexandras Av.- N.Psihiko</td>
</tr>
<tr>
<td>14</td>
<td>Line 15</td>
<td>El. Venizelou - Petralona</td>
</tr>
</tbody>
</table>
The data set consists of four (4) variables. The single output is the total vehicle-kilometres. The inputs are: the total labour expanded, the total available vehicles, and the total energy expanded (electricity) by the fleet of the vehicles of each line. Each of these variables reflects the operational characteristics of each line of the T.B.A.P.A.

More precisely, the output of our model reflects the kilometers that are covered by the fleet of the vehicles of each line in total. The total number of the vehicle-kilometers is estimated by the total number of the route ways multiplied with the length of each line. The number of the route ways of each line is scheduled by the A.U.T.O. With regard to the independent variables of the model, the energy expanded is a crucial one, as it depends on several factors, such as the number of the passengers carried by the fleet of the vehicles, the number of the vehicles used, their average speed, the traffic situation and the geographical characteristics of each route. The employees can be drivers, ticket collectors or stationmasters. Finally, with regard to the number of the vehicles of each line this is scheduled by the T.B.A.P.A. and the A.U.T.O.

5. Empirical Results

From a methodological point of view the question of technical efficiency is examined by using the Cobb-Douglas specification of the production function. Thus, the adopted functional form, corresponding to equation (1) is:

$$\ln Y = a_0 + a_1 \ln E + a_2 \ln L + a_3 \ln K + v - u$$

where: $Y$ is a measure of output, $E$ is a measure of energy spending, $L$ a measure of labour, and $K$ a measure the vehicles available. The regression results showed a very good fit to the data for almost all of the twenty (20) lines, while the $p$-values of the variables were particularly high, which are clear indications of multicollinearity. As a result, some variable(s) had to be removed from the model. In this spirit, first we note that with regard to the variable “labour”, it is practically constant (at a monthly basis) for each line of the data and, thus, it does not affect the lines’ level of output. Second, we exclude the variable “vehicles” from the model because of multicollinearity problems in the regression, as was easily confirmed. This was expected and easily interpretable because the number of vehicles is
implicitly counted in the total amount of energy expanded. As a result, energy expanded is the only variable that we keep in the model and provides a very good fit to the data as can be inferred from Table 2. Thus, the Cobb-Douglas production function after the exclusion of these two variables takes the form of equation:

\[ \ln Y = \alpha \ln E + \nu - u \]

The results of the regression analysis are illustrated in Table 2. It can be inferred that the model provides a very good fit to the data and of course the variable “energy” is highly significant in almost all the regressions.

<table>
<thead>
<tr>
<th>Line</th>
<th>Const</th>
<th>lnE</th>
<th>R-Sq (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>10.661 (0.00)</td>
<td>0.943 (0.00)</td>
<td>89.0</td>
</tr>
<tr>
<td>2</td>
<td>10.026 (0.00)</td>
<td>0.970 (0.00)</td>
<td>94.1</td>
</tr>
<tr>
<td>3</td>
<td>10.547 (0.00)</td>
<td>0.988 (0.00)</td>
<td>97.6</td>
</tr>
<tr>
<td>4</td>
<td>10.225 (0.00)</td>
<td>0.962 (0.00)</td>
<td>92.6</td>
</tr>
<tr>
<td>5</td>
<td>10.431 (0.00)</td>
<td>0.962 (0.00)</td>
<td>92.5</td>
</tr>
<tr>
<td>6</td>
<td>10.361 (0.00)</td>
<td>0.981 (0.00)</td>
<td>96.2</td>
</tr>
<tr>
<td>7</td>
<td>9.095 (0.00)</td>
<td>0.558 (0.06)</td>
<td>31.1</td>
</tr>
<tr>
<td>8</td>
<td>9.183 (0.00)</td>
<td>0.911 (0.00)</td>
<td>83.0</td>
</tr>
<tr>
<td>9</td>
<td>9.268 (0.00)</td>
<td>0.913 (0.00)</td>
<td>83.4</td>
</tr>
<tr>
<td>11</td>
<td>10.242 (0.00)</td>
<td>0.984 (0.00)</td>
<td>96.8</td>
</tr>
<tr>
<td>12</td>
<td>10.461 (0.00)</td>
<td>0.892 (0.00)</td>
<td>79.6</td>
</tr>
<tr>
<td>13</td>
<td>10.551 (0.00)</td>
<td>0.991 (0.00)</td>
<td>98.3</td>
</tr>
<tr>
<td>14</td>
<td>10.023 (0.00)</td>
<td>0.981 (0.00)</td>
<td>96.1</td>
</tr>
<tr>
<td>15</td>
<td>9.636 (0.00)</td>
<td>0.900 (0.00)</td>
<td>81.0</td>
</tr>
<tr>
<td>16</td>
<td>9.601 (0.00)</td>
<td>0.913 (0.00)</td>
<td>83.3</td>
</tr>
<tr>
<td>17</td>
<td>9.960 (0.00)</td>
<td>0.978 (0.00)</td>
<td>95.7</td>
</tr>
<tr>
<td>20</td>
<td>10.017 (0.00)</td>
<td>0.884 (0.00)</td>
<td>78.1</td>
</tr>
<tr>
<td>21</td>
<td>10.654 (0.00)</td>
<td>0.666 (0.08)</td>
<td>44.3</td>
</tr>
<tr>
<td>24</td>
<td>9.883 (0.00)</td>
<td>0.668 (0.08)</td>
<td>44.6</td>
</tr>
<tr>
<td>25</td>
<td>10.063 (0.00)</td>
<td>0.849 (0.00)</td>
<td>72.0</td>
</tr>
</tbody>
</table>

The next step is, through equations (3a, 3b, 4a, 4b), to estimate the second and third central moments, \( \sigma_u^2 \) and \( \sigma_v^2 \) of each line. After measuring the second and third central moments, \( \sigma_u^2 \) and \( \sigma_v^2 \), we are able to estimate the technical efficiency of each line. Table 3 presents the measures of technical efficiency (T.E.).
The results after the removal of several unusual observations range between 97% and 100% with an average equal to 98.8% approximately. This result implies that the lines appear to be highly efficient in terms of technical efficiency. Line 11 is the most technically efficient while line 24 is the least efficient line in our dataset.

After a closer look at the empirical results, namely the technical efficiency measures and the characteristics of each line, it seems that a combination of the length of each line and the areas that it connects are the factors which define each line’s technical efficiency. More precisely, the lines which serve areas that are distanced and not connected directly with other “competitive” means of transportation, seem to be more technical efficient.

For instance, line 11 connects areas around the center of Athens that are served neither by the metro nor by bus or electric railway. More characteristic is the case of line 7, the second most efficient line of the sample. This line serves areas near the centre of the city, which are served by metro and buses. However, this line is highly efficient because its connection with these “competitive” means is not direct. The same is in force for line 13, which is the longest (25km) line of the sample and the third most efficient. This line connects many areas around Athens via big
avenues in which the bus network is very extensive. Passengers seem to prefer trolley buses because they offer a direct way to their destination. Contrarily, lines which serve areas that are served by metro (line 8), or the electric railway (lines 20, 21) are among the least efficient lines.

6. Comparison with D.E.A.

In this section, we compare the SFA technical efficiency estimates with the D.E.A. respective results (Kagiantalides, 2004). See Table 4. It is not a strict comparison, because the variables in the two approaches are different given that DEA is a non-parametric technique which does not specify a production function for the estimation of technical efficiency.

<table>
<thead>
<tr>
<th>Ranking</th>
<th>S.F.A.</th>
<th>D.E.A.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>99.17</td>
<td>95.79</td>
</tr>
<tr>
<td>2</td>
<td>98.89</td>
<td>95.31</td>
</tr>
<tr>
<td>3</td>
<td>99.34</td>
<td>98.18</td>
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<tr>
<td>4</td>
<td>99.46</td>
<td>94.24</td>
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<td>99.47</td>
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<tr>
<td>6</td>
<td>99.44</td>
<td>94.84</td>
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<td>7</td>
<td>99.72</td>
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<td>8</td>
<td>99.01</td>
<td>100</td>
</tr>
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<td>9</td>
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<td>100</td>
<td>90.87</td>
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</tr>
<tr>
<td>18</td>
<td>97.41</td>
<td>99.81</td>
</tr>
<tr>
<td>19</td>
<td>97.01</td>
<td>100</td>
</tr>
<tr>
<td>20</td>
<td>97.82</td>
<td>99.97</td>
</tr>
</tbody>
</table>

Just like in S.F.A., D.E.A. technical efficiency measures range in relatively high levels, with an average equal to 96.5%, although the D.E.A. measures are, in general, lower than the ones estimated by S.F.A., as D.E.A. attributes the entire distance from the frontier to inefficiency as it does not discriminate between inefficiency and noise.

Another interesting issue is the comparison of the lines’ ranking with both methodologies. As we can infer from Table 5, lines 3, 5, 7, 13, 17, ranked in the top 50%, regardless of the methodology used, while lines 1,
2, 16, are in the middle of the ranking, whereas lines 9 and 12 are among the least efficient with both methodologies.

Table 5: The ranking of with SFA and DEA

<table>
<thead>
<tr>
<th>Ranking</th>
<th>S.F.A.</th>
<th>D.E.A.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>11</td>
<td>8</td>
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<tr>
<td>2</td>
<td>7</td>
<td>24</td>
</tr>
<tr>
<td>3</td>
<td>13</td>
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<td>4</td>
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<td>8</td>
<td>15</td>
<td>17</td>
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<td>9</td>
<td>3</td>
<td>3</td>
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<td>10</td>
<td>14</td>
<td>20</td>
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<td>11</td>
<td>1</td>
<td>16</td>
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<td>12</td>
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<td>13</td>
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<td>15</td>
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<td>16</td>
<td>12</td>
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<td>17</td>
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<td>18</td>
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<td>12</td>
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<td>19</td>
<td>21</td>
<td>11</td>
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<td>20</td>
<td>24</td>
<td>15</td>
</tr>
</tbody>
</table>

7. Conclusion

The main purpose of this paper was the estimation of technical efficiency of the Trolley Busses in Athens and Piraeus Area (T.B.A.P.A.), for each one of its twenty (20) lines for the year 2003, by means of S.F.A. Furthermore, a comparison between the S.F.A. estimates with the ones measured with the aid of the deterministic approach of D.E.A. was attempted.

With regard to the empirical results, the estimated technical efficiency measures range in high levels. More precisely, technical efficiency has an average equal to about 98.80% and 96.5% with the SFA and DEA methodologies, respectively. This is expected given the fact that conventional D.E.A. cannot discriminate between inefficiency and noise. The ranking of the lines is, in general terms, consistent when measured with the aid of the two respective methodologies. Finally, a closer look at the results and the characteristics of the route way of each line indicates that lines which connect areas that are distanced and not connected directly
with other “competitive” means of transportation, seem to be more technically efficient, ranking very high in the list. We believe that our findings could be used for the formulation of policy rules. Clearly, future and more extended research is of great interest.

References

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The Image of a Region: A Tool for its Sustainable Development

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Abstract:
In most countries, mobility is largely a voluntary process. People and industries move in to or out of a given region on the basis of their perception of its relative advantages and disadvantages. Hence, the growth or decline of a region depends on its power to pull and retain both industries and the right blend of people to run them. This pulling power depends on what we call the “Image” of the region, a variable which expresses its present state of development and future prospects and may be defined as a function of a multitude of factors, natural, economic, social and environmental. At each point in time, the region “sends out” its Image and depending on its impact on the people, both employers and employees, the region may be considered Attractive or Repulsive. The Image of a region may prove a very useful tool for planning purposes, since it doesn’t only give an early diagnosis of any possible changes, sometimes discontinuous, in the region’s pattern of development, but it also indicates the reasons for those changes. Hence, it may be used as the basis for designing appropriate measures to assist a region’s development. The concept of a region’s Image was firstly introduced by the author in 1979 and has been improved several times since then, so as to take into account any new elements related to the changing socioeconomic framework but also the changing needs and preferences of all the potential movers into a region. The objective of this paper is to present the concept of a region’s Image as initially defined, outline the major changes that took place and conclude with its presentation as it stands now.

Keywords:
Region’s Image, Regional Development, Regional Policy, Sustainable Development
1. INTRODUCTION

The growth or decline of a region depends on its power to “pull” and “retain” business activities but also the right blend of people to run them; this pulling power depends on what we call the Image of a region. At each point in time the region «sends out» its Image and depending on its impact on the people (both employers and employees) the region may be considered as Attractive or Repulsive. However, one may argue that since people «receiving» the Image of a region belong to various distinct groups (i.e. employers, professionals, unskilled workers, skilled workers etc.) and are sensitive to different factors, the impact of the region’s Image on the members of each particular group will be different. Whilst this is plausible, empirical evidence suggests that all groups of potential movers react similarly to a basic set of factors; more precisely, a set of minimum standards, largely common to all groups, must be satisfied if the region is to be considered as a potential choice by any of them. To reconcile these two views we refine the concept of a region’s Image by introducing the following two concepts Basic Image and Specific Image (Angelis, 1981).

The Basic Image of a given region measures the degree to which this region satisfies a set of basic criteria common for all movers. A region satisfying those criteria is considered, by all potential movers, as worth a closer examination and a potential final choice.

The Specific Image of a given region, as perceived by a particular group of potential movers, measures the degree to which movers belonging to that particular group, consider this region as their best final choice.

At this point it should be mentioned that the growth or decline of a region may be expressed both in absolute or relative terms. In the latter and most interesting case the development pattern of a given region is compared to that of a hypothetical region, which is referred to as the “typical” region and expresses, as far as possible, an average of the main areas of a similar type to that of the study. In this paper we shall be looking at the relative development patterns of a region. Hence, all the factors affecting its images (Basic and Specific) should be expressed in relative values as compared to the corresponding values of the “typical” region.

The concept of a region’s Basic and Specific Images have been firstly introduced in 1978 (Angelis, 1978) and has been improved several times since then, so as to take into account any new elements related to the changing socioeconomic framework but also the changing needs and preferences of all the potential movers into a region. The objective of this paper is to present the concept of a region’s Image as initially defined, outline the major changes that took place and conclude with its presentation as it stands now.
Following this brief introduction the paper has been organized as follows. Section 2 presents the concept of Basic Image as originally defined, as a function of economic and social factors. Section 3 modifies the Basic Image function, so as to include environmental factors as well. Section 4 focuses on one of the key factors affecting a region’s Basic Image, namely its accessibility to influence centers and discusses all the modifications on the way of its modeling and inclusion in the Basic Image function from its initial introduction to its present form. Section 5 introduces the concept of a region’s Specific Image, as a function of its Basic Image and a set of specific factors. Section 6 discusses ways of improving a region’s Image and focuses on the case of islands. Section 7 redefines a region’s Basic Image for the case of islands, so as to take into account all their special characteristics. Finally, Section 8 summarizes the conclusions and makes suggestions for further research.

2. THE BASIC IMAGE AS A FUNCTION OF ECONOMIC AND SOCIAL FACTORS

In most Northern American and Western European countries, mobility is largely a voluntary process. People and industries move in to or out of a given region on the basis of their perception of its relative advantages and disadvantages. Their mobility is, therefore, a function of a multitude of factors. Although Government intervention aims at a more balanced economic and social development, the control mechanisms available are mostly negative and therefore able to influence mobility but not direct it. Consequently, the vital part of any attempt to improve or sustain the attractiveness of a given region must be “the provision and maintenance of a framework in which voluntary mobility can flourish and this must inevitably be a task for general policy rather than direct measures on the mobility processes themselves” (Hunter and Reid, 1968). The Basic Image, as defined, could well be the basis of such a framework and the factors that influence it, the prime targets for improvement. The most important of those factors, as identified by empirical evidence (Cullingworth, 1969; Harris and Clausen, 1966; Hunter and Reid, 1968; Lutrell, 1962; Rhodes and Chan, 1971; Sant, 1975; Townroe, 1971, 1979), are: Accessibility to Centers of Influence, Land Availability, Financial Conditions, Housing Conditions, Environmental Conditions and Social Conditions.

The factors of the first group (Accessibility to Centers of Influence, Land Availability, Financial Conditions) properly quantified and scaled, define three respective multipliers, which in turn provide a measure of the region’s economic potential. This measure is referred to as Economic Indicator and it is defined as follows:
\[ EI = \sqrt[3]{LOCM \times LAVM \times FCM} \]

where
- \( EI \): Economic Indicator
- \( LOCM \): Location Multiplier
- \( LAVM \): Land Availability Multiplier
- \( FCM \): Financial Conditions Multiplier

Similarly, the factors of the second group (Housing Conditions, Environmental Conditions, Social Conditions) properly quantified and scaled, define three respective multipliers which in turn provide a measure of a region’s social potential. This measure is referred to as Social Indicator and it is defined as follows:

\[ SI = \sqrt[3]{HCM \times ECM \times SCM} \]

where
- \( SI \): Social Indicator
- \( HCM \): Housing Conditions Multiplier
- \( SCM \): Social Conditions Multiplier
- \( ECM \): Environmental Conditions Multiplier

All the above mentioned multipliers have been defined and discussed in full detail in some earlier papers (Angelis, 1981; Angelis, 1990; Angelis and Dimopoulou, 1991; Doumi, 2006; Bovolos et al, 2009a).

Having defined the two indicators, Economic (\( EI \)) and Social (\( SI \)), we can now go on to define the Basic Image (\( BI \)) as a function of them. Hence, \( BI = \varphi_3(EI, SI) \).

The expression of the Basic Image as a function of those two Indicators is not accidental; on the contrary, it is consistent with the concept of a region as a socio-economic unit. The main advantage of such an expression is that it may be used to underline, and eventually describe, the basic conflict that characterises the development of a region (Perloff and Wingo, 1971; Zolotas, 1981).

Furthermore, there seems to be evidence to suggest that the Basic Image function is non-linear and its graph discontinuous. To study this function, Catastrophe Theory has been employed, a general mathematical theory, which is particularly applicable in cases where continuous underlying forces result in discontinuous and divergent phenomena. The theory is derived from topology and classifies the ways in which discontinuities may occur in terms of a few archetypal forms called elementary catastrophes. Although the underlying mathematics are difficult, the elementary catastrophes themselves are relatively easy to
understand and can be used profitably even by non experts on the subject (Thom, 1975; Zeeman, 1973, 1977).

Table 2.1 summarizes the elementary catastrophes in the case where a process is expressed through one behavior variable depending on one up to four control variables. In the case of a process, for example, whose behavior depends on two control variables it is sufficient to know that a theorem exists giving the qualitative shape of a 3-dimensional surface which shows all possible ways in which a discontinuity in the behavior may occur. The two control variables are usually referred to as normal and splitting factor respectively and the three dimensional surface as the Cusp Catastrophe Surface.

<table>
<thead>
<tr>
<th>Number of Behavior Variables</th>
<th>Number of Control Variables</th>
<th>Type of Catastrophe</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>Fold</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>Cusp</td>
</tr>
<tr>
<td>1</td>
<td>3</td>
<td>Swallowtail</td>
</tr>
<tr>
<td>1</td>
<td>4</td>
<td>Butterfly</td>
</tr>
</tbody>
</table>

Returning to the present case, it is reminded that the Basic Image of a region has been defined as a function of two conflicting indicators. Hence, according to Catastrophe Theory, the value $BI = i$, of a region’s Basic Image, at each point in time, is given as a solution of the equation

$$i^3 - bi - a = 0$$

with

$$a = m(a - a_o) + (\beta - \beta_o)$$

$$b = (a - a_o) - m(\beta - \beta_o)$$

if $m \leq 1$ (i.e. $\theta \leq 45^\circ$) and

$$a = (a - a_o) + (1/m)(\beta - \beta_o)$$

$$b = (1/m)(a - a_o) - (\beta - \beta_o)$$

if $m > 1$ (i.e. $\theta > 45^\circ$)

Equation (2.1) is referred to as the Basic Image Equation and its graph is qualitatively equivalent to the Cusp Catastrophe Graph (Figure 2.1.).

The variables $\alpha$, $\beta$ express the values of the given region’s Industrial and Social Indicator respectively, while $\alpha_o$, $\beta_o$, express the values of those two Indicators for the “typical” region. The point $(\alpha_o, \beta_o)$ corresponds to the vertex of the cusp, while $m = \tan \theta$ represents the slope of the cusp axis and expresses the relative weights attached to each one of the two indicators in defining the Basic Image.
The methodology presented in this section has been applied for the calculation of the Basic Image of a number of British industrial cities (Angelis, 1978) and for the calculation of the Basic Image of the Greek prefectures (Angelis, 1990; Angelis and Dimopoulou, 1991; Virras, 1999; Doumi, 2006; Gaki, 2006).

The expression of a region's Basic Image as a function of two conflicting Indicators and the use of the Cusp Catastrophe to model it is, up to a certain point in time, in line with the overview presented in the previous section. Indeed, according to this overview, economic growth was the only concern of development until the early 1970's when social objectives gradually began to appear, as distinct from and as important as economic efficiency. However, by the early 1980's protection of the environment appeared and soon became the third objective of development. (Svedin, 1991; Munasinghe, 1993).

Coming back to our definition of an area's Basic Image we may note that environmental quality was one of the factors that have been considered as affecting the area's Social Indicator. However as environmental quality becomes increasingly important there is a growing need to isolate it and to treat it separately as a third indicator let's say Environmental Indicator (ENI) (Angelis et al, 1999; Bovlos et al, 2009a, 2009b; Mavri et al, 2009). The separation of the Environmental Indicator

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**Figure 2.1. The Cusp Catastrophe graph in the case of Basic Image**

The methodology presented in this section has been applied for the calculation of the Basic Image of a number of British industrial cities (Angelis, 1978) and for the calculation of the Basic Image of the Greek prefectures (Angelis, 1990; Angelis and Dimopoulou, 1991; Virras, 1999; Doumi, 2006; Gaki, 2006).

3. **THE BASIC IMAGE AS A FUNCTION OF ECONOMIC, SOCIAL AND ENVIRONMENTAL FACTORS**

The expression of a region's Basic Image as a function of two conflicting Indicators and the use of the Cusp Catastrophe to model it is, up to a certain point in time, in line with the overview presented in the previous section. Indeed, according to this overview, economic growth was the only concern of development until the early 1970's when social objectives gradually began to appear, as distinct from and as important as economic efficiency. However, by the early 1980's protection of the environment appeared and soon became the third objective of development. (Svedin, 1991; Munasinghe, 1993).

Coming back to our definition of an area's Basic Image we may note that environmental quality was one of the factors that have been considered as affecting the area's Social Indicator. However as environmental quality becomes increasingly important there is a growing need to isolate it and to treat it separately as a third indicator let's say Environmental Indicator (ENI) (Angelis et al, 1999; Bovlos et al, 2009a, 2009b; Mavri et al, 2009). The separation of the Environmental Indicator
from the Social one generates the following changes in the way of modeling an area's Basic Image.

- Introduction of a new control variable (Environmental Indicator).
- The variable \( m \), which was built into the Cusp model, in order to express the relative importance of the two Indicators, Economic (EI) and Social (SI), in defining an area's Basic Image, will now have to be treated as a fourth variable.

On the basis of all the above, the Basic Image (BI) of a given region will now be expressed as follows:

\[
BI = \varphi_m(EI, SI, ENI)
\]  

Furthermore, as we can see from Table 3.1 the Butterfly Catastrophe will be used to model it. Hence the value \( BI = i \) of an area’s Basic Image, at each point in time, is now given as a solution of an equation

\[
-a - bi - mi^2 - ci^3 + i^5 = 0
\]  

where

\[
a = (\alpha - \alpha_0), \quad b = (\beta - \beta_0), \quad c = (\gamma - \gamma_0).\]

Equation (3.2) is referred to as the Basic Image Equation and its graph is qualitatively equivalent to the Butterfly Catastrophe Graph (Figure 3.2).

The variables \( \alpha, \beta, \gamma \) express the values of the given region's Economic, Social and Environmental Indicator respectively, while \( \alpha_0, \beta_0, \gamma_0 \) express the values of those three Indicators for the "typical" region. Finally \( m = \tan \theta \) expresses the relative weights attached to each one of the two indicators, economic social and environmental, in defining the Basic Image.

The first two factors are called, as it has been mentioned already, the normal and splitting factor respectively. The third factor is referred to as the "bias" factor, because it tends to tilt the initial cusp pattern in one direction, or another. Finally, the fourth factor is called the "butterfly" factor because it can generate the middle sheet "pocket of compromise". Since the behaviour variable \( i \) depends on four factors, its graph will be 5 dimensional. Hence, we can approach it graphically only by looking at 3-dimensional cross sections of it obtained by keeping some of the control factors fixed. Two such views obtained in our case by holding the third factor (in this case \( m \) ) constant and allowing the fourth (\( ENI \) ) to take two different fixed values as shown in Figure 3.2.

The Butterfly model exhibits a wide range of behaviours similar to the cusp and yet, because of the additional control factors and its greater complexity, it can exhibit more complicated behaviour as well. In our particular case, the introduction of the third control factor, the
Environmental Indicator results into the separation of the catastrophe surface into three distinct layers, with the middle layer representing a compromise state between two behavioural extremes, namely attractive section and repulsive section respectively. In other words an area with high Economic Indicator and decreasing Social Indicator may remain in the attractive section, if the Environmental Indicator is high enough (Bovolos, 2006). This middle layer, which is also referred to as a “pocket of compromise”, appears for certain negative values of \( a \). The shape of this pocket is like a butterfly and gives the whole catastrophe its name.

![Figure 3.2 The Butterfly Catastrophe Graph](image)

The methodology presented in this section has been applied for the calculation of the Basic Image of the Greek prefectures (Bovolos, 2006; Bovolos et al 2009a, 2009b; Kondakis, 2009; Kondakis et al 2009) and for the classification on the European Countries (Mavri et al 2009).

4. CHANGES IN THE WAY OF MODELLING THE EFFECT OF A REGION’S LOCATION ON ITS BASIC IMAGE

As it has already been mentioned, the Basic Image of a region may be defined as a function of a multitude of factors, physical, economic and social. In this section the emphasis is placed on one of those factors, namely the region’s location, as expressed through the Location Multiplier (\( LOCM \)), which is considered, in many cases, as the key factor for its
Initially \( LOCM \) had been defined as a function of the size of a region’s neighbouring influence centres and the cost of transporting a unit between the region and those influence centres. Hence,

\[
LOCM_{ij} = g_1 \left( SI_j * TC_{ij} \right)
\]

where,

\( LOCM_i \) : Location Multiplier of region \( i \)

\( SI_j \) : Size Index of centre \( j \)

\( TC_{ij} \) : Cost of Transporting a unit quantity between region \( i \) and centre \( j \)

Defined in this way the Location Multiplier expresses the extra transportation cost involved in the case of islands but does not take into account the feeling of isolation and all its consequences. To take that into account, we redefine the Location Multiplier by introducing the Spatial Continuity Index \( SCI \), which expresses a region’s relative use of the available alternative transportation modes (Angelis and Slafkou, 1997; Gaki and Angelis, 2009). Hence,

\[
LOCM_i = g_2 \left( SI_j * TC_{ij} * SCI_i \right)
\]

where,

\( SCI_i \) : Spatial Continuity Index of region \( i \)

Every region may potentially use all four different transportation modes (road, rail, sea and air). A region which actually uses all four modes enjoys full spatial continuity whereas, a region that uses only some of them has a reduced spatial continuity. Using historical data we can get the percentages of use of each transportation mode for the whole country and then use them to calculate the Spatial Continuity Index for each region.

5. THE CONCEPT OF SPECIFIC IMAGE

Having defined a region’s Basic Image and having suggested ways of measuring it, we may now go on to define the region’s Specific Images for the various groups of potential movers. The concepts of Specific Images have been discussed in full detail in some previous papers (Angelis, 1990; Angelis and Dimopoulou, 1991). Summarizing the main findings we could say that the Specific Image, as perceived by a group of potential movers, may be expressed as a function of the region’s Basic Image and certain specific factors relevant to this particular group. The two main groups of
potential movers are industries and employees. Furthermore, if needed, industries may be classified into several subgroups i.e. new, mature and declining and the same goes for employees who may be subdivided into professionals, skilled workers and unskilled workers. However, for the purposes of this work, we will limit our analysis to the two basic groups, industries and employees.

5.1. Specific Image for Industries

Specific Image for Industries (SPIMI) is expressed, as shown below, as a function of four multipliers, corresponding to the region’s Basic Image and the three major factors affecting this Specific Image, i.e. Labor Availability, Labor Quality and Financial Incentives for Industries, i.e.

\[
SPIMI = \sqrt[4]{BIM \times LBAVM \times LBQLM \times FINIM}
\]

where

- \(BIM\) : Basic Image Multiplier
- \(LBAVM\) : Labor Availability Multiplier
- \(LBQLM\) : Labor Quality Multiplier
- \(FINBM\) : Financial Incentives for Industries Multiplier

All the above mentioned multipliers have been defined and discussed in full detail in some earlier papers (Angelis, 1981; Angelis, 1990).

5.2. Specific Image for Employees

Specific Image for Employees (SPIME) is expressed, as shown below, as a function of four multipliers, corresponding to the region’s Basic Image and the three major factors affecting this Specific Image, i.e. Job Availability, Job Prospects and Financial Incentives for Employees, i.e.

\[
SPIME = \sqrt[4]{BIM \times JBAVM \times JBPRM \times FINEM}
\]

where

- \(JMAVM\) : Job Availability Multiplier
- \(JBPRM\) : Job Prospects Multiplier
- \(FINEM\) : Financial Incentives for Employees Multiplier

All the above mentioned multipliers have been defined and discussed in full detail in some earlier papers (Angelis, 1981; Angelis, 1990).
6. IMPROVING A REGION’S IMAGE

6.1. General Measures

As it can be seen from the definition of a region’s Specific Images, they may be improved, either by improving the region’s Basic Image, or by improving the specific factors appealing to the members of the various groups of movers.

Improvement of the Basic Image requires mainly infrastructure development. This is expected to generate an inflow of potential investors and eventually lead to an improvement of the specific factors and a self-sustained growth. Infrastructure development refers both to the economic and social aspect of the region. Regarding its social aspect the key points are improving housing stock quality, environmental conditions (air and water quality) and social conditions (health services, education services, social amenities). On the other hand, regarding the region’s economic aspect, the key issue is improving its accessibility. This may be achieved by improving transportation infrastructure (roads, ports, airports), transportation means (bigger and faster planes, faster and all-weather vessels) and transportation frequency (more arrivals/departures per day). Obviously, improving a region’s Basic Image is a slow and expensive method but, on the other hand, effective and with long-term effects.

Improvement of the specific factors is usually referring to the provision of financial incentives to the various groups of potential movers and particularly to the economic units. Its objective is to “push” investors into the region, hoping that the growth generated will eventually improve the region’s Basic Image. Evidence has shown that this solution is rather ineffective with short-term effects unless it is combined with a parallel substantial direct improvement of the region’s Basic Image.

Concluding this section we should underline that the key for every region’s development is the value of its Basic Image. By keeping the Basic Image of a region attractive, we make sure that, in spite of any possible fluctuations in the effectiveness of various specific factors and of unexpected external adversities, the region may retain its overall pulling power, renew its ageing industries, maintain the right blend of workforce and finally overcome any difficulties. As soon as the Basic Image becomes repulsive, however, the situation changes completely; the region enters a vicious circle of deprivation and decline, the breaking of which is extremely difficult. Piecemeal approaches, aiming at the breaking of this vicious circle, through the improvement of certain specific factors, may help temporarily but the only lasting solution to this problem is the restoration of the Basic Image.
6.2. FACING DISCONTINUITY

All the measures presented so far aim to assist regions in overcoming the development problems they face. Their applicability however, depends on the type of the region and in certain cases, such as islands, is extremely difficult. The key difference in those cases is the geographical discontinuity. There have been many attempts in trying to overcome this problem by “reducing” geographic discontinuity, through the improvement of transportation infrastructure and means, but the problem still remains. Since the measures aiming at “reducing” geographic discontinuity don’t seem to have the expected results, another set of measures aiming at “bypassing” geographic discontinuity may be introduced.

The first measure is to develop local business activities, not requiring extensive transportation of physical entities. The effectiveness of this measure, however, is questionable, as the potential markets for the local products are usually very limited.

A second measure is to develop business activities for which unfavourable location is not necessarily a handicap. Tourism is such an activity, where geographical discontinuity may not be a problem but on the contrary, in certain cases, a strong comparative advantage. The exclusive dependence of the region’s development, however, on a single activity, such as tourism, is vulnerable to external factors and therefore risky.

Finally, a third measure, quite different from the previous two, is to move from geographic discontinuity to communication continuity, by establishing a communication network where no discontinuity occurs. In this way the regions will be able to attract or develop economic activities involving the production of intangible goods (financial services, computer software) locally, which may then be communicated to customers located elsewhere. The rapid development of Information and Communication Technologies (ICT) over the last years has made the third solution possible. Several studies have shown the importance of ICT on economic, social and political level. ICT networks seem to be able to improve the access to remote regions and reduce the importance of physical distance and proximity. As a result, businesses would have much more freedom in selecting their location (Berben and Clements, 1995; De Castro and Jensen-Butler, 2003; van Greenhuizen, 2000; Gaki and Angelis, 2009). On the other hand, the lack of access to ICT can make existing inequalities even worse. Therefore, one could say that ICT have the ability, if not to eliminate geographical discontinuity, at least to reduce it drastically, by establishing communication continuity.
7. REDEFINING A REGION’S BASIC IMAGE

The previous section introduced a number of measures for improving the attractiveness of islands. In order to quantify the effectiveness of those measures, we have to modify the Basic Image function accordingly, so as to include all the variables, each of those measures aims at improving. For every proposed measure, those variables are combined into a respective multiplier, which enters the respective indicator’s function and hence the basic image function, substituting one of the existing multipliers (Gaki et al, 2009). The three modified Basic Image functions are presented below.

7.1. Development of Local Business

The development of local business, using local resources and selling their products to local markets, implies that the region has a number of characteristics which will facilitate such a development. The first set of characteristics (sources of raw materials, unique products) refers to the region’s raw materials availability and is expressed by the Natural Resources Multiplier \(NRM\). The second set of characteristics (population, \(GDP\) per capita) refers to the region’s market size and is expressed by the Market Size Multiplier \(MSM\).

These two multipliers may be combined into the Local Business Multiplier \(LBM\) which expresses the region’s potential for local development and may be defined as follows,

\[ LBM = NRM \times MSM \]

Going back to the Industrial Indicator, the Local Business Multiplier will substitute the Location Multiplier, which has no meaning in this case, as practically all goods are produced and consumed locally. Hence, the redefined Basic Image function will be as follows:

\[ BI = \phi \left( \frac{EI}{SI} \right) \]

where,

\[ EI = \sqrt[3]{LOCM \times LAVM \times FCM}, \text{ while } SI \text{ remains unchanged.} \]

7.2. Tourism as a driving force for development

The use of tourism as a driving force for a region’s development implies that the region has a number of characteristics which will facilitate such a development (Doumi et al, 2009). The first set of characteristics (natural, built, cultural and social attractions) refers to the region’s natural and man-made attractions and is expressed by the Attractions and Environment Multiplier \(AEM\). The second set of characteristics (facilities and services such as accommodation, restaurants, bars, banks and transportation) refers to the region’s existing tourism infrastructure and is
expressed by the Facilities and Services Multiplier \( (FSM) \). Finally, the third set of characteristics (number of airports and ports, daily carrying capacity of all the means of transport available) refers to the region’s accessibility infrastructure and is expressed by the Accessibility Multiplier \( (ACM) \).

These three multipliers may be combined into the Tourism Development Multiplier \( (TDM) \) which expresses the region’s potential for tourism development and may be defined as follows,

\[
TDM = AEM \times FSM \times ACM
\]

Going back to the Industrial Indicator, Tourism Development Multiplier will substitute Location Multiplier, which has limited effect in this case and in any way is a part of the \( TDM \). Hence, the redefined Basic Image function will be as follows:

\[
BI = \varphi (EI, SI)
\]

where,

\[
EI = \sqrt{TDM \times LAVM \times FCM}, \text{ while } SI \text{ remains unchanged.}
\]

### 7.3. Establishing Communication Continuity

Communication Continuity, which will assist a region to overcome its geographical discontinuity, implies that the region has a number of characteristics which will allow it to take full advantage of the ICT capabilities and the benefits offered, thus enhancing its development (Alexopoulos et al, 2009; Gaki et al, 2009). The first set of characteristics (Broadband Penetration and Affordability, Mobile Phone, Internet and PC Penetration) refers to the connectivity and technology component of Communication Continuity and it is expressed by the Connectivity and Technology Infrastructure Multiplier \( (CTIM) \). The second set of characteristics refers to the business environment component and is expressed by the Business Environment Multiplier \( (BEM) \). The third set of characteristics (level of education and literacy, level of internet literacy, degree of innovation and entrepreneurship, centers of innovation and knowledge diffusion) refers to the social and cultural environment component and is expressed by the Social and Cultural Environment Multiplier \( (SCEM) \). The fourth set of characteristics (government spending on ICT and local digital strategy) refers to the government policy and vision component and is expressed by the Government Policy and Vision Multiplier \( (GPVM) \). Finally, the fifth set of characteristics (level of e-business and of e-commerce development and availability of e-Public Services) refers to the consumer and business adoption component and is expressed by the Consumer and Business Adoption Multiplier \( (CBAM) \).
These five multipliers may be combined into the Communication Multiplier \((COMM)\) which expresses the region’s potential communication continuity and may be defined as follows,

\[
COMM = CTIM \times BEM \times SCEM \times GPVM \times CBAM
\]

Going back to the Economic Indicator, Location Multiplier will be substituted by the Location and Communication Multiplier \((LOCOM)\). This is a weighted average of the region’s Location Multiplier \((LOCM)\) (weight 70%) and the new Communication Multiplier \((COMM)\) (weight 30%) which is defined above. Hence, the redefined Basic Image function will be as follows:

\[
BI = q_1(EI, SI)
\]

where,

\[
EI = \sqrt[3]{COMM \times LAVM \times FCM}
\]

while \(SI\) remains unchanged.

Having defined the three modified Basic Image functions, we can proceed as follows. In case the value of a region’s Basic Image is low and further analysis shows that this is due to spatial discontinuity, the three modified Basic Image functions are introduced and their values are calculated for the given region. If the value of one of those is clearly the higher among the three, the respective course of action is chosen, as the best option for the region’s development. On the other hand, if the values of all three functions are comparable, the option, or the combination of options, to be chosen would depend on the prevailing regional policy.

8. CONCLUSIONS AND SUGGESTIONS FOR FURTHER RESEARCH

A region’s development depends on its power to attract business activities but also the right blend of people to run them. This pulling power depends on what we call the Image of a region. At each point in time, the region “sends out” its Image and depending on its impact on the people, both employers and employees, the region may be considered Attractive or Repulsive. The concept of a region’s Image was firstly introduced by the author in 1978 and has been improved several times since then, so as to take into account any new elements related to the changing socioeconomic framework but also the changing needs and preferences of all the potential movers into a region. This paper introduced the concept of a region’s Image as initially defined, outlined the major changes that took place over the years and concluded with its presentation as it stands now.

The Image of a region may prove a very useful tool for planning purposes, since it doesn’t only give an early diagnosis of any possible changes, sometimes discontinuous, in the region’s pattern of development, but it also indicates the reasons for those changes. Hence, it may be used as
the basis for designing appropriate measures to assist a region’s development.

A first area of further research would be to elaborate on the economic, social and environmental factors affecting a region’s Image and the form of the Basic Image function. A second area of further research would be to use a region’s Basic Image as the basis for drawing alternative paths for the region’s development and select the optimum one (Kondakis, 2009; Kondakis et al, 2009).

REFERENCES


A model to investigate the critical success factors of the acceptance of online education

Vasileios P. Aggelidis, Polychronis G. Aggelidis

Innovative teaching methods: music, movies, and podcasts to augment students’ learning of quantitative subjects (ABSTRACT ONLY)

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The mutual learning program: an indispensable process for policy transferability

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A model to investigate the critical success factors for the acceptance of on line education

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Abstract:  
The use of Internet, as an instructional tool in higher education, is rapidly increased worldwide. This trend is also visible in Greece, with several higher education institutions attempting to use e-class to support their learning activities. There are plenty of factors that need to be considered while developing or implementing a university curriculum which provides e-class based courses. However, an important aspect of concern for both educators and researchers is the students’ acceptance of on line education. This paper is intended firstly to specify on line education’s critical success factors (CSFs) as perceived by university students and afterwards to investigate the relationships among these factors, proposing a new causal model. In line with the literature, 4 categories of critical success factors were used namely, instructor characteristics, student characteristics, information technology, and university support. Each category included several measures. Confirmatory factor modeling approach is used to assess the criticality of the measures included in each CSF category and structural equation modeling technique to evaluate the causal model.

Keywords:  
On line education, Acceptance of on line education, Critical success factors, Distance education, structural equation modelling
1. Introduction

The tremendous evolution in Information Technology (IT), in combination with the new developments in learning science, provides opportunities to create well-designed, learner-centered, meaningful, distributed and facilitated on line education environments (Khan, 2005).

On line education can be considered as the delivery of course content through electronic media, such as Internet, Intranets, Extranets, satellite broadcast, audio/video tape, interactive TV, and CD-ROM (Urdan and Weggen, 2000).

On line education can be synchronous (real-time) or asynchronous (flex-time). Synchronous on line education includes technology such as video conferencing and electronic white boards (Romiszowski, 2004) and requires students to be present at the time of content delivery. Asynchronous on line education is a method with standard instruction and tutorials that allow students to work through their personal computers at their own pace and at their own time. Most of the courses available on the Internet are based on this asynchronous model (Greenagel, 2002). Students can participate in on line education from distributed locations, as in distance learning, or from the same place, such as using a group support system in a classroom, to work on something (e.g. an assignment) (Gunasekaran et al., 2002).

On line education applications also differ in the levels of collaboration. Some courses are entirely independent and individual, while others use some elements of group learning such as discussion forums or chat rooms. The mode of course delivery can be entirely electronic (with or without an instructor) or it can be a more blended approach being a combination of electronic and classroom delivery to varying extents. Many current on line education offerings follow the latter mode, taking advantage of the benefits of various types of delivery (Jack and Curt, 2001).

On line education seems capable to become the new learning paradigm. It is estimated that the on line education market has a growth rate of up to 35% (Sun P-C et al., 2008). On line education has some synonym words such as Web-Based Learning (WBL), Internet-Based Training (IBT), Advanced Distributed Learning (ADL), Web-Based Instruction (WBI), Online Learning (OL) and Open/Flexible Learning (OFL) (Khan, 2001). The benefits of such systems cannot be realized if learners do not accept or use the system in an appropriate manner (Lin H-F. et al., 2007; Pavlou P., 2003).

On line education method exists for many years and is one of the most important recent developments in the Information Systems Industry (Wang, 2003). According to Carr and Carr (2000), Jung (2000) and Salmon (2000), quality of on line education is the contextualized
experience of learners, and evidence of learning outcomes. However, the quality and design of on line education courses, sometimes is just an 
“effort to simply get something up and running” in response to pressing consumer demands (Dick, 1996). Many educators and researchers are worried about the lack of evaluation of the studies of on line education programs (Arbaugh, 2000; Howell et al., 2004; Robinson, 2001). McGorry (2003) adds, “Although the number of courses being delivered via the Internet is increasing rapidly, our knowledge of what makes these courses effective learning experiences is limited”. In this wide range of activities, the levels of awareness and concern for the quality of the activities have been increased in order to review performance and to demonstrate successful results. The quality of on line education is often approached as the quality of the content or the resources, but, in reality, it must be considered as the quality of the decisions and behaviors of learning and teaching practitioners and participants.

Finally, there are some special characteristics in on line education that need to be explored. These are the Critical Success Factors that make an on line education system to succeed, to have the desirable quality and generally to do the job that it is made for. A great variety of factors that can influence the success of on line education environments is known from the literature. Past researches showed that a number of factors such as students’ and instructors’ characteristics (Hong et al., 2003; Ndubisi, 2004; Poon et al., 2004), technology support and system (Poon et al., 2004), university support (Passmore, 2000; Latifah & Ramli, 2005), course content and knowledge management (Selim, 2005; Rosenberg, 2001), and interactive applications (MacDonald, 2001), can influence learners’ acceptance of on line education a lot. If the on line education system is successful, its acceptance from the students will be more possible.

The objective of this study is to specify on line education’s critical success factors (CSFs) as perceived by university students and afterwards to investigate the relationships among these factors, proposing a new causal model.

2. Literature review

Many authors attempted to explore the factors that contribute to the success of distance education courses, based on literature sources or findings of research.

During a survey conducted on the postgraduate program in Information Management, Van Brakel (1999) presented what a successful on line education course needs, and how its implementation to the specific program will be done. One of the most critical success factors was the fact that the students came from quite different working environments and so they had the chance to interact with different cultures and ideas. Levy
(1999) tried to give definition to six factors that an institution (university) needs to consider during the design of online education programs in higher education. These six factors were: vision and plans, curriculum, staff training and support, students’ services, training and support, copyright and intellectual property and change in organizational structure. The time the institution needs to create an efficient design for all areas of online education, will help the institution in using its limited resources and funds effectively, efficiently and wisely.

Volery and Lord (2000) paper presents the results of a survey that took place at an Australian university, amongst students who participated in an online education management course. They identified three critical success factors which are the technology, the instructor and the previous use of the technology from a student’s perspective. They also report that the instructor will continue to be very important in online education, becoming a learning catalyst and knowledge navigator. To be more specific, the instructor can guide the students so they will be able to find their own learning and that procedure is critical. Papp (2000) in his study about online education critical success factors, named intellectual property, suitability of the course for online education environment, building the online education course, online education course content, online education course maintenance, online education platform, and measuring the success of an online education course. He also advised the study of these critical factors to be both isolated and combined to determine which of them play important role and affect online education success.

Alexander (2001) presented a more general aspect about the design, the growth and the execution of online education systems in universities. This aspect assumes that online education is successful when it is a combination of the student’s experience of learning, the teachers’ strategies, planning and thinking, and the teaching/learning context. Especially for online education courses, the development of the staff focuses on the level of technological delivery strategies, when other issues, such as the instructors’ conception of learning, have a major influence on the planning of courses, development of teaching strategies and the level of students’ learning. Sigala (2001) tried to discover the critical success factors that affect the effectiveness of the development, the design and the implementation of online education environments. In her paper, she first analyzed the theoretical background of online education and then referred to several potential factors that can influence its effectiveness. She found three categories: technology factors, characteristics of instructor and characteristics of learners (students). The importance of these factors was tested by gathering data from students participating in an online education environment. Soong et al. (2001) pointed out as the main critical success
factors (CSFs) of on line education the following: human factors concerning the instructors (motivational skills, time and effort investment), technical competency of instructors and students, constructivist mindset of instructors and students, high level of collaboration, user-friendly and sufficiently supported technical infrastructure. Honey’s (2001) paper attempted to find out which factors can make teaching successful. The first factor refers to the effective use of technology from both the instructor and students. Secondly, the students must have basic knowledge of the use of computers and the learning process needs to be actively encouraged and supported. Honey believes that on line education has plenty of potential, and in combination with the fact that it is a welcome addition to a huge variety of learning opportunities; it can be developed a lot in the next years. Graf and Caines (2001) in “WebCT Exemplary Course Project” developed a scoring scale to evaluate online courses. They separated the criteria in two categories: academic rigor (includes items such as course objectives, assignments, student participation, use of technology, course content, and ancillary resources) and content robustness (refers to the degree in which the course content is available online, how it is structured, the use of images and graphics, the degree of interaction among students and with the lecturer, and the type and quality of student assessment). Oliver (2001) in “Assuring the Quality of Online Learning in Australian Higher Education” points out the major factors for the successful adoption and sustained use of on line education in Australian higher education. Some of these factors are: a) Teacher expertise in online teaching: teaching online, using technology in teaching, technology currency, teacher training. b) Student readiness to move online: technology skills, access to technology, technology literacy, self-regulated learning. c) Technology infrastructure: courseware delivery systems, hardware and software, service provision. d) Provision of content and learning resources: reusable learning objects. e) Instructional design: reusable learning designs.

Schrum and Hong (2002) attempted to categorize the dimensions of successful students of on line education, by examining the results of primary research, and combining them with the results of literature review. Their second step was to take some advices from expert on line education instructors, about these dimensions and propose strategies for more chances on success. These are the seven dimensions that identified: student expectations, students’ learning preferences, experience of technology use, study characteristics, work and family obligations, personal characteristics and habits. Also, the main strategies that were identified and proposed in order to succeed in on line education were: conferencing, subject variety, frequent interaction and participation. Hassan (2002) pointed out that on line education as a concept, as seen by the Malaysian Ministry of Education, includes systems that enable information gathering,
management, access and communication, in many types. The first step of on line education plan, for most Malaysian universities, is the sufficient infrastructure of information technology, so they will be able to offer an excellent on line education platform to students. This infrastructure for on line education has become one of the most important ways for universities to make students participate in their programs. Govindasamy (2002) attempted to present a pedagogical foundation as a condition for successful on line education implementation, pointing out seven on line education critical factors which are: institutional support, course development, teaching and learning, course structure, student support, evaluation and assessment, and faculty support.

Hong et al. (2003) investigated a web-based course at University Malaysia Sarawak and reported that more than half of their participants had high level of acceptance with the web-based course. The students who had high level of acceptance indicated that the web-based course was convenient and flexible. Nonetheless, some students faced difficulties with the web-based learning environment. They found the web-based course to be a new learning experience and felt that they needed more guidance and time, to adapt to the learning environment.

Meanwhile, Poon et al. (2004) studied web-based learning environments at several local universities in Malaysia and reported that their participants were not fully comfortable with e-learning. Likewise, Poon et al. (2004) posited one possible reason was that the students were unfamiliar with the e-learning medium. On the positive side, Hong et al. (2003) and Poon et al. (2004) reported that students generally agreed that e-learning helped in their studies.

Selim (2005) noted that on line education critical success factors (CSFs) into a university environment, can be gathered into four categories which are: instructor, student, information technology and university support. The instructional implementation of the Information Technology (IT) can reveal the effectiveness of on line education. Selim’s on line education critical success factors included control and attitude towards technology, teaching style, computer competency, interactive collaboration, on line education course content and design, ease of access, infrastructure and support. Friesen (2005) in his thesis “Critical success factors for quality web-supported learning” discussed eight critical success factors. He suggested the following categories and he also analyzed and categorized each of these factors to sub factors which specifically explain the feature of respected factor: a) Institutional factors (infrastructure, adequate resources for web-supported learning, etc.). b) Lecturer factors comprise (interaction with students, qualifications, etc.). c) Student factors (pace of learning, motivation, etc.). e) Instructional design factors cover (team work, rich learning resources, etc.). f) Pedagogical factors (provide a
Khan (2005) in e-learning Quick Checklist, identified various critical factors for successful on line education. He also classified them in eight categories: a) Institutional factors (Financial Readiness, Infrastructure Readiness, etc.). b) Management factors (Management Team, Managing Content Development Process, etc.). c) Technological factors (Hardware, Software, etc.). d) Pedagogical factors (Content Analysis, Ethical factors comprise Social and Political Influence, etc.). e) Interface Design factors (Page and Site Design, Resource Support, etc.). f) Evaluation factors (Evaluation of On line education, Evaluation of On line education Environment, etc.). He argues that the critical factors based on his studies are integrated and, according to previous researches, the most useful dimensions for an open, flexible and distributed learning environment.

3. Research Model

Based on the literature review, the proposed model about students’ acceptance of online education is presented in Figure 1. As illustrated, four constructs were proposed. Instructor characteristics, student characteristics, information technology, and university support. Students’ intention to use was measured by four indicators.

![Research model and hypotheses](image)

**Figure 1:** Research model and hypotheses

**Students’ characteristics:** There are plenty of characteristics which can affect the success of on line education and can be identified in the literature. Poon et al. (2004), Folorunso et al. (2006), Selim (2005) and Volery and Lord (2000) reported that some students’ characteristics such as their
satisfaction with time and place flexibility of the system, their involvement and participation, their cognitive engagement, their level of self-confidence, their technology self-efficacy, their initiative and motivation and their anxiety, could influence acceptance of on line education among students.

In order to determine “students’ characteristics” section were included 20 indicators (A2.1 A2.20). Indicators A2.1 and A2.2 measured the student’s motivation to use on line education. Indicators A2.3 – A2.7 measured the student’s technical competency. Indicators A2.8 – A2.14 were developed to measure the effectiveness of on line education’s course content, structure, and design from student perception. Finally, indicators A2.15 - A2.20 were developed to generally measure students’ attitudes and behaviors. The first 14 indicators were adopted from Selim (2005) and the rest from Lim et al. (2008). Indicators A2.1 – A2.7 were also previously used by Soong et al. (2001).

In our study “instructor’s characteristics” section includes 13 indicators (A1.1 - A1.13) which will investigate the characteristics of instructor. Indicators A1.1 – A1.7 were adopted from Selim (2005), and
were previously used by Volery and Lord (2000), to examine instructor’s attitude towards the technology, teaching style and control of the technology. Indicators A1.8 and A1.9 were adopted from Lim et al. (2008) to measure the availability of the instructor. Indicators A1.10 – A1.11 were adopted from Selim (2005) and were previously used by Volery and Lord (2000). Indicators A1.12 – A1.13 were adopted from Selim (2005) and were previously used by Soong et al. (2001). Indicators A1.10 – A1.13 will be used to check if the instructors are related to online education and e-class.

**Technology:** The infrastructure of technology and the technical support of online education system are contributing to the acceptance of online education, too. To earn online education acceptance, the technology and the online education system must be renewed and conserved continuously (Folorunso et al., 2006; Poon et al., 2004; Selim, 2005). The system must have minimal technical problem and supports various platforms and applications. According to Sanders Lopez and Nagelhout (1995), the reliability, quality and medium richness are crucial technological parts and need to be considered. Specifically, the network setup should provide both synchronous and asynchronous tasks and opportunities. Also, students should have easy access (remote access) and the network should be fast when exchanging documents. Trevitt (1995) notes how important the quality of the interface is. The related literature varies and includes many opinions-tendencies from highly artistic (Laurel, 1990) to highly technical (Blattner and Dannenberg, 1992). Reeves and Harmon (1993) tried to combine these two tendencies defining the following dimensions as essential in the user interface: ease of use, navigation, cognitive load, mapping, screen design, information presentation, aesthetics, and overall functionality. Daft and Lengel (1986) analyzed in medium richness theory that a rich medium allows for both synchronous and asynchronous communication and supports many teaching methods such as text, graphics, audio and video messages. A basic part of the medium richness has to do with interactivity. As McIntyre and Wolff (1998) said: “one of the powers of interactivity in a Web environment is the capability to engage by providing rapid, compelling interaction and feedback to students.’ Engagement is also empowered by problem-based presentation of educational material.

The “technology” section includes 13 indicators (A3.1 – A3.13). They will be used to measure the reliability, richness, consistency and effectiveness of the technology of university. The indicators were adopted from Selim (2005). Indicators A3.1 – A3.8 were previously used by Volery and Lord (2000) and measured the on campus ease of Internet access and browsing, browsing speed, course websites ease of use, user interface efficiency, student–student communication reliability and student–
instructor communication. Indicators A3.9 – A3.13 were developed to capture the effectiveness of the IT infrastructure and services available at D.U.TH. They will be used to measure the consistency of computers access using the same authentication, computer network reliability, and student information system efficiency.

**University (institutional) support:** Latifah and Ramli (2005) noted that to improve on line education adoption, institutional support should not be ignored. Better technology facilities, copyright system, accreditation system and human and technical support should be provided (Poon et al., 2004). Passmore (2000) believes that, students’ satisfaction and progress in on line education are affected by the facilities and infrastructures of technology and support the university offers. Well-designed course content is more possible to be accepted by the students (Gan, 1998; Parker, 1997). Also, it improves their access on information (Carlson & Zhao, 2004). According to Selim (2005) and Silong & Ibrahim (2002), the self-instructional materials or learning packages of the course website, would be good to include a variety of support services such as tutorials, links to additional learning materials available in other websites, multimedia presentation or animation and narration, instead of just text-based materials (Zhang et al., 2004). Rosenberg (2001) asserted that knowledge management improves positively the creativity and information sharing between students and instructors. Students are able to learn better with knowledge sharing among them and instructors and this would become a new learning mode in on line education (Poon et al., 2004).

The “university support” section was covered by 5 indicators (A4.1 – A4.5). They were adopted from Selim (2005) and used in order to investigate the effectiveness and efficiency of the university technical support, library services and computer labs reliability.

All indicators have a five-point Likert type scale of potential responses: totally agree, agree, not sure, disagree, and totally disagree. The students will be informed that all data will be anonymous and will be used to assess the acceptance of online education at D.U.TH.

**Hypotheses**

According to the research model (shown in Figure 1), instructor characteristics, student characteristics, support and technology are able to predict students’ acceptance of online education and their intention to use it. Therefore, the following hypotheses are proposed:

H1: Technology will positively affect Instructor’s Characteristics.

H2: Technology will positively affect Student’s Characteristics.

H3: Technology will have a positive direct effect on Intension to Use.
H4: Technology will positively affect Institutional Support.

H5: Institutional Support will positively affect Instructor’s Characteristics.

H6: Institutional Support will positively affect Student’s Characteristics.

H7: Institutional Support will have a positive direct effect on Intension to Use.

H8: Instructor Characteristics will have a positive direct effect on Intension to Use.

H9: Student Characteristics will have a positive direct effect on Intension to Use.

4. Conclusions and Future work

On line education has been and will be adopted by many higher education institutions. Consequently, several adoption-related critical factors must be carefully evaluated before, during, and after any adoption. This paper, in line with the literature, specified four on line education critical success factor (CSF) categories that can assist universities and instructors to efficient and effective adoption on line education technologies, and proposes a new conceptual model to investigate the relationships between the factors and students intension to use.

For future work, the criticality level of each CSF must be evaluated and causal model must be tested. There is a need to expand in this research, to develop a causal structural equation model that includes more constructs. Another future expansion is to check the validity of the causal research model in different countries. In conclusion, this study specified the critical factors affecting on line education adoption by universities from students’ perspective.

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Innovative teaching methods: music, movies, and podcasts to augment students’ learning of quantitative subjects

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Abstract (only):
Over the last few years, the use of online teaching supplements in the traditional classroom settings has increased dramatically, and so has the number of stand-alone online classes offered by traditional teaching institutions. The rise of online learning, up to now, seems to have been demand driven. The evolution of purely face-to-face teaching into a hybrid of on- and offline instruction has been favored by most end-users—be it traditional university students who are increasingly internet savvy, or adult learners in search of further learning opportunities while employed, most likely full time.
It is one goal of the current study to show the use of online technology to improved learning, increased access (students from various geographic locations), increased quality (content, teaching and learning experience from students’ and instructors’ perspective) and/or reduced costs (operation costs of online vs. brick and mortar universities). The second part of this study fast-forwards to the future of teaching: the use of most innovative multimedia tools in sprucing up this once-boring subject. We will demonstrate the innovative teaching methods we have successfully used in enhancing the learning experiences of our traditional classes, including standard platforms such as Blackboard, emerging standards such as Aplia, and groundbreaking tools and methods such as iPods and Podcasting.
Finally, and very importantly, we present multimedia projects created by students in some of our economics classes to further signify that indeed “learning gets personal” with liberal use of the technology.

**Keywords:**
Innovative Teaching; Podcasts; economics; learning outcome; Teaching Method; Online Learning
A Systemic Approach for a Course Management System:
Adopting social constructionism as an educational approach

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Abstract:  
Internet technology has brought a new era in distance learning educational process. In this paper we present how computer aided learning benefits from the use of content management systems (CMSs). We present a CMS not just as a suite of software tools and applications but we consider it as a vehicle that helps both teachers and students to focus in the learning process itself and become dynamic part of it themselves.  
A CMS can be resided in a server and can be accessed through internet by many clients that run far way. On the one hand the access can be asynchronous, time independent and the clients can be assigned different roles (teachers or students). On the other hand access can be simultaneous, real time among peers. It can act as an online service only or supplements a face to face lesson.  
A variety of software tools facilitates the functions of a CMS. FTP helps the uploading of material and information sharing. Chat helps real time communication whereas forums provide a means of asynchronous communication. Quizzes form a grading tool that can give results to students instantaneously. Other tools are responsible to keep track of student assignments, or to keep track of students’ performance in a course.  
Nowadays not only more and more students are technically capable of using computers and internet but a lot of teachers incorporate information technology products in their work as well. Moreover CMSs are more mature than they were in the past.  
Use of CMSs opens new possibilities in learning process. Material can be disseminated with virtually no cost. It can also change easily so that to be constantly updated. It opens new means of communication since students can freely pose questions in forums. Their peers can also benefit since both questions
and answers remain in forums for as much time as it is needed. It is not needed for students to be in the same place physically in order to cooperate. Instead of it they can exchange emails or communicate interactively. There is no need to change their way of life to attend a course they can study from the place they want the time they want. Administration of students becomes easier. A teacher can have a clear view of his or her students. Questions like “what the students ask for”, “what their marks are”, “how they are doing in comparison to previous years students” can be easily tackled.

The result is economies of scale in time and cost saving. On the other hand the physical presence of a teacher cannot be replaced by a CMS. Actually best results are achieved when blended learning methods are adopted. We argue that a CMS should allow team working reflecting the social dimension of a learning process. Moreover not only students learn using a CMS but also teachers learn from the feedback they get from their students. This way a CMS becomes a dynamic and open, self adapting system.

**Keywords:**
Context management system, learning process, dynamic systems.

### 1. INTRODUCTION

Learning was and is highly affected by advances in educational technology. 19th century was overwhelmed by technological achievements that brought several advances in educational technology. It is worth to mention pictures, maps, diagrams, photos, radio, television, video and recently the use of internet in educational process. In the beginning emphasis was put in combining audio and visual information. After World War II the focus was on education through communication environments. Later educational technology was related with concepts like “product”, “process”, “approach” etc. In recent years educational technology is oriented towards constructionism. Constructionism considers that students interact with open educational environments and take part in the construction of knowledge. Moreover new educational practices and methodologies are emerged in parallel with advances in educational technology. E-learning [1] is considered a major challenge that uses information technology as a vehicle offering education in a new way. E-learning is supported by factors like:

- Increasing variety of digital educational means,
- Global social and financial trends,
- Individual characteristics of students and their interaction with the presentation means of educational material,
- Differences in the way every individual conceives and process information [2].

The term e-learning includes technologies like internet, multimedia, hypermedia, blogs, wikis, animation, email, chat, and software for the
administration of the teaching process itself. It can be considered as a new flexible way of learning. The following table summarizes a brief comparison between traditional learning and e-learning [4].

<table>
<thead>
<tr>
<th>Sector</th>
<th>Traditional learning</th>
<th>e-Learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge distribution</td>
<td>Decided beforehand by the teacher</td>
<td>Student decides for educational material that fits his needs</td>
</tr>
<tr>
<td>Reciprocation</td>
<td>Presupposes the needs of the audience</td>
<td>Meets the need of the audience</td>
</tr>
<tr>
<td>Advance</td>
<td>Linear. The advance of knowledge is predefined.</td>
<td>Non linear. It allows direct access to every part of knowledge.</td>
</tr>
<tr>
<td>Progress</td>
<td>Concrete. It offers specific self-sufficient parts of knowledge</td>
<td>Continuous. Offer of knowledge does not stop</td>
</tr>
<tr>
<td>Authority</td>
<td>Central. Teacher is the only authority</td>
<td>Distributed. Teacher and students decide jointly.</td>
</tr>
<tr>
<td>Individualization</td>
<td>Offers the same knowledge massively to all audience.</td>
<td>Designed to meet the needs of each individual.</td>
</tr>
<tr>
<td>Adaptability</td>
<td>Static. The content is not updated regularly.</td>
<td>Dynamic. The content can change according to the students needs.</td>
</tr>
</tbody>
</table>

Although the previous table is in favor of e-learning there are drawbacks concerning e-learning. We can mention least but not last that:

- Students and teachers should have access to computers and high speed networks.
- Students and teachers should be familiar with software and hardware they use.
- Students are usually isolated from other students and teachers.

An e-learning system consists of several components that are material, teachers, students and software tools. These elements are combined together and there is close interaction among them. A course management system (CMS), alternatively called learning management system (LMS) or virtual learning environment, is software that is used in the design, implementation and overall support of e-learning systems.
In this paper we argue that effective learning is achieved if teachers, students and educational material interact with content management systems following a systemic approach.

2. CHARACTERISTICS OF COURSE MANAGEMENT SYSTEMS

In this section we describe common and desirable characteristics of CMSs. We also refer to notable CMSs that are currently used by various educational institutions.

A course management system facilitates the interaction among teachers, students and learning objects, that is educational material. It helps teachers to create and manage educational material. It gives students the ability to use educational material and to communicate directly or indirectly with other students or with teachers. Moreover they support the development and organization of educational material according to standards. SCORM (Sharable Content Object Reference Model) and IMS content packaging have been emerged as a framework of specifications and rules that concern the development and distribution of learning content. Most modern CMSs support either or both of them.

A CMS should support not only many different users but also different roles for them. The main users of a CMS are teachers and students, not to mention system administrators or any technical staff. Teachers can use the system with a variety of ways according to their role in course e.g. a teacher can use the system as a tutor and another teacher as an author of learning material. Even though these roles are discrete it is possible the same person to be assigned more than one role. Different
roles imply different privileges for a user e.g. an author should have editing privileges but a tutor may have only monitor privileges.

A CMS should offer functions of uploading managing and sharing learning materials. Most CMSs provide tools to easily publish content. The usual way to publish content in web is to use an HTML editor and then send documents to a server via FTP. CMSs make this process quite easy since they usually offer a web form to store teachers’ syllabus on the server. Instructors are free to upload their syllabus, lecture notes, reading assignments, and articles for students to access whenever they want. Instructors with administrating and authoring privileges can not only create or delete learning objects but also organize their structure, store them in specific locations, change their format. They can also create classes, add lessons, add students.

Communication is vital for a CMS. Forums, chats and email are usual forms of communication that a CMS supports. They provide a means of communication outside of classroom meetings. Forums provide asynchronous communication. They give students more time to generate their responses and can lead to thoughtful discussions. Forums can be thought as online message boards where teachers and students can post messages to each other while easily keeping track of individual conversations. Chats, on the other hand provide a means of synchronous, real time communication. They give a way to quickly, easily and inexpensively communicate with remote students. They can be used for discussions between groups of students or even between teachers. Email is an easy way of exchanging messages, notifications or even digital files that addresses either to a broad audience or can be personalized to specific individuals.

Feedback on performance is a critical part of a learning environment, and assessment is one of the most important activities in education. Tests are integral part of any CMS. They consist of various types of online quizzes that can be graded instantaneously. They are a great tool for giving students rapid feedback on their performance and for gauging their comprehension of materials. Moreover a well-designed test, can give teacher valuable information about students’ misconceptions.

Traditionally, assignments are useful tools that teachers can use in many creative ways to collect more authentic responses from their students than it is possible with a quiz. Online assignment submissions are an easy way to track and grade student assignments. In addition to easier grading of student assignments research indicates that using an online environment for student peer reviews increases student motivation and performance. CMSs are excellent tools for gathering and reviewing assignments.

Grades can be considered as a necessary evil in modern education[]. They serve as yard sticks for measuring students’ achievements in the
process of learning a subject. Grades can function as both carrot and stick for motivating students. They are the primary measure of success or failure in a course. Tracking and calculating grades are serious and tedious tasks. An online gradebook offered by a CMS can give students up-to-date information about their performances in a course. They also comply with privacy rules that prohibit posting grades with personal identifiers in public places. CMS gradebooks can allow students to see only their own grades, and not another student’s grades. They also help teachers to statistically process and analyze grades in order to extract valuable results.

CMSs offer new tools like wikis and blogs that promote closer communication and collaboration among students and allow them to take a more active part in the learning process than in the past. A wiki is a collection of collaboratively authored web pages. A wiki starts with one front page. Students can edit the page or add more pages to the wiki by creating links to new pages that don’t exist yet. Old versions of each page are not lost but they can be viewed by checking the page history. The people that are involved in authoring are given special privileges for doing so. Logging of ideas, opinions and online discussions is a relative new form of communication. It is expressed with the tools that are called blogs. The word “blog” is a contraction of “web log.” Nowadays millions of people around the world use blogs for self-expression and communicating with family and friends. A blog is usually organized as a chronological series of postings. Only one central author usually exists for each blog but multiple groups of people can join a blog and contribute in the discussions. Blogs are growing in importance around the world. A “blogger” can be almost everyone who wants to publicly express his views. Blogs are currently incorporated in CMSs and open new channels of communication inside the academic community of educational institutions.

A CMS should offer tools for conveying online surveys. Getting feedback from students about the nature of a course is useful. It helps in applying quality control measures that gradually improve the quality of education offered.

CMSs are offered either as commercial software or as open source software. Open source CMSs offer their source code for free. It is possible to read, redistribute it or even to rewrite and adjust it to meet the special needs of users. Software license of open source CMS is technologically neutral, does not depends on other software, all distributions offer to all users the same rights, it is free of cost, there is no constraint concerning individuals or specific groups of individuals, in case that modifications of the original code take place the modified code has to be free for redistribution following the same license rules as the original one. Currently there are more than 190 open source software packets that focus on education itself. Proprietary software on the other hand belongs to a
party and its distribution subjects to the rules that this party imposes. Commercial CMSs are sold as products separated from their source code that produces them.

Among the most notable CMS we can mention the following [5]:

Claroline [6] “is considered a collaborative e-Learning and e-Working platform (Content Management System) released under Open Source license (GPL). It is used by hundreds of organizations worldwide (universities, schools, companies, associations) that create and administer courses and collaboration spaces through the web. The platform is used in more than 80 countries and is available in more than 30 languages.”

Connections Academy [7] “in the United States is a free public school that students attend from home. It combines aspects of homeschooling with those of traditional public education. Connections Academy is a virtual educational program (also known as virtual school or cyber school) serving students in grades K-12. Certified teachers work with students and a parent or other adult, referred to as a "Learning Coach," to deliver instruction. Learning is done both asynchronously and synchronously (i.e., independent work and real-time instruction online). The curriculum is a compilation of texts, materials and on-line resources drawn from a range of publishers and educational content providers, along with lesson plans and instruction developed by in-house curriculum specialists.”

Digication [8] “is one of several "managed learning environments" or "learning management systems" which are sold to colleges and other institutions for the development and use of e-learning products. The web-based software allows faculties to create and manage course content, as well as share and view student contributions. Digication was first launched in 2004 at Rhode Island School of Design (RISD) for the sharing of rich media works by the students.”

Dokeos [9] “is a company dedicated to open source Learning Management Systems. Its main product is a SCORM compliant open source learning suite used by multinational companies, federal administrations and universities in some 60 countries for a total of 1,297,000 users.

Dokeos operates on a professional open-source business model based on open code, community development, professional consulting, quality-assurance services, and subscription-based customer support.”

The FlexTraining learning management system [10] “was first introduced in 1998, and is marketed and developed by National Training Systems Inc., based in Tampa Florida.

FlexTraining is currently in use at several hundred corporate, non-profit, and government organizations, with an estimated user base of over a million online learners. The purpose of the FlexTraining product is to bring to the small and mid-market customers a richer feature set than had been
available elsewhere, and to provide all required tools for online training in one package. Secure access, top-down authorization, and a built-in address book functions support internal and external communication capabilities. An array of point-and-click setup screens allow administrators to select features that are tailored to meet the needs of online learners, without programming.

In 2004, FlexTraining introduced its Login & Go service, which provides a complete learning environment without requiring a customer to purchase software. This delivery model, often called a "SaaS" (software as a service) program, is provided at various fee levels, depending on the number of online learners to be trained.”

LAMS [11], “the Learning Activity Management System is an open source Learning Design system for designing, managing and delivering online collaborative learning activities. It provides teachers with an intuitive visual authoring environment for creating sequences of learning activities. These activities can include a range of individual tasks, small group work and whole class activities based on both content and collaboration. LAMS is "inspired" by the concept and principles of IMS Learning Design.

LAMS is developed in collaboration with LAMS Foundation Ltd, LAMS International Pty Ltd, and the Macquarie E-learning Centre Of Excellence (MELCOE), all based in Sydney, Australia, in affiliation with Macquarie University.”

Moodle [12] “is a free and open source e-learning software platform, also known as a Course Management System, Learning Management System, or Virtual Learning Environment. It has a significant user base with 49,256 registered sites with 28,177,443 users in 2,571,855 courses.

Moodle is designed to help educators create online courses with opportunities for rich interaction. Its open source license and modular design means that people can develop additional functionality. Development is undertaken by a globally diffused network of commercial and non-commercial users, streamlined by the Moodle company based in Perth, Western Australia.”

Sakai [13] “is a community of academic institutions, commercial organizations and individuals who work together to develop a common Collaboration and Learning Environment (CLE). The Sakai CLE is a free, community source, educational software platform distributed under the Educational Community License (a type of open source license). The Sakai CLE is used for teaching, research and collaboration.

Sakai is a Java-based, service-oriented application suite that is designed to be scalable, reliable, interoperable and extensible. Version 1.0 was released in March 2005. Sakai is in production at over 150 institutions
and being piloted by over 100 more. A map showing many of these is available.”

SharePointLMS [14] “is a Learning Management System which is based on the Microsoft Office SharePoint Server 2007 & WSS3.0 platform. SharePointLMS is an .Net-based application that is designed to be scalable, reliable, and secure. SharePointLMS is SCORM 1.2 and 2004 compliant and enables users to import courses either created using SCORM Rapid Elearning authoring tools or off the shelf acquired SCORM packages.”

Thinking Cap Campus [15] “is a Learning Management System that was released in January of 2003 by Agile.Net Inc. On May 24th, 2005 Campus received SCORM 2004 certification by ADL. (Advanced Distributed Learning)”

3. A SYSTEMIC APPROACH FOR A CMS

In this section we see a CMS as a central part of a system that links together students, teachers, and learning objects.

New generation students are more and more familiar with information technology. Some of them find quite natural communication through internet and web based interfaces. They want the get the latest information easily any time they go online.

More and more students need flexible educational schedules. They want schedules that meet their learning hours and also easy access to their course. Many want to access their online course from any place they are and any time they can devote to learning. They also want to communicate with their peers or with their teachers using the new tools that internet offers. They also need flexibility in answering quizzes and making assignments.

Students can be better prepared for face to face lessons. They can have material beforehand. They can have sent queries to teachers and get better prepared answers. The best ideas and questions from online forums can be brought to classes and discussed. Vice versa announcements or important topics that were focused in traditional classrooms can be uploaded and disseminated as online material allowing students that were not present in the meeting to get them.

Teachers also want to update material easily so to offer their students the latest information. They also want the maximum freedom in their work. They want to answer queries irrespectively of the place they are e.g. their office or their home, to get assignments easily, to assess their students avoiding tedious processes.

Moreover learning objects must not only easily be distributed among students but also to comply with standards that allow their reusability and
interoperability among software packages. They have to change easily and cost effectively. They can contain not only textual data but also multimedia material. Their structure can be not strictly linear but to it should allow branches and hyperlinks.

The above specifications lead to better courses.

CMSs [3] are very important tools in a technologically supported educational environment since they can meet the previously defined specifications but other educational activities should not be neglected. We mention other important factors such as:

- Active learning and the importance of feedback. CMSs support direct reaction and give high motivation to the students because they encourage active involvement of students in education and direct feedback to their actions.

- Authenticity. Authenticity and value of educational activities depend on a great extend on their relation to every day life activities. Technology helps to create educational environments that represent what happens in every day life (simulations, dynamic modeling systems and directed discovery systems).

- Teachers’ mediating role. Teachers mediate between new technologies and students. Teachers have to be informed and have to be familiar with new technologies in order to be able to change their teaching practices. Such a change demands redefinition of teachers’ role. Teachers have not only to transfer knowledge to students but their main role will be to support and teach students how to learn.

On the one hand learning as it is presented in this paper is something that involves groups of individuals. On the other hand the following clauses are clearly underlined. Every individual has his own needs and his own way of learning. Moreover every student has his own beliefs, experiences and way of life. Teaching can be independent of space and time. Teachers set educational targets and give guidance to students on how to achieve them. Feedback gives new meaning to learning objects that can be negotiated in terms of a shared culture of understanding. Knowledge is viewed as social process. We advocate that CMSs are tools that can cope with this perspective and can express from that point of view social constructionism.

4. CONCLUSIONS

In this paper we approached CMSs through a systemic approach. We presented common and desirable technological characteristics of CMS. We elaborated on the way CMSs support e-learning and new technological advances that affect learning process. We also mentioned notable CMSs
that are used allover the world. Educational needs from the side of students, teachers and learning material and how CMSs satisfy these needs was also discussed. We conclude that learning can benefit from adopting CMSs in a way that links interactively teachers, students and learning objects.

References
research of e-learning
The mutual learning program: an indispensable process for policy transferability

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Abstract:  
This paper provides an overview of an innovative and very successful program that makes public administrations in Europe aware of successful practices in labour market policies. The initial peer review programme – or the mutual learning programme as it is called today - examines the transferability of labour market policies which were successful at national level and which are considered as good practice, by organising structured discussions at a high level. The programme takes place through a set of meetings involving representatives of the countries developing the policies, of the countries interested in the policies, of the European Commission and of independent experts.

Keywords: evaluation, transferability of policies, employment, open method of coordination

1. Introduction

Ten years have passed since the 11th May 1999, when the first peer review of the European Employment Strategy took place in the Hague. It discussed the Dutch SPAK-measure in which employers were entitled to a reduction in taxation and social security contributions for any employees earning less than 115 per cent of the statutory minimum wage. From this first and very successful review it became evident that the reduction of non-wage costs was not an empty message of the European Employment guidelines but a realistic objective with important impact in employment creation. This measure eliminated about 10 per cent of the total non-wage cost and offered an important incentive for new recruitments.

Since that day, a large number of peer reviews on all aspect of Labour Market Policies have been held every year in the EU. The mutual learning programme that incorporates the peer reviews consolidates developments
in the Labour Market and acts as a central point for focused discussion on every detail of employment policy. It is widely recognised as the cornerstone of the European Employment Strategy, something like an expert network were everybody learns from other’s successes or failures. The utility of this programme has been recognised from the first review, and its format of organisation remains unchanged and effective for all those years. The program expanded in 2005 with a new name, the mutual learning programme, and now includes the peer reviews as well as thematic reviews and other activities. Moreover, many other European Institutions conduct regular reviews and in-depth examination of policies having as an objective the transfer of successful policies to other Member States.

This paper describes and assesses this innovative process that helps governments of the EU in embarking on specific initiatives and in implementing ideas in the field of active labour market policy that have been successfully put into practices elsewhere in the EU.

The paper first sets out the overall background for the development of new methods of governance in the field of employment policy. In a second step, the peer review process is explained in closer detail. Thirdly, the concrete application of the method is illustrated on the basis of a concrete example. Fourthly the new developments and the expansion of the use of the mutual learning programme are presented as a proof of the success of the initiative. The final section draws conclusions from a historical perspective.

2. The Development of the Peer Review Method: Background and Policy Context

Policy-making becomes more and more difficult both in its conception as well as in its implementation. More specifically, globalisation, rapid technological developments and the new focus on green policies are continuously changing the relationships between actors in policy-making. In this context, critical questions are raised as to whether government is out of touch with the citizens’ needs and whether public trust in governments is diminishing. (OECD, 2000)

Against this backdrop, new innovative practices in policy-making are now in high demand. This statement, which holds true for many policy areas, is of particular relevance in the field of employment policy. The main cause that leads to a debate about new methods dealing with employment in the 90s, was the recognition of some major defects of responses to previous crises. Thus improving and monitoring active labour market policies became a major concern both in national and European level. In addition to the fight against unemployment, European
governments and the general public are well aware of the increasing importance of spending on employment measures, of tight public budgets and of the need for more efficient public services. However, cultural and political differences between countries do not permit a clear-cut line on how to better respect the subsidiarity principle and to reconcile national and European competencies, particularly on how to better respect the subsidiarity principle and to reconcile national and European competencies, particularly regarding active labour market policies.

Such considerations created a new interest in finding European solutions through greater co-ordination and convergence of policies. The first step took place in the macro-economic field with the Maastricht Treaty, which has allowed the European economies to stabilise and converge and which led to the European Monetary Union (EMU) and the Euro. Employment is an essential ingredient of the macro-economic policy mix and a parallel action was therefore required.

During the Intergovernmental Conference on the EMU (1992), a debate took place on the advisability of including employment among the convergence criteria, which Member States would have to respect if they wanted to participate in the single currency. Most governments, keen to guard their prerogatives in the field of employment policy, rejected this idea. During the national debates in the run-up to the ratification of the Treaty on European Union, the absence of any reference to employment in the new Treaty came in for heavy criticism. It looked as if the European Union cared little about unemployment and jobs - at a time when the Member States were finding themselves compelled to make difficult social choices in order to reduce their deficits in preparation for the EMU.

The insertion in the Treaty of the provisions on employment was a response to a widely perceived gap in the Treaties. It can also be seen as a symbolic action to counter balance on the part of the Treaty devoted to economic and monetary policies, resulted in part from pressures by a number of Member States, such as France. The provisions on employment redress the balance by adding to the macroeconomic provisions a number of measures that meet European citizens' expectations with regards to the fight against unemployment. One of the key points of this new Title was that repercussions on employment had to be taken into account whilst adopting and implementing each Community policy and action.

However, in addressing the issue of employment, the EU did not start from scratch. From the '70s, employment was at the centre of the debate. The White Book on growth, competitiveness and employment in 1993 set the agenda under which a European coordinated approach on employment was developed.

Before the Treaty of Amsterdam, the development of employment and labour market policy at the European level was characterised as a traditional form of co-operation between governments similar to the OECD
or the ILO. From December 1994, successive European Councils set employment as the main priority for economic and social policy in the European Union and prepared the ground for an integrated strategy. While responsibility for employment policy was under the sovereign domain of the Member States, the role of the Commission was to promote co-operation between them at the European level by taking initiatives, reporting on employment trends and prospects and undertaking research and analytical work, without really having a legal base for supranational work firmly established by the Treaty. The Commission also promoted dissemination of information and assisted the Member States in their fight against unemployment and social exclusion, with Community funding provided mainly by the European Social Fund. Decisions by the Council required unanimity, a process which did not facilitate progress in the legislative field. Yet, at the policy level, there was progress in the European fight against unemployment: inspired by Jacques Delor’s White Book, the European Council at Essen in December 1994 agreed on a number of employment objectives which were to be called the Essen Strategy and which were reinforced by successive European Council conclusions and resolutions.

In June 1997 the European Council in Amsterdam agreed on a draft Treaty for the Union, which gave a new and considerably enhanced role to the EU co–ordination of employment policies. For the first time a separate chapter on Employment made employment an integral part of the Treaty obligations. In so doing the Community work towards developing a co-ordinated strategy for employment, encouraging co-operation between Member States. Moreover, the various actors must support actions in the field of employment through initiatives aimed at developing exchanges of information and best practice. This involves providing comparative analysis and advice as well as promoting innovative approaches and evaluation, in particular by the use of pilot projects, (see Articles 125 and 129 of the Amsterdam Treaty).

The Jobs Summit in Luxembourg in 1997 provided a further step in putting employment firmly at the top of the political agenda of the Union. In Luxembourg, the Heads of State and Government engaged in implementing the new Employment Title’s provisions on a voluntary basis, ahead of Treaty ratification. What this meant in concrete terms was a new strategy based on priorities, objectives and commitments.

That was the European Employment Strategy (EES) and it is important to see the policy context in which it is pursued. The EES is part of the overall economic and social policy of the Union, which consist of macroeconomic policy (in particular, the Broad Economic Policy Guidelines), reforms in product, services and capital markets (known as the Cardiff process) and structural reforms of employment systems and the
labour market (the Employment Guidelines, often referred as the Luxembourg process). Additionally there is a commitment to build a constructive dialogue between all the relevant actors responsible for monetary and fiscal policies, as well as structural policies in order to ensure that all, including the social partners, have the same understanding and vision of where Europe is heading. This last is known as the Macroeconomic Dialogue or the Cologne process. After some years of implementing these processes the Lisbon Strategy consolidated all the Guidelines in one stable set that is updated every two to four years.

The European Employment Strategy is based on principles that distinguish the Luxembourg open method of coordination from any previous attempt in the field of employment policy. First, it is consistent with subsidiarity, by establishing equilibrium between EU level co-ordination in the definition of common objectives and outcomes, and Member States responsibilities in this process of definition as well as for deciding the detailed content of policy measures. Secondly, it aims at achieving commonly agreed employment outcomes, where each Member State contributes to raising the average employment performance of the EU. This process is known as convergence which is completely different from harmonisation; the convergence goal became more concrete with the Lisbon Summit in March 2000, where full employment was adopted as a objective of the Union. The specific targets set were to raise male employment rate up to 70% and female employment rate up to 60% by 2010. The achievement of this goal is dependent upon country surveillance and an integrated policy approach, the European Employment Strategy.

The cornerstone of the provisions at EU level, the commonly agreed Employment Guidelines, were initially organised under four main "Pillars":

- Employability, to equip those without work for the labour market;
- Entrepreneurship, to support those who create jobs in generating economic activity;
- Adaptability, to help enterprises and the workforce keep the pace with change; and
- Equal opportunities, to facilitate women and men to assuming new roles and responsibilities in the workplace and in the home.

The Pillars were an important educational device in the monitoring of the developments in the labour market and remain so. However, they have created some fragmentation that does not correspond to the way that labour market policies are managed. Labour market policies are in practice highly interrelated and should be better seen as policy mix initiatives and less as isolated practices or concepts that belong only to one of the pillars. Certainly, these four Pillars shaped the 1998 National Action Plans (NAPs) on employment policy delivered by Member States and new NAPs are
submitted regularly focusing on how plans are being implemented, how political commitments are translated into budgetary and administrative commitments and any other new initiatives. An assessment of these plans is published subsequently in a report, prepared by the Commission jointly with the Council, known as the Joint Employment Report on Employment. In light of this report, the commonly agreed Guidelines are revised and delivered together with Recommendations by the Council (based on proposals by the Commission) for policy adjustments in each Member State.

The new employment policy framework created by the Amsterdam Treaty and the Luxemburg Summit complements, to some extent, the economic and monetary policy of the Union. Policy instruments like the Guidelines, the evaluation of National Action Plans and the Recommendations are used in the field of EMU as well as employment policy. However, employment policy-making at the European level does not affect national competencies in any respect. The Treaty makes it clear, that the Employment Strategy supports and complements the initiatives of the Member States and fully respects all their competencies. Member States have also agreed to implement the Employment Guidelines agreed every year, but there is no provision for any kind of sanction in the case of non-compliance. This is in stark contrast with the coordination of economic policies. The Stability Pact gives the right to the EU to impose heavy fines when one Member State fails to comply with the well-known Maastricht criteria. During the implementation of the open method of coordination, the existence of two separate sets of economic and employment guidelines had created misunderstandings. Now there is only one set of guidelines and the National Action Plans, were renamed National Reform Programmes and the guidelines does not restricted to the initial four pillars approach.

The conclusions of the Lisbon European Council have given the most concrete definition of the implementation of the open method of coordination.

It is worth, in the light of this discussion, reproducing the complete paragraph 37 of the Presidency conclusions, which refer to this matter:

*Implementation of the strategic goal will be facilitated by applying a new open method of coordination as the means of spreading best practice and achieving greater convergence towards the main EU goals. This method, which is designed to help Member States to progressively develop their own policies, involves:*  
fixing guidelines for the Union combined with specific timetables for achieving the goals, which they set in the short, medium and long terms;
establishing, where appropriate, quantitative and qualitative indicators and benchmarks against the best in the world and tailored to the needs of different Member States and sectors as a means of comparing best practice;

- translating these European guidelines into national and regional policies by setting specific targets and adopting measures, taking into account national and regional differences;

- periodic monitoring, evaluation and peer review organized as mutual learning processes.

In addition to the Treaty definition, the following box summarises the Open Method of Coordination as it applied since the Lisbon Council in March 2000.

The Open Method of Coordination: a quick summary

In broad areas of economic, employment and social policy the Member States have to meet reform challenges that are similar throughout Europe. The convergence of challenges has been driven by the economic integration within the internal market, and the effects of the fast changing global economy, technological innovation and demographic change. Therefore, a new instrument was needed which supports the Member States in their reform efforts, while respecting their legal competences.

Set up at the Lisbon European Council of March 2000, the Open Method of Coordination provides this framework of political coordination without legal constraints. Member States agree to identify and promote their most effective policies in the fields of Social Protection and Social Inclusion with the aim of learning from each others’ experiences.

This is a flexible and decentralised method, which involves some simple steps: Agreeing to common objectives which set out high-level, shared goals to underpin the entire process; Agreeing to a set of common indicators which show how progress towards these goals can be measured; Preparing national strategic reports, in which Member States set out how they will plan policies over an agreed period to meet the common objectives; Evaluating these strategies jointly with the European Commission and the Member States through mutual learning activities.

The use of the OMC has given rise to different and conflicting views, as regards its utility and effectiveness. Those in favour of the OMC, call it the "Lazarus of European integration", as promoting experimental learning and deliberative problem-solving, as a 'third way' for EU social policy, or a
middle course between regulatory competition and harmonisation. It is also considered as a tool for achieving convergence of results, whilst respecting national diversity. Critics of the OMC argued that it allows the EU to pursue its creeping agenda of Europeanisation in fields that are the domain of national decision making or that, conversely, it represents a protest and a threat to the Community Method, because it lacks transparency, accountability and enforcement mechanisms, and that it is thus ineffective as an instrument of policy learning and transfer (Beveridge, 2008).

Another criticism is the plethora of processes: Essen Strategy, Luxembourg process, Cologne process, Cardiff process and the Lisbon Strategy. The Lisbon Council made clear that no new processes would be introduced. However, a certain momentum has been created by the open method of coordination. Peer reviews and other aspects of this process have already started to be used in other policy areas. For example, the new social inclusion process is using peer reviews and other aspects of the mechanism; asylum policy is also a subject of an open method of coordination; and enterprise policy and research policy in the Commission are using a more quantitative version of the open method with a greater focus on benchmarking and indicators. This paper focuses on the peer review process as the key element of the method.

3. The Peer Review Method in European Employment Strategy (EES)

3.1. Good practice and the peer review method

It has always been emphasised that the EES – also known as the open coordination process in employment - is based in the Treaty of Amsterdam for developing the exchange of information and best practice and for providing comparative analysis, without recourse to ‘hard’ legislation such as Directives or Regulations. Within this global process of convergence of employment policies, a process that has been supported by all Member States, good practice in labour policy is identified and evaluated. Potentially transferable best practices are disseminated through the peer review process with a view to possible implementation in other Member States.

The peer review programme seeks to facilitate mutual learning and to encourage the transfer of policy measures or reform initiatives that have proved effective in their original context to other Member States. The programme involves multilateral assessment of specific employment and labour market policies with the objective of determining whether and how they can effectively be implemented in other Member States. It does not attempt any ‘ranking’ of policies by merit.
Until 1997, however, good practices in employment policies were to a large extent, identified unilaterally by the Member States without appropriate evaluation. The element of transferability of these practices was often missing. There is a clear advantage in presenting such practices for multilateral and independent expert consideration, aiming at the promotion of transferability of good policies, using the peer review process.

Although the selection of the examples of good practice depends partly on the availability of the results of the evaluation or on substantive early monitoring data, this data and the results alone cannot determine whether a particular good practice could or should be transferred to other Member States. Further difficulties arise either when the framework conditions influencing the success of a given policy are replicated in another Member State, or when the policy objectives envisaged apply across Member States.

Despite some teething problems at the beginning of the peer review programme, more than seventy peer reviews have been organised since its inception and several are being planned. Expert teams consisting of government representatives, independent experts and Commission officials carry out the reviews. The composition of the expert teams varies, depending on the subject of the review, with the independent experts being nominated by the Commission in agreement with the Member States and with the involvement of the Employment Committee (EMCO). The Employment Committee plays an important role in the development of the European Employment Strategy and, in general, in promoting co-ordination between Member States on employment and labour market policies. All feedback from peer review participants was positive and many consider the peer reviews as one of the most influential imitative of the EU. The following graph presents the summary of participation in peer reviews since the inception of the Peer review programme in 1998. The blue column represents the number of participation by each country as host of good practice and the brawn the participation of each country as a peer country.
3.2. The method in context
The term "peer review" usually refers to a critical evaluation of scientific, technical or academic work by independent experts and is methodologically related to quality assessment processes. Independent peers selected for their acknowledged expertise in their field undertake the actual work of evaluating, judging and comparing policies. Each peer reviewer having a unique background in his/her discipline and having the experience of his/her national system broadens the scope of influence of each peer review. As already suggested an effective peer review, also needs to be supported by an extensive data collection procedure.

Moreover, new frameworks of policy-making need to actively involve all stakeholders and this is particularly the case with the involvement of citizens (or civil society) and of the social partners. Citizens cannot be viewed any more as targets of policy-making but must also be considered as fully responsible actors.

The peer review method has long been in use in purely scientific establishments and at policy-making level. Since the early 1990’s, the OECD has been reviewing development aid programmes using peer reviews. The importance of peer review is fully recognised, as are the significant changes brought about by peer reviews in the systems of the
countries reviewed. The OECD peer review aim at monitoring development co-operation policies, assisting in improving performance and comparative analysis, sharing experience and fostering co-ordination among OECD Members. Peer reviews are also used extensively in Europe and the US in various fields. In the US there are peer reviews of good practice in employment programmes, as well as in public hearings on environmental matters where scientific expertise is essential.

The Commission’s working paper (Group 5 on World Governance) reports on another striking example of peer review: the WTO’s Trade Policy Review Mechanism (TPRM) which has been in place since the middle years of the Uruguay Round. Its aim is to create a space for debate on the broad range of trade and economic policies maintained by WTO member countries and to assess their impact on trade or broader economic and development objectives. Like the Commission’s peer review, this experiment could be taken further. For example, if there is participation by non-government players in policy-making, peer reviews could be a relatively safe place for such development. As the Commission’s paper points out, TPRM - as an exercise in peer review - has earned the support of MEPs who were able to participate - as part of the Commission delegation - in a hearing on EU trade policy.

The peer review programme offers to society and to the social partners an opportunity to participate actively in policy-making, in a way which will allow the full understanding of all the aspects of a policy proposal. Their participation will guarantee their involvement at a very early stage of a policy initiative. It will also improve substantially the quality and the substance of discussions in peer review meetings. That was evident from peer reviews where there was participation by the social partners. The Dutch review, for instance, on the Flexibility and Security Act in the Netherlands, proved the importance of close cooperation with the social partners for new labour market legislation. That aspect of policy-making in the Netherlands might not have been so convincing for the peer countries, without the presentations by trade union representatives in the peer review and the discussions which followed.

The programme could also be very useful as an instrument at the local level where there is a need for concrete and distinct procedures to adapt to the various aspects of local development. The programme facilitates discussion, as it is focused on particular initiatives and local issues.

3.3. The process in detail

The peer review programme as an innovative process, conceived in 1998 and operational from 1999, aims at identifying, evaluating and disseminating good practice across the EU in the field of employment and
labour market policy. It is an all-important element of the European Employment Strategy, scheme which aims at providing the necessary qualitative complement to the quantitative approach of indicators and benchmarking. With its origin in the Luxembourg Summit in November 1997, later supported by many subsequent Summits, the idea of using peer group learning has been repeatedly advocated. The conclusions of the Cardiff European Council in June 1998 underlined the importance of working together to exchange good practice and to develop peer group evaluation of Member States' Action Plans. The Vienna European Council further endorsed the need to develop objective criteria for selecting the best practices.

The programme is a multilateral exchange of experience between the EU countries in active labour market policies. It builds on the concept of best practice and should substantially contribute to a gradual convergence of labour market policies in Europe. The same idea could, and perhaps should, be used in many other policy fields like the environment, public administration reforms and development aid to the developing and developed world.

In the case of this particular programme in the EU, the Member State with an employment policy for review (the host country) provides information material, policy descriptions, evaluation studies and statistics. The participation of other Member States (the peer countries) is voluntary, following an expression of interest in the policy in question, either for possible adoption or because a similar policy already exists and a comparison is deemed useful. The following diagram offers a pictorial representation of the papers:
Each review includes both quantitative and qualitative elements but the potential and the methods for transferability of successful labour market policies is always the crucial aspect. Policy transfer may not always be realistic but it is extremely helpful for stimulating discussion and for helping appropriate dissemination of information. While the review concentrates on particular examples of good practice, it can serve as a useful input for Member States and helps them in evaluating their policies in order to meet the qualitative and quantitative targets set in the Employment Guidelines.

The results of the assessment, which may involve local visits, discussion with those responsible for local implementation and analysis of evaluation studies, are disseminated through a web site. This web site (http://www.mutual-learning-employment.net/) has now become one of the most important reference points for employment policies with high quality documentation of all the reviews and thousands of visitors from academia, practitioners and the general public.

3.4. Selecting good practices for review

The successful selection of good practices is crucial to the success of the peer review process. Many procedures focus on the formulation of very strict criteria, which define what should be considered as good practice. In the peer review programme of EU employment policy, the focus was more on the close co-operation of all participants while upholding the quality of the selection. To this end, the following criteria were taken into account:
the willingness and capability of host countries to provide the
information required for peer reviews and to organise study visits and
meetings;

the availability of evaluation results or, at least, of substantive early
monitoring data, providing sufficient information for examination;

the relevance of the policies to the Employment Guidelines.

Then, follows a process to guarantee that the suggestions of every Member
State are taken into account in the final selection. There is considerable
input from several Commission services as well as from all the Member
States. The final programme is formulated as follows.

- Each year, examples of good practice are identified in the NAPs (and
  now the National Reform Programmes), in the Joint Employment
  Report, in Commission Communications and in internal discussions in
  the Commission. Member States are asked to confirm their willingness
to organise and host peer reviews of their respective good practices.

- A consolidated list of potential subjects is compiled, covering the
  Employment Guidelines. Whenever possible, similar measures
  proposed by two or more countries are combined into one review.

- On the basis of the consolidated list, each Member State is asked to
  indicate preferences for peer participation in the review teams.

- The most frequently preferred policies are selected for the peer review
  process. Member States with a preference for a particular review are
  automatically included in the review team. Those with a preference for
  non-selected policies are normally reallocated among the selected ones
  in such a way as to ensure balanced participation of all Member States.

- Finally, the Commission, with the help of external resources selected
  by open tender, provides the necessary analytical, logistical and other
  support to the whole process.


One interesting example of the Peer Review Method is the Swedish Policy
of using Female Business Advisors for Female Entrepreneurs in Sweden1.
Developing entrepreneurship as well as helping women to realise their
potential in the every area of professional activity are two vital elements of
the European Employment Strategy. This is essential for the creation of
new jobs, particularly among women who face considerably greater
obstacles than men when they want to set up their own business. The idea
that female entrepreneurship could help tackle high-unemployment in

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1 This section gives a brief account of one of the measures discussed in peer reviews and
the outcome of those discussions. Analysis of all the peer reviews can be found on the
peer review web site (http://peerreview.almp.org/)
deprived areas inspired the Swedish Government to set up a special programme to stimulate female entrepreneurship in such regions. In this programme, a network of female business advisors was set up, with the aim of supporting women who want to start their own business in the ‘regional policy support areas’ (Northern Sweden). The programme started in 1993 by NUTEK (Swedish National Board for Industrial and Technical Development) and was extended in 1997 to continue until September 1999. More than 200 female business advisors are currently working within the programme which was unique in its ambition, being by far the largest and most comprehensive EU programme on female entrepreneurship in terms of number of persons involved, resources used and geographical orientation. While there was central co-ordination by NUTEK, the regional and local authorities were closely involved in the administration and financing of the programme. The programme had the following objectives:

- to increase female entrepreneurship;
- to change the general attitude towards female entrepreneurship;
- to develop a new type of support for women;
- to increase employment in problem areas;
- to stop the outflow of women from sparsely populated areas.

Women, who want to start a business, are supported by female business advisors. The business ideas came from the women themselves; the advisor was only there to facilitate the process by providing help, assistance, training and consultancy through her network. Because the business advisors do not have all relevant knowledge themselves, their contacts help them to find experts in the field. Most business advisors work part-time, combining their advisory work with their own company. This, of course makes them all the more suitable for advising new female entrepreneurs.

The advisors are trained and receive a certificate before they start offering their services. They are employed on a project basis for three years, either part-time or full-time.

There was an open discussion on the evaluation of the results of the programme. There were no explicit, quantitative goals set for the programme, mainly because of its open and long-term character. As a consequence, a predominantly qualitative assessment was set up to monitor developments.

The evaluator of this programme was positive on its overall impact. There were indications that the business advisors not only developed their own competencies and know-how but also helped to create at least 1000 new companies within the first three years of the programme. Moreover, they seem to have initiated a change in attitudes towards female entrepreneurship. The development of a network between the business advisors themselves, both regionally and nationally, was considered as an important aspect of success.
On the less successful aspects, there was, firstly, a lack of clearly defined goals from the beginning and, as a consequence, no quantifiable target was set, which makes evaluation difficult. Secondly, it might have been preferable if instead of local authorities national authorities had employed the business advisers. The advisers had to try to change attitudes towards female entrepreneurship and to improve gender balance in workplace. Had a national authority employed them, business advisers might have met less hindrance from existing attitudes at local level towards female entrepreneurship.

4.1. The Peer Review: qualifying transferability

Five peer countries attended the review meeting: Finland, Portugal, Greece, Belgium and Spain. All peer countries indicated their intention to discuss the possibility of implementation of a similar programme in their own country.

Some specific elements were mentioned as being particularly interesting for possible transfer to other countries. First of all, the fact that women are being advised by women is new and attractive. The Spanish expert thought this reinforced the commitment to the programme objectives and especially the aim of attitudinal change. A second appealing element of the programme mentioned by almost all peer representatives was the (electronic) network. Initiated by NUTEK, it was further developed due to the benefits recorded by the business advisors, and turned out to be a very important part of the (success of the) programme. Other countries, such as Spain, mentioned that they had developed a network as part of gender programmes as well. However, these networks had not (yet) evolved into such a widespread and integrated fashion.

Other aspects earmarked as positive and helpful by the peer countries were the long-term perspective of the programme and the fact that an ongoing evaluation was being carried out from the start. The long-term perspective was valuable as changes in attitudes are not realised immediately. The perceived merit of ongoing evaluations lay in the possibility of taking remedial action while implementing the programme. For some countries with a strong regional orientation, like Belgium and Spain, the local flexibility of the programme was also perceived as an advantage.

5. New developments in the programme

In 2005 the Peer Review Programme (EES) was extended and was incorporated in the newly formed Mutual Learning Programme (MLP). The main objectives of the MLP are to encourage mutual learning at all levels and to promote the transfer of the most effective employment and labour market policies between the EEA (European Economic Area) the
Member States (the EU Member States and Iceland, Norway and Liechtenstein) and the Candidate Countries (presently Croatia, Former Yugoslav Republic of Macedonia (FYROM) and Turkey). One of its many purposes is to spread information about the EES and its implementation furthermore. The MLP includes new elements, which are based on the same principles as the initial Peer review programme and reply to the specific needs of the EU and national authorities.

The Thematic Review Seminars have an agenda-setting role for the mutual learning process and aiming at steering the policy debate under an overall thematic focus. As emphasised in the Joint Employment Report 2007/2008 the implementing priorities for action are

1. Attract and retain more people in employment, increase labour supply and modernise social protection systems.
2. Improve the adaptability of workers and enterprises.
3. Increase investment in human capital through better education and skills.

The seminars are organised twice a year and dedicated to one of these thematic priorities. Together with recognised experts the seminar includes a large group of policy-makers and stakeholders from across Europe. Each Thematic Review seminar focuses on the main policy challenges and approaches, from national to EU-wide perspectives and the selected priority area. Official delegates from different member states present national achievements in the field as a basis for the subsequent discussions involving other member state officials and representatives of the social partners and other stakeholders.

Follow-up and dissemination activities are meant to complement the European-wide mutual learning activities in order to achieve the objectives of the Mutual Learning Programme. These objectives are:

1. to develop partnerships or networks which pursue the identification and exchange of good practice in a transnational context

2. to encourage mutual learning -within Member States and between Member States- of the most effective policies and practices within key areas for the European Employment Strategy, with participation of all key decision makers and stakeholders

3. to promote a wider and more effective dissemination of knowledge about the EES and its implementation to national or European-wide stakeholders.

The European Commission promotes mutual learning between Member States and their relevant stakeholder by ‘Calls for Proposals, a process by which public authorities in Member States can apply for co-funding of projects to be conducted nationally or in co-operation with other Member States, thus involving a larger group of stakeholders.
6. Spill-over effects of the programme

6.1. Adoption of the peer review method in SOCIAL PROTECTION

One recent book examined how and to what extent the European Employment Strategy and the Open Method of Coordination (OMC) on Social Protection and Social Inclusion have influenced national labour market and social welfare policies. The book concludes that the OMC has contributed significantly to both substantive and procedural reforms, in spite of the many institutional barriers to Europeanization in this policy area (Heidenreich M., 2009).

Apart from Social Protection, The PROGRESS programme, a financial instrument for employment policy and research offers support for the testing of new tools for mutual learning and exchange of best practices such as projects for temporary pooling and transfer of expertise between Member States; training on strategic planning, mainstreaming, coordination, involvement of stakeholders, monitoring and evaluation in the Social OMC process. PROGRESS can also help the development of "social experimentation" as a way to test innovative ideas before engaging in large-scale social programmes, for example in the field of minimum income, child benefits, or long-term care. The programme will support the study, dissemination and evaluation of social experimentation projects.

Exchange of Good Practice and Peer Learning Activities in the area of Education

Exchanges of information on different policy options can help advance reforms in national education and training systems and, together with other mutual learning activities, form a key part of the Education and Training 2010 work programme.

Such peer learning activities are organised by either groups ("clusters") of member states interested in specific topics, or by expert groups set up by the European Commission. In addition, the Copenhagen process in education and learning organises specific peer learning activities for vocational education and training and the Working Group on the Adult Learning Action Plan organises peer learning in the field of adult education.

Since most these initiatives are newly born it is difficult to evaluate their impact. However, there is already very positive feedback from all participants.
7. Conclusion

So far, the experience from the mutual learning programme has been very positive and resulted in very constructive comments from all stakeholders: the Employment Committee and the Member States. It is true that transferability, despite the peer review programme, is difficult to document. However, evidence from the National Action Plans and the National Reform Programmes indicate that most peer countries participating in reviews have either introduced or have modified their programmes in the relevant domain. Although it cannot be argued that this is a direct result of the peer review, it shows at least that the choice of the reviews was timely and correct and that the active and consistent participation of all Member States might have helped them to improve their Active Labour Market Policies.

The open method of co-ordination as well as the mutual learning programme, which is the less well known but the most important element of the method, has attracted a lot of attention. It has inspired many other policy areas. The willingness to use open method of co-ordination in areas other than employment where the Union has no competence, and the interest shown by other institutions on the method proves that it is an initiative, which will flourish in the future. However, it is not free of criticism. More European Institutions, apart from the Commission, interested to have extensive access to the method and the method does not include a legislative compliance mechanism. This last argument, however, misses the main point of the method. On the one hand, it is not a legal procedure. Hence, it does not make sense to use this method in areas of the *acquis communautaire* where the existing mechanisms are effective, well established and there is no need to replace them with a different legalistic process. On the other hand, it is certainly a very useful and “softer” step to convergence and to faster integration. If after the use of the method for some time, in areas unrelated to the Union competencies, the conditions are appropriate it might be partly or totally replaced - on a case by case basis- by a formal legislative procedure with directives and regulations. In other words, the method could complement the initial stage of legislative procedures but it would certainly be totally inappropriate to replace the traditional and successful community method. In summary, it is not an alternative to legislation, but rather a complement to it. It may trigger off legislation, but it is essentially about joining forces in a quest for better policy, better performance through continuous peer pressure, benchmarking and comparative peer review.

Finally, the open method of co-ordination may be used very effectively at national or even at local level. That is particularly the case
when aspects of decentralisation create problems, and the need to use good practice and learn from other successes or failures is pressing.

Perhaps the best justification of the peer review process comes from Karl Popper. As Bryan Magee states in his brief presentation of his seminal work on the Open Society and its enemies: *policy is a hypothesis, which has to be tested against reality and corrected in the light of experience. Detecting mistakes and inherent dangers by critical examination and discussion beforehand is an altogether more rational procedure, and one as a rule less wasteful of resources people and time, than waiting they reveal themselves in practice. Furthermore, it is often only by critical examination of the practical results, as distinct from the policies themselves, that some of the mistakes are to be identified.*

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Systemic analysis of the intractability of the Cyprus problem (ABSTRACT ONLY)

Yiannis Laouris, Aleco Christakis

A systemic view of history: the synergy of our stories

Paul R. Hays, Jacqueline Wasilewski
Analysis and Comparison of Systemic Methodologies for Organisational Design

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Abstract:
The large number of available systemic methodologies has created the need for their classification and comparison. The organisational designer (analyst), the user of the methodologies, needs to select the most appropriate methodology, identifying which one serves best the interpretative requirements of a specific area of concern. The aim of the present paper is to analyse in depth three systemic methodologies, Soft Systems Methodology (SSM), Viable System Model (VSM) and Critical Systems Heuristic (CSH), by identifying the way in which some basic concepts of systems thinking are taken into consideration, used, implemented and how they have influenced each methodology. The concepts used are ‘system’, ‘level hierarchy’, ‘emergence’, ‘variety’, ‘constraints’, ‘modelization’, ‘complexity’ and ‘organisation code’. This particular attempt to compare methodologies provides the organisational designer with the ability to choose the most appropriate methodology in order to apply it in specific problematic situations. Additionally, the organisational designer can easily create hybrid
methodologies by isolating and incorporating in his methodology characteristics and processes from other methodologies that seem more effective for the specific direction he is interested in. The fact that the concepts of systems thinking are utilized, can help organisational designers to better understand the methodologies through the detection of the way each concept is implemented in each methodology. This will provide the organisational designer with a comprehensive capability of the meaning and the importance of his actions. In this way the organisational designer gains the ability to pay attention and lay emphasis on important actions or to circumvent some of them when he thinks that this is essential. Further research can be made by enriching the analysis with other systemic concepts, and by analysing other systemic methodologies.

**Keywords:**
Systems Thinking, Systemic Methodologies, Soft Systems Methodology, Viable System Model, Critical Systems Heuristics

### 1. Introduction

In recent years, there has been significant development in systems thinking, which has yielded a variety of different methodologies and tools. This fact raises the issue of which of the available methodologies or tools would be more appropriate or effective for the understanding of any given complex state of affairs and the structure in which it belongs. Consequently, the development of a way to compare the available methodologies and to identify which one serves best the interpretative requirements of a particular situation is needed. There are many tools available for this purpose discussed in international literature, as, for example, Flood and Jackson’s “System of systems methodologies”.

Flood and Jackson (1991) begin by acknowledging the fact that a significant number of systemic methodologies dealing with organisational problems exist. According to Flood and Jackson, the fact that there are many such methodologies available can actually benefit the analyst. This benefit is taken advantage by the construction of a framework – according to which the various methodologies are evaluated and classified – that will allow the analyst to choose the most appropriate methodology for a given situation. Hence, Flood and Jackson provided a classification of systems methodologies under categories according to specific (well defined) criteria. They call this classification, “System of Systems Methodologies”. Based on this approach, the problematic situation is being studied and analyzed with regard to two dimensions. Depending on the particular characteristics of a situation, a methodology is being selected. The most appropriate methodology is that which will allow an effective transition from a problematic state to a more desirable one. The two dimensions suggested are the *system’s dimension* and the *participant’s dimension*. 
The system’s dimension concerns the degree of complexity characterizing the problematic situation. It is possible to observe relatively simple systems or systems with a higher degree of complexity.

The participants’ dimension concerns the relations developed between the people involved in the system. Usually, the participants in an organization agree or disagree on related topics. Therefore, in respect of this dimension, systems can be characterized as unitary, pluralistic, or coercive.

The combination of the two dimensions (system and participants) results in the following six possible descriptions of the problem situation (Flood and Jackson, 1991).

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Depending on the form of the problematic situation, systemic methodologies themselves are classified under corresponding categories. Their classification is done according to their ability to deal with the problems belonging to each category.

It is important to note at this point that other attempts have been made to this direction, such as the classification of management science methods proposed by Mingers (2003). However, we are mainly focused on Flood’s and Jackson’s way of comparison since the purpose of this paper is not to identify, evaluate and classify all the available comparison approaches but to provide and support a new one.

The aim of the present paper is to introduce a new comparison framework that is based on the recognition of systemic principles in each methodology, and, to apply it to three selected methodologies: Soft Systems Methodology (SSM), Viable System Model (VSM) and Critical Systems Heuristics (CSH). The main reason of selecting these particular methodologies is that according to Flood and Jackson’s classification of methodologies they belong in different fields. That means that they are more suitable for implementing them in different kinds of problematic situations. Soft Systems Methodology (SSM) is categorised as a complex – pluralistic methodology, Viable System Model (VSM) as a complex –
unitary while Critical Systems Heuristic (CSH) as a Simple - Coercive. Additionally, these are three well-known methodologies which have been widely discussed, criticized and implemented.

2. Analysis of Methodologies

At this point we will briefly describe the three methodologies (SSM, VSM and CSH) which will be classified and compared as an example of applying the suggested framework in the following sections.

2.1 Soft Systems Methodology (SSM)

Soft systems Methodology was developed in the 1980s by Peter Checkland. Initially, SSM consisted of seven steps, but while it has been implemented in a variety of applications, it has differentiated in order to be improved, keeping however the principles which was based on.

The seven steps of SSM are the following:

- **1st step, Investigation of the Problematic Situation**: In order for SSM to deal with the subjective nature of problematic situations it tries to collect as much viewpoints of the stakeholders as possible. The way of collecting them is not strictly defined by the methodology. It can be done through structured or unstructured discussions, questionnaires, interviews etc. (Checkland, 1981; 2000), (Armson, 2001).

- **2nd Step, Construction of Rich Picture**: At this stage all the viewpoints that were collected in step 1 are recorded and presented in a ‘rich picture’, which is a graphical representation – draw. Rich Picture aids in understanding the problematic situation better. According to Checkland, in a rich picture, concepts of structure, concepts of process and concepts of the relation between them must be presented (Checkland, 1981).

- **3rd step, Root Definition**: Through the rich picture a wide range of relevant systems can be identified. At this stage a particular viewpoint of the situation is brought out. ‘Root Definition’ is an idealized, comprehensive description of what a relevant system should be. According to Checkland a root definition must include some important elements for describing a relevant system. These elements are codified in the mnemonic CATWOE and are presented below as provided by Checkland and Scholes (1999).

  - **C** – ‘customers’: the victims or the beneficiaries of T
  - **A** – ‘actors’: those who would do T
  - **T** – ‘transformation’: the conversion of inputs to outputs
  - **W** – ‘weltanshauung’: the worldview which make the T meaningful in context
  - **O** – ‘owners’: those who could stop T
  - **E** – ‘environment’: elements outside the system which it takes as given
• 4th step, Conceptual Model: The next step of the methodology is the creation of a model that achieves what is described by the root definition. This model is called conceptual model. The greatest danger for the model is to be influenced from the real situation. The creation of the model is the most strictly defined part of SSM.

• 5th step, Comparing the Conceptual Model with Reality: At this point the analyst has two different tools available. The rich picture, which refers to reality, and the conceptual model, which presents an ideal form that the situation under study could have. These two different results of the whole process are going to be compared.

• 6th step, Feasible and Desirable Changes: The differences that derive from the previous step have, as a consequence, the specification of possible changes. In that point a new set of discussions begin for the identification of the changes that are not only desirable but also feasible. The involvement of the stakeholders in the problematic situation during that stage is fundamental. According to Checkland (1981) there are three types of possible changes: In the structure of the under study situation, in the processes, and in the behaviour. The latter concerns the way of thinking and the roles of the stakeholders.

• 7th step, Implementing Changes: After the identification of the desirable and feasible changes, the necessary actions in order for the changes to be implemented begin. These changes will probably have as a consequence the creation of new problems that can also be managed through repeating the process that is proposed by SSM.

![Figure 17: The seven steps of SSM (Checkland, 1981)](image-url)
While SSM was implemented in a variety of problematic situations the need of some changes that would lead to a more effective application of the methodology were recognised. One important change which concerns its structure is the abandonment of the seven steps. Instead of seven steps, SSM now has four main activities which are represented in the following figure and are briefly presented below.

**Figure 18:** The four main activities of SSM (Checkland, 2000)

**Finding Out about the Problem Situation:**

The process of investigating the problematic situation consists of the first two steps in the seven step methodology. However, a new analysis, the cultural analysis, was also included in SSM at this phase. It consists of three separate analyses which complement the rich picture and were named by Checkland himself Analysis I, II, and III (Bennetts et al, 2000), (Checkland, 2000; 2001). With the introduction of the cultural analysis, SSM is presented like following two different flows. The cultural one, which consists of analyses I, II, and III, and the logical one, which aims at the creation of conceptual model.

The aim of analysis I is to clarify the roles of the stakeholders in the problematic situation (Checkland, 2000) and identify the problem owners. In Analysis II the under study situation is viewed as a social system.
According to Analysis II, the system consists of interactions between three features, the “roles”, the “norms”, and the “values”. A role is a social position that is considered as fundamental from a stakeholder. The roles might be either formal or informal and it is very important for the analyst to try to identify the informal roles as well. Additionally, the stakeholders of a system have a specific behaviour. This behaviour is defined by norms which are influenced by a set of values (Checkland, 2000). Analysis III examines the political dimension of the under study situation. It examines how different interests are being compromised and how power is expressed. The first step is to identify the features of power in the problematic situation and after that to identify how they are gained, transferred, manipulated, preserved, or abandoned (Checkland, 2000).

2.2 Building Purposeful Activity Models:

In order to build a conceptual model the analyst must first have framed a root definition. In recent years, CATWOE analysis (which was described previously) was not considered enough for the definition (Mingers 2000). A new analysis was also proposed. According to this the root definition must have the form: “to do P by Q in order to achieve R”. Based on that, we can say that the root definition must answer three questions. “What to do?”, “How to do it?”, and “Why do it?” (Checkland, 2000), (Bergvall – Kareborn, 2002). This analysis is also referred as PQR analysis.

Another important addition to the methodology is the introduction of the criteria for the evaluation of the conceptual models. According to Checkland, models must have three features by which their performance can be measured (Checkland, 2000). These features are: efficacy (which refers to the outputs that are produced), efficiency (which evaluates if the resources that have been utilised are the minimum), and effectiveness (which examines if the transformation contributes to a higher level, and if it has a wider purpose). Due to the first letter of the words, these criteria are also known as 3E.

Debating the Situation Using the Models:

At this stage the methodology has not changed and no further additions have been proposed.

Exploring the Situation and Taking Action:

Through the discussions of the previous activity the feasible and desirable changes are defined in order for the situation to be improved. The circle of the methodology closes by taking action for implementing those changes. The application of SSM may continue by repeating the process.
2.2 The Viable Systems Model (VSM)

The Viable Systems Model (VSM) was developed during the 1970s by Stanford Beer. Beer suggested that the viability of an organization equals with its conservation through time. VSM presents a set of principles, which if applied correctly, will satisfy the need of the organization to survive even if its parts do not follow these principles. For the survival of a system, the Viable Systems Model not only stands on internal auditing procedures but also on auditing procedures concerning its environment (Beer, 1972).

The notion of reappearance which VSM introduces plays a rather significant role. VSM can appear and be repeated many times within an organization, from a small group of individuals until it is completely theorized as a general hyper-system (Schwaninger, 2004).

The most important principle that the VSM is based on is Ashby’s law of requisite variety (1956) according to which ‘only variety can absorb variety’. Ashby extends his law by suggesting that the variety of a system must, at least, equal to the variety of its environment and also the variety of the management system must be at least equal to the variety of the rest of the system. That means that the system must be capable of reacting successfully in every perturbation it receives and adapt accordingly to it. It has to be noted that every viable organization has to demonstrate the appropriate mechanisms which will be capable of minimizing the reactions of its environment. These reactions are the ones reaching the organization with a form of perturbation and at the same time enhance the reactions of the organization itself (Beer, 1979, 1989).

![Figure 19: The Viable System Model (Beer, 1972)](image-url)
2.3 Analysis of the elements that form VSM

According to VSM every organization that functions correctly must demonstrate five (5) basic systems. These systems are (Beer, 1979, 1989):

System 1, Implementation

System 1 is the part of an organization responsible for all activities that take place within the organization. Every activity that contributes to the fulfillment of the organizational goals takes part within it. Every procedure concerning the transformation of input to output belongs to the system, which is, of course, formatted by subsystems which in turn are formatted by other systems. What is actually demonstrated is a reviving reappearance of systems, within each one of them. As such, a viable system with its own functions and its own external environment can be identified. (Leonard, 1999)

System 2, Coordination

The subsystems of the organization are frequently trying to act for “their own interest” ignoring the goals of the general system. In such circumstances the coordination between the systems is difficult and as a result unpredictable and undesirable consequences are observed for the whole organization. What is required is a mechanism responsible for the coordination and the communication between the systems. This particular task is performed by system 2. Coordination is an important procedure within an organization, aiming to minimize the turbulence within the system which could force the system to collapse.

System 3, Control

System 3 is responsible for the control of the system, aiming to secure its unity and conserve the system as a composed unit. Differentiating from the goals of the subsystems, the whole system that is under study has to be capable of fulfilling its own goals. These goals are fulfilled only if the system maintains the coordination and the unity between its parts. The coordination system, which was previously analyzed, contributes to this direction (coordination and unity) but its contribution is inadequate. What is required is a broader system which will control the activities performed in the autonomous units, provide appropriate guidance and receive information for the future goals of the system. These tasks are performed by system 3 (Beer, 1972), (Schwaninger, 2004).

According to VSM control is exercised through three (3) communication channels. These channels can diffuse the required information quantity to the appropriate route. In such way, system 3
receives information for the status of the functional part of the system and transfers it to system 4. At the same time system 3 receives information from system 4 (concerning mostly the future activities of the organization) and forwards them with the appropriate form to system 1.

**System 4, Intelligence**

According to Beer (1979, 1989), in order to maintain its viability, each organization must develop a mechanism which will render the organization with the capability to set its goals correctly. In VSM, system 4 is responsible for this procedure. System 4 allows the organization to rearrange its parts constantly aiming to react successfully to the external environmental perturbation without losing its initial identity. Consequently, apart from system 1, the intelligence system of the organization is in direct contact with the broader environment. Its role is different and holds responsible of the adaptation of the system to the constantly altering environment that it operates. Contact with the external environment of the organization is not one-way. System 4 not only receives elements from the environment but also comes to close contact with it in order to present and diffuse certain characteristics of the organization. As a result, system 4, is in charge of promoting the identity and the messages that the organization desires to communicate to its environment.

**System 5, Policy**

System 5 is responsible for the organizational politics. It is the point within which important decisions are made for the advancement of the organization its stance when facing important issues. System 5 must provide clear guidance for the route each organization will follow, the values that will choose to promote and the general goals that will choose to fulfill. Its aim is to secure the unity of the organization through the fulfillment of it goals and its values rather than being involved in lower level procedures. Essentially, System 5 is responsible for the design and conservation of the “personality” of the organization.

What is then obvious is the fact that while system 5 receives information from systems 3 and 4, the later must be capable of developing ways of communication and cooperation which will contribute to the solidity of the information that is channeled to system 5. It is a fact that naturally these 2 systems demonstrate various differences. System 3 is held responsible for the internal of the organization while system 4 with its external environment and its future. The appearance of different requirements and goals forces the systems to inevitable conflicts.
2.4 Critical Systems Heuristic (CSH)

Critical System Heuristic (CSH) was developed by Werner Ulrich whose aim was to encourage critical thinking in a methodological way. The main principle of CSH is the idea of boundary critique through which Ulrich emphasized on the ‘partiality’ of claims (Ulrich, 1983, 1987) that must be handled through boundaries, justified by rational argumentation (Car and Oreszczyn, 2003). In order to investigate a problematic situation CSH suggests that a reference system must be determined by selecting (boundary judgment) not only the ‘facts’ but also the ‘values’ that are considered relevant and those that are left out as less important. In order to underline and explain the significance of judgments of facts and values as well as their dependence and connection with the reference system CSH creates the eternal triangle and suggests that it is important to ‘consider each corner of the triangle in the light of the other two’ (Ulrich, 2005, p6).

![Diagram of the eternal triangle](image)

**Figure 20:** The ‘eternal triangle’ of judgments, facts and values (Ulrich, 2000)

Note that the reference system must be clarified in order for everyone who is interested in the situation to have the same understanding. However, the reference system not only consists of judgments that describe a situation as it is (empirical selectivity – ‘is mode’) but also includes judgments about what the case should be (normative selectivity – ‘ought mode’). CSH calls the process of empirical selectivity ‘actual mapping’ while the process of empirical selectivity is called ‘ideal mapping’ (Ulrich 1983, 1987, 2005).
In order to define the reference system CSH provides some guidelines. It recognises the existence of four main issues called ‘boundary issues’ that must be examined in every problematic situation. According to Ulrich (2005, p9) these issues are:

- ‘the motivation – where does a sense of purposefulness and value come from?'
- the power – who is in control of what is going on and is needed for success?
- the knowledge – what experience and expertise support the claim?
- the legitimacy – where does legitimacy lie?’

Moreover, each boundary issue raises three boundary problems. These problems concern the relevant aspects of the situation (concern), who determines these aspects (stakeholders), and how the deferent viewpoints are handled (difficulties) (Ulrich, 1987). Consequently, based on that classification, 12 boundary categories are raised. Each of the boundary categories are formulated into a boundary question. The reference system consists of answers to those 12 questions not only to the ‘is’ mode (actual mapping) but also to the ‘ought’ mode (ideal mapping). The boundary questions are the following as they were framed by Ulrich (1987, p279):

**Figure 21: Boundary Categories (Ulrich, 1983)**
Sources of Motivation

1. Who is (ought to be) the client or beneficiary? That is, whose interests are (should be) served?
2. What is (ought to be) the purpose? That is, what are (should be) the consequences?
3. What is (ought to be) the measure of improvement or measure of success? That is, how can (should) we determine that the consequences, taken together, constitute an improvement?

Source of Power

4. Who is (ought to be) the decision maker? That is, who is (should be) in a position to change the measure of improvement?
5. What resources and other conditions of success are (ought to be) controlled by the decision maker? That is, what conditions of success can (should) those involved control?
6. What conditions of success are (ought to be) part of the decision environment? That is, what conditions can (should) the decision maker not control (e.g. from the viewpoints of those not involved)?

Source of Knowledge

7. Who is (ought to be) considered a professional or further expert? That is, who is (should be) involved as competent provider of experience and expertise?
8. What kind expertise is (ought to be) consulted? That is, what counts (should count) as relevant knowledge?
9. What or who is (ought to be) assumed to be the guarantor of success? That is, where do (should) those involved seek some guarantee that improvement will be achieved – for example, consensus among experts, the involvement of stakeholders, the experience and intuition of those involved, political support?

Sources of Legitimation

Who is (ought to be) witness to the interests of those affected but not involved? That is, who is (should be) treated as a legitimate stakeholder, and who argues (should argue) the case of those stakeholders who cannot speak for themselves, including future generations and non-human nature?
10. What secures (ought to secure) the emancipation of those affected from the premises and promises of those involved? That is, where does (should) legitimacy lie?

11. What worldview is (ought to be) determining? That is, what different visions of ‘improvement’ are (should be) considered, and who are they (should be) reconciled?

3. Correlation of methodologies with concepts of system theory

At this point we would like to propose a new comparison framework of systemic methodologies that will allow the observer - analyst - practitioner not only to select the most appropriate one for a specific problematic situation but also to utilize a combination of them based on the characteristics he wants to focus on. Real life problematic situations are so complex that, although there is a significant number of systemic methodologies, a single methodology might not always be able to encounter them effectively. However, as Jackson (2001, p 233) points out “…the variety of methodologies now available can be used together in a coherent manner to promote successful intervention in complex societal problem situations”. This is why we believe that the comparison framework proposed below provides the analyst with an additional advantage to utilize a hybrid approach uniquely defined for the particular under study problematic situation by selecting parts of each methodology able to support his objectives better.

The basic idea is to use fundamental concepts of systems theory as a point of reference for specifying and studying the way these are being applied in each methodology. This procedure results in an indirect comparison between methodologies, since it relies on identifying differences and similarities in the way concepts of systems theory contribute to the application of each methodology in problematic situations. The following table presents in detail the way in which each concept is being separately examined.

<table>
<thead>
<tr>
<th>System</th>
<th>1st systems methodology</th>
<th>2nd systems methodology</th>
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<td>Under examination:</td>
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<td>1. The kind of systems that the methodology studies in general</td>
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<td>2. The kind of systems which are being examined in the problem situation</td>
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<td>Closure</td>
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<td>3. energy</td>
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<td>Level’s Hierarchy – Emergence</td>
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<td>1. if super-systems and subsystems are considered</td>
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<td>2. if emergent properties are considered</td>
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<td>3. How 1 and 2 are done?</td>
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<td>Variety</td>
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<td>1. if the maximisation of a system’s variety is</td>
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<td>2. if the increased variety of an environment is</td>
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<td>3. In which way?</td>
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<td>Constraints</td>
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<td>1. if the system’s constraints are considered</td>
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<td>2. How?</td>
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<td>Organization Code – Control</td>
<td>Under examination:</td>
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<td>1. the way which the methodology contributes to</td>
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<td>2. if the situation’s procedures are being tested</td>
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<td>3. if the methodology application procedure is</td>
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<td>Complexity</td>
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<td>1. if problem situations with increased complexity</td>
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<td>are being dealt with</td>
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<td>2. How?</td>
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<td>Modelization</td>
<td>Under examination:</td>
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<tr>
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<td>1. how is the problematic situation being dealt with</td>
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<td>2. if models are constructed</td>
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<td>Etc.</td>
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<td>systems theory in each methodology could be</td>
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Through that procedure an indirect comparison of the methodologies is conducted as we can identify the similarities and differences in the way each methodology utilises the concepts of systems thinking.
Following that, the comparison framework is applied in three systems methodologies, Soft Systems Methodology (SSM), Viable System Model.
(VSM) and Critical Systems Heuristics (CSH) by examining each concept separately.

3.1 System: open – closed systems

The term system is the basis of systems theory. Systems theory approaches a situation that needs to be studied, by identifying interacting systems that form a cohesive unit. Correspondingly, the methodologies on which the proposed comparison framework is applied, relate to systems of human activity where, given their presence, human beings' actions affect significantly the situation under examination.

On the one hand, in all three methodologies, the systems examined are open systems with regards to the energy and information that they posses. They are in direct contact with their environment and interact with it. They receive raw materials, they channel products or services (energy exchange), and at the same time they obtain information. On the other hand, the three methodologies examine systems that are closed with regards to their organization. Therefore, the design of their organisation and the action required for changing it, are functions internal to the system and can only be triggered by external elements.

However, while organizations and companies often appeal to external sources – other companies – in order to achieve a more effective form of organization, there is a misconception that the systems are open organisation-wise. This argument is refuted on the grounds of two reasons. First, no external element can make suggestions on the organisation of the system, unless it enters a system of human activity and studies it from within. The second and most important reason is that any suggestions made regarding the organisation of a system do not constitute change of the system's organisation; rather, these suggestions are changes on the information available. More specifically, they provide information on possible ways in which to reach a better form of organisation. The application or incorporation of the suggested changes leads to the system's re-organization and this is evidently an exclusively internal function. Therefore, systems are not open organisation-wise.

Although all three methodologies make use of the term system, there are, nevertheless, several differences between SSM, VSM, and CSH. In SSM, systems appear in the third stage as systems that come about after a careful study of the problematic situation, and are related exclusively to it (Checkland, 1981). In VSM, however, systems (systems 1-5) appear as already determined by the model independently of the situation under investigation (Beer, 1972, 1979). Correspondingly, in CSH the general characteristics of the reference system are predetermined by the set of questions that must be answered (Ulrich, 1983, 1987). Therefore, an important difference between these methodologies is that in SSM the
systems that are being identified, studied, and evidently applied are uniquely defined for the problematic situation on which the methodology is being applied, whereas, in VSM and in CSH the systems are predetermined and independent of the problem situation. In that sense, it is thus necessary that an extra action is required in order to apply SSM – that of the identification of the relevant systems – which is not required for the application of VSM and CSH (as it is already included in the methodology itself). As far as VSM is concerned it is part of the process of applying the model to investigate whether there are specific systems in the situation under study and implement them, wherever necessary (Beer, 1979; Flood and Jackson, 1991). Respectively, the most significant part of applying CSH concerns the identification of the reference system (Ulrich, 1983, 1987). However, there is a significant difference between VSM and CSH. In the first case, the predetermined systems present the ideal ‘form’ that the under study situation should have and it proposes the precise implementation of those systems in practice, while in the second one the reference system aims to the identification not only of the ideal form but also of the actual one. The process of improving the situation does not lie on direct implementation of the ideal ‘form’ but on the critical evaluation of the actual form comparing it with the ideal one (Ulrich, 2005).

<table>
<thead>
<tr>
<th></th>
<th>SSM</th>
<th>VSM</th>
<th>CSH</th>
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<tbody>
<tr>
<td>Systems</td>
<td>Study of human activity systems</td>
<td>Detection of systems which constitute the model (system 1-5, predetermined)</td>
<td>Identification of Reference System (predetermined characteristics of the system)</td>
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<td>Specification and Detection of relevant systems (defined for the specific situation)</td>
<td>Identification of Reference System (predetermined characteristics of the system)</td>
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<td></td>
<td>Closure</td>
<td>Considering: Energy and Information, open Systems, Organisation, closed Systems</td>
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### 3.2 Level Hierarchy – Emergent Properties

The analyst who employs a systems thinking approach is able to distinguish and examine different levels of analysis and emergent properties. All three under study methodologies – SSM, VSM and CSH – analyse a problematic situation using these characteristics.

As far as SSM is concerned, we can say that the hierarchical ordering of the different levels of analysis may be appear in the construction of the rich picture. The analyst is in the position to present the problematic
situation in a rich multilayered picture displaying the various systems, subsystems, and hyper-systems that compose it. This action however, is not dictated by the methodology. It is up to the observer whether he would pursue this kind of presentation for the problematic situation.

The existence of different, hierarchically ordered, levels of analysis becomes more obvious with the introduction of the PQR mode of analysis. With the addition of PQR to the methodology, the root definition is of the type: "P must be done by means of Q in order to achieve R" (Checkland, 2000; Bergvall – Kareborn, 2002). According to this formulation, the system that concerns the observer is that which determines what needs to be done, that is, P. Yet, it is also necessary to know the way in which P may be accomplished, that is, to know Q, which refers to a system belonging to a level below P. Finally, it is also necessary to acknowledge the reason(s) why P needs to be accomplished, that is, to know R, which reveals the existence of a higher level goal that informs the actions on system P. Consequently, R leads us to the next higher level.

In VSM the hierarchy of various levels of analysis is one of the fundamental principles of the model itself, and therefore it is easier to locate. System 1, which is responsible for implementing actions, includes other systems that, in turn, may be analysed through VSM (Schwaninger, 2004). Each of these systems has its own systems of implementation, coordination, control, intelligence, and politics. These separate models describe the system's subsystems and therefore belong to a lower level of analysis. The same reasoning process applies to the hyper-system which the system belongs to.

As far as CSH is concerned, level hierarchy is not clearly stated. The Reference System however consists of two different parts, those involved in the situation and those affected but not involved. In these two categories of people different Boundary Issues (Source of motivation, power, knowledge and legitimacy) and different Boundary Categories (client, purpose, measure of improvement, decision-maker, decision environment, professional, expertise, guarantee, witness, emancipation, world view) can then be identified (Ulrich, 2005). All these categories and issues are separate systems (subsystems) that interact with each other providing the wider Reference Systems (hyper-system).

The main difference between the three methodologies concerns the ability of selecting the level on which the analyst will concentrate his interest and conduct his analysis. In SSM, the analyst is able to choose the level: for example, while for one analyst the system chosen may be regarded as a hyper-system in the context of their his analysis, for another analyst the same system related to the same problematic situation may be considered a subsystem (Checkland, 2000). This is not the case with VSM since the purpose which a specific model serves is already determined.
Inevitably, the level on which the analyst will concentrate is predetermined. In order to apply VSM to a problematic situation, any observer would have to study and analyse the same specific system: the system that is already set as the one able to bring about a particular predetermined goal. Accordingly, all subsystems that a system comprises, as well as the hyper-system to which it belongs, are also predetermined (Flood and Jackson, 1991). In the case of CSH, the level of analysis of the observer is also of subjective nature, since he will determine who the client, the decision-maker etc. is, but unlike SSM the system in the analysis of one observer cannot be the hyper-system or the subsystem in the analysis of another one. This is because each Boundary issue (hyper-system) consists of three Boundary Categories (subsystem) which prescribe the answer to different questions. The first one determines what aspects are to be considered relevant, the second one who is among those involved in determining these aspects, and the third one how we handle differences or conflicts among their views (Ulrich, 2005). Consequently, Boundary Categories (answering what or who or how) have different purpose and different meaning from Boundary Issues (answering what and who and how) and it is impossible for a Boundary Category to be seen as a Boundary Issue or vice versa.

### Table 4

<table>
<thead>
<tr>
<th>Level Hierarchy</th>
<th>SSM</th>
<th>VSM</th>
<th>CSH</th>
</tr>
</thead>
<tbody>
<tr>
<td>PQR analysis</td>
<td></td>
<td>Goals which are forced by a higher level</td>
<td>Due to Predetermined goal</td>
</tr>
<tr>
<td>Subjectivity in determination of studied systems</td>
<td></td>
<td>Subjective nature in determination of studied systems</td>
<td>Predetermined focus of the observer</td>
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</table>

**3.3 Variety – Constraints**

The term Variety is another fundamental concept in Systems Theory. Each system needs to have the necessary variety in order to be able to react effectively to the perturbations it receives from its surrounding
environment. Moreover, and especially in relation to systems of human activity that primarily concern the present study, it is particularly important that systems strive to increase their existent variety. According to Ashby’s *Law of Requisite Variety* (Ashby, 1960), in order to survive, every system must sustain variety greater than that of its surrounding environment.

In the context of VSM, variety and the *Law of Requisite Variety* play a very significant role. The operation of a mechanism that would allow the system to grow in variety, and thus react effectively to challenges presented by its environment, is considered necessary. This is a role assumed primarily by system 4, the system of intelligence (Espejo, 2003). Due to its direct contact with the wider environment of the system, system 4 is responsible for recognising possible threats that are being posed or opportunities that are being presented by the environment and to disseminating these to the other components of the system.

In the context of SSM and CSH, variety does not seem to play an equally important role. There seems to be no additional mechanism specifically dedicated to the increase of variety. This is taken care of by the processes integrated with the application of these methodologies to the problematic situation.

However, variety may be limited or it may decrease, due to the existence of constraints. All three methodologies deal with the constraints imposed by the system under investigation. They attempt to identify constraints that are due to the higher level, those that emerge due to the coordination and interaction of the subsystems, and those that are imposed by the wider environment of the system. In this direction however, SSM and CSH take an additional step. SSM aims at identifying constraints that rise due to cultural reasons and this is accomplished through analyses I, II, III (Checkland, 2000, 2001; Bennetts et al, 2000). On the other hand, CSH puts particular emphasis on the ethical considerations and consequently we could say that it highlights constraints deriving from ethical reasons (Carr and Oreszczyn, 2003).
Emphasis in variety maximisation

Variety Contribution of participants System 4

Constraintss

<table>
<thead>
<tr>
<th></th>
<th>SSM</th>
<th>VSM</th>
<th>CSH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variety</td>
<td>Emphasis in constrains that are defined from a higher level, the environment, and the coordination of subsystems of the same level</td>
<td></td>
<td>Ethical considerations</td>
</tr>
<tr>
<td>Constraintss</td>
<td>Cultural constrictions, Analysis I, II and III</td>
<td></td>
<td></td>
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</tbody>
</table>

3.4 Organization Code – Control

In VSM the organization code is constructed as following: the selection of the elements by the specification of the implementation system, their association by the coordination system and the control by the control system through three communication channels. This procedure concerns activities which are carried out or have to be carried out in a real situation (Beer, 1989).

As far as CSH is concerned, the selection and the association of the elements belonging to the reference system are made by answering the 12 questions proposed by the methodology and identifying the Boundary Categories. It is important to note at this point that by selecting the elements which belong inside the system (performing a Boundary Judgement) we automatically decide which elements are excluded as well as the facts and the values that have been considered and those which have not. CSH suggests a process of thinking about the triangle of boundary judgments, facts and values, calling it systemic triangulation (Ulrich, 2005). This process is nothing else but a process of controlling whether the appropriate elements have been selected. Additionally, control can be also identified in CSH by combining the ‘is’ and the ‘ought’ mode through the suggested four basic applications (ideal mapping, evaluation, reframing, and challenge) (Ulrich, 2005).

In SSM control is a crucial procedure that can be identified in multiple points of applying the methodology. At first control applies to the evaluation of conceptual models. This evaluation was firstly performed by a typical system model’s help, or with any other systemic approach, the analyst preferred. Later, this procedure was put aside and the 3E criteria appeared (Checkland, 2000; Mingers, 2000). Another crucial point of
control is the definition of changes. According to SSM it is necessary to locate both desirable and feasible changes. This procedure is by itself a control procedure (Checkland, 1981). Finally, the most important part of the methodology is repeating the whole application process (Checkland, 1981).

It is obvious that the three methodologies follow a completely different approach. VSM studies the situation, which needs to be improved as a system and aims to manage it. This means that this kind of control pertains whether the procedures followed in the real situation are accomplished correctly. Conversely, SSM faces the methodology’s application process itself as a system whose goal is the improvement of the problematic situation. This kind of control concerns the improvement of the situation’s procedure, but not the problematic situation itself. In CSH both of these kinds of control are present; the first one through the four basic applications, and the second one through the systemic triangulation.

<table>
<thead>
<tr>
<th>Control</th>
<th>SSM</th>
<th>VSM</th>
<th>CSH</th>
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</thead>
<tbody>
<tr>
<td>Process Review</td>
<td>Systemic triangulation</td>
<td>Combination of actual and ideal mode</td>
<td></td>
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<tr>
<td>Typical system model, 3E</td>
<td>System 3</td>
<td></td>
<td></td>
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<tr>
<td>Definition of changes</td>
<td></td>
<td>Controlling implementation process</td>
<td>Controlling the real problem situation</td>
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<td>Controlling the real problem situation</td>
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3.6 Complexity

The existence of complex systems, like human activity systems has led to the introduction and the institution of systems approach in the scientific world. According to Flood and Jackson’s classification of methodologies (1991) VSM and SSM are able to approach all problematic situations regardless of their size and complexity.

According to this acknowledgement, when examining the complexity of a system, the role of human relationships is examined separately from the other parts of the system. The relationships among the participants are
considered as an extra dimension, which along with the system, either simple or complex, contribute to the construction of the System of Systems Methodologies. This relationship is not considered as an extra term which contributes dramatically to the increase of the whole system’s complexity.

The level hierarchy, as presented above for all three methodologies, contributes to facing system’s complexity. However, in SSM and in VSM this is established through a more systematic way (SSM: PQR analysis, VSM: identification of other viable models inside the implementation system). Moreover, it is important to locate and understand the connecting relations of different levels and define behaviors. In CSH the systems in different levels do not have the same substance.

Concerning the increasing complexity because of the existence of non unitary relationships among participants the VSM lacks effectiveness. SSM emphasizes in these relationships - especially with the of the participants in all the stages of the methodology – and allows the analyst to apply it even in situations where the participants’ relationships are not always harmonic. CSH makes a step forward to that direction and it has been characterised (Jackson, 1987a; Oliga, 1988; Flood and Jackson, 1991), although some researchers have argued against that (Midgley, 1997), as applicable even to problematic situations where the participants’ relationships are coercive. This is mainly because of the core principle of CSH which is the Boundary Critique (Ulrich, 2005).

<table>
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<th>Table 7</th>
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<tr>
<td><strong>Level analysis, emphasis in processes and system’s interaction</strong></td>
</tr>
<tr>
<td><strong>Complexity</strong></td>
</tr>
<tr>
<td>Contribution of participants</td>
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3.7 Modelization

When approaching a problem situation certain models are being built. As it was mentioned before, systems theory does not consider these models as a direct reconstruction of reality, but as an abstractive description of it. In all three methodologies which are examined here the creation of models that depict reality is not proposed. Contrarily, the models which are being proposed are notional which will contribute to the improvement of the situation.
In SSM this role is engaged by conceptual models, and their creation is a part of the whole application procedure of the methodology. Furthermore, conceptual models of SSM are not designed by the methodology itself, but the observer-analyst is charged for that process. Only some underlying remarks are proposed by the methodology itself (Checkland, 1981, 2000).

This is not the case in VSM, which presents the form that the under study system should have in order to operate properly. Consequently, the model’s form is set by the methodology. The analyst is restricted to the implementation of the model in the problematic situation (Beer, 1989). CSH constructs a model which is presented by the reference system of the methodology. Similarly to VSM, the key characteristics of that model are proposed by the methodology (through Boundary Categories, questions 1-12). The role of the analyst is to identify how these characteristics appear in the real problematic situation, in the actual and in the ideal form (Ulrich, 1983, 1987).

Another important difference is that VSM’s goal is that the model itself must be implemented in the problematic situation, meaning that the observer is trying to create the procedures which are depicted by the model (Flood and Jackson, 1991).

On the contrary, in SSM the conceptual models are not applicable in reality. According to the designer of the methodology, the application of models in the problematic situation could be proved catastrophic. The observer compares the models with reality and through this comparison possible changes that could be implemented will arise (Checkland, 1981). Correspondingly, in CSH the purpose of the created models (actual and ideal one) is not to substitute one another but to be used according to the four basic applications of boundary critique proposed by Ulrich (2005) depending on the objectives of the analyst.

| Table 8 |
|------------------|-----------------|----------------|
|                  | **SSM**          | **VSM**        | **CSH**        |
| **Modelisatio**n| Conceptual      | Viable system  | Reference       |
|                  | models (not     | model          | System (not     |
|                  | applicable in   | (applicable in | applied in reality, |
|                  | reality, not    | reality,       | predetermined)  |
|                  | predetermined)  | predetermined) |                  |


4. Conclusion

The purpose of the present paper was to present a new comparison framework for systemic methodologies. The core idea for creating the framework was to use as a point of reference principles and concepts appeared in systems theory. These concepts are identified in each methodology and through this way an indirect comparison is conducted, identifying the differences on how each methodology utilizes the concepts. This particular attempt to compare methodologies does not only provide the analyst with the ability to choose the most appropriate methodology for applying it in specific under study problematic situations, but also, it moves a step forward, by constituting a useful tool for understanding better the methodology itself. Through the detection of the way each systemic concept (“system”, “closure”, “level hierarchy”, “emergency” etc.) is applied and implemented in each methodology, the analyst automatically penetrates in it and can understand the meaning and the importance of his actions. The aim is not to follow a “practice”-methodology by experience or out of habit but to understand the reasons why each step, each tool and each action that is proposed or demanded by the methodology is applied. In this way the analyst is enforced with the ability to pay attention and lay emphasis on important actions or to circumvent some of them when he thinks that this is essential.

Another important contribution of the proposed comparison framework is that it gives the opportunity to the analyst to expand a methodology by using elements of other methodologies. Hence, if he realizes that the methodology he uses lacks effectiveness in some points he can easily isolate and comprehend within the methodology (using the comparison framework) characteristics and processes from other methodologies that seem more effective for the specific direction he is interested in. Through this procedure hybrid methodologies can appear, uniquely suitable for particular under study problematic situations. The width of complexity in real world problematic situations does not allow methodologies to provide effective improvements in multiple situations. This particular premise leads the analyst to seek and construct new practices of approaching a situation within which the comparison framework we provide could play a crucial role.

However, it is important to mention, that in order for the analyst to effectively use the proposed comparison framework he has to be up to date in terms of the methodological applications of systemic thinking and willing to expand his knowledge about the processes that are indicated by each of the compared methodologies, as well as the meaning of the concepts of systems thinking that are utilized. The proposed comparison framework is not to be thought as a powerful tool that provides adequate solutions to the real problems each organization designer is facing but as a
tool that helps him increase his methodological knowledge. The responsibility of making the appropriate decision is up to the analyst. These decisions are not only based on the proposed comparison framework but also on each particular problematic situation that is being handled as well as the analyst’s previous experience. Finally, it has to be mentioned that although this particular framework reduces the time needed by the organization designer to achieve a concrete understanding of the methodologies, it still remains a time consuming process.

Apart from enriching the current comparison framework by applying it to other methodologies, further research could be conducted with reference to identifying more systemic concepts to each methodology.

References


Synthia: An Object-Oriented Framework for the Synthesis of Internet Activity

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Abstract:
The generation of synthetic Internet workloads is of utmost importance as it is highly utilized in the evaluation of the innovative technologies proposed for better network resource management. In this paper, we make a brief overview of the currently developed generators, emphasizing on their shortcomings and potential flaws, in an attempt to determine necessary additional specifications for such tools. Finally, we propose SYNTHIA (SYNTHesis of Internet Activity), a flexible and generalized framework for the synthesis of application-specific Internet activity, which was developed to face the emerging challenges of a dynamic and continuously changing environment, such as is today’s Internet.

Keywords:
SYNTHIA, Synthesis of Internet Activity, Workload Generator, Modeling

1. Introduction

Application-oriented modeling of the Internet activity is an essential part of any network simulation study, since it leads to the generation of representative and controllable synthetic workloads that are crucial for the evaluation of the innovative technologies in network resource scaling and management, such as the study of application specific – e.g. web, network media streaming and P2P file sharing, etc. – proxy caching.

Thus, the generation of synthetic Internet activity is of utmost importance and high value. At first, the utilization of real workloads is hampered by privacy protection rules that make it difficult to collect and analyze such data. Although the preservation of user anonymity is feasible, many Internet service providers and network administrators are still demonstrating their unwillingness to support this type of scientific research. On the other hand, the high parameterization of the synthetic
workloads enables to focus on the specific constructional elements of Internet activity – e.g. the popularity and size of the objects, the temporal and spatial locality of the transactions, the origin of the requests, etc – and their corresponding impact on the system under study.

The current generators of synthetic Internet activity – such as, ProwGen, Gismo and MediSyn – are based on non easily adaptable models, which were, in turn, extracted from a rather limited part of the available research on workload characterization and modeling. Thus, these tools are very rigid as far as their ability to adapt to the new trends in the Internet realm is of concern. Furthermore, the explosion of new applications is continuously changing the key characteristics of Internet traffic, resulting in the degradation of the fidelity and appropriateness of today’s workload generators.

This paper presents the design and implementation of SYNTHIA (SYNTHesis of Internet Activity), an object-oriented tool for the generation of synthetic, Internet application-specific workloads. SYNTHIA fulfills all the modern specifications imposed by the challenges of today’s Internet. SYNTHIA is totally encoded in Java, which makes it platform independent. SYNTHIA can be seen as a generalized framework for the development and integration of innovative workload generators. Its flexibility in modeling the Internet activity stems from its embedded statistical library that consists of a complete collection of distributions and other functions.

SYNTHIA, in its current version, integrates the upgraded versions of ProwGen – i.e. a tool for the generation of web proxy activity – and Gismo – i.e. a generator of synthetic, stored media streaming. The functionality of both tools has been broken into Java classes, which, in turn, can be re-used for expanding SYNTHIA with other generators, which is one of the basic advantages of SYNTHIA.

The layout of this paper is organized as follows: Section 2 presents the current tool for the generation of application-specific Internet activity. In section 3 the motivation behind the decision to develop SYNTHIA is put forward and the flaws of the current generators are revealed, in an attempt to determine the necessary additional specifications that our tool would have to follow. Section 4 introduces SYNTHIA, while section 5 analyzes its architecture in detail and section 6 scrutinizes its graphical user interface (GUI). Finally, section 7 concludes this paper.

2. Related Work

A significant number of tools for the generation of application-specific Internet activity and workloads have been designed and presented in the scientific literature, each one having its own distribution and generating models.
At first, Barford and Crovella (1998) designed and implemented the scalable URL reference generator (SURGE). SURGE takes into consideration several parameters – e.g. the size and the popularity of files, the request size, the temporal locality of the references, the embedded file references, and the idle periods of individual users – in order to generate user-based web workloads to support research on capacity planning and management of network systems. SURGE creates the web workloads by aggregating the requests streams of individual users, who switch between ON and OFF periods of time – i.e. between periods of file transfers and periods of thinking – that are heavy-tailed distributed. This ability further enables SURGE to model self-similarity (Crovella and Bestavros, 1997) that characterizes today’s web activity.

Busari and Williamson (2002) developed ProwGen in an attempt to investigate the sensitivity of cache object replacement policies to web workload characteristics. ProwGen specializes in generating synthetic traces of web activity from a proxy server or origin server point of view. It can model the object size and popularity – and the correlation between them – as well as the temporal locality of requests. Later, Markatchev and Williamson (2002) introduced WebTraff, an advanced tool that provides a visual front-end to an upgraded version of ProwGen and further integrates ProwGen with a simple simulator of web cache object replacement strategies and a module for analyzing web workloads.

Concerning the generation of synthetic workloads of multimedia network applications, Jin and Bestavros (2001) developed GISMO (Generator of Internet Streaming Media Objects and workloads). In its initial version, GISMO supported only stored media applications, but another version of the software was later introduced to support live networking media. GISMO is able to model both properties of session arrivals – i.e. the popularity of media objects, the temporal correlation of requests and the seasonal access frequency – and properties of individual sessions – i.e. the object size distribution, the user interactivity times and the framing of the media objects. Jin and Bestavros demonstrated the usefulness of GISMO in the research on proxy caching and server patching techniques.

MediSyn (Tang, Fu, Cherkasova and Vahdat, 2007) is another generator of synthetic streaming media workloads. MediSyn models two types of workload properties: static and temporal. The static properties include the duration, the encoding bit rate, the access popularity and the access prefix of the media files. On the other hand, the temporal properties include the introduction process of new files, the life span of the media files and the diurnal access patterns. Because of its ability to model the dynamics and the evolution of the content, MediSyn is claimed to be a very
powerful and useful tool in the development of Internet hosting centers and content distribution networks (CDNs).

GENIUS (Costa, Ramos, Cunha and Almeida, 2004) – i.e. GENerator of Interactive User media Sessions – claimed to be more complete in the accurate modeling of media streams than previous tools, such as GISMO and MediSyn. The superiority of GENIUS over the other tools stems from its ability, on the one hand, to produce streams for different media types and, on the other hand, to mimic more accurately the heterogeneous user interactivity in the sessions.

Besides the above workload generators that are mostly targeted at evaluating application-specific caching, patching, prefetching and other similar network resource management and testing techniques, there is also a great deal of research on modeling and mimicking Internet activity from different aspects and for different scientific purposes.

Sommers, Yegneswaran and Barford (2004) developed MACE – i.e. Malicious trAffic Composition Environment – that is able to generate a large and diverse set of malicious attacks for the black-box testing of firewalls and other network middleboxes. Sommers and Barford (2004) also developed and proposed Harpoon, a tool for generating application-independent packet traffic at the IP flow level, which may be used for router benchmarking. Antonatos, Anagnostakis and Markatos (2004) proposed their own solution in the composition of malicious Internet activity, as well.

3. Determining New Specifications

Each of the application-specific workload generators presented above comes with its own flaws and disadvantages. At first, the classic services and applications of today’s Internet, and primarily the Web, experience radical changes – e.g. the Web has been transformed to an environment of social networking, where the information is created by many and is also consumed by many. On the other hand, emerging, new and innovative applications are continuously coming forth and alter the basic characteristics of Internet activity. Unfortunately, the models behind the basic properties of the synthetic activity are too rigid to adapt to this rapidly changing nature of the Internet.

Thus, the current generators are rendered useless and inefficient to cope with the challenges of today’s Internet, because of their lack in flexibility. Moreover, the presence of an interactive user interface would be beneficial in order for the user to perceive the maximum possible flexibility as described above. Otherwise, the user would have to bear the tedious task to recode at the source file level. Actually, this is the case for SURGE, GISMO and ProwGen before the emergence of WebTraff.
Under these circumstances, the development of an innovative generator of synthetic Internet activity is of the highest priority. The basic requirements of such a generator include the following:

- Generalized synthesis of application-specific Internet activity.
- Backup compatibility and upgrade ability of the previous generators.
- Expandability in order to support new and emerging Internet applications.
- Flexible adaptation to the ever-changing trends and models that describe today's Internet.
- Portability to run on different platforms and operating systems – e.g. Windows, Linux, MacOS, etc.
- Interactive graphical user interface.

4. SYNTTHIA: Synthesis of Internet Activity

SYNTTHIA is not just another tool for the generation of workloads that mimics the activity of a given application. The rationale and ultimate objective behind SYNTTHIA is to design and build a generalized framework for the synthesis of application-specific Internet activity that fulfills all the aforementioned specifications.

The utilization of the Java programming language to encode SYNTTHIA’s modules guarantees its portability to different platforms and operating systems. One of the renowned properties of Java is its platform neutrality. That is, java programs are compiled into bytecode for a virtual machine – known as Java Interpreter – which Java has already installed within the real computing system. Thus, SYNTTHIA is able to run without modifications on a variety of platforms, where Java is installed, such as MS Windows, Linux, UNIX, Solaris and MacOS.

In order to flexibly adapt to the ever-changing trends in the application-specific Internet activity, SYNTTHIA was equipped with an extensive and compact library of statistical distribution functions. This library was enhanced with additional statistics, necessary to support SYNTTHIA’s functionality.

SYNTTHIA currently backwards compatibility to an upgraded version of ProwGen for the generation of classic Web 1.0 workloads and an upgraded version for the generation of GISMO 1.0 for the generation of stored media workloads. The upgrade of both generators aimed at increasing their adaptability to the dynamic properties of the Internet activity. For example, a part of the research on the characterization of both the Web (Arlitt and Jin, 1999) and the networking media activity (Almeida, Krueger, Eager and Vernon, 2001; Costa et al., 2004) have revealed that object popularity exhibits a multiple Zipfian-like behavior,
than a pure Zipfian-like one. The modeling of this multiple Zipfian-like behavior in popularity is beyond the capabilities of the standard versions of both ProwGen and GISMO 1.0.

It must be noted that SYNTHIA does not provide only a simple interface for the incorporation of the already existing generators. It aims at integrating the generators in such a way that their basic functionality is broken into autonomous modules that could be reused in the future. This was also a good reason that motivated us to use the Java language, since the most renowned property of Java is its ability to support modular programming through its classes and packages. Thus, SYNTHIA becomes a generalized framework for the development of new application-specific workload generators, which provides the programmer with a number of useful tools in an attempt to support his/her effort. Furthermore, the encoding of new tools within SYNTHIA means that new modules will be added into its libraries. This further makes SYNTHIA more complete and increases the solutions provided to the programmers.

5. Analysis of SYNTThIA’s Architecture

Figure 1 shows a simplified view of SYNTThIA’s architecture. SYNTThIA consists of three main modules, whose functionality is supported by the Java Runtime Engine (JRE) library set:

- The Statistics and Distributions Support Module contains the basic functionality concerning the distribution functions – i.e. given a specific distribution, for example the Weibull distribution, this module is engaged with the computation of the probability density function, the cumulative distribution, or the generation of random variants etc. – and other statistic features – such as the generation of self-similarity.

- The Trace Generation Support Module supports all the functionality that corresponds to the generation of synthetic workloads. Some the basic tasks of this module include the modeling the object popularity and size, the request temporal locality, the user interactions, the framing of the multimedia objects etc. This module is highly dependent on the statistics and distributions support module, presented above.

- The GUI Support Module implements the Java classes needed for providing the user with an interactive visual interface.

In an attempt to delve deeper into its architecture, figure 2 depicts the hierarchical layout of the basic java packages that make up the SYNTThIA software. The dashed lines correspond to the classes belonging to each package, while the solid lines reveal the sequence and the father-child relationship of the packages.
Figure 1 A modular view of SYNTHIA’s architecture

Figure 2. The analytical hierarchy of SYNTHIA’s packages
The synthia package contains the main class – i.e. SynthiaMain.class that is needed in order to start and enter into SYNTHIA’s environment. It is also the root package of the library that contains all the sub-packages presented below.

The Statistics and Distributions Support Module is made up of the packages on the left-hand side sub-tree in figure 2 – i.e. statistics, statistics.distlib and statistics.distlib.rng. Both distlib and rng are parts of the R statistical computing package1 that were translated into Java from C. They contain the classes with the functionality of the basic distribution functions. On the other hand, their parent package, which is called statistics, is a complementary package that is necessary for SYNTHIA’s workload generation task.

The Trace Generation Support Module contains the packages in the middle sub-tree – i.e. tracegen, tracegen.gismo and tracegen.prowgen. The tracegen package contains general classes that may be utilized by future generators, which may be incorporated into SYNTHIA. The gismo and prowgen modules consist of these classes needed for the incorporation of the upgraded versions of the two cognominal generators.

Finally, the GUI Support consists of the packages on the right-hand side of figure 2 – i.e. views and views.auxiliary. The views package consists of all classes needed for supporting the graphical user interface that is analyzed in the next section. The classes that correspond to the visual frames of the workload generators – e.g. the ProwgenView.class and Gismo10View.class – execute a basic functionality that is defined in the interface class GeneratorView.class. The SynthiaView.class corresponds to SYNTHIA’s main window.

The views package also contains a sub-package, called auxiliary. As its name implies, the auxiliary sub-package consists of classes that constitute basic constructional elements for the GUI and critical parts needed for the interaction with the user and the corresponding Java event handling.

6. SYNTHIA’s Graphic User Interface

This section is devoted to SYNTHIA’s graphical user interface (GUI). The GUI is based on the Java swing and awt packages that specialize in creating interactive and friendly environments to the user. Actually, the GUI is made up of a sequence of Java frames. Figure 3 depicts the current architecture of the GUI, including the alternative frames the user can navigate through and the corresponding Java classes.
When SYNTHIA is activated, the main frame is initiated, providing the user with a number of choices on tasks he/she can execute. For the time being these tasks are the generation of a synthetic web 1.0 or stored media trace and the generation of distribution-based random numbers. The later task was initially used for the testing of the distribution library and the statistical packages.

**Figure 3** Architecture of SYNTHIA’s GUI G.

**Figure 4** SYNTHIA’s main frame
Figure 4 depicts SYNTHIA’s main frame, which consists of two screens – the task screen and the output screen – task selection buttons and task control buttons. The task screen prints a brief summary of the task that the user chooses to execute. The output screen prints the status during the execution of the task.

Figures 5 and 6 show the frames that are related to the parameterization of Prowgen and GISMO 1.0, respectively. Both frames are organized in a tabular manner in an attempt to facilitate the user’s perception of the different parameterized properties. In both frames, all fields are initialized with the default values, as defined in the original works on the generators. After pressing the OK button, a summary of the generation task with the parameterization is printed on SYNTHIA’s task screen. In case of wrong input, the event handling system of both frames marks the corresponding tabs and fields and notifies the user.
An aspect of the GISMO 1.0 frame

7. Conclusions

Nowadays, the Internet is a completely dynamic and an ever-changing environment that provides a constantly increasing number of innovative services. Furthermore, the current applications are continuously evolving in such a way that affects the users’ behavior when accessing them. Under these circumstances, the current generators of synthetic, application-specific, Internet activity are rendered useless and they are driven to their retirement, because of their inflexible modeling mechanisms.

In this paper, we have presented the state-of-the-art tools for the generation of synthetic Internet activity. We have revealed their deficiencies and potential flaws in order to define new specifications on workload generation. Having these specifications in mind, we have created SYNTHIA, a novel framework for the development of workload generation tool, which was designed to cope with the challenges posed by today’s Internet. Finally, a detailed analysis of SYNTHIA’s architecture was presented, which focused on its modular layout, the constituent packages of its library and its interactive GUI.
References


**Note**

More information about the supported statistical distributions and a copy of the library can be acquired from the following URL: http://statdistlib.sourceforge.net/.
Brokerage and closure in sociotechnical systems transitions

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Abstract:
This paper investigates the role of brokerage and closure among and within social groups, in sociotechnical systems transitions. Brokerage refers to social group interconnecting agency that acts as driver of innovation and change, whereas closure is connected to homogeneity and stability within groups and acts as a stabilizing force and resistor to change. In the sociotechnical systems approach the study of system innovations, social groups and institutions, rather than techno-economic forces, play the most decisive role on the orientation and characteristics of the technological transitions, and on the selection and use of technologies, that eventually constitute sociotechnical regimes. In our paper, using system dynamics modelling and simulation in conjunction with the case study of functional foods system we investigate the role of the two principal social capital attributes (brokerage and closure) on the governance of sociotechnical systems transitions and we demonstrate their use as governance instruments.

Keywords:
Sociotechnical systems, social capital, system dynamics, transitions

Introduction
The sociotechnical (ST hereafter) systems approach is an approach to study technology evolution and diffusion. It is a systemic approach because it is based on the study of the interconnections and the dynamics of social groups that are of interest in studying technological dynamism and inertia. There is considerable literature on the study of transitions and a number of case studies (Geels, 2002;2004) on how current established technologies came to be by replacing or complementing previously dominant technologies. Central tenet in these studies is the coevolution of social trends, attributes and institutions along with technology. There are two main approaches on the ST systems so far: the multi level perspective
(MLP) (Geels, 2002 & 2004; Geels and Schot, 2007) and the transition contexts approach (Smith et al, 2005). In this paper an attempt is made to explicate how a new system is created from the interaction and mutual “osmosis” of elements and/or activities of two particular systems supplying distinct societal needs. This is a novel case as a search into the extant literature has shown that the main focus so far has been the provision of analysis and explanations of the dynamics of sociotechnical regime transition as a result of new technologies.

The aim of the paper is to make explicit the importance of two social capital attributes brokerage and closure in the dynamics of ST system creation. By looking into the case study of functional foods we develop a system dynamics model of the process of the new ST system creation and investigate the role of brokerage and closure as governance instruments. Our claim is that brokerage is a necessary leverage point in taking advantage of the weakening of “technological closure” that takes place within ST regimes as a result of endogenous or exogenous pressures which act towards creating inter-regime “osmosis”. In the following section the two leading ST system approaches are presented, then the concepts of brokerage and closure as attributes of social capital and their relevance to ST transitions are discussed, followed by the presentation of the model and simulation results. Finally conclusions are drawn.

2. Sociotechnical systems and transitions

There is a lot of literature so far, on shaping, providing cases studies, critiquing and refining or complementing the concept of ST regimes and transitions. The articles of Geels (2002, 2004, 2007) and Smith et al (2005) are among those that provide a significant part of the core of the theory related to ST regime transitions while constituting two distinct approaches to transitions. The common theoretical ground is briefly discussed below, while each specific approach is explicitly presented separately in sections 2.1 and 2.2.

The core concept in ST systems is that of the ST regime which has been drawn from the work of Rip and Kemp. They define the concept of technological regime as: “the rule-set or grammar embedded in a complex of engineering practices, production process technologies, product characteristics, skills and procedures, ways of handling relevant artefacts and persons, ways of defining problems; all of them embedded in institutions and infrastructures” (Rip and Kemp, 1998, p. 340).

The concept of technological regimes has been further developed to explicitly include core social groups such as product and technology users, policy makers, societal groups (NGOs etc), suppliers, scientists, capital banks. These groups also bear an influence on technical trajectories while also adhere to set of rules that guide their activities, and thus the set of
technological and social rules is fittingly termed sociotechnical (Geels, 2002). Nevertheless in a ST system, there are social groups and/or activities that do not belong to the core regime, although they are related with it. These groups and/or activities form the fringe of the ST system and when organised either by themselves or by some governing bodies they constitute sociotechnical niches.

ST regimes thus provide stability to technological trajectories in more than one ways: by guiding and focusing the search heuristics of engineers rendering them blind to developments outside their focus (Nelson and Winter, 1982), regulations and standards (Unruh, 2000), socio cultural adaptation to technical systems, sunk investments in machines, infrastructures and competencies (Christensen, 1997). Pressures, acting upon a regime usually evoke a response that can lead, under certain conditions, to a transition. In each transition there are elements that can be used to characterise it. There are two characteristic frameworks of typology in the literature. The main proponents of the first one are Geels and Schot (2007) and of the second are Smith, Stirling and Berkhout (2005). Both are briefly presented below.

2.1 Multi Level Perspective

The approach owes its name to the explicit use of three distinct levels of analysis namely landscape, regime and niche levels, in order to explain the ongoing dynamics in regimes which are either stable or in transition. The relationship between the three levels is conceptualised as a nested hierarchy in Geels (2002) with the landscape level at the top providing gradients for the ST trajectories, the established regime level where incremental technological development takes place and synthesizes the trajectory of the regime and the niche level at its base where radical innovations are developed. The core of ST regimes and niches is formed by the system, the rules and the actors that are involved.

Transitions in ST systems come about by processes of accumulation in the levels of niche and landscape. The landscape level contains heterogeneous factors that are “technology external” (Geels, 2002). As such these form an external structure to the ST system, a substrate or context for the interactions of the system actors. On the landscape level, changes take place slowly in the form of cultural changes, demographic trends, environmental changes and broad political changes or in the form of a shock for example a war. Being beyond the direct influence of actors landscapes provide gradients for action in the ST regime and niche levels.

Niches on the other hand, are the place where radical innovations reside. They act as “incubation rooms” for them (Schot, 1998). In these protected spaces, new technologies are shielded from market (market niches) and technology (technology niches) forces as in their initial stages.
they might have some potential but lack the performance that would enable them to compete with established regime technologies. In this way they are developed under different selection criteria than those of mature technologies and are thus easily geared towards the problems the established regime faces. Thus, niche research and development is a process of accumulation of knowledge and expertise, of learning that proceeds unencumbered from the pressing demands of the market place and a process of building the network that will support the innovation in its later stages of development. Niches provide such locations for learning processes e.g. about technical specifications, user preferences, public policies, symbolic meanings, it is a place shielded from the rules of the established regime. It follows from the description so far that niches and regimes are: "similar kinds of structures, although different in size and stability" (Geels and Schot, 2007).

Geels and Schot distinguish six types of transition in their typology: reproduction process, transformation path, de-alignment and re-alignment, technological substitution, reconfiguration pathway and disruptive change. They draw the distinction based on characteristics of the transition such as the character of landscape pressures (sudden or gradual), regime resource sufficiency in responding to the pressures, and the existence (or not) of niches in which solutions to ensuing problems may be found.

2.2 Transitions contexts

The conceptual model of regime transformation of Smith et al (2005) makes use of three factors: articulation of selection pressures on the part of the regime members towards the problems the regime faces, the degree of availability of resources for regime transformation (tangible and intangible) and the degree that the response to the articulated pressures is coherent and coordinated across regime members. The authors define as adaptive capacity the availability of resources and the coordination of the regime response. It is these concepts of coordination and resource locus that they use to define the transition contexts (see Figure 1).

Transformation processes can then can be analysed according to whether they contribute to the articulation of selection pressures or whether they contribute to adaptive capacity.

The articulation of pressures (pricing, competition, taxes and regulations, standards, profitability and knowledge) comprises two elements: the orientation of selection pressure towards a particular direction and the processes that render these pressures explicit and translate them into a form that prompts and enables a response by the regime. An example offered for the second element is climate change. The pressure to respond to climate change was made explicit by the scientific evidence offered by IPCC on the anthropogenic rise of temperature. This evidence
puts pressure for the establishment of national and international policies aimed at curbing GHG emissions.

Pressure on any regime is bound to produce some response. The functions that the regime encompasses are critical to this response. The degree to which these functions are performed adequately by incumbent regime groups is instrumental in responding effectively to selection pressures. The most adaptive regimes are thus those that can maintain and perform their function in the face of selection pressures. This notion of fitness, as Smith et al note, is close to the notion of resilience as it is defined in Folke et al (2002): “the capacity to absorb shocks while maintaining function”. However, in the case of regimes, a characteristic is that a contribution to maintaining system function can be made by groups on the fringe or outside of the regime. In this case a regime with weak adaptive capabilities could respond by opening windows of opportunity to social groups outside or close to its boundaries which could contribute to the functions of the regime. Hence adaptive capacity is not intrinsic to a regime but can be sought outside in networks of actors that can mobilize and utilise resources beyond those of the regime. Resource locus thus becomes a transition factor. This is reflected on the vertical axis in Figure 1 below.

![Figure 22: Transition contexts (Adapted from Smith et al. (2005))](image)

The four quadrants in Figure 1 are abstractions and as such comparison with real world regime transformation processes will reveal that a transition has elements of more than one quadrant or that a transition successively traverses more than one quadrant before it is completed. By altering governance patterns at different stages (quadrants) of the regime and therefore altering the given context of selection pressure and adaptive capacity, the pace and orientation of transformation processes can be
modulated. This typology can be used analytically about transitions that have taken place or prescriptively in an ongoing transformation.

3. Brokerage and Closure in sociotechnical systems

Brokerage and closure are properties of social capital, social groups and intergroup networking. Specific agents (individuals, groups or formal institutions) have different roles at different time instances. That is, as brokers they may be agents of change when connecting groups and act as carriers of knowledge from one group to another. On the other hand, they may be the key players in maintaining the status quo within a social system.

Social capital is defined as: “the advantage created by a person’s location in a structure of relationships” (Burt, 2005, p4). These persons are better connected with others. Their advantage becomes manifest when they do better than their peers because, one way or another, their interests are better served. According to Coleman (1990, pp 302): “social capital is productive, making possible the achievement of certain ends that would not be attainable in its absence”. As a concept social capital, a product of relations, has become central in business, political science and sociology. In ST systems, social relations within and among groups are defined with respect to the dominant perception of specific technologies. In regime shifts (transitions) and re-orientations, as new technologies emerge, specific agents undertake the role of forming internal integrating relations through promoting a dominant perception of the technology. They act as actor network (ANT) (Latour, 2005) enrollers to translate the interest of social groups towards the new technology or vice versa (the social needs to interest in technology).

From the definition of social capital it follows logically that it can potentially lie in structural holes between two groups. These are analogous to an information barrier. The potential that lies in structural holes is that the sources of information they separate can be more additive than overlapping. The action of coordinating across holes and realizing the potential that lies therein by creating value, is defined as brokerage and brokers or network entrepreneurs are the people who build these structural bridges (Burt, 2005). The social capital of a broker thus consists of the opportunities that the broker unearths, opportunities of facilitating flows of information between people by creating bridges. Opportunity in this context is taken to mean a hole in a social structure and a bridge is the relationship intended on spanning it. Brokers by weaving networks that span structural holes (Burt, 2005, p86): (a) Provide a broad base of referrals to customers, suppliers, alliances and employees for a project, (b) improve diligence on potential customers, suppliers, alliances, employees, financing and alternative organization models, (c) increase the probability
of knowing which of alternative ways to pitch the project will most appeal to specific potential customers, suppliers or other sources of support, (d) the projects launched are more likely to reach fruition because network entrepreneurs are more likely to anticipate and adapt to the problems that will inevitably arise. The effect of brokerage thus goes beyond information diffusion. Carrying information or an idea across structural holes adds value to it as it traverses the social structure. Implementing it though involves mustering support within the groups bridged, specifically from people who will benefit from the idea such that resources are allocated to it. The advantage that social capital stemming from brokerage harbours manifests itself in recognition and resources. This can work in two levels: at an individual level for the broker, and for the groups that are brought in contact.

The sense of investing in people because of the foreseeable potential before this actually manifests, captures the essence of brokerage and underlines the critical role that trust plays in brokerage. Brokerage is about coordinating people, whom it would be valuable but risky, to trust. What reduces the risk by making it safe to trust is closure. The network around two people (or groups) is said to be closed to the extent that both have strong relationships to mutual contacts. Closure creates value by having an effect contrary to that of brokerage. It decreases information variation within a group and increases coordination, thus reinforcing the status quo or (stating it in ST terms) the established regime of the system. Drawing the connection to ST regimes, these are a result of internal (ST systems) closure. In systems terms (Maturana and Varela, 1991) i.e. they tend to reproduce their selves by exercising the same way of thinking, the same routines and by utilising the same resources. Closure operates at two levels: within social groups engaged in the regime and within the regime, i.e. at the intersection of groups altering the perception of one group by another with respect to the established technology. Closure thus adds to the inertia of a group with regard to outside stimuli and as a result in-group structural holes deepen, thus increasing the potential returns to brokerage within and in between groups. This happens because regardless of the potential of their ideas, people are less likely to discuss them in groups with high levels of closure. Most likely to do so are people whose network extends across structural holes. As a corollary, organizations with management teams and collaboration networks of sufficient absorptive capacity for new ideas, which operate across structural holes in their markets, are able to be more creative and bring new ideas to market.

Brokerage creates value by exposing people to variation in information. Closure’s value comes from driving variation out of the closed network. In one case information is valuable when it is non redundant, in the other case information is valuable when it is redundant.
What at first sight may appear a contrast between two concepts can be resolved by outlining the potential complementary effects of brokerage and closure. Burt (2005) argues that the two mechanisms can be integrated in the concept of structural autonomy. Brokerage concerns coordination of agents whom it would be valuable but risky to trust. Closure ensures that it is safe to trust. So value can be created when the two concepts are put together. Bridging a structural hole can create value but delivering the value requires the closed network of a cohesive team around the bridge. Ideally a group that could take advantage of both brokerage and closure (a structurally autonomous group) (Burt, 2005, p 141): “consists of people strongly connected to one another, with extensive bridge relations beyond the group...It has a strong reputation mechanism aligning people inside the group and a strong vision advantage from brokerage outside the group”.

The discussion so far brings up the issue of distinguishing among groups. There are several criteria by which groups can be defined (Burt, 2005, p 116) for the purposes of this study the sole criterion is knowledge. Moving such knowledge is why brokerage is valuable and this is what happened in the functional foods case. In the creation of a new ST system by a combination of elements of existing regimes, brokers act at their exterior, between them, to bring together loosely related elements of existing systems which reside at the fringes of the regime. Some social groups may even be at competition. This is the case as there are always technologies within a regime with disruptive potential.

The case of emergence of functional foods is of particular interest precisely because it is a case of quasi-emergence of a new system without replacement or decay of already established systems. It bears similarities to Sapsed et al. (2007) in that novel applications are developed on the fringes of two systems. However in our case the technology is aiming to satisfy a new societal need. In our case the two systems, whose interaction brought the new one into existence, are the food and the pharmaceuticals. The case has the following interesting features: there have never been clear boundaries among the systems, the new technology (functional foods) was not protected in its infancy and this is a departure from the MLP model put forward by Geels (2002, 2004) in that there are no technology or market niches. A distinguishing characteristic is that the “parent” systems and the new coexist without any indication of decay and disappearance of either of the three. This is partly because each one of them bases its existence on fulfilling distinct societal functions. The food regime fulfils the function of human nutrition, the pharmaceutical regime that of medicine supply and the functional food regime the emerging need for proactive health enhancing nutrition. Indeed the health costs that national economies have to bear are great and can be said to provide further reason for promoting functional foods, without this however being the primary one for the
emergence of the regime. Its emergence is still a process in development, while its start can be traced back in the 50s (see table 1 below). It is a process that has gathered momentum through pressure at the landscape level and a series of events that resulted in the accumulation of knowledge and resources relevant to the production and supply of functional foods.

Landscape pressure is primarily related to the population age stratification in western countries. As the average life span increases the frequency of age related diseases increases. Examples are osteoporosis or cardiovascular diseases. This is a fact that harbours commercial potential for products that can contribute to preventing occurrence of such diseases. This is what functional foods have been associated with from the beginning. Apart from landscape developments that put pressure on the regime, there were other internal processes that acted to exacerbate the need for diversification. In the pharmaceuticals regime the long lead times and enormous R & D costs increase the loss occurrence of failed products. At the same time the accumulated knowledge constituted a significant asset in search of other applications. In the food regime high publicity cases of failure to adhere to production standards and intense competition made evident the need for diversification. On a parallel note the improvement of standard of living, shift in social norms and an increasing interest regarding nutrition and health issues mark a clear and substantial consumer shift towards innovative nutrition products that have additional disease prevention attributes on top of nutritional value. Nowadays the consumer’s belief that appropriate nutrition contributes to health is stronger than ever (Mollet and Rowland, 2002).

The word emergence in the case study is used advisedly because both “parent” regimes have contributed either to production or to supply. In particular the pharmaceuticals system with its increased R & D capability and resources and product development know how (Brannback et al., 2002; Menrad, 2003) contributed to the production side while the food regime contributed its market knowledge and distribution capabilities. In this way the barriers that the pharmaceutical companies met when they independently tried to enter the market and failed, for example Novartis (Menrad, 2003; Biester, 2001), were overcome. The new regime thus can be said to have arisen by brokerage between the two regimes. This is particularly so as the pharmaceuticals industry got involved when it saw the leverage in using biotechnology in food product development i.e. there were returns to brokerage.

In the development of the functional foods regime three phases can be distinguished. In the first phase (1980s) landscape pressures were still low with no interaction among the two “parent” regimes. Functional foods have not gained market share. In the second phase (1990s) sales are increased and technology developed further. The strategy of companies also changed
and commercials aimed at raising product awareness appeared on the media. In a move to further strengthen their market foothold, companies indirectly promoted their products by gaining support and/or approval by the cardiological and other medical societies. In the third phase (mid nineties to present) landscape pressures persist and the two regimes actively cooperate. The use of biotechnology marks a change in products offered. Sales increase further as product promotion becomes more intensive with conferences organised and university research and education becoming ever more involved (alliances among members of systems). An example is that of Unilever with product named Becel that addressed initially specialists in order to gain legitimacy and then targeted mainstream consumers by integrating the product into wider campaign for a healthier lifestyle.

The main markets are in the US, Europe and Japan where in the US functional foods hold a 2% of the food market (Menrad, 2003). In Europe the most important markets are in Germany, France, UK and Netherlands. However Japan has the highest per capital consumption, which is double that of the US and quadruple that of Europe. This is a result of an annual market increase of 12% in the last decade (www.functionalfoods japan.com, access 27/1/2009). Functional foods appeared first in Japan where a regulative framework existed since 1991. According to it, functional foods are categorized into unregulated conventional foods without an officially approved labelling for health improvement claims and functional foods designated as FOSHU (Food For Specific Health Uses). This is evidence that the regime is not yet fully developed as is the plethora of definitions found elsewhere. As an example a quote taken from the European Food Information Council (EUFIC, 2009): “Functional foods are developed specifically to promote health or reduce the risk of diseases…. they are a positive health enhancing addition to an overall balanced diet and active lifestyle.”. It should be noted that due to there being different definitions of functional foods it is difficult to estimate market size (Menrad, 2001).

In the table below a number of important developments are listed and characterised according to whether they contributed to opening up the two interacting regimes (brokerage) or solidifying the new regime of functional foods (closure).
Table 4: Key milestones in healthy and functional food development  
(adapted from Heasman & Mellentin, 2001)

<table>
<thead>
<tr>
<th>Date</th>
<th>Development/Event</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950 onwards</td>
<td>Researchers begin to investigate more closely the relationship between nutrition and degenerative diseases, such as the connection between heart disease and dietary intakes.</td>
<td>Brokerage</td>
</tr>
<tr>
<td>1955</td>
<td>Yakult Honsha company incorporate in Japan.</td>
<td>Brokerage</td>
</tr>
<tr>
<td>1965</td>
<td>Concept of probiotic lactic acid bacteria introduced in paper by Lilly and Stillwell.</td>
<td>Brokerage</td>
</tr>
<tr>
<td>1969</td>
<td>US White House conference on food nutrition and health, draws public attention to the links between diet and chronic disease risk.</td>
<td>Brokerage</td>
</tr>
<tr>
<td>1976</td>
<td>Norwegian government publishes world’s first set of dietary guidelines.</td>
<td>Closure</td>
</tr>
<tr>
<td>1977</td>
<td>Dietary Goals for the United States (1977). One of the first documents to report several diet disease hypotheses and to set quantitative target levels for reducing fat, saturated fat and cholesterol in the American diet.</td>
<td>Closure</td>
</tr>
<tr>
<td>1980s</td>
<td>Japanese introduce the functional food term and step up research and funding. By the end of the decade more than 100 reports had been published throughout the world.</td>
<td>Brokerage</td>
</tr>
<tr>
<td>1980s</td>
<td>Food industry moves towards sugar free, low fat, fat reduced new product launches.</td>
<td>Closure</td>
</tr>
<tr>
<td>1983</td>
<td>NACNE report published in UK giving Britons quantified dietary goals for the first time.</td>
<td>Brokerage</td>
</tr>
<tr>
<td>1983</td>
<td>Aspartame, the artificial sweetener approved for use in EU.</td>
<td>Brokerage</td>
</tr>
<tr>
<td>1984</td>
<td>COMA report on cardiovascular disease. UK government officially accepts the diet and health link.</td>
<td>Brokerage</td>
</tr>
<tr>
<td>1984</td>
<td>The Kellogg company makes its artificial cancer prevention health claim for its All-Bran cereals in the US supported by the National Cancer Institute.</td>
<td>Brokerage</td>
</tr>
<tr>
<td>1988</td>
<td>Fibe Mini a dietary drink introduced in Japan by Otsuka Pharmaceutical is credited with being the world’s first functional food.</td>
<td>Brokerage</td>
</tr>
<tr>
<td>1990</td>
<td>Concept of functional foods introduced in Europe and US.</td>
<td>Closure</td>
</tr>
<tr>
<td>1990</td>
<td>Finnish dairy company Valio launches Europe’s first ever product Gefilus.</td>
<td>Brokerage</td>
</tr>
<tr>
<td>1990</td>
<td>The US becomes the first country to introduce mandatory nutrition labelling.</td>
<td>Closure</td>
</tr>
<tr>
<td>1991</td>
<td>The Japanese introduce the FOSHU system of self regulation for food products which allows product specific health claims.</td>
<td>Closure</td>
</tr>
<tr>
<td>1994</td>
<td>By law claims for dietary supplements that do not need priori approval by the FDA in the US are allowed.</td>
<td>Closure</td>
</tr>
</tbody>
</table>

(continued)
4. Modelling the dynamics of the ST system creation

For exploring the dynamics of brokerage and closure a system dynamics model was developed. This was based on the context of the case study. The general structure of the model consists of two groups (the “parent” regimes) and the interface, or the network spanning structural holes. A causal loop diagram was developed in accord with system dynamics methodology (Sterman, 2000) to depict the dynamic hypothesis that underlies the model. Below the dynamics of brokerage and closure are discussed in more detail and the causal loop diagram, the basis for the model, is presented.

Within each group the agents interact and maintain the flow of information by engaging in informal discussions and gossip (Burt, 2005). This flow acts to increase relationship strength among the group agents and thus increase group closure by acting to confirm the beliefs of the agents. As there is no brokerage in the beginning the flow of information is replete
with redundant information and if matters are left to develop unencumbered group closure will increase. With closure increasing, the reputation cost for misbehaviour within the group increases as does the probability of detecting such behaviour. As a result the coordination among the employees and their performance increases, again reinforcing group closure. With increased information flow within the group coordination among employees has another effect, the strength of relationships increases adding to group inertia – resistance to change, which leads to higher levels of closure. This is how information flows act to reinforce group closure. The two groups are brought closer i.e. inter group closure increases as the number of group links and the level of information flow between the groups increases.

What can on occasion break the progression towards higher group closure is brokerage between the groups (the loop is shown in dotted lines). High closure with little inter group communication is taken to be equivalent to high returns to brokerage. This attracts brokers who attempt to utilise the opportunities that arise and bridge the ensuing gaps in between the groups. In this particular case opportunity first appears in the food regime and a decade later in the pharmaceuticals regime. Brokerage creates inter group flows of non redundant information and forces group agents to adapt themselves to a situation where they have to learn new things. It places them in a situation where it pays to lower their resistance to change and investigate novel ways of performing specific tasks, organizing as a group, or producing novel process outputs. The plus sign is used to indicate a reinforcing effect that one variable has on another ceteris paribus. In a similar logic a minus is used to indicate a balancing effect.
In developing the model and in keeping with the principle of model parsimony a number of assumptions have been made and they are discussed next. A strong assumption made is that intergroup relationships once developed by brokers do not decay. In reality they may become inactive (this is not modelled) without being severed or they may decay and eventually broken. All inter group relations are assumed to be of equal strength. However this does not hold in reality as the specific context in which connections between groups is more important than the actual number of connections (Burt, 2005). This is something that will be looked into in successive studies. Relationship strength could be disaggregated with respect to age (how old a relationship is) but on this first attempt on modelling taking the aggregate effect of all the relations is deemed to be sufficient.

A second assumption is that returns to brokerage are calculated for each group. Consequently there are two separate sets of brokers, whose number varies with returns to brokerage, one for each group that work to connect the groups. The coupling variable is the number of network structural holes. If these are eliminated then there are no further returns to
brokerage for either of the two sets of brokers. Brokerage activity within each group is not modelled. Structural holes within each group are taken to have no effect i.e. an assumption is made that brokerage takes place exclusively in between the two groups and not within each group. Brokers become aware of Returns to Brokerage and become potential brokers with a certain delay. First an opportunity has to surface in the vicinity of either group e.g. technology, social trend etc. and increase the returns to brokerage. Then potential brokers mobilise under one condition: brokers must exist on both groups in order to bridge the network holes that exist.

5. The development of ST systems a quantitative analysis

Simulations were conducted to investigate the effect that brokerage has on the information flows between the two “parent” regimes with time. We investigated the effect that the time that opportunity presents itself has on the performance of the regimes. A complementary test was performed, to see whether policies designed to reinforce the interaction among the two regimes by increasing the returns to brokerage have the intended effect.

Simulation horizon was set to 100 years as it is assumed that the development of the new regime is still far from over (its start dates back to 1950s, see table 1). As the calibration of the model uses an arbitrary datum for variables not referring to the case study the absolute values of variables on the graphs are of less significance than the trends they display. The base case scenario which follows the case study, opportunity in the food regime appears in the 1980s and for the pharmaceuticals regime in the 1990s. For brevity where necessary on the graphs, 1 is used to designate the food regime and 2 the pharmaceuticals regime.

In general the behaviour of the model follows the reference pattern of the case study. As pressures on the landscape level accumulated, the need for a response in the food regime (1) became apparent. But in this case it could be said that the food regime did not have sufficient adaptive capacity (Smith et al, 2005) for an appropriate response. In search for a solution new information flows are thus created and inevitably the closure of the regime is reduced. Agents within the system become more willing to diversify and resistance to change is less. As the food regime begins to utilise the capabilities of the pharmaceuticals regime in the early nineties its performance improves. The pharmaceuticals regime also benefits but to a lesser extent (something present in the simulation results as well). This is primarily because of the work that had already been done on functional foods within the food regime in the eighties.
Further experiments were carried out in order to investigate the potential of brokerage and closure as tools for governance. Focused policy measures to bring forth the opportunity for the regimes can (assuming that the policies are adopted at the time the regimes become involved in interaction) improve the overall situation with reduced resistance to change and closure, and increased regime performance. If policies are left to act alone and keeping their timing the same as before, they still increase the performance of both regimes although the increase is less compared to the
base case because the levels of closure and resistance to change are higher and they counter brokerage efforts (see figure 2). Thus purposive brokerage and closure is possible and can be effective. This result is in accord with Burt (2005).

If policies are implemented prior to an opportunity being there (ten years earlier) the most striking difference is that the closure of the pharmaceuticals regime is significantly affected and reduces instead of increasing (base case). Regime performance rises earlier but remains lower than in the base case for the period of 1995 to 2030. Increasing the temporal distance between the opportunities in the food and pharmaceuticals regimes, results in increasing the maximum attainable performance for the food regime. This is logical since the resources for the regime response have to come from outside. Any delay increases the predicament in which the food regime finds itself and simultaneously the readiness with which it can open up to new information flows.

6. Conclusions

The results highlight the importance of the time in regime governance but do so through the lens of of brokerage and closure dynamics. If policy prematurely provides incentives, this may result in lower overall performance of the target regimes, precisely because of the dynamics of brokerage and closure. Less closure means less coordination and lower performance. This for a given level of brokerage can be expected to result in lower overall regime performance (see figure 2). This result supports the conclusion of Burt (2005) that when brokerage and closure operate in unison performance should be higher than the case where either operates unilaterally. Paraphrasing the quote by Pasteur: “chance favors a prepared mind but not an impatient one”. The case study and subsequently the model demonstrate that attending to the details that are crucial in the systemic relationship of brokerage and closure is a point that should not be overlooked when it comes to regime governance.

References

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Considered as an age of changes, our age ends with systemic changes that can, either confirm and continue this characteristic trend of the current social evolution, or open a new era, an era in which the current changes will come to an end, within a homogenous and stable global system. In the latter case, an aspect that should be considered is represented by the nature and the structure of the new social organization, aspects that will also determine the characteristics of its dynamics. The next social order will be necessarily a new one, but at this moment, its structure is hard to predict. However we have to formulate rigorous social models in order to avoid both a) spontaneous evolutions towards crisis and b) failed social experiments at high human costs.

Our age is also an age of crisis; it presents even a system of crises. The way that the manifestations of the current crises are approached suggests that not all the current crises (economic, financial, political, ecological) are spontaneous or necessary. Some of these types of crises, such as the managerial ones, the crises from the field of labor and human resources, or the project crises, result from or are induced by the way of conceiving and organizing the cultural and educational processes. We consider here the aspects pertaining to the economic culture, technical culture, biological culture or spiritual culture.

Aside from the information culture, the computer culture and the culture of computer environment, it is necessary to initiate the biological culture, the culture of a socially-oriented mind, and the prospective culture. The prospective thinking also involves the concern with avoiding certain special forms of loneliness of the human being as self-privileged biological species, as social being and as cosmic entity, itself on the verge of extinction through ecocide, through progressively abandonment of natural relations and through extreme individual originality.

In the present paper we emphasize the conditions of social evolution based on intellectual education oriented by a social design and supported by the development of knowledge-based IT instruments. We explore, starting from our previous papers, the possibility of developing certain intellectual techniques based on information technologies.

The complexity of human evolution and, therefore, the necessity of its efficient orientation are also demonstrated by the life cycle of neuron, the natural unit of intellectual activity, which has a biological origin, a social conditioning, a cultural...
causality and an individual evolution which, however, takes place within a specific ecosystem, and which now imposes the ecology of mind.

The finality of the paper is the development of the crisis management research field, as a field of strategic management. The place of crisis management in relation with other management fields such as change management, risk management or emergency management is established.

The paper highlights the natural, informational and sociological bases of an efficient social evolution and organization, with a strong IT involvement, starting from the fact that in certain fields and at certain levels of organization, the automatic evolution or control of processes is the most efficient.

A theory of systemic change oriented crisis management is developed in the paper, on the basis of the selection and the application of certain principles related to Systems Dynamics, Systems Practice and Human Systems Designing. The proposed theory explains the ensemble of remnant, current or emerging crises in today’s society and formulates a methodology for the management of social crises.

The developed theory explains both the great number and the rapid succession of the recent crises, the scope of the current crisis, and the failure of the repeated attempts throughout the last 50 years to solve or to postpone the developing crisis. Based on this theory, alternative or successive - economic, political, technical - ways of crisis management, attempted in the last historical period, are identified.

Obviously, among these ways, the most recent, namely the one based on IT development, was also the most successful.

The same theory offers a methodology (a set of principles) of social organization, starting from the study and the application, for the purpose of Design for Society, of three categories of principles: the evolution principles, the principles of efficient action and the principles of systemic collaborative thinking.

The examination, based on the same theory, of the probable evolutions of social systems coexisting nowadays, allows the identification of a solution for a social evolution realized as a development. For this purpose the theory of crisis management is associated with the application of a model of technological development similar to the one in progress in the co-evolution of natural and artificial intelligent agents, given the fact that the stages of the evolution of artificial intelligent systems are accepted as steps in the human evolution.

The mixed evolution, natural (human) and artificial, can generate new and efficient models of economic growth, of technological development and intellectual evolution. This possibility is illustrated by the current processes of creating new forms of technological art and information aesthetics, new species of computing ethics and even of machine ethics or new fields of scientific computing and artificial philosophy.

The co-evolution of the natural and artificial intelligent entities will not necessarily lead to the emergence of a new mixed, natural and artificial, species, but to a mixed evolution which could induce more formalized and more operational common activities and even some aspects of automatization of the social evolution, which will be, however, far from the current aspects of standardization and beaurocracy. In this process of co-evolution also new, common capacities and aptitudes could be generated.
The social innovation, in its various forms, is also taken into account as a factor in
the management of the system of crises; and the possibility of combining the
algorithmic and the euristic as a solution for an efficient social evolution,
euristically oriented and algorithmically realized is assessed.
In the paper are examined 1) several ways in which the evolution of the artificial
intelligent systems can be realized as 2) some causes of the failure of certain
forms of social evolution so far practiced, that are represented through four
graphs.
We also highlight three methods of identifying a global and systemic, but modular
and evolutionary, solution which could be sequentially applied for social and
cultural models based on different economic, political and spiritual development
strategies. These ways of development tolerate errors, non-standard attempts and
aging phenomena, exclude the acceleration of the social processes towards
unknown objectives or the recourse to powerful technologies without fundamental
knowledge and involve the development and application of new socio-cybernetic
technologies as well as the development of intellectual techniques based on
information science and technology.

Keywords:
Dynamics, explorations in systems practice, social innovation, crisis
management, design of human systems
Philosophical foundations for systems thinking in economics: a critical realism perspective

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Abstract:
One of the most refreshing philosophical perspectives introduced to social sciences over the last twenty years or so is undoubtedly this of Critical Realism (CR). Its ideas have been received both with great interest and enthusiasm by some economists (Marxians, post-Keynesians and institutionalists), as well as with scepticism and opposition by others. Overall, the CR project has given rise to many discussions and debates making its presence well felt in various fields, such as economic philosophy and economic methodology.

Keywords:
Philosophy, methodology, economics, critical realism

1. Introduction
One of the most refreshing philosophical perspectives introduced to social sciences over the last twenty years or so is undoubtedly this of Critical Realism (CR). Its ideas have been received both with great interest and enthusiasm by some economists (Marxians, post-Keynesians and institutionalists), as well as with scepticism and opposition by others. Overall, the CR project has given rise to many discussions and debates making its presence well felt in various fields, such as economic philosophy and economic methodology.

Despite recent endeavours to launch CR as an independent school of thought in economics (Lawson, 1997a, 2003a; Downward, 2003; Davidsen, 2005), CR has very much played the role of ‘underlabourer’ within the discipline, critically inquiring the mainstream orthodoxy and elaborating alternative perspectives as applied, or as of concern, to economic issues (Lawson, 1995; Fleetwood, 1999b). This is because CR is
intrinsically a philosophical position and particularly an ontologically oriented one. It presents a new way of seeing socioeconomic reality, and, on these grounds, it advances discussion in philosophy and methodology providing guidelines of how modes of reasoning and research might be fashioned in economics and other social sciences, such as management (Mingers, 2006), organisation theory (Willmott, 1997) and information systems (Mutch, 2002; Morton, 2006). Moreover, the fact that CR is “clearly compatible with a wide variety of theoretical and methodological approaches” (Outhwaite, 1990: 366) without prescribing to a specific ideology or political programme (Fleetwood, 1999b), confers on this philosophical framework the status of a general platform, capable of embracing and ontologically enriching a wide variety of approaches in natural and social sciences as well as in economics (Lawson, 1997a, 2003a; Fleetwood, 1999a, Lewis, 2004; Castellacci, 2006; Downward, Dow and Fleetwood, 2006).

So far advocates of the CR project in economics have made contributions mainly in three domains. First, drawing on the CR insights, a critique has been launched against mainstream economics (Lawson, 1997a; Reiss, 2004; Wilson, 2005). Second, the work of selected prominent economists and economic schools have been analysed from the viewpoint of CR (Peacock, 1993; Brown, Fleetwood and Roberts, 2001; Lawson, 2003b; Castellacci, 2006). Third, the philosophical insights of Roy Bhaskar, upon which the critical realist project is founded, have been organised, refined and adjusted to the discipline of economics (Lawson, 1997a, 2003a; Fleetwood, 1999a; Lewis, 2004).

The current paper contributes to the last literature, though its scope is fairly moderate. In a space which is quite limited for such an endeavour, it delineates the key ontological and epistemological premises of CR, before it moves to outline its methodological implications. The paper concludes by summarising the key points raised.

2. The philosophical bases of Critical Realism

Science never takes place in a philosophical vacuum. All research activity independent of its specific subject matter presupposes the adoption of a philosophical position. This is because it is impossible to generate or integrate knowledge without a clear perspective of how ‘reality’ is constituted and realised and what constitutes valid knowledge, as it is these ontological and epistemological assumptions that define appropriate methodologies and generally inform and guide the overall research process (Johnston, 1986; Blackburn, 1996).

The CR understanding of social reality is based on three fundamental premises about the social world. First, the world is comprised of objects that are ‘structured’ and ‘intransitive’: structured in the sense that they
cannot be reduced to the events of experience and intransitive in the sense that they exist and act independently of their identification and the knowledge of which they are the objects (Bhaskar, 1975, 1979, 1989; Lawson, 1997a, 2003; Archer et al., 1998; Fleetwood, 1999a; Lewis, 2004). From this perspective it follows that the world is constituted not only by events or states of affairs, and our experiences or perceptions of those actualities, but also by ‘deep’ structures, mechanisms, tendencies and their relations that, although they may not be directly detectable, nevertheless exist and govern the actual events as well as what we experience, understand and do.1 Such a distinction between intransitive entities (i.e. structures, institutions, mechanisms, processes and tendencies) and transitive objects of knowledge (such as events, observations, theories, hypotheses, etc.) precludes any anthropocentric definition of ontology (that is, defining reality and what exists on the sole basis of human senses and experience), and the subsequent collapse of the ontological into the epistemological domain (that is, confusing what exists with what can be known to exist). On this basis, the importance of ontological determination as an important step in any social enquiry is pointed out (Bhaskar, 1975; Sayer, 1992; Lawson, 1997a; Archer et al., 1998; Dow, 2002).

Furthermore, it is essential to highlight that CR sustains a clear conception of the intransitive nature of social entities without underestimating the relativity and historical transitivity of our knowledge of them. Thus, their emphasis on ‘ontological realism’ (the proposition that there are true entities which exist and act independently of our knowledge of them) is complemented by an ‘epistemological relativism’, the thesis that the only way to know and express these entities is “…via human mediation in cognitive discourse”4 (Lawson, 1997a: 241). Note, however,

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1 Lawson (1995, 1997a) neatly illustrates this with an example from the physical world discussing the falling of an autumn leaf. He points out that, not only does the leaf pass to the ground, and this is experienced as falling, but this is in fact a complex movement specified by real mechanisms (such as gravitational, aerodynamic, thermodynamic, electromagnetic and other interactive forces) and their relations.

2 Although the realist literature does not provide a consistent definition of structure, it is evident that most realists (see for instance Bhaskar, 1979; Sayer, 1992; Lawson, 1997a; Archer et al., 1998) employ the concept of structure to describe more or less socially embedded sets of relations through which social objects, positions or practices are interdependently constituted (e.g. those of master and slave, landlord and tenant, employer and employee, etc.).

3 Facts, events, observations, etc., are regarded as transitive objects in the sense that, although they refer to states or properties of intransitive entities, they are in fact thought products or outcomes of human discourse that are based on some predefined conceptual systems (Sayer, 1992).

4 In response to those who, on the account of this assertion, may be tempted to contest the validity of ontological realism (i.e. to argue that it is irrelevant, unnecessary, or simply a fallacy to believe that there are intransitively existing entities if their existence can only be postulated in thought) it must be answered that “what we see gives us reasonable grounds for supporting [the notion] that the world is not our own invention even though the concept ‘world’ undoubtedly is. … For it is precisely because the world does not yield to just any kind of expectation that we believe it exists.
that such an assertion does not imply that knowledge is infallible, nor that there is only one supreme or correct understanding of the world. What is plainly maintained is that reality can be understood only through the available conceptual resources, where different standpoints provide different (yet valid to a degree) perspectives of the world, but not determine the structure of the world itself. As such, a distinction between existential and causal interdependence is acknowledged, where intransitive social entities are seen as existentially independent of, but causally interdependent with, the processes by which they are known (Bhaskar, 1979).

On the basis of this thesis, which distinguishes between our knowledge of these entities and their independent reality of being, knowledge is inevitably seen as the endless social activity of understanding and expressing these true entities (Sayer, 1992, 2000; Lawson, 1997a; Archer et al., 1998). This means that knowledge is never created out of nothing. Rather, it can only be a produced means of cognition, where revised understandings are achieved via the update or transformation of existing conceptions, insights or hypotheses on the basis of their ‘practical’ adequacy, intersubjective intelligibility and acceptability, internal consistency, as well as coherence to the overall existing conceptual framework (Bhaskar, 1975; Sayer, 1992; Lawson, 1997a; Boylan and O’Gorman, 1999). In short, CR regards knowledge as both a social process and product, which is historically and culturally specific, symbolically mediated and expressed, and, as such, not only fallible but also theory-laden, practice-dependent and value-impregnated (Archer et al., 1998).

On this epistemic account, the vital task of social sciences is to advance knowledge, that is to (re)define and refine existing nominal conceptualisations (i.e. definitions, theories) in an attempt to expand and improve understanding of the (continually active and transfactually enduring) intransitive entities and their properties, which account for the phenomena under investigation (Sayer, 1992, 2000; Blackburn, 1996; Lawson, 1997a). Certainly, new theories do not emerge out of nothing and without a reason. They are forged out of old ones in an attempt to reconcile

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1 Moreover, the admission that knowledge is fallible does not mean that all knowledge is equally fallible (Bhaskar, 1979; Sayer, 1992; Archer et al., 1998).
2 To be practically adequate, knowledge must generate expectations about the world and about the results of human actions which are, in general, realised, or correspond to reality (Sayer, 1992). Note that this idea of ‘practical’ or pragmatist evaluation of knowledge is similar to the one developed by the pragmatist tradition (Peirce, 1905; James, 1907; Dewey, 1929, 1939).
3 While one cannot exclude the possibility that there are entities and mechanisms which are not like anything we currently know or could conceive of, these cannot be justifiably invoked in explanations. In this sense a line is drawn distinguishing the plausible from the idly speculative (Sayer, 1992).
either anomalies of an empirical and practical kind, or inconsistencies and omissions in existing theoretical systems through theoretical reflection (Sayer, 1992). These theories are then assessed and reviewed in specific situations (in an essentially reflexive and iterative manner), and if found to be empirically adequate (i.e. empirically realised or correspondent to reality) they are accepted as valuable parts in the continuous unfolding of scientific knowledge1.

The second core premise of CR relates to the ‘stratified’ nature of the social world. The notion of stratification enables the differentiation of reality in distinct domains, or strata, which, though unsynchronised or out of phase (that is, operating and changing on different time frames), are seen as interconnected with one another2 (Bhaskar, 1989; Sayer, 1992; Lawson, 1997a). What relates and connects one layer with another is the phenomenon of ‘emergence’3. According to it, each level of reality exhibits entities or aspects which emerge from, depend upon, and are conditioned by entities found at another layer of reality. However, these entities display a degree of taxonomic and causal autonomy from the level from which they emerged, in virtue of the real essences, intrinsic structures, complex interrelations and organisational potentialities of the stratum in which they exist. This autonomy prevents entities formed at a particular level of reality from being reducible to (and predictable from or explainable in terms of) the entities of the other levels from which they have emerged (Kim, 1999). On these grounds differentiation of one layer from another is established, reaffirming the lack of ‘synchrony’ between them (Archer et al., 1998). Moreover, this autonomy is marked by the existence of separate and additional causal powers and novel qualities that are absent from the entities located in other strata of reality. In particular, these emergent entities have the ability to frame (that is to constrain, enable or simply to influence), and cause changes to, important attributes, powers and dispositions of the basal layer from which they have emerged. However, this causal effect, although it may alter (or even give rise to new)

1 However, the relation between theory and empirical research should not be understood in terms of correspondence rules where theory is supposed to provide a set of propositions from which empirical forms can be logically deduced, but in terms of statements about causal connections between real objects (Sayer, 1992; Lawson, 1997a).

2 Realists seem to perceive the notion of stratification in two complementary dimensions. The first dimension (which comes directly from Bhaskar’s writings and is equally applicable to both social and natural realms) highlights the distinction between the three ontological domains: the empirical, the actual, and the real. The second dimension, which is more relevant to social analysis, emphasises a view of reality consisting of hierarchical ordered levels, where the lower one creates the conditions for the higher one. Although this perspective is relatively underdeveloped and subject to an ongoing debate (concerning, for example, which levels exist and what is their relation), a very general and simplified but, for the purpose of the current discussion, sufficient way of describing the ordering between some of the most important levels is: social, psychological, biological and molecular.

3 For a more detailed discussion on the notion of emergence see Hodgson (1998) and Kim (1999).
true dispositions and conditions (or our perceptions of them), does not radically disrupt or destroy the intransitive subsistence and existential status of that level (Sperry, 1991; Lawson, 1997b). In that sense some order is sustained at each level and in reality as a whole, alongside complexity, contingency, novelty, plurality, openness and dynamism1.

Finally, realists insist on the ‘transfactuality’ and ‘openness’ of social structures. In short the argument states that the underlying generative mechanisms, structures and institutions operate independently of the closure or, in other words, of the system in which they occur (Bhaskar, 1975). Their power is continuous and invariant, stemming from their relatively durable properties, and thus they constantly operate independently of both the conditions for their actualisation and their actual realisation (Sayer, 1992; Archer et al., 1998). However, although these generative qualities are always present, they may be “possessed unexercised, exercised unactualized, and actualized undetected or unperceived”2 (Archer et al., 1998: xii), depending upon ‘contingently related conditions’, which determine whether and, if so, which countervailing mechanisms would be activated or released3 (Dow, 2002). On that basis, it is asserted that the mechanisms and powers of the underlying structures should be seen and analysed as transfactual or ‘universal’ (within their range), but neither actual nor empirical, indicating that they are expressed and manifested in more or less historically-specific and highly differentiated forms (Bhaskar 1979; Sayer, 1992; Lawson, 1997a). On that basis, Sayer (1992) acknowledges that, although the abstract analysis of mechanisms into which human agency is locked by specific structures may be more generally applicable, further empirical (concrete) research is necessary to establish the extent of their generalisation.

It must be highlighted at this point that this final premise of CR does not imply that entities of social reality are immutable. Indeed, as Bhaskar (1979, 1989), Sayer (1992), Archer (1995) and Lawson (1997a, 2003), clearly indicate, one of the defining features of the social world is its potential to change its shape or form as a result of the conception, reflection and action of purposeful human agency4. Thus, since realists

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1 This quality also safeguards from the danger of structural determinism as developed, for example, in some Marxian or institutionalist writings.
2 A power is possessed by an entity by virtue of its intrinsic structure, it can be exercised unactualised due to counterbalanced interference of other exercised powers, or actualised if it is not deflected by the effects of other powers.
3 As such, depending on conditions, the operation of the same mechanism, tendency, etc., can produce quite different results and, alternatively, different mechanisms may produce the same empirical results (e.g. an effect such as the loss of jobs may be caused by either the introduction of a new technology or by failure to introduce it – the latter being due to reduction of competitiveness and closing down) (Sayer, 1992).
4 Following Lawson (1997a, 1997b) agency is differentiated from action in the sense that the former
insist upon a stratified view of social reality, they accept that “there are properties and powers particular to people which include a reflexivity towards and creativity about any social context which they confront” (Archer, 1998: 190). From this conception, the ‘transformational model of social activity’ emerges, emphasising that social life possesses a non-
teleologically but historically evolving character by virtue of the agents’ potential continually to re-interpret, and collectively reproduce and transform, the social reality they confront (Bhaskar, 1979).

Given these three ontological principles and their qualifications, it is now possible to advance the discussion on the nature of social structures and their connection with human agency, providing a solid ontological basis for the consideration of the social world. From the outset, the CR understanding of social structures, and social phenomena in general, entails a ‘relational conception of the subject-matter of the social sciences’ arguing that all social entities (structures, institutions, as well as human agency) presuppose a social context and depend upon social relations for their existence (Bhaskar, 1979; Sayer, 1992; Lawson, 1997b; Archer et al., 1998). In this sense it can be claimed, first that social structures would not exist without human activity, and second that such human activity would not occur unless the agents engaging in it had a conception of what they are doing1 (something which presupposes the prior existence of social forms) (Bhaskar, 1979; Archer, 1995). On this basis, the concept-
dependence, activity-dependence and space-time specificity of social structures is identified (Bhaskar, 1979 Lawson, 1997a).

However, it is equally important to acknowledge at this point the intransitive dimension of social structures. Thus, although social structures depend upon agents’ conceptions (which may be distorted, incomplete, inadequate, or simply inappropriately conceptualised due to their evolving character), they exist intransitively and, so, function independently of their appropriate conceptualisation (Bhaskar, 1989, Archer et al., 1998). To sum up, it can be said that social structures are regarded as both the ever-present condition and the outcome of human agency (defined as perception, conception, reflection and action), where people both reproduce and transform the very structures that they utilise for their activities in a recursive and non-teleological manner (see Figure1).

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1 Such conceptions can be held consciously as well as unconsciously (or implicitly) by the human agents (Bhaskar, 1979; Archer, 1995).
However, there is an important asymmetry here: at any moment in time social structures are pre-given for individuals who do not create them, but merely reproduce or transform them in their day-to-day activities (Archer, 1995, 2000). To put it bluntly, as individuals we do not make social structures; these are there in some form at our birth, sustaining the properties and powers that have emerged as a result of actions and behaviours of the human beings of the past. This means that social structures (although they exist – sustained or modified – as a result of the totality of human activities) always pre-date the individual and provide (transcendently and causally) the necessary condition for human behaviour and action. These causal powers proclaim the reality of social structures whereas their pre-existence establishes their relative autonomy as distinct objects of scientific investigation. On this basis, the ontological (and methodological) ‘separability’ of social structure and human agency is recognised whereby it becomes clear that, by virtue of the different emergent properties and causal powers they possess, social structures and human agency belong in two distinct strata of social reality which are usually out of synchrony (Archer et al., 1998).

3. Methodological implications

The previous section laid down the philosophical bases of CR. In particular, an intransitive, transfactual and stratified ontological reality was put forward alongside an epistemological interpretation which recognises

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1 It is in that sense, viz. by reference to the past activities, positions, practices and concepts of former (even deceased) human agents, that both the activity-dependence, concept-dependence and space-time specificity character of social structures can be affirmed and validated.

2 This is the celebrated notion of dualism.
the historical transitivity of, and causal interdependency on, our knowledge of these entities. On this epistemic account the objective of economics is to (re)define and refine conceptual resources, in an attempt to expand and improve understanding of the real structures, mechanisms and the ways in which they can act, in order that events in, and states of affairs of, the economic process to be explained (Lawson, 1995, 1997a, 2003; Fleetwood, 1999; Downward, Dow and Fleetwood, 2006).

These philosophical premises provide the methodological bases upon which investigation can successfully be carried out. The methodological strategy that is put forward is pluralistic, but eclectic and critical (Sayer, 1992; Lawson, 1997a; Dawnword, 2003). The purpose is not to seek out event regularities from which to declare universal laws, but to corroborate theories or explanations that contribute towards proper understanding of the causal structures and their relations. As these causal entities are contextual and historical in their realisation, understanding refers to the process of constructing a unified system, and identifying the place of these entities in the system and in the pattern that characterises the ongoing process of change in that system.

To achieve this, CR makes reference to two relatively distinct modes of analysis or types of explanation: abstract and concrete (Sayer, 1992, 2000; Lawson, 1997a; Archer et al., 1998). Abstract or pure explanation is referred to the theoretical identification of underlying structures, causal mechanisms and their essential relations that govern the flux of economic phenomena in regard to the particular object of study. This mode of analysis is “characteristically retroductive” (Lawson, 1997a: 221, emphasis in the original). It draws on existing conceptual resources and, by focusing on specific parts of reality, attempts to refine them into plausible theories of structures and mechanisms that would account for the phenomena under study (Lawson, 1997a). Abstractions need not be seen as ‘idealisations’ or heuristic devices for ordering observations. They refer to real objects (rather than the ideal or fictitious) and attempt to grasp precisely the essence of particular generative structures and their causal mechanisms.

Concrete or applied explanation, in turn, works at the empirical level to explicate the number of causal mechanisms and contingent conditions which account for the observed phenomena in specific, real-life situations. This mode of explanation, called ‘retrodiction’ (Lawson, 1997a), entails the resolution of the event or situation of interest into its separate components and their redescription in theoretically significant terms. This entails the identification of possible determinative mechanisms and the elimination of the less-probable ones. Such analysis can be articulated through the use of a variety of techniques of investigation, combining both qualitative and quantitative perspectives, usually by means of case-study analysis (Sayer, 1992; Lawson, 1997a; Dawnword, 2003; McEvoy, 2006).
As argued above, theories make claims about generative mechanisms and essential relations that exist in virtue of the nature of structures. Such claims must be interpreted as tendencies (Sayer, 1992; Lawson, 1995, 1998; Downward, 2003). A statement of a tendency, in this sense, is not a conditional statement about something empirical but an unconditional statement about a causal “power that is being exercised whatever events ensue” (Lawson, 1997a: 23). As numerous countervailing mechanisms may be operative at the same moment and place (without, however, being necessarily manifest in actual outcomes), such tendencies are not expected, in general, to lead to regularities at the level of events (Lawson, 1989; Sayer, 1992). However, when certain tendencies (or combinations) persistently operate over a significant span of time and/or space, it might be possible to trace their effects in actual phenomena. Thus, to the extent that any manifest phenomenon appears to reveal some degree of uniformity, generality, or persistence, albeit by no means complete in these respects, it would seem to support the case that some enduring generative mechanisms are at work. These partial empirical regularities are referred to as ‘stylised facts’ (Lawson, 1989, 1995). A stylised fact, therefore, is “a conceptualised phenomenon – typically a broad but not universal generalisation about an event regularity – that is interpreted to hold in a way, or to a degree, such that the researcher regards as significant enough, given the context, that prima facie an explanation is called for” (Lawson, 1989: 65). Such stylised facts can serve both to form hypotheses (about particular causal mechanisms) and to refine (on the basis of empirical support) the relative explanatory power of developed or competing theories (Lawson, 1997a).

4. Concluding remarks

This paper has outlined the key ontological, epistemological and methodological principles of CR, which constitute the foundations upon which the CR project in economics can be built. The research programme put forward is dynamic, critical and pluralistic. It is dynamic because it appreciates the evolutionary character of (our knowledge of) the socioeconomic system, it is critical because it seeks understanding of the

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1 This, however, does not imply that a hypothesis about a mechanism and the outcome that it could produce can be discarded simply because expected empirical patterns are not apparent. Theories make their claims at the abstract level about causal powers that exist in virtue of the ‘intrinsic nature’ or ‘real essence’ of structures (Sayer, 1992; Dow, 2002). These powers may or may not be exercised or actualised. In these terms a case is made for further investigation in terms of countervailing tendencies and contingent conditions (Lawson, 1997a).

2 Note also that Lawson in later writings (e.g. 1997a: 204) uses the term ‘demi-regularity’ to convey virtually the same idea. Demi-regularity is defined as “a partial event regularity which prima facie indicates the occasional, but less than universal, actualisation of a mechanism or tendency, over a definite region of time-space”. 
generative mechanisms and their relations which account for the phenomena under study, and it is pluralistic because it urge employment of both qualitative and qualitative approaches in this quest for knowledge.

Six fundamental premises about social reality were emphasised. In concise terms these are:

1. The ‘intransitivity’ of social structures, that is the argument that structures, mechanisms, etc. exist independently of their identification and the knowledge of which they are the object

2. The ‘stratification’ of the social world, that is the differentiation of social reality in distinct domains, or strata, which though unsynchronised are interconnected with one another

3. The ‘transfactuality’ of generative qualities, that is the argument that mechanisms are always active, independently of whether they are being exercised, actualised, or perceived

4. The ‘relational conception of the subject-matter of the social sciences’, that is the argument that all social entities presuppose a social context and depend upon social relations for their existence

5. The ‘transformational model of social activity’, that is the argument that social reality possesses a non-teleologically evolving character by virtue of the agents’ potential to re-interpret, and collectively reproduce and transform, the structures they utilise and are shaped (constrained/enabled) by

6. The ‘temporal priority and separate identity of structure over agency’, that is the argument that at any moment in time social structures pre-exist individuals, who do not create them, but merely reproduce or transform them in their substantive activities.

These principles provide the methodological bases upon which research can successfully be carried out. The methodological strategy that is put forward regards theoretical conceptualisations, applied explanations and empirical research as interlinked. Research is based on the formulation of a theoretical framework (through abstraction) where underlying structures, causal mechanisms and essential relations are identified with regard to the particular object of study. Concrete or applied research is also involved, where the operation and effects of the causal mechanisms are examined in specific, actual situations, vis-à-vis the contingent conditions which determine whether these causal powers would be actualised. Analysis at this stage is based on the identification of empirical tendencies,
represented as ‘stylised facts’, which are perceived to be meaningful manifestations of the effects of causal mechanisms.

The paper has set an agenda for the study of economics along CR lines. We hope it can provide a solid ground for further research and developments in the area that would enrich our understanding of the processes and outcomes of the socioeconomic system.

References


Analysis of the FX traders’ work using the Naturalistic Decision Making framework: Implications for the Design of User Centred Decision Support Systems

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Abstract:
The present study deals with an aspect of the Foreign Exchange traders’ work, i.e., the choice to trade directly with other traders or indirectly through electronic brokers. Based on data obtained through systematic observations, and adopting the naturalistic decision making framework, we searched to identify persisting patterns of the context within which the execution of orders has been carried out. The results show that direct trading is preferred within contexts different from those of indirect trading. Apart from the confirmation of the central hypothesis of the NDM according to which experienced decision makers prefer the pattern matching than the analytic evaluation of alternatives, these findings have also implications for both the theory of FX trading and the design of decision support tools for this complex cognitive task.

Keywords
Complex Cognitive task, Foreign Exchange Market, trading behavior, Naturalistic Decision Making

1. Introduction
The introduction of information technology tools in decision making domains is inevitably accompanied by the need for increased formalization (Nathanael & Marmaras, 2008). By increased formalization we mean rearrangement of work practices towards more standard and official procedures. This augmented formalisation may constrain the decision makers to effectively respond to the particularities of the situation at hand, and consequently may lead to the entire or partial abandonment of the tools.

In the present paper, we investigate this phenomenon in the domain of Foreign Exchange (FX) traders. Traditionally, FX traders negotiated and executed the orders directly with other FX traders or brokers, via phone or
telex. In 1992 electronic broking systems have been introduced in the domain, rendering the trading more “automatic” and indirect. Despite the advantages of the indirect trading, the traditional direct trading has not been abandoned and is still used by the traders. Adopting the naturalistic decision making paradigm, we try to identify in which contexts the traders prefer the direct than the indirect mode of trading.

A few words about fx trading
The FX market (both in its retail and the wholesale-interbank mode) was first founded as a result of changes in the international monetary system, passing from the fixed exchange rate requirements of Breton Woods till 1970s to the flexible rates of today. The elimination of national government controls, the freedom for transnational transactions and advances in technology, have all led to an enormous amount of foreign currencies exchanged on a daily basis ($1.9 trillion bought and sold globally, compared to $1.6 billion a day on the New York Stock Exchange) (Bjonnes et al., 2003). One of the main characteristics of the market is the 24-hour activity and the geographical dispersion. Other important characteristics of that market are (Bjonnes et al., 2003):

- low transparency because of decentralization,
- low execution cost of trades (owed to deal automation) and
- increased speed of trade execution.

FX traders are employed by Commercial and Investment Banks and work in the Dealing Rooms at the Banks’ Treasury Divisions. They deal with purchasing and delivering foreign exchange either on a proprietary or on customers’ order fulfillment basis. Their main goal is to make profits by selling currency at a currency rate greater than that of purchase, or – conversely– by buying currency at a currency rate lower than the expected selling currency rate. As the traders may choose the time at which they will carry out a particular trading, they have to predict future currency rates and trends. Predictions are made based on a multitude of information such as the currency rates movements, changes of national and international economic indices (e.g. unemployment rates, gross domestic product, gross national products, inflation rate), political and economic events, other traders’ opinions and market sentiments.

A FX trader can give quotes (acting as a market maker) when other traders directly ask him/her for quotes (i.e. the FX trader receives an incoming trade). Alternatively s/he can ask other traders for buy-sell quotes (outgoing trades); the other traders are in this case acting as market makers while the trader asking for quotes is now named “market taker” (Bjonnes et al., 2003). These trading options belong to the direct trading category made via telephone or electronic communication networks, since
the auction is bilateral. However, traders can also give quotes or enter orders to Electronic Broking Systems or physical brokers, therefore relying on indirect trading; brokers, either electronic or physical, manage all buy-sell orders and quotes submitted by traders and match them according to currency rate, time of entry and quantity criteria.

From a FX market taker point of view, the spread is defined as the difference between the “buy” currency rate (ask – which is always higher than the selling currency rate) and the “selling” currency rate (bid) (Bjonnes et al., op.cit). Conversely seen, a market maker gives always-higher selling currency rates than buying quotes. From a theoretical FX Market Structure point of view, a market taker, who has just bought (as a market taker) a currency and wants to sell it later on (as a market taker again), usually waits till the bid currency rate reaches the ask currency rate of the initial trade, in order to experience neither profits nor losses (break even point) (Bjonnes et al., op.cit.).

FX traders deploy a set of tools in analyzing and explaining market movements. FX traders frequently face unpredicted situations: in such cases s/he usually tries to make sense of “where the market goes” in order to predict exchange movements. Fundamental Analysis and Technical Analysis tools help towards this end. Fundamental Analysis consists of analysis and prediction methods based on macroeconomic and microeconomic models. Their main contribution is the integration of various national and international economic indices into consistent models of analysis with predictive capabilities of the real value of currencies. On the contrary, Technical Analysis tools focus on the analysis of past prices and chart interpretation (chartism): a large part of practitioners’ community think of technical analysis tools as a means for future trend and turning points prediction.

These two categories of tools are not mutually exclusive in use, but are consulted on a complementary basis, although predictions are not fully reliable (Curcio et al. 1997). However, FX theorists come to the general conclusion that the shorter the time horizon of trading is (i.e. the higher the frequency of trades is), the more the reliance on technical analysis tools is, because the integration of fundamentals into an analysis or prediction formula presupposes plenty of time and exhaustive analytical process; however time pressure, especially in high frequency-intra day trading, is one of the main task-setting factors (Lui et al. 1998).

As far as the nature of the trade itself, we identify 2 generic categories: FX traders make market orders when they want to execute a trade (buy/sell) of a specific amount of a currency at the best current/available rate. Conversely, they set limit orders to execute when they want to execute a trade (buy /sell) of a specific amount of money at a
determined currency rate (which is determined either on a proprietary basis or is set by the customer).

We can conclude that FX traders perform a complex decision making task (Marmaras & Pavard 2000). In fact decisions are taken within and for a complex system consisting of many interrelated and interacting components –i.e. the other FX traders– and factors –i.e. the factors determining the economic environment--; there is uncertainty regarding the time at which one or more events occur, and the severity of changes they cause to the system; there are multiple quantitative objectives to be achieved, often conflicting (e.g. increasing profits versus minimizing losses risk).

The introduction of computerized trading
Foreign Exchange traders, till 1970, could negotiate and execute the orders directly, via the phone or telex. Alternatively, broking companies were taking the responsibility to intermediate between a “buying” and a “selling” party, announcing currency rates for execution, and after executing the trade, those companies were also responsible for trade settlement.

In 1992 the electronic broking systems were introduced. Using them FX traders can execute an order in the following way: they either input a “price” (the rate at which they want to execute the order) and the quantity of money they want to exchange, or they just enter a quantity of money for exchange stating that it is a market order (an order that they want to be executed for the given quantity at the best available price/rate). An electronic broker acts as an order “warehouse”: different orders are matched with time and requested price (rate) priority. When the rate of orders being executed via an electronic broker is close to the rate requested by the FX trader, the rate input field in the interface begins to flash (as an indication that the order is all about to execute). Submitting an order is anonymous and counter party details are revealed only after the trade is executed.

Furthermore, the electronic offer additional opportunities:

- FX traders can have access to chart display that presents real time information about currency pairs (fully flexible in display mode).

- FX traders can also access market information using special applications, that usually present national and international economic indices, news, interest rates, Gross National and Domestic Product and incorporate current market activity (such as last trades all over the world, biggest trades etc.).
Finally, FX traders can use fundamental and technical analysis tools via specific formulas use and visualization facilities. "Reuters" electronic broker and "E.B.S." (Electronic Broking Systems) are the most favorite electronic broking systems used in the Inter bank market nowadays. "E.B.S." is the outcome of major market making banks partnership, as a response to "Reuters" high shares in electronic trading.

However traders still use direct trading in executing trades. The introduction of computerized trading (electronic broking) did not eliminate direct trading volumes; on the contrary, it seems that electronic broking triggered the evolution of direct trading. Indeed, "Reuters" made the next step in direct trading and auctioning during '90s with the introduction of bilateral electronic communication systems. These systems-networks resemble to the traditional telephone system that was formerly used, serving as a tool for typing conversations (with up to 4 other traders). Traders soon rendered them the leading tool for direct bilateral trading since they could substitute voice bargaining for typing written auction.

FX theorists generally agree that electronic broking systems have undoubtedly led to higher market centralization by representing (Bjonnes et al., 2003):

- best available currency rates (either best currency rates available in the whole market or best currency rates currently available by the system, only from credit approved banks),
- own trader’s deals-trades,
- the direction of all trades executed by the system - characterized either as given (at the bid currency rate-buy) or paid (at the ask currency rate-sell),
- group market data (currency rates and directions for all trades, and not only for those that voice brokers can announce) leading to higher post trade transparency (transparency after trade execution: data announcement such as buy/sell, currency rate, counter parties details).

In which cases FX traders execute trades directly or indirectly according to the literature

As far as the FX traders’ choice between direct and indirect trading is concerned, we should first state that direct trading permits anonymity vis-à-vis the market, since the trades executed directly are neither displayed on a globally accessed screen nor publicly announced. On the contrary, in indirect trading, the counter parties’ identities are disclosed after trade execution, when the two counter parties get the details of each other and the trade is displayed on the electronic broker screen. Moreover, FX
traders, when trading directly think that they have the discretion to accept or reject currency rates given by a counter party, however daily practice and related literature show that each time a FX trader receives an incoming quote query “has” to respond, by giving quotes to the initiator of the contact. On the other hand, participation in indirect trading is not obligatory, as FX trader fully decides on when to place on order or the currency rate s/he wants to trade at. In addition, not only literature in this field but our ethnographic observation data also revealed that FX traders give 2 way quotes (when another trader asks for currency rates) in direct trading; on the contrary, FX traders in indirect trade give only the direction of the trade (buy/sell) and currency rate.

FX theorists such as Bjonnes et al. (2003) agree that FX traders prefer direct trading for making large trades: it is a common sense among practitioners of the field that when a FX trader asks for a large trade, there is a lot of information revealed (such as the personal expectancies of the trader asking for the trade or possible private information). As a consequence, practitioners claim that direct trading is preferred since it does not permit information on large trades to be disclosed. Furthermore, FX trading behavior research (Bjonnes et al. 2003, Bjonnes 2003) has come to the conclusion that in periods of distress (e.g. after shocks in the market, an announcement or an unexpected event or a catastrophe), FX traders rely more on indirect than direct trading. Researchers state that, when FX traders act in such an environment, they think of electronic brokers as the safest way to trade: the danger to deal with a well informed FX trader theoretically splits to all of the electronic broking system’s current users (while in direct trading FX traders have to address this issue individually).

As already stated in the introduction, in the present paper we search to identify the context factors that contribute to the choice of trading execution channel that traders make in their everyday activity, adopting a different research paradigm than that usually used by the researchers of the domain: the Naturalistic Decision Making paradigm.

**Method**
In order to acquire the required data, we used the ethnographic approach. During a period of three months, we carried out systematic observations of the work of an experienced FX trader specialised in Euro/US Dollars transactions, at a Dealing Room of a major Greek commercial bank. We tried to trace any information perceived by the trader as well as every observable activity performed by him. When possible, explanatory questions regarding his actions were posed to the trader. Furthermore, we also traced intraday Euro/US Dollars (EUR/USD) data for the specific period; these data concern the open currency rate, the close currency rate,
the minimum/maximum currency rate, and the transactions volume, within a 10-minute time interval between records.

For the needs of the present study, we focused on the analysis of data regarding the execution of customers’ orders given to the FX trader by the Back Office or other desks of the Dealing Room. Aiming to identify eventual differences in the contexts in which the trader chooses to trade an order directly with another trader or indirectly through the electronic platform, at a first phase we determined two factors that characterize the trading context. The first one is the state of the market which can be described by two parameters: (i) the total amount of money spent on buys-sells at the specific moment in the whole FX market (or volume of trades), and (ii) the current level of the EUR/USD rate (which was the currency pair that was traded in the 95% of recorded cases). The second factor is the order to be executed that can be described by four parameters: (i) the quantity of money requested for buy/sell, (ii) the requested currency rate, (iii) the time of delivery (or valeur) and (iv) the time that order request was submitted.

At a second phase we searched to visualize the different contexts in which the orders have been executed. To do that we determined the following three-grade scales for each parameter of the context:

- for the volume of trades: low for 1-400 million EUR/USD trades, medium for 400-700 million EUR/USD trades, high for 700-1000 million EUR/USD trades;
- for the current rate: falling when the EUR/USD rate was decreasing for the 10 last minutes, stable when the rate was more or less stable for the10 last minutes, and rising when the EUR/USD rate was increasing for the 10 last minutes;
- for the quantity of money requested for buy/sell: low for 1-4 million EUR/USD, medium for 4-7 million EUR/USD, high for 7-10 million EUR/USD;
- for the requested currency rate: under, within or above the open-close range of the rate for the specific 10-minute time interval;
- for the time of delivery (or valeur): no valeur, delivery on the same day, or delivery on the next day.

Using these three-grade scales for the context parameters, we were able to draw a visual representation of the context for each trade performed during the period we observed the FX trader. Figure 1 presents two examples of contexts within which a direct and an indirect trade have been performed.
Figure 1: Two examples of contexts within which a direct and an indirect trade have been performed.

At a third phase, observing the visual representations of the context for the twenty four (24) cases of order execution trades we searched for persisting context patterns which would differentiate the cases of direct and indirect trading.

Results
As already stated, during the period of our systematic observations, there were twenty four (24) orders executed by the trader. Nine of them were executed directly (via the Reuters direct trading system), while the remaining (15) were executed indirectly, via electronic brokers (E.B.S. or Reuters). We identified three (3) persisting context patterns for the direct trading cases, and four (4) for the indirect trading cases, while the remaining of these orders do not qualify into any of the context patterns mentioned above.

More specifically, the persisting context patterns within which the trader chose the direct trading are the following:

Pattern d1: medium volume of trades, flat current EUR/USD rate, low requested amount of money, no specified requested rate (market order), without specified date of delivery (Figure 2-left side, three trades).

Pattern d2: high volume of trades, flat to slightly rising current rate, medium amount of money requested, requested rate lying within the
current EUR/USD range, without a specified date of delivery (Figure 2-
centre, three trades).

Pattern d3: minimum volume of trades, marginally falling current
market rate, very low requested amount of money, requested rate above
current market levels, without specified date of physical delivery (Figure
2-right side, three trades).

As far as the persisting context patterns within which the trader chose the
indirect trading, they are the following:

Pattern ind1: medium volume of trades, falling current rate, low
requested amount of money, requested rate within market levels, without
specified date of delivery (Figure 3-left side, two trades).

Pattern ind2: medium volume of trades, falling current rate, low
requested amount of money, requested rate within the current EUR/USD
rate, without specified date of delivery (Figure 3-left to center side, three
trades).

Pattern ind3: medium volume of trades, flat current rate, low
requested amount of money, requested rate lying below the current
EUR/USD range of rate, without a specified date of delivery (Figure 3-
right to center side, three trades).

Pattern ind4: medium volume of trades, flat to slightly rising current
EUR/USD rate, low requested amount of money, requested rate lying
below the current EUR/USD range, specified date of delivery the
following day of the execution date (Figure 3-right side, two trades).
Therefore we can conclude that the contexts within which the trader chose to execute an order directly are different to those he chose to trade indirectly. The differences of the contexts form distinctive patterns of parameters values.

Conclusions

The results presented above are partial and preliminary. In fact they do not concern the whole FX traders’ task but a sub-task, and were obtained by studying only an experienced trader. However a number of conclusions can be drawn with both a generic value for the paradigm of naturalistic decision making (NDM), as well as a specific value for the study of traders’ work aiming to support it.

A central hypothesis of NDM is that proficient decision makers use situation-action matching decision rules with the basic structure of “do A because it is appropriate for situation S”, rather than concurrent choice process with the structure of “do A because it has superior outcomes to its alternatives”. Matching differs from concurrent choice in three respects. (i) Options are evaluated sequentially one at a time. Evidence exists that even when presented with several options, decision makers quickly screen most of them by comparing them against a standard, rather than with one another, and then focus on one, or at most two, options, which are compared (Beach, 1993; Montgomery, 1988). (ii) Options are selected or rejected based on their compatibility with the situation (Endsley, 1997; Klein, 1998; Pennington, & Hastie, 1993), or the decision maker’s values (Beach, 1990), rather than on their relative merits. (iii) The process of matching may be analytic but more often it relies on pattern matching and
informal reasoning (Cohen, Freeman, & Wolf, 1996; Klein, 1998; Lipshitz, 1993; Pennington, & Hastie, 1986).

The results of our study confirm this hypothesis. In fact as we have shown the choice to trade an order directly or indirectly is based on the recognition by the trader of type of situation at hand, i.e. by pattern matching, and not by an analytic evaluation of the two options for each case of trading.

A second conclusion that can be drawn from the present study concerns the fertility of the knowledge that can be gained adopting the NDM paradigm. In fact, as already mentioned, previous studies dealing with the choice of direct or indirect trading and using classic analytical approaches, have find only one relevant factor, this of the volume of the amount to be traded (Bjonnes et al., 2003). In contrast, the results of our study shows that there are much more factors that describe the situations under which a FX trader may choose one or the other type of trading. This finding, if confirmed by studying other FX traders, will enrich the theory of trading and may have positive practical implications both on the traders’ education as well as on the design of decision support tools. Specifically, an information technology system equipped with a user interface representing the information related to the state of the market as well as to the parameters of order to be executed in a graphical way similar to the patterns recognized by the traders, is expected to provide a valuable support to the traders’ decision making process.

References
Systemic analysis of the intractability of the Cyprus problem

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Abstract (only):
“Cyprus is a communication laboratory and an anomaly; it is a country globally connected but locally and interpersonally divided” (Gumpert and Drucker 1997).
For over 40 years, stakeholders and interested parties both on and off the island are engaged in negotiations that always lead to impasse. Without disregarding the obvious obstacles to achieving a solution (i.e., the continuing occupation of the island by Turkey, the interests of the United Kingdom and USA to maintain military bases on the island etc.), the authors argue that those involved in the negotiation process are unsuccessful also because they lack the skills and the tools required to consider all the parameters of the problem at the onset of each negotiation round. They fail to appreciate and capture the entire breadth of the problématique, because they do not explore interrelations between sub-problems. Complex societal problems can of course be broken down to sub-problems. However, these sub-problems cannot be tackled in isolation and cannot be solved by simply assigning responsibility to various committees of ‘experts’ or relevant government bodies, ignoring all those whose lives will be affected. Nor can they be solved using analytic methods or technologies based on a single scientific discipline. This is why they are referred to as complex problems; sub-problems are heavily coupled and their interactivity is so strong that a holistic/systemic approach becomes an absolute necessity for their resolution.
Furthermore, the paper will discuss how all stakeholders involved in the negotiation process over the last forty years have fallen into the trap of pursuing flawed priorities, a symptom referred to as the Erroneous Priorities Effect (EPE). The EPE states that whenever the elemental observations (problems, objectives, actions) made by stakeholders in the context of a complex socio-political design situation are interdependent, assigning priorities for action on the basis of aggregating individual stakeholder voting on the relative importance of the statements, leads to erroneous priorities and ineffective actions. The paper will review a number of cases in which all parties involved (Cyprus, Greece, Turkey, UN etc) were trapped in such erroneous priorities.
The author will also elaborate on the thesis that any attempt to resolve the problématique excluding those whose lives will be affected is not only doomed to failure; it is also unethical. This is formalized as the Law of Requisite Action.
The last part of the paper will discuss the two most recent phases of the Cyprus problem in light of the above theses:
(a) The UN plan’s known as the “Annan Plan,” failed despite the fact that it was developed partly using complexity science, because it violated the Law of Requisite Action.
(b) The current negotiations may fail despite the fact that the two leaders adhere to the Law of Requisite Action, because they violate the thesis that a systemic approach is necessary in order to solve complex societal problems.
In concluding, the author makes the case that the solution of the Cyprus problem requires not only the concurrent alignment of political powers and interests, but also the synchronized alignment of methodological approaches and adherence to the laws of the science of dialogic design.
A Systemic View of History: The Synergy of Our Stories

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Abstract:
George Santayana (1905) said, “Those who cannot remember the past are condemned to repeat it.” So in order to progress as a civilization we must attend to history. However, “History is written by the victors.” This is often taken as true, as it is often misattributed to Winston Churchill. It means that only one version of events is acknowledged. History is often used to justify questionable military interventions. War is seen as a just or righteous solution to social problems. Even if academics write the history, it is still from a single perspective. That perspective is often socio-cultural or political one, as in Marxist or Feminist interpretations of history for example. Does this mean the human race is condemned to a constant state of war in response to our problems?

But if we are to seek a history that tries to free us from the tyranny of repeating past mistakes, we need a broader, subtler view of history. Einstein (attributed) said that the definition of insanity is to repeat actions with an expectation of different results. Do we question the sanity of human society? Or do we suggest that human society has in it the seeds of the possibility to become sane?

A systemic view of history can take us out of this one dimensional, one solution dilemma. History-as-what-happened is much more complex and nuanced than currently written by academics and politicians. It is the collective experiences of all the participants in an event. These experiences are all interrelated in a system of memories. Many indigenous people have a history of storytelling in which all participants can share and contribute to the group memory. This can be a more nuanced way to create our history.

Recent advances in information technology have given humanity new tools through which to share and collaborate, and this gives us, for the first time, a chance to create a history from a systemic view. The North East Asian Dialogue (NEAD) Project was an attempt to begin to create such a history for WWII in North East Asia. This project, over three years, brought together participants from many countries (Japan, Korea, China, Russia, Poland/Germany) and ethnic groups (for example, Ainu and Evenki) to address the problems of unresolved issues in the region. Part of the process was an integration of web design specialists during the dialogue to provide a record as the dialogue was going on. Participants, thus, were able to share their stories both in the face-to-face dialogue and on-line as a way of providing a richer historical record than some academic metatstory. While not completely successful, the NEAD Project offers interesting insights into the potential for the creation of systemic histories, as well as the difficulties involved in the technological implementation of such a history.
1. Introduction: The Systemic Model of History

The Systemic Model of History is a view that history is actually the sum of all the stories told by those people that actually had the experience of the event. Studs Terkel was a historian who stunned the world with his versions of the histories of wars and social life, as he recounted the stories of those who had been there. See for example, Terkel, 1984.

In school, we learn that such and such happened: “Alexander of Macedonia conquered much of the known world”, or “Queen Elizabeth defeated the Spanish Armada.” And we learn the dates when these things happened and maybe a timeline. We often think of this as history. We value the writings of those who were there, such a Churchill’s history of WWII. But in most of these cases, the ones writing are the ones who survived, the victors. This means that the written history is often a justification for war as a solution. One of the problems with education in Japan is that the Ministry of Education cannot bring itself to accept a written history of World War II that accurately reflects Japan’s aggression. This means that modern Japanese youth often have no sense of modern history, of the context of Japan’s place in the modern world.

Of course, history is more than the record of conflict. Other events are powerful shapers of our present and future world. Migration, plagues, the rise and fall of financial empires, trade patterns and more are all forces shaping the present. There are histories that comprehensively and accurately tell the story of certain events, such as the volcanic destruction of Pompeii or the rise of the AIDS epidemic in the U.S.A. These are better attempts to provide a context to history, but even here, they often reflect a single viewpoint. The best of them do try to combine the stories of the many participants, weaving a narrative that is complex and detailed. There is a continuum between the macro and the micro, the world-wide and the personal. I am shaped by my parents, and their lives, and the historical context in which they lived.

It is easy to see the over-arching meta-story we are taught in school as “what happened.” But, in fact, what happened, happened to people, to individuals. In a sense, history is the sum of the experiences of all the individuals who experienced the events. Our processes of category formation, as we know from cognitive science, are based on extracting prototypes, cognitive summations of our experiences. So, the history taught in school books is a summation of the experiences of individual participants. However, such historical texts have often been the work of a single individual, who takes it upon himself or herself to extract the prototype of the collective experiences. From Herodotus through Churchill and beyond, individuals have written history as “what happened” without the coda that it is their summation of the experiences, if not their own experience itself.
But if we are to seek a history that tries to free us from the tyranny of repeating past mistakes, we need a broader, subtler view of history. Remember that Einstein’s definition of insanity is to repeat actions with an expectation of different results. Can we continually see war and violence as the solution to our social problems? Each conflict plants the seeds of the next conflict, and then history is written to justify this continued use of violence. Are we human beings stuck in this insanity? Or are we suggesting that human society has in it the seeds of the possibility to become sane?

How can we create more inclusive histories? Paradoxically, it is not by seeking a larger story, but by seeking all the smaller stories. If we are to see history as a system, then we have to begin to create it at the level of individual experience. When looking at ancient events, this can be hard because individuals did not leave their stories, did not write them down. The hundreds of millions of lives that have brought us to this moment are quiet. These individuals are silent. But in the realm of relatively recent events, such as regarding those who experienced the birth pains of our modern world, while they are still alive, we have a chance to create a truly systemic history of events. Technology also supports this possibility. It allows the storage of masses of material. It allows not only the storage of text and images, but of audio and video information as well. The costs of storing and disseminating such information have collapsed (Shirky 2008), and the old guardians of history are no longer in control.

This is critical, especially in cases where the official histories are disputed, and when governments seize the meta-story and use it as political fodder and propaganda. In such cases in particular, we need to bring the history back down to the reality of the experiences of those who were there. In the case of the Massacre of Nanjing, the official meta-stories are about the Japanese invasion, the justice or injustice of it, and the brutality or bravery of the participants. The governments of Japan and China are trying to control this story to control the present, the reality in which we live. It is a game of positioning and geopolitics. The real history of the events that took place is both more horrifying and brutal, and yet more nuanced and humane than any “official” meta-story can possibility be. The stories of all the participants, from brutalized Chinese who saw their families slaughtered, to the young Japanese men who, filled with patriotic zeal, did things that they would never have done in a rational state of mind, to the Chinese peasants that saved wounded Japanese soldiers deserted by their officers on the field battle, are the real history of what happened. We, as descendants of that time, can never know what these people thought, felt and did, unless we ask them to tell us. Even then, it is not one story, but all of their stories together, that are closest to what actually happened.
With this in mind, the North East Asian Dialogue was an attempt to provide both a physical and a virtual agora in which the stories of WWII in North East Asia could be told and preserved.

2. The North East Asian Dialogue (NEAD) Project

Dr. Wasilewski’s work has focused on the creation of social spaces where diverse participants can come together and collectively address their complex problems. One of her main concerns is how people can effectively participate in the decisions that affect them. Much of this work has been done with Indigenous people around the world and from these interactions much has been learned about the traditional dialogue techniques used for problem-solving and decision-making that are an alternative to mainstream, majority rule processes idealized by western democratic societies.

Part of this research has included various experiments with various dialogic processes, ranging from highly structured, consensus-constructing, computer-assisted processes for complex problem-solving (Christakis and Bausch, 2006; Wasilewski, 1997; L. D. Harris and Wasilewski, 2004; L. Harris and Wasilewski, 2004) to very unstructured, open processes (Bohm, Factor and Garrett, 1991). With Center of Excellence funding from the Japanese Ministry of Education, two dialogues were organized that brought together people to discuss issues facing North East Asia (Wasilewski, 2005; 2006) at International Christian University in Tokyo.

The first Northeast Asian Boundary-spanning Dialogue in 2005 (Wasilewski, 2005; Hays and Wasilewski, 2005) brought together Japanese, Chinese, Korean and Russian students and civil society members to identify major obstacles to intercultural communication in North East Asia. Using the Christakis/Bausch (2006) consensus-constructing, computer-assisted structured dialogue process, 78 obstacles to intercultural communication in the region were identified. These were reduced to eleven of fundamental importance, and of these, the issue of contested history was seen as the “root cause” or fundamental obstacle. Addressing the contested history issue would have a positive effect on the ability to address all the other obstacles. However, two problems complicated the ability to address the history issue. First, there is no common language of wider communication in the region. None of the state languages (Chinese, Japanese, Korean, Russian) serve that function and neither does English. Second, there are not many occasions when people from throughout the region gather together to engage in any activity together, much less the collective management of challenging issues. Civil society relationships in the region are very thin. (Horvat, Andrew in Wasilewski 2005.)

In February of 2006, a second Dialogue to address the historical issue was held. Participants tried “to map” the historical territory of the North East Asian region as a whole through sharing historical narratives. This
was the beginning of the idea of a systemic history. While many participants from the year before had knowledge of the dyadic issues between two countries in the region, such as those between Japan and China or Korea and Japan, few had a comprehensive awareness of the history of the region as a whole. It was this comprehensive mapping of the historical terrain through personal narrative that was the first step. This systemic history included, not only the master narratives of the nation-states of the region, but also personal and family narratives, as well as the “hidden” narratives of the different groups of people making up each nation-state, for instance, those of Buryat, Evenki and Khanmigan people in Russia, of Ainu and Okinawans in Japan, of Korean-Chinese, etc.

There were 36 participants and nearly as many observers, divided up into four Dialogue Circles, each of which represented the diversity of the overall group, including students, academics and civil society members, from Japan, Korea, China and Russia, male and female, young and old, with different ethnic and regional affiliations. These four Dialogue Circles each had a facilitator and a language resource person who could interpret between Japanese and English, but each group had to insure that those who preferred to speak in Korean, Cantonese or Mandarin Chinese and/or Russian would be heard and understood using informal resources within the group. A condition of participation was to agree to be video-taped presenting a twenty-minute historical narrative to one’s fellow participants in the Dialogue Circle. So, each participant (and a few of the observers) contributed twenty-minute historical narratives generated from their specific personal socio-cultural-historical points of view. The other participants in the Circle then had an opportunity to ask clarifying questions, but only clarifying questions, about the narrative. Each narrative was video-taped by another member of the Dialogue Circle and then archived. The original intent was to provide translations of the texts into five languages - Japanese, Korean, Chinese, Russian and English on a web site developed by students at Kwansei Gakuin University to accompany the project. This site can be found at NEAD.kwansei.ac.jp. It was conceived in the beginning that this site would provide a virtual record of all the narratives as well as a continuing space for interaction amongst the participants. While the site does exist as a record, its use as a continuing social space was never realized for the reasons described below under Problems.

During the breaks in the process of sharing the narratives, participants could visit the room where the students from Kwansei Gakuin University’s Department of Applied Informatics were creating the website supporting this dialogic process into the future. Participants were able to see their texts on line, and the students were able to incorporate elements from the discussions occurring in the different Circles into their design of the site.
The idea of incorporating the web design team from the beginning of the process and involving the participants in the design process was important. It gave the participants a stake in the virtual result, and it made the web design team feel that they were a part of the overall process.

3. From Dialogue to a Virtual Space

From this initial dialogic encounter, the virtual space was meant to extend the process and archive the narratives in multiple languages as a first effort in creating a systemic history space.

There were five interaction rules in the initial dialogue in 2005.

1. Anyone interested in participating could do so.
2. The point of view of each participant was valued and respected, without fear of confrontation or ridicule.
3. All participants really “heard” where “others” were coming from.
4. The process of “selecting preferences,” that is, selecting the “best” ideas (rather than deciding who was “right” and who was “wrong”) avoided dividing the group into winners and losers.
5. All participants went away feeling good about their contribution to the overall outcome and so had a sense of ownership and responsibility for the outcome.

These rules of interaction were modified to serve as the basis for the virtual space. The most fundamental difference was the public nature of the web site. The texts presented on the site are a public offering, and not all those viewing the site will have accepted or even been aware of the basic principles on which the dialogue was based. So, these principles were modified to give the participants greater control and protection.

The modified rules of interaction are the following.

1. All interested participants are encouraged to submit a text to the site.
2. The story or text from each participant is valued and it remains their own. Any participant has the right to edit or even withdraw their text at any time. They may even ask that their identity not be publicly revealed.
3. In order that each story or text be “heard” as widely as possible, each should be presented in at least two of the target languages (Japanese, Chinese, Korean, Russian, English).
4. The texts are presented in such a manner that none has precedence over any other. All are equal.

5. All participants should have a sense of ownership and responsibility for the site and so are encouraged to participate as equal members of a web site (website?) editorial board.

Some issues arose when implementing these principles for the on-line repository of this systemic history. Work on resolving these issues is not finished, and the resolutions involve work in many areas including technology, community building and history. But two essential principles were followed in “translating” the rules of interaction for the dialogue space into the virtual space.

First, all interested parties were encouraged to submit a story or text to the site to be included in the systemic history. This was an extension of the idea that all interested parties should participate. One of the ways the contested histories of this region are problematic is that governments cherry pick various incidents and use them to promote a particular view. The purpose of a virtual systemic history is to go beyond any one view, political or personal, and to encompass all views so that every story is available for public viewing. Thus, a systemic history is a summation of the individual experiences of all the people who lived through the events of a particular time.

Second, the story or text from each participant was valued, and it remained their own. Any participant had the right to edit or even withdraw their text at any time. As rule number two above stipulates, they could even ask that their identity not be publicly revealed.

4. Results

Each group was successful in video taping each person’s narrative. On the site there are about 30 hours of narratives from 40 participants and some observers. Most of the texts of the narratives are available in either English or Japanese. Some are available in other languages.

The narratives reveal some very interesting trends. These are not in any sense the result of a formal historical analysis, but they are indicative of the power of this systemic approach to history. There are narratives that contribute towards constructing a new cosmopolitan concept of a global citizen. Concrete results of this trend were many. The first meeting to organize an ongoing Transboundary Environmental Project among university students in North East Asia was held in December 2006 sponsored by Tokyo Keizai University and the ICU-COE NEAD Project, and subsequent activities occurred in April and December of 2007. Both ICU and TKU students also participated in the 2007 North East Asian Network Conference organized annually by Yonsei University’s Institute
for Leadership Development. ICU students participated again in this meeting in 2008. In addition, a combined version of structured and open dialogue processes were used to facilitate a planning meeting between ICU and Nanjing University administrators and faculty to create a permanent relationship on student exchange, language teaching, gender studies, service learning and history and peace studies.

Beyond the idea of a new generation of global citizens, there were also parallel experiences of destruction and loss. There is the emerging, previously untold, comprehensive story, of the Korean diaspora and various “hidden histories” (Ainu, Okinawan, Evenki, Khanmigan, Buryat, Japanese “returnees” from Siberia, Manchuria and North Korea, the testimonies of teenage Japanese aircraft factory workers during WWII, etc.)

Ainu and Khanmigan and Evenki connections have been made. As a result of the Dialogue, Holocaust survivors in Siberia began telling their stories in Siberian high schools. The Polish participant with Ainu connections began looking for the records of his grandfather’s death in the concentration camp in Mauthausen. There are possible cooperative activities between NEAD participants and the pan Japanese university student organization, RING (Real Interaction with Neighbors around the Globe), and there are possible future activities with Peace Boat Japan.

In one of the most noticeable outcomes, many of the Ainu participants were so encouraged by the dialogue that they organized an alternative Indigenous Peoples Summit held in parallel with the G8 summit in Hokkaido Japan in 2008. This received global attention and “encouraged” the Government of Japan to recognize the Ainu as Indigenous People, which the Government finally did one week before the Summit began.

5. Problems

We encountered four main problems on several levels in this attempt to build a systemic virtual history space. They were continuing participation of the stakeholders, linguistic barriers, authenticity of translation and ownership of the narratives, and multilingual search for the archive. Each of these represents areas where work is needed to be done.

First of all, the digital divide was a strong barrier to continuing participation. How can those who do not have regular snail mail participate in an on-line, electronic archive? More than that, how can they benefit from the archive? These are basic issues that as yet do not have answers. Additionally, many of the younger participants, who are more net literate, did not return to build a community. They took their experiences and moved out into the wider world. There are many issues involved with community building, but it seems that conflating a community site and
providing a dialogue space should be separated from the archiving of personal narratives.

Perhaps the biggest barrier was the continuing linguistic barrier. Of course, those telling their histories have to be comfortable with the language in which they speak. Some of the participants were multilingual, and they were able to provide their texts in multiple languages. But in order for this history to be accessible to all, the stories have to cross linguistic barriers. In an extremely large collection of texts, it might be possible to simply insist that there is more than one translation available. It might seem good to translate everything into a single language. English is often used by countries with multiple indigenous languages. It is seen as an acceptable choice, since it favors none of the local linguistic groups. However, in the realm of history and politics, English cannot be the common tongue. English carries too much baggage to be the only language of history.

A compromise was suggested that each story or text should be translated into at least two of the regional languages. One of the problems facing the ability to dialogue in the Northeast Asian region is the lack of a common language of wider communication. The basic languages for the region are Chinese, Japanese, Korean, and Russian. English, in fact, does not fill the role of a language of wider communication as it does in South and South East Asia. In addition, the major State languages of the region do not have a common orthography, and then there is the problem of the Indigenous languages, such as Ainu in Japan and Evenki in the Buryat Republic of the Russian Federation. Some these Indigenous languages have no writing system, or only a borrowed orthography.

Even though the speakers of these languages are usually fluent in one of the four state languages, there are still times when things can be said in one’s original language that cannot be fully conveyed otherwise. Thus, issues regarding the participation of people from oral traditions on the internet and on virtual sites were revealed even in a project as small as the NEAD Project. Of course, technology provides for the recording and dissemination of audio as well as video input, but this complicates the translation problems immensely. It may be that advances in technology can resolve these issues.

Another issue regarding translation was the authenticity of the translation and the rights of ownership of the participants over their own narratives. Is a translated story the same story? How would a monolingual author approve of the translation and still accept ownership of the story? This is a difficult question.

Certainly each author should have editorial control. Some authors were multilingual and could provide their own story in multiple languages. A small community can provide services and attest to the authenticity of
translations. In the NEAD Project, the quantity of narratives was small enough that control was maintained, but it was difficult. Even translating the 30 or so narratives into multiple languages was daunting for a volunteer staff. This issue of scalability is as yet unresolved.

Beyond just collecting and archiving historical narratives, the function of the virtual space must be to provide access to the narratives. An on-line, searchable narrative space will have the potential to create a systemic history of North East Asia. This gives rise to a whole set of problems with a multilingual search that renders results with the search term translated. A search for Nanjing would look for results with as well as the term in Cyrillic or Hangul. This is no easy task. Rather than history as the summation of events by an authority, whether an academic, a novelist or a government, history will be the shared collective virtual history space. Rather than reading a single text for a view of history, any interested person can search for a topic and read through various narratives to understand the experiences of the people for whom it was a real experience, not just a story. As these narratives are shared across a larger audience, a shared vision of the history of the region can develop. And, as with any search, people will find new things, things unlooked for in their original search. They will not be restricted by the preselection of events by an authority. What we search for may not be what we find, even if we find what we need. As Moreville (2005) said, “the journey transforms the destination.” We may begin by seeking the truth and find ourselves with a shared awareness of and respect for each others’ experiences. In the end, this virtual web of personal historical narratives can be a true global agora. This is the beginning of a true virtual historical space. With all of these narratives available, the people of the region can begin to explore the richness and variety of the region’s history and begin to create a shared vision of that history.

References


**Topic:**

**IT / IS**

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Investigation of variations in the software development process: a case study

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Abstract:
This study employs the business software project variations in understanding the customer. The relevant literature shows many business software implementation failures and their reasons. Our research is based on a real case study in Turkey and it has a potential for encountering in any location of the world as well as in Turkey. We focus on a business software implementation process and obtain observational data from project meetings and interviews. Our findings show that the most of the factors, that affect the software development process’ success; are understanding the customer, good communication and promises.

Keywords:
Software development process, software project management, software project failures

1. Introduction
Business environment has radically changed during the transformation of information technology and management. Advancing technologies have encouraged a migration away from the traditional, life cycle methods of development toward more flexible and dynamic approaches in which
reusable components are assembled into working systems in a radically shorter time (Welke, 1994).

Today, there are few technical reasons for companies to experience the software project management as compared to 20 years ago. Most of the risks in today’s system development process are due to management and organization rather than technological infrastructure. Information systems projects continue to fail at an alarming rate, and the problem of ‘runaway’ development projects has never been more serious (Lyytinen and Robey, 1999).

Contents of agreements on implementing software between software developers and companies are subject to variation during the new product development and/or process improvement in terms of time requirement, cost of implementation, product specifications and allocated resources that depends highly on other factors such as application area, specific needs when implementing standard software, user knowledge level and top managers’ point of view. These variations may cause unplanned negative situations for both software developers and companies as customers.

Business software like Enterprise resource planning (ERP) automates core corporate activities such as manufacturing, human resource, finance and supply chain management by adapting and incorporating 'best practice' that facilitates rapid decision-making, cost reductions and greater managerial control. However, there is extensive evidence of IT implementation project failure in the academic and business literature. Many surveys showed that large portion of software projects fail completely, that is, the system is not delivered or is unusable (Holland and Light, 1999).

According to the existing literature related to the software development, several models have been structured for standard software development processes. These include the waterfall model, spiral model and evolutionary models that can be regarded as favorites. Software development supported by Computer Aided Software Engineering (CASE) tools, especially Joint Application Development (JAD) and Rapid Application Development (RAD) among these tools, and the 5th Generation Software Development tools (i.e., model-based software development), can be considered as modern approaches. Although software development models reach a certain maturity and structure, in practice, applying these models do not seem very possible especially for concerning project-based software needs.

The main reasons for these impossibilities are thought to include factors such as rashness of the firm that needs to use the software, the level of trust in scientific management, customers’ lack of knowledge on cost items and their insufficient information of the project about the implementation process. However, it is necessary to investigate the effects
of the product structure, application area, company ownership structure, software development techniques that the software developer is capable to use professionally on the software implementation process triggered by the agreement.

In this study, it is aimed to investigate the main and secondary sources of variations in understanding of needs, and try to minimize the time, allocated resources, product specifications and costs related deviations that are highly possible to emerge during the project development.

This study utilizes information about the software developer company and OzInc, structured observations, interviews, analysis forms, the initial commitments, pre and post analysis results of the project needs, project maps, meeting notes and conversations as a primary data source. The software company here is a leading business solution provider with standard enterprise ERP software and customizable products and OzInc is growing rapidly in semi product steel sector.

The customer company that is subject to our case study achieves both countrywide and international trade facilities in other countries. These collected data in the meetings and interviews are evaluated in terms of different dimensions by applying qualitative approach.

The rest of the paper is organized as follows: Section 2 includes literature survey about the software project failures, Section 3 presents a detailed real case study that is concluded by a failure and in the last section we discuss the reasons for failure in the case study.

2. Literature survey

There are many studies that employ software project failures in the last two decades. The researchers mostly focused on reasons for failure at different stages, project types, durations, technology, management and organizational failures. The researches in this subject were primarily conducted by qualitative research methods because of the nature of the problem domain in that one could not measure directly the effect of any factor in terms of cost, time and contribution to failure. There is also number of surveys about failure statistics of software projects in many ways.

Holland and Light (1999) discuss critical success factors for ERP implementation as in figure. Here critical success factors might be considered in two categories: long term factors as strategic and short term factors as tactical.

One of the most familiar series of surveys about software projects is conducted by Standish Group International. According to reports published by this research company in Standish Group (1994, 1996, 2004 and 2006), approximately 20 percent of software projects are cancelled before they completed and half of the projects’ cost almost doubled their estimates.
According to these reports overall success rates (i.e., meeting the budget, delivery, and meeting the business needs) of the projects are around 20 percent. IT project management, despite the fact that it deals with “modern” technologies, is embarrassingly immature in the mastery of risks. We see similar recriminating data year after year reminding us that about 20 percent of IT projects are canceled before completion and less than a third are finished on time and within budget with expected functionality.

Software development is approaching its 50 years as a profession. During this time there have been numerous success stories as well as many broadly publicized failures. These publicized failures are either associated with safety problems or substantial cost overruns and schedule delays. There are many more examples of these projects in the literature. Authors describe these projects as runaway and death-march projects (Glass, 1998).

Lindberg (1999) investigates the reason of high failure rates of 84% of software developers whereas researchers determined that software developer has much higher achievement needs than the general population. In his research, he provided an in-depth look at a project failure through the perspective of the software developers that worked on a software development project failure.
Jones’ (2004) CrossTalk analyzes about 250 large software projects at or above 10,000 function points in size that were examined by the author’s company between 1995 and 2004. Findings showed that when comparing large projects that successfully achieved their cost and schedule estimates against those that ran late, were over budget, or were cancelled without completion, six common problems were observed: poor project planning, poor cost estimating, poor measurements, poor milestone tracking, poor change control, and poor quality control (Jones, 2004).

Kappelman (2006) studied about early warnings of failure in software projects by conveying 53 symptoms that could be used as early detection. These symptoms can be grouped as people, process and product based symptoms.

The major factors that contribute to the success or failure of software systems fall into seven categories as management, customer and users, requirements, estimation and scheduling, the Project manager, the software development process and development personnel (Procaciono et al., 2002).

One of the software companies in Turkey stated that the key point about getting failure in business software projects is around the defects in developing business model (Aksoy, 2007).
According to APICS, the important issues in software project managements are fitness to organizational structure, applicability and cost estimations before implementation step. In this manner cost dimension can be explained in terms of hardware, database, operating system, training, consultancy and others (APICS, 1999).

3. Case study: A failure story of integrating business software

Almost in all countries there are plenty of software companies that are extensively focused on providing business solutions like basic accounting and financial operations, human resources, production, inventory, purchasing and sales operations. In the most of the business cases, software companies create customized solutions as mixture of existing software and company specific added ones. During the delivering of solution by starting the agreement on scope of the project, project time, cost and working conditions up to physically adapting and implementation, there are lots of difficulties with the project’s application phases.

The case study here presents an ordinary mid-sized company implementation failure of three different software companies that is highly possible for similar business cases in the future.

3.1. Customer Company Description

The Customer Company (OzInc) is a leading company established in 1992 in İzmir and it produces, sells, purchases to/from other countries and it operates in a 10 thousand square meter closed area. There are two different business software installed and both of them are already currently in use. Organizational hierarchy has a flat structure consisting of a company GM, department chiefs and bottom level workers. General manager (GM) is responsible for every main operations inside the company such as daily production, sales, purchases, financial-accounting operations and information systems.

3.2. Starting Project: Sales Analysis

The phone rang and Vice GM called the Project Manager of Software Company (NTX) in 25 November 2008 and said that they sold their software product with some customizations and they should install firstly their software called as “basic set” while entering the new year within 3 weeks. Basic set involves basic functions of the business requirements such as billing, managing inventory operations, financial operations, and accounting operations.

SC sales representatives had promised that the full implementation cost with Customer Relationship Management (CRM) was around 30 000
dollars and it would be payment for once. It is established in İzmir and there would not be additional cost because of being here.

3.2.1. Rough Cut Analysis

As a second step of implementation, they should build a CRM for OzInc because there is no such a software module in their current software product spectrum. Finally, the project would be finished by integrating current production planning facilities with their relevant and existing software module after little modifications. In this time period the software provider company just feels the effect of the 2008 crisis that spreads quickly over the world and their software sales were going to decline sharply as 20-30% within 2-3 months. Therefore this was the exciting sales agreement for them to increase their hope for the future. The owner of OzInc, who is also GM of the company, is very enthusiastic, hardworking person and willing to integrate this software to his company, even if it is necessary to work for this project at the weekends for a long time.

3.3. Competitors

Another important point of this project is that OzInc has some business software of other leading software companies in the market that is to be removed upon installing their software. In other words our software company will gain a prestige since their business software preferred to installed ones. OzInc uses two different companies’ software for different purposes. One is for basic accounting operations and the other one is for managing production activities. It has been caused the duplicate entries for some of the transactional data that was related to accounting, production and sales activities since 2006. In fact the software used for production is capable of the accounting operations and most of the accounting plan is defined in it but nobody knows why the first software is preferred redundantly.

3.3.1. History of Business Software in the Company: Past Success/Failure Histories

PX: Company of First Installed Software: Company is established in İstanbul. There is currently installed software in OzInc that operates basic accounting transactions but full functioning of accounting is achieved by co-working of AX and PX. If NTX is installed once, there will be no need for the others for accounting. Recently PX released a new ERP software included CRM and it is worth evaluating. PX is the first software installed in a company and customer manager talked to PX for ERP integration firstly but cost of the product was very high. Therefore second software is selected for ERP.
AX: Company of Second Software Installed: Company is established in Istanbul. It has robust and very flexible infrastructure with CRM module. It doesn’t require great effort to adapt it, but its annual cost is as much as 30000 dollars. There is still ongoing interview with sales representatives. Location based constraints between Izmir and Istanbul might cause adaptation and other developments.

Leading analyst of AX was very qualified and she could always understand what the company manager wanted and OzInc manager was very satisfied with the work she does. He always looks for such a consultant in other software projects and makes comparison between current consultants and AX’s.

AX’s consultant team was working at very high daily costs in Izmir and implementation cost was about 400 thousand dollars. If the company manager decides to work with AX, he will suffer daily adapting costs and will have to meet the additional annual cost of 30000 dollars for licensing and upgrading. It is the most important disadvantages of AX. It seems that it is one of the most important points for selecting NTX.

3.4. Initial Stage of Analysis

As a first step of defining business requirements project managers went to OzInc with their project consultant in the first week of the February. It was weekend and OzInc’s manager invited the entire employee to the starting meeting. In the first meeting they told us their general structure of working, organization and business processes. We used to prepare draft plan in our first meeting but in this case the meeting was progressing toward business analysis. For the first day consultant and project manager were trying to understand the business requirements and we considered how these processes could be implemented via our business software based on our first impression. OzInc manager thought that the software company would install their software within two or three days and OzInc could start operating upon installation. We expressed that it was impossible to implement in that time and it could take at least 3-4 months because adapting the software by means of leaving the legacy system has some affordable steps. Eventually, OzInc’s GM was convinced and satisfied with these reasonable explanations. As a project manager and consultant we began to get worried about progress of the project in the near future and our first group of questions was raised upon this situation:

- Why did OzInc decide to left current business software that is used for operations management?
- Why did the company GM select our company?
How could we implement some of the current processes that were achieved in an opposite way to us?

We were finding some answers to our questions but it was time to pay for the first part of the contracted cost. OzInc’s GM said that they could not pay anything without demonstrating the model of inventory module. This situation was a sign for the weak contract and the lack of reliability between software and OzInc. Therefore we were going to focus on inventory part of the software to get some payment. We believed that we could adapt our existing inventory model easily to replace the legacy system by means of parametric arrangements without significant structural changes. That is why our inventory module named as flexible structured module.

3.4.1. Determining Software Needs of the Company

However, we requested our software team to develop some additional attributes for OzInc within the flexible structuring inventory module. Since this is a star project in this time period against our competitors, our GM promised to support all the required additional software changes and improvements by allocating software developers without considering cost-benefit ratio. We were conscious of that the more we requested additional changes the more we would steal time for regular software updates. On the other hand our chance to success in this project, get payment and integrate more robust software would decrease unless these revisions were made. Moreover, OzInc manager wanted to demonstrate the developed model in the working environment in a short time and it took significant time to express the impossibility of developing software in such a way.

3.4.2. Understanding Business Requirements: Difficulties in Understanding Phase

When we understood about disagreeing with OzInc manager on selecting flexible structuring as an inventory management model, our project consultant had to go urgently to abroad for a month. It was the first radical change in that it would put the project team into difficulty. By this time another consultant inside our company started to work with us. This person was implementer for small sized projects and he is currently at self development stage. OzInc was not affected by this radical change with their work.

The second important meeting was on evaluating the steps achieved, we discussed about inventory structure and our aim was to convince the company manager for replacing the flexible structuring model with the item-by-item inventory management since we began to think that flexible structuring model was hard to adapt for the working structure of the
company. The main reason for early preferring of flexible structuring model was that the existing legacy software was used the system similar to this model and was managing only four main item types. These four types were maintained on the basis of size and vendors attributes. It means that the part code involved material attributes (length, width and thickness) and vendor information as a set of numbers. In this meeting OzInc manager stated that it was so difficult to create the entire materials if the project manager decided to implement new inventory system and he explained why they prefer using second business software for the inventory management. Finally we promised that we would develop a hybrid model that involves attributes of both legacy system and our product features by relying on our software team. OzInc’s manager wanted to see the new promised model as soon as possible. We started to develop this special promised software with purchasing processes as well as inventory operations. Entire user interfaces would be renewed as special to OzInc.

With our decisions we would assign less amount of work to the software developer team and we would develop the screens of the part code creating. We would develop screens like legacy system but we could maintain the parts in our way without great changes in program code by means of creating relation’s legacy system likely screens and our traditional system. After introducing these improvements in the new model, the company GM seemed to be satisfied with these developments but emphasized on their priorities about CRM and requested to focus on it.

Three weeks ago we introduced a CRM specialist to company GM and the specialist presented the basic information about CRM and suggested to begin with the basic operations’ design. In that meeting, company GM has decided to begin with improvements in CRM. We found suitable to work with our new project leader for the CRM because of it would require different aspects rather than inventory management.

3.4.3. NTX and OzInc’s Perspective

We created user interfaces with the CRM specialist within 6-7 business days. Then project consultant started developments for the main product groups. These developments were only achieved for animating the events in company GM’s mind and establish trust. We made first presentation to show improvements in CRM and we showed all the user screens as the company GM expected and he satisfied with these screens but he requested to be able to enter data to CRM system in a spreadsheet format in a real working environment.

Last developments and impressions were boring because we would back to basic developments stages again otherwise it could not be possible without achieving the basic implementations. Then we repeated that our software is built for general commercial purpose and we only could adapt
our software to manage company’s business process with small changes and could not create new software for them.

3.5. **Looking for Remedies to Get Rid of Misunderstanding: Hiring a Consultant as a Bridge Between NTX and OzInc**

In the CRM meeting we could not agree with OzInc’s GM on CRM objects. It was meaningless to keep records about the customer like his wife’s birthday, school grades, gender and ages of children. We blew up at GM against his unnecessary needs and our specialist told him that the most of his needs about CRM were meaningless and could involve some harmful effect since the violation of privacy. As a result, we quarreled over CRM and we suggested that a CRM consultant and process consultant was to be hired for OzInc. We finished this meeting after promising to find two consultants for structuring their CRM module.

We showed the inventory, purchasing and process model one week later. Although the models in the design stage, we built user screens that worked properly in terms of calculations and functionality. The model presentations included creating parts, defining the part attributes, inventory data entries, purchasing order entries, freight bill entries and purchase invoice.

3.5.1 **NTX has still trouble: Payment problems and Its Chain Effect to Management**

OzInc’s GM's attitudes were taking attention of not only our sales department but also our vice general managers. OzInc’s GM, who told us they would not pay anything as long as having no satisfaction with inventory module through early meetings, was keeping his pessimistic attitudes against lots of the significant improvements, and we were experiencing disappointment entirely.

We went to OzInc with the new CRM consultant as promised. The CRM consultant has been installing most of the modules of our software for the number of consulted company for many years as well as CRM consultancy. The CRM consultant was an industrial engineer, led many successful business projects and had her own consultancy firm. Consultant would play a bridge role between OzInc and us as understanding, refining, rationalizing the OzInc manager needs.

We focused on building CRM module and priority of adapting inventory management module was lowered. Our aim was to build CRM module as soon as possible. Firstly we would gain the respect of OzInc again by increasing sales potential with our software. To do this, CRM consultant desired few days for working and understanding OzInc and then consultant presented a CRM demonstration that impressed OzInc’s GM. In our opinions consultant was best person for a bridge between two
companies and he could build quickly an applicable model. Last thing was an agreement between CRM consultant and OzInc on consultancy cost, time and other working conditions.

3.6. Dissatisfaction with the Progress of the Project

When we went to OzInc with our vice general manager, OzInc manager said that he dissatisfied with the current situation and developments built so far. He complained us about we insisted on prioritizing inventory management and consumed much more time instead of building CRM module but CRM consultant could develop a fast and successful CRM model in two days. Moreover he criticized that why we could not achieve such a model in a very long time. Moreover, he was undecided on hiring the CRM consultant because of extra higher cost. Eventually, OzInc manager said he wanted to review the CRM module of other software packages that were currently installed on and consider making developments on one of the software as an alternative. As a result he would make a decision as continuing with us or leaving us and continuing with others after evaluating the alternatives within one month. Our vice manager stated that one month is too long to make a decision and we could continue to work on the project within this time interval, but he refused.

As a project team we have to take the consequences of this dissatisfaction after the meeting. We were investigated about why we could not present a CRM demonstration like CRM consultant did. Our answer was to speed up the project and focusing on “basic set” which was a necessity for the rest of the project success and we said that CRM was planned as another major stage after adapting the basic set and inventory management module.

3.6.1. The Great Misunderstanding

We passed three weeks without getting any feedback from OzInc. Then we visited the company with our instructors for a planned research to get some data, project manager told us that what they understood from “basic set” was different from what we understood from it.

3.6.2. Start with “Basic Set”

We call the essential parts like vendors, customers, inventory, invoices and purchasing in our software as “the basic set” and we promised and prioritized to implement “the basic set” firstly. On the other hand OzInc’s GM had completely perceived different thing in that the entire software included all the modules (i.e., inventory, CRM, vendors and etc.) will be “basically” installed at once as a “basic set” of implementation and then required adaptations would develop via small changes in the long run.
There were a great gap in our standpoints and unfortunately we understood it after 4 months.

### 3.7. Freezing Project for Evaluating the Present Situation

We didn’t any information for two weeks from the CRM studies of the consultant. When the project manager talked to CRM consultant, he said that OzInc’s GM did not want to answer the call requests and provide him with an excuse of lots of works and could not allocate enough time for studying the project. Finally project manager called OzInc manager and manager said he wanted to have a talk with our vice general manager.

### 3.8. Different Viewpoints about Basic Set of OzInc and NTX

Moreover, another difference with our point of view was about feeding method of CRM system with data. We would provide the basic customer fixed data for the system via spreadsheet since end users could prepare data to initialize the system for once. On the other hand, they comprehend that they would use this spreadsheet in every time as entering data to system. At this point our main fault was to neglect the customer background and consequently confusing of terms and events, lack of informing the customer about the integration steps of our software with company business processes. We supposed that the customer contact person could understand what we told them technically, but it did not. Shortly, we had lack of empathy with OzInc representative.

Another important mistake was extending through the initial step of project: initial contracting and agreement on working conditions. There was a significant lack of communication between our sales department and of course their verbal promises and project group. They had not forwarded the priority information of the customer and project strategy to our group.

### 3.9. Feelings of OzInc After 8 Months

OzInc said that they told us they did not know about CRM too much. According to OzInc manager, if OzInc were them, OzInc would hire a CRM specialist definitely. The consultant came to OzInc and gave basic information. He advised that it was necessary to complete “the basic set” and CRM can be built up simultaneously.

Changing consultants as many times causes to tell everything again and again is so boring and time consuming process and it is not a professional approach. That is why we give up interviewing with the last consultant.
OzInc believes that they were misdirected about reporting structure and custom tailored reports in terms of types, costs and number of free custom designed reports.

OzInc manager feels himself as misled and deceived and he blames himself due to the fact that he should have been more conscious as a customer and audited the progress, should not have believed the verbal promises by salesperson of software company. He expected that the project should be finished as 70 percent so far.

OzInc manager impressions are listed below:

- Knowledge and experience of CRM specialist of NTX has at beginner level as compared the others,
- There seems to have an organizational, communication problem, problem with informing the higher level of hierarchy about the real situation in the project,
- Dissatisfaction with the data conversion (i.e., utilizing spreadsheet software)
- OzInc manager does not evaluate the progress up to here as a great work done by the software company, according to OzInc, it is so simple that an ordinary spreadsheet user can build such a model himself.
- There is a lack of contracting that captures all the promises as a written statement even if there are some meeting reports sent via e-mail but company manager occasionally read his mails.

3.10. Feelings of NTX’s Project Manager

NTX project leader confesses that this was their first project experience in this kind in that they were used to working with information technology department specialist and/or information system consultants, but this was different in terms of working manner.

3.11. Looking for Other Alternatives

Finally we concluded to evaluate the CRM alternatives with OzInc and instructors. In this last meeting each part of the project could say everything about progress easily since nothing remained to lose by this point.
4. Conclusion

We present a business case in this study and investigate the differences in understanding the customer and source of differences that cause the project failure. It can be generalized for other project implementations in similar situations.

The meeting notes and interviews show that the most of the factors affect the software development process with different importance level as starting from managerial effect to point of view and the project management style of the software developer in analysis and design.

Understanding the customer is the most crucial step in that it is early step of entire development process and as in our case study showed that both side of the project should have a good communication.

Both sides of the implementation project should promise what make them really be able to do and offer within the working constraints such as project time, cost, technology and functional abilities of the final product.

It seems that there is a mistake on software development life cycle method: evolutionary or spiral model would be preferred rather than waterfall model because of keeping the priorities of OzInc.

It is necessary to employ a consultant between NTX and OzInc continuously. He should play an interface role as converting needs to requirements and preserving boundaries of the project.

There should be an information technology department within the company that is responsible for maintaining software projects, basic hardware and networking operations. It makes it easier to communicate with the software companies technically.

References


Software development project risk management: A new conceptual framework for evaluating risk and performance in Greek projects

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Abstract:
During the last two decades, the adoption of risk management strategy in many fields of business activities has been expanding rapidly worldwide. The frequently observed positive impact of risk management on the overall outcome of projects has led many software development organizations to appreciate its significant role in the pursuit of cost reduction, schedule overruns decrease and, generally, improved performance. This study proposes a conceptual framework for the risk management strategy that should be adopted by software development projects. The proposed model incorporates a group of factors that affect the total risk level of software development projects. In addition, it indicates the impact of project risk (and all of the dimensions that compose it) as well as residual performance risk on the final subjective and objective project performance.

Keywords:
Project Risk, Performance Risk, Project Performance, Software Development, Project Quality

1. Introduction
Risk management involves and has been applied to various fields like the national security, exploration of space, nuclear reactors, security, construction industry and financial investments (Iversen et al., 2004). This research will focus on the study of various approaches of risk management
applied to software development projects. Although they have been applied with success in the last decades, dealing with problems in the development of various systems, the fact that a large percentage of the systems is never completed or fails to operate effectively and efficiently (Lyytinen and Hirrscheim 1987; Gibbs 1994; Jones 1995; Glass, 1997; Ropponen and Lyytinen 1997; Klein and Jiang 2001; Shafer 2004; Johnson 2006), renders the study of these approaches even more imperative.

The fact that the majority of the software development organisations perceive risk in a different and not systematic way contributes to the lack of the stability and effectiveness of the projects. Kwak and Ibbs (2000) identified risk management as the least applied scientific field among the various knowledge areas of project management. In line with Kwak and Ibbs study, Adams and Pinto (2005) research states that risk management has not received sufficient attention and does not appear to be widely accepted within the software engineering community.

Given the complexity of most software projects and the several risk types emerged during the development/implementation stages, the abandonment of risk management to human intuition and initiative (Kontio et al., 1998) can sometimes be proven effective, yet remains an insufficient substitute of the constant professional and stable approach of risk management.

Risk management of software development projects has been recognised as an independent field of research in 1989, when Barry W. Boehm lead the way with his pioneering book “Software Risk Management”. Since then, this particular issue has been discussed and studied quite thoroughly, especially in the beginning of ’90s. The fundamental surveys of Boehm (1989; 1991) and Charette (1989; 1990), laid the foundations for the extensive contribution of the Software Engineering Institute (SEI) in the middle of ’90s (Van Scoy 1992; Carr et al. 1993; Higuera et al. 1994; Sisti et al. 1994; Higuera et al. 1996; Dorofee et al. 1996), that even today acts as an archetype in several references in risk management literature.

The goal of the current study is the creation of a new research model, which will emerge from after a thorough examination of the literature and will be used to measure conceptual factors and their relationships in order to achieve a better and more complete understanding of risk management as an organisational process. In doing so, the effect of several organisational strategies and characteristics on the determination of the risk level of software projects, as well as its consequential influence on the total project performance, will be assessed. In sections 2 and 3 the conceptual framework and the research questions are presented, respectively, while some concluding remarks are provided in Section 4.
2. Literature Review

2.1 Risk Identification Approaches

In an attempt to promptly, effectively and easily identify risk, managers of software projects have been using various methods. Four of them are going to be discussed below, in a similar way as they were classified by Kulik and Weber (2001).

The first one is the Ad-hoc Approach, which provides an assessment of risks when the initial symptoms appear on the project, as well as their mitigation with unofficial way. The second approach is called Informal Approach and includes a discussion with people, that are directly or indirectly involved with the project, about the several risk issues that appear (or will possibly appear) and the recording and documentation of the risks for future use. The third is named Periodic Approach and, as it can be understood from its title, involves the use of repetitive procedures for the identification and specification (quantitatively and qualitatively) of the risks. Finally, the fourth approach is the Formal Approach for the identification of the various risks. According to this approach, a thorough and in-depth assessment of each risk by independent individuals is performed.

An international research, carried out in 2001 by the Research Corporation KLCI, about software development risk management, indicated that the most common risk identification approach is the informal, used by 37% of the respondents.

2.2 Project Characteristics

The factors that characterise, and in many occasions form, the development of a project, affect to a great extend the determination of its risk level. In the present research, five main characteristics of the software development projects will be studied.

The first of these is Project Scope, which in this case is going to be studied through an indicator, Project Duration (Wallace et al. 2004a; Murthi 2002). This indicator is selected as the measure for project scope because, as Wallace et al. (2004a) propose, the duration information is tracked for most projects and this type of information can be easily collected using a survey-based data collection procedure.

The second characteristic has to do with whether a project is carried out totally In-house or in collaboration with external providers (Outsourcing) (Hirschheim and Lacity, 2000). It has been stressed that outsourcing, as a strategy of gaining competitive advantage for a company, is particularly effective yet equally risky (due to the complexity and sometimes the vagueness that characterize its procedures) compared with the in-house method (Chatzoglou and Sarigiannidis 2009; Wallace et al.)
Still, although the rapid increase in the use of outsourcing on software development projects in the past few years (in 2005, 75% of the U.S.A. organisations had been making use of outsourcing to some extent), its effect on the risk level of the projects, and especially on those taking place in countries with less developed infrastructures, have been studied poorly by literature (Na et al., 2007).

The third characteristic of a software project that will be included in this study is its Strategic Orientation (Wallace et al. 2004a; Clemons 1991). The strategic nature of a system can be measured by the classification of the projects in a) strategic, b) organisational and c) informational.

Moreover, Project Diversity constitutes a structural form that is expressed in work specialization terms (Aladwani, 2002). In this research the project diversity will refer to the differentiation level that appears in the knowledge background, capabilities and experience among the participants of a project (Campion et al., 1993).

The fifth and final characteristic is the Type of System being developed (Jones 1994, 2000). The failure to identify, understand and confront the risks that are connected to different project types is an important and defining factor for the problems during the realisation of the project, concealing the real risks of the projects from their developers (that is by differentiating the perceptions that they have formed for them) (Gotterbarn and Rogerson, 2005). Four main types of software development projects can be distinguished: a) Management Information Systems, which are the most common software applications, b) System Software, like for example the operating systems involving software that facilitates software applications (Application Software), c) Commercially-marketed Software and d) Military Systems, which are created for securing rules and models in military data.

2.3 Risk Dimensions

Barki et al. (1993) support that the risks of software projects consist of interrelated dimensions and that their assessment should not be made with the use of a one-dimension scale, but, on the contrary, every dimension should be defined separately both theoretically and practically. The multidimensional assessment of risk can supply a clear specification for research and practical purposes (Boban et al., 2003).

Despite the significance of the study of risk through its dimensions, very few researches have been carried out studying this issue. McFarlan (1981) found three major dimensions of risk in the software development process which are project size, technology experience and structure of the project. He suggested, as well, that the project administrators should develop a complete and aggregated software risk profile for every software
project. Boehm (1991) proposed a software risk management framework that included the evaluation and control of risk and conducted a list for the top ten risks based on his personal professional experience. In spite of all these, Boehm’s list was lacking some theoretical substantiation (Huang and Han, 2008) and, moreover, due to its complexity and other factors that characterise software projects, it ceased having any diachronic value through the passing of years (since it was composed in 1991). Barki et al. (1993) conducted a comprehensive review of the studies related to the software development risk (in particular from 120 projects that were realised by 75 organisations) and then they proposed 35 measures for its estimation. These measures were categorised in five dimensions: technological newness, application size, expertise, complexity of the application and organisational environment. Although this research delivered a quite useful and understandable instrument for measuring risk, it was noticed that the risk evaluation scale was extremely complicated (Wallace et al. 2004b; Huang and Han 2008). Heemstra and Kusters (1996), based on previous studies and professional experience, composed a list of 36 risk variables that were later grouped into 9 categories. Moynihan (1997), in co-operation with 14 experienced Irish application developers, evolved a total of 21 points that are risk related. Sumner (2000), through structured interviews, compared the differences of software risks between MIS and ERP projects and proposed nine risks that are unique in ERP projects. Kliem (2001) developed a list of 38 risks in BPR (Business Process Reengineering) projects, which were categorised in 4 main dimensions: people, management, business and technique. Schmidt et al. (2001) identified 53 risk variables that were categorised in 14 factors and suggested that the difference in the culture of the three countries (Finland, China and U.S.A.) where their research was carried out, could affect considerably the list of risks and they finally concluded that only 11 of them have cross-cultural application. Addison (2003) has used the Delphi technique to collect opinions from 32 specialists and then presented a list of 28 risks for e-commerce projects.

This research will mainly be based on the dimensional distinction of a quite recent approach, the one proposed by Wallace et al. (2004b). They proposed 27 software development risks that could be grouped in six dimensions, those referring to: Users (Jiang and Klein, 1999), System Requirements (Han and Huang 2006; Mizuno et al. 2000; Curtis et al. 1988), Project Complexity (Barki et al. 1993), Planning and Control (Han and Huang 2006; Keider 1984), Team (Mizuno et al. 2000; Abdel – Hamid 1989; Jiang et al. 2000) and Organizational Environment (Barki et al. 1993; Jones 1994).
2.4 Project Participants’ Characteristics

Ward (1999) attempted to trace and analyse the most significant characteristics of the project participants that have taken on the difficult task of risk management. These characteristics include the Capability & Experience of the participants, the Motivation for their activation in the undertaking of initiatives and the Perceived Responsibilities in risk management subjects.

2.5 Residual Performance Risk

The primary influence mechanism of the performance of a software project is a risk called Performance Risk that represents the difficulty in evaluating the final performance in terms of cost and schedule overruns (Nidumolu, 1996). According to Nidumolu (1996; 1995), the estimated performance risk that is detected in the final development stages of a project is called Residual Performance Risk. This definition is used in order to clearly distinct it from the risk that is found during other phases in the project’s development life cycle. Therefore, this risk refers to the difficulty in assessing the consequences of the execution of the project, during the final phase of its development.

Meyer et al. (2002) introduced a more “forward thinking” approach that emphasises on the uncertainty frame of a project. These researchers have agreed that, apart from the predictable uncertainty that can be controlled by the traditional methods of risk management, an unexpected uncertainty and a general chaos appears, in many innovative projects. As a consequence of this notion about the risk profile of the project, the residual performance risk can be decomposed in two parts, based on the following equation (Na et al. 2004; 2007):

\[ \text{Residual Performance Risk} = \text{Residual Controllable Risk} + \text{Unforeseeable Risk} \]

The Residual Controllable Risk is expressed by the uncertainty that continues to exist during the final stages of the software projects and that can be controlled and limited with various ways. The Unforeseeable Risk is the uncertainty that cannot be identified or controlled while planning the project. However, despite the intention of previous studies (Na et al., 2004) to examine these two dimensions of residual performance risk separately, no effort of this kind is recorded until today in international literature. In the present study, a first attempt of disintegrating the factor of residual performance risk will be made, on the basis of the variables defined by Na et al. (2004; 2007) and their classification according to their notional coherence to the theory.
2.6 Project Performance

The present research will concentrate on the results that are related to the performance of a project, due to the emphasis that is given to them by literature and because performance is the dependable variable of most vital importance (Nidumolu, 1996).

The performance of a software development project can be divided for reasons of better, deeper and more circumstantial studying into two main categories: the subjective and the objective performance (Na et al., 2007). These two categories for measuring the performance are quite important for software developers and users as well, since both of them affect directly or indirectly the execution and implementation of every project (Singh, 2005).

The factor of subjective project performance refers to the efficiency and efficacy by which a software development project is completed (according to the people involved in the project) (Wohlin et al., 2000) and bears in mind two basic dimensions (Na et al. 2004; Barki et al. 2001; Rai and Al-Hindi 2000): the process performance and the product performance.

Process Performance is an efficiency measure for the software development process and can be described by three dimensions (Nidumolu, 1996): a) the increase in the gained knowledge during the implementation of the project which is called Learning, b) the management level in the development process that is named Control and c) the quality of the relationship among the various participants (managers, technicians, analysts, programmers, external specialists, users etc) through the duration of the software development process, that is called Quality of Interactions (Miller and Doyle, 1987).

Product Performance is a measure for registering and illustrating the performance of the final product and is described by the following three dimensions (Nidumolu, 1995; 1996): a) the technical performance of the software, that is called Operational Efficiency, b) the respond quality to the needs of the software users, that is noted by the term Responsiveness and c) the ability of the software to provide perceptible support to new products and functions and its Flexibility to the interchangeable organisational needs.

These two dimensions of project performance need to be estimated separately since between them there is not necessarily a high relationship (Barki et al., 2001). For example, it is quite possible that a project with cost or schedule overruns problems will deliver a high quality product and vice versa.

Although the measurement of subjective risk performance has the plain advantage of the easy collection of necessary data (Na et al., 2007), it deals intensely with the problem of standardization, since all the
evaluations of a project depend on personal judgement or moreover the mood of a certain manager (Singh, 2005).

Contrary to the subjective risk performance of a project, the objective performance includes some more quantified metrics like, for example, excess in terms of cost, effort and schedule. According to literature (Na et al. 2007; Briand et al. 1998; Gray et al. 1999), the measurement of both subjective and objective performance of a project is proposed, due to the special nature that characterises the software development projects.

2.7 Project Quality

Another factor that can significantly define risks, as well as the level of their presence during the process of a project’s software development is the project quality (Ould 1999; Herbsleb et al. 1997). In the present study, the total quality of a project will be defined through the measurement of two main factors and the variables that define them according to literature (Fenton et al., 2008; 2004). These two fundamental factors are: process quality (Hoffman, 2003) and people quality. To begin with, people quality is divided into two main sub-factors, so that it can be measured with the utmost detail. These two sub-factors that compose it are management quality and staff quality.

Management quality includes variables like communications management adequacy, subcontract management adequacy, interaction management adequacy and internal management quality (AgenaRisk, 2005). On the other hand, people quality involves the quality of non-administrative staff that is occupied with a project. For its measurement, variables like staff turnover, staff experience, staff motivation, staff training and programming language experience are used (Fenton et al., 2004).

Process quality is a complex factor for defining the quality of a project which associates the specification clarity of a project and development and testing process quality. Specification clarity is defined by the variables of specification process quality and requirements difficulty. Development and testing process quality consists of variables like regularity of reviews, quality of documentation and level of independent testing. In the AgenaRisk manual of software risk modelling (AgenaRisk, 2005), for measuring the development and testing process quality, one more indicator is used – a model of the maturity of the capabilities that an organisation has in executing specific organisational procedures, the Capability Maturity Model (CMM). In the present research CMM was omitted, mainly due to the non-categorisation of the majority of Greek companies according to the various levels (five) that it determines (Hughes and Cotterell 2006; Keil et al. 2000).
In Figure 1 the factors and the sub-factors that compose the general risk management model are presented, as well as the relationships that exist between them, which will be examined thoroughly in the following section.

3. Conceptual Framework

3.1 The Relationship between Project Characteristics and Project Risk

In literature, there is a lack of studies that attempt to examine the various characteristics of software projects and the way different risk dimensions, especially, and the total level of risk in general, are affected by them. This research will examine, five project characteristics, emerged from the literature, which have been discussed above (Wallace et al. 2004a; Aladwani 2002; Jones 1994).

First, an application with the strategic orientation will have fundamental differences from the development of an application about the automation of transactions or the decision-making. For example, the survey of Wallace et al. (2004a) showed that strategic applications involve more complexity risk than information or transaction oriented applications. Yet, though it seems quite possible that projects of strategic nature differ
from non-strategic projects in terms of risk, far too few empirical researches have been carried out about them.

Moreover, although the relationship between project scope and software project risk is known from unpublished experiences, it has not been empirically tested in depth. However, a research by Huang and Han (2008) elevated the fact that a parameter of the project scope, its duration, affects to a great extent some of the dimensions of risk, like those of planning and control, team, user and requirements as well. In total agreement with the survey of Huang and Han (2008), two earlier surveys of Wallace et al. (2004a) and Zmud (1980), verified this parallel relationship of project scope with risk. Wallace et al. (2004a) detected a clear influence of project scope on the total of risk dimensions, while Zmud (1980) supported that the higher level of uncertainty that is observed on projects with long duration is an outcome of the co-dependence between the various project procedures and the high level of co-operation that should be accomplished for the harmonic and effective management of people, of their requirements and complexity.

Wallace et al. (2004a) revealed the insufficiency of surveys and the relationship between the use of outsourcing and project risk, although they verified that the use of outsourcing would bring a different risk profile of projects compared to the complete use of intra-organisational resources for the development of a project. The use of one indicator for the two different strategies (in-house and outsourcing), in conjunction with the risk dimensions metrics, can lead to the exploration and projection of the main sections of a project that become more or less risky, according to the selection or not of an outsourcing strategy for their development. Through the empirical results of their survey, they projected the highest levels of risk on the dimensions of team and planning and control, in those cases that an organisation decides to make use of the outsourcing strategy. In order to explain this limited relationship of outsourcing with the total level of risk (as it is defined by its 6 aforementioned dimensions), they stated that the projects that are liable to outsourcing practices, justifiably tend to encounter greater challenges and difficulties, in terms of team communication and co-operation, provided that at least two organisations are engaged.

The issue of project diversity -although it has been a matter of examination in the field of software development many times in the past (Campion et al. 1993; Guinan et al. 1998; Aladwani 2002), concerning its relation and effect on the degree of success and performance of a project-is obviously absent from the international literature, as regards the examination of its relationship with the risk level of software projects.

Last but not least, Jones (1994) defined four basic categories of software projects and correlated them with the most risky factors of the
project, recognising that different risks affect different software systems with different weight. Though, the Application Taxonomy catalogue that Jones presented constitutes an interesting contribution in the field of risk management, his research suffers many paradoxical tendencies and omissions that should be improved through future surveys. The present study is going to proceed towards this direction.

The main research question that emerges from the above discussion and illustrated in Figure 1 is the following:

Research Question 1: How the characteristics of a project affect the level of its risk?

3.2 The relationship of the Characteristics of the Project Participants with the Project Risk

The importance of selecting the appropriate party that will carry out the risk management process so as to achieve an effective and high performance project was recognised by Ward (1999). Ward expressed the view that an effective risk management by a participant requires the necessary motivation, capability and experience as well as the deep understanding of his responsibilities both in process and outcome. He also stated that if one of these requirements is missing or cannot be elevated, then it will be desired to find a more adequate party for managing risk. Recognising the importance of the characteristics of the project participants for the risk management process and their effect on the total project performance, an attempt should be made to connect these characteristics with the software development risk. The examination of this link is another goal of the present study.

Research Question 2: How the characteristics of the participants of a project affect the level of project risk?

3.3 The Relationship of the Project Characteristics and Project Participants’ Characteristics with the Project Quality

After the analysis of those variables that define some of the elements that characterise a software project as well as its stakeholders, and their connection to the project risk, an attempt will be made to examine their interaction with project quality. The specific conceptual connection among these volatile factors, despite its obvious theoretical and practical value, has not been studied in depth in the past, at least not in the restricted framework of software development. For this reason, the examination and interpretation of these relationships were considered essential, despite their indirect reference to the main issue of the emergence, the impact, the mitigation and overall management of the project risks. No matter what
results-conclusions that will be derived, a wider research framework in the field of risk management in the international literature will be triggered.

**Research Question 3:** How Project Characteristics affect Project Quality?

**Research Question 4:** How Project Participants’ Characteristics affect Project Quality?

### 3.4 The relationship of the Risk Identification Approaches with the Project Risk

Kulik and Weber (2001) classified the risk identification approaches for software projects in four main groups: ad-hoc, formal, informal and periodic. In the present research a step forward is going to be made, attempting to connect directly the risk identification approaches with the total level of risk in the software development project and indirectly these approaches with risk dimensions. These relations will be studied in order to estimate the importance, uniqueness and effectiveness of every approach separately on each risk dimension and on the project risk as a whole.

**Research Question 5:** How does the use of different risk identification approach on software projects affects the level of the risk that they involve?

### 3.5 The relationship of Residual Performance Risk with Project Performance

Nidumolu (1996) was the first to examine the relationship of residual performance risk of a project with its performance. Data from 64 software development projects in the U.S.A. provided substantial foundation for his model. Nidumolu used residual performance risk as an intermediate factor among those of standardisation, uncertainty of requirements and project performance. After the statistic analysis and the examination of the hypotheses, Nidumolu enunciated the existence of a negative consequence of residual performance risk on the process and product performance of the project.

Na *et al.* (2004) tried to examine the original model of Nidumolu’s survey in the software development industry of Korea. By using identical structural models and by gathering data from Korean software projects that were developed from 1999 to 2000, they compared the findings of Nidumolu from the U.S.A. with those of their research. The analysis indicated that the mean of residual performance risk and its effect on the subjective performance of a project, differs significantly between the two studies and the two countries, since the correlation coefficients of both residual performance risk and of the two aspects of project performance are
not statistically important for the data of the Korean research. According to Na et al. (2004), a possible explanation for this observed difference is that in technologically developing countries like Korea, where the systematic use of risk management is still in early stages, the residual performance risk is less important and substantial for software development companies.

Extending the previous research, Na et al. (2007) carried out a survey in three of the largest software development companies in Korea (companies that occupied at least 25,000 employees). In this survey, Na and his colleagues attempted to measure (in 123 software development projects), among others and the relationship between the residual performance risk and the objective performance of projects. They reported the existence of a positive and statistically important relationship between these factors.

A recent study by Jiang et al. (2009) measured and evaluated the effect of the factor residual performance risk on the subjective performance of 151 organisations in the U.S.A. This research verified the negative relationship between these two factors.

The goal of the present study as far as the residual performance risk is concerned is the examination of the relationship, that has never been totally examined in the past, between it and the subjective as well as the objective performance of a project in Greek software development companies that, similarly to the Korean, have a rather “immature” and not systematic level of risk management.

Furthermore, since the Korean research (Na et al., 2004) was designed to copy the previous American research (Nidumolu, 1996), Na et al. did not try to collect data that would allow them to analyse the two elements of residual performance risk. As a result, they could not define the proportion of the unforeseeable risk and the residual controllable risk (through the aforementioned control techniques, at the final stage, though, of the development of a project), in the total residual performance risk. For this reason, another contribution of the present study would be the selection of appropriate data that will allow us to study and analyse thoroughly these two elements of a project’s residual performance risk. Na et al. (2004) stated that since managers of software projects continue to improve the risk management practices, the mean of residual controllable risk would gradually decrease. However, as the software development becomes more and more innovative and the development technology continues to improve rapidly, the risk of unexpected uncertainty and chaos situations could emerge and quickly take gigantic dimensions.

**Research Question 6:** How does the residual performance risk of a project affect the subjective and objective performance of a project?
Research Question 7: How does the unforeseeable risk and the residual controllable risk affect the residual performance risk of a project?

3.6 The relationship of the Project Risk with the Project Performance

The relationship between the risk level of a project and its performance has been examined by several surveys in the past (Jiang and Klein 2000; Wallace et al. 2004a; Wallace et al. 2004b; Han and Huang 2006). In particular, Jiang and Klein (2000) agreed that the various risks in software development consist a great problem that affects the performance of a project, while they underlined the effect of two main factors for the effectiveness of the project. Wallace et al. (2004a) composed a model – that was established in the literature of project management and the sociotechnical theory, along with the special risk metrics – that is based on six risk dimensions and explains to a great extent the variability that occurs on the project performance. Wallace et al. (2004b) designed a model measuring project’s performance and risk level and its analysis showed a reverse relationship between them (especially the process instead of the product). Recently, Han and Huang (2006) examined the relationship of software risks and their effect on project performance. In their book, they displayed the findings of an empirical research that was based on 115 software projects about the analysis of the possibility of appearance and the consequence of the six different dimensions of risks on the project performance.

Considering the above surveys as a more general framework for future research, in this study an attempt will be made to find the prevalent relationship among the project risk and its effect on the project performance in Greek software development companies, in order to verify or reject the reverse relationship that was mentioned earlier.

Finally, since the empirical data that describe the relationship between risk and performance of a project are rare and often fail to take into consideration the several risk factors that prevent their successful outcome, an attempt is going to be made to examine those risk factors that are less projected in literature and have an important effect on the relationship between the project risk and its outcomes.

Research Question 8: How does the level of project risk affect the performance of a project?

3.7 The relationship of Project Quality with Project Risk

Despite the fact that the quality issue in software development project has been taken into consideration in many research papers in the past (see...
section 2.7), none of these studies investigated its importance and relationship with the conceptual factor of software development risk. In this study, using the variables and items of Fenton’s et al. (2004) research, a first attempt will made to conceptualize and implement this framework with data collected from Greek software development projects.

**Research Question 9**: How does the level of quality of a project affect its risk?

4. **Concluding remarks**

In spite of the indisputable fact that in the past 20 years there have been noticed remarkable efforts internationally in literature, it is true that quite enough issues that involve risk management in software development projects remain unexamined and lack theoretical and practical support. In the present study, through a brief literature review and the construction of a new research framework, an explicit conceptual framework has been formed. In this framework, a group of factors has been added for the determination of both the total risk level that occurs in Greek software development projects and, moreover, its effect (and all of the dimensions that compose it) on the final subjective and objective project performance. Part of the value of this framework lies in the conceptual representation of factors and the examination of the possible relationships between them that have not received the appropriate attention when thinking about managing software development projects. While the value of the risk management has already been underlined in the past, still there is not a complete model describing and analyzing specific relationships between all these organizational concepts. The proposed framework is considered to be an original and complete model that intends to contribute to literature by exploring the linkages among software project risk, risk identification approaches, project characteristics, project participants’ characteristics, residual performance risk, project quality and project performance.

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Security issues in distributed financial information systems: case of Greece

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Abstract:
The significance and the susceptibility of financial data make the security of financial information systems (FIS) a major and simultaneously, neuralgic concern for every enterprise; especially, when FIS control industrial plants. Last decade, the modern industrial FIS not only widely use distributed data processing (DDP) configuration, but also being more and more pushed by the demand of transferring information inside (from the shop to the top-floor in a typical factory scenario) and outside the factory (through public networks e.g. Internet). However, it is remarkable that the number of the threats and violations are increasing while technology is developing. Therefore, building efficient and safe FIS in industrial plants is not a trivial task, but it is a fundamental issue starting from the earlier phases of the design of a system and continuing with the adoption of diverse complex technologies. A survey in forty large industrial plants of Greece sheds light to the vulnerable points of security in distributed FIS. Thus, several in-depth interviews with the CIO (Chief Information Officers) and/or system administrators and also, observations on the spot took place in order to examine the security policy of the FIS in distributed computer networks. User authentication policy, audit trails events, CIOs’/system administrators’ graduated studies are the mainly examined criteria in this study. The results revealed that the Greek companies need to realise and to take more seriously the fact that security is not something extra, but a normal part of performing business.
Keywords:

1. Introduction

Nowadays, advances in network technology and the globalisation of markets and business processes have created a revolution in business and information systems (Calderon, Chandra and Cheh, 2006). The well-known term “business” is converted to “e-business” (“e-” refer to various technology-enabled business activities) upgrading its main infrastructure. The main infrastructure for e-business consists of corporate computer networks that compose the backbone of distributed financial information systems (Prabhu and Raghavan, 1996). Nevertheless, Bertolotti et al. (2007) underlined that computer networks are exposed to serious security threats (attacks from hackers, malicious users or even cyber-terrorists, who use hi-tech abuse techniques and methods to commit computer fraud) that can even have catastrophic consequences from both the economy points of view and safety; especially, if computer networks control critical infrastructures, such as industrial plants. The basis of the above mentioned problem is the fact that the modern industrial information systems (which include networks between computers and intelligent devices from the shop to the top-floor of a typical factory scenario) are interconnected with public networks (e.g. Internet) which makes them vulnerable to common security threats (Romney and Steinbart, 2003; Bertolotti et al., 2007). Subsequently, how secure, reliable, consistent and valid are the distributed financial information systems (FIS) in the Greek industrial plants? A survey in forty large industrial plants in Greece sheds light to the hidden points of view of security in distributed FIS. The observation of the technical network specifications as well as the analysis of the security policies of the examined firms are the main targets of the current study.

Though computer networks offer a lot of worthy of remark services and advantages, many expanded threats appear to the FIS and eventually, to the whole enterprise. It is remarkable that the number of the threats is increasing while the technology is developing (Allen et al., 2000). Despite the fact that most employees don’t even give a minute per hour of their workday for IT security (Luzwick, 2004), system security is a very important issue, which the chief information officers (CIO), system administrators, supervisors and managers ought to take it into serious consideration. In addition, system security also consists of many and various components. A user name and a password is only one of the known safety measures against expanded threats. Furthermore, there are a lot of
other types of security, such as data encryption, routing verification procedures, intrusion detection etc. That is why a survey took place in order to examine specific factors that seriously affect the security of distributed FIS of several large enterprises. Throughout this survey, primary data were gathered from forty large industrial plants in Greece (several interviews and observations took place). The password policy, audit trails events, the use of Kerberos system and CIO’s/system administrator’s graduated studies were examined in this work.

2. Theoretical Background

2.1 Financial Information Systems (FIS)

The main obligation of FIS is to keep updated and under control not only the revenue, the expenditure, the production and the human resources/payroll cycle of a firm, but also the general ledger and the reporting system of a firm (Romney and Steinbart, 2003). Thus, financial information systems offer: operational assistance to a firm (keeping track of transactions), knowledgeable support (using computerised tools for quick and easy support in investments), managerial aid (controlling financial resources) and strategic development of the organisation (establishing long-term investments goals and providing long-range forecasts of the firm’s financial performance). The above features of FIS are achieved and integrated with the widely use of distributed data processing (DDP) configuration, as well as the use of enterprise resource planning (ERP) system applications. ERP systems integrate all the operational aspects of a firm with the traditional accounting-financial functions. The corporate data are kept in databases and a database management system (DBMS) is responsible for the data exploitation and sharing. Romney and Steinbart (2003, p. 335) mentioned that “in response to the Y2K issue, many large organisations replaced their disparate stand-alone legacy systems with integrated information systems, such as enterprise resource planning (ERP) systems”. Nowadays, it has been observed that there is a wide use of ERP systems by most of the contemporary enterprises (O' Mahony and Doran, 2008).

2.2 Secure password policies

The Securing Proprietary Information Committee of the American Society of Industrial Security observed that the value of a company's future lies not in its tangible assets, but in the "intellectual capital" of the business (Carter and Katz, 1997). In most businesses today, intellectual property is kept in computers by means of data, information and computerised processes. Crume (2004) cited that according to a survey by Barron McCann, 92 per
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cent of IT managers prefer to use passwords as protection from possible data thieves. This means that FIS are only as secure as the weakest password (Schneier, 2000, p. 139). Hacking or cracking can be slowed down significantly or even defeated through the use of strong passwords. According to Microsoft Security Guidance Kit (2004) and to SANS Institute Password Policy (2005), a strong password is a password that includes characters from at least three of the five groups in the character classes table (Table 1). In addition, the longer the password the more difficult it is to break. Crume (2004, p. 1) stated that “a 4-digit numeric password could be cracked on a modest PC in 0.02 seconds -faster than you can blink your eyes”. However, the longer the passwords are, the more difficult it is for the users to remember them (Warkentin, Davis and Bekkering, 2004; Schneier, 2000). Consequently, creating passwords with both complexity and length makes it the most difficult of all to break.

Table 1 Character classes table.

<table>
<thead>
<tr>
<th>Group</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lowercase letters</td>
<td>a, b, c, …</td>
</tr>
<tr>
<td>Uppercase letters</td>
<td>A, B, C, …</td>
</tr>
<tr>
<td>Numerals</td>
<td>0, 1, 2, 3, 4, 5, 6, 7, 8, 9</td>
</tr>
<tr>
<td>Non-alphanumeric (symbols)</td>
<td>( ) ` ~ ! @ # $ % ^ &amp; * - + =</td>
</tr>
<tr>
<td>Unicode characters</td>
<td>€, , f, and ?</td>
</tr>
</tbody>
</table>

Choosing a secure password is mainly a matter of individual responsibility and training, too (Cooper et al., 1995; Charoen, Raman and Olfman, 2005). Thus, a couple of secure password techniques have been developed in order to help end-users and system administrators to keep their passwords safe. One of the best secure password techniques is the use of smart cards (Hancock, 1999). These smart cards generate a new and unique password every minute. The information system uses the same algorithm and generates the same passwords, because it is time-synchronised with the smart cards. The specific password procedure requires a user to enter a value obtained from a smart card when asked for a password by the computer. Even though it is a better way of dealing with authorisation than with the traditional password approach, it is more expensive and maybe a little bit inconvenient to carry the smart card. Moreover, an alternative password technique which is based on the confidentiality of the systematically repeated change of passwords is the password age. The system administrators ought to adjust properly the maximum password age (in days). This adjustment determines how many days a password can be used before the user is required to change it.
2.3 Audit trails

Another security technique, which has been developed for FIS since the inception of computers, is audit trails (Allinson, 2001). Although in the beginning the audit trails were used in accounting for the checking of financial reliability of a business, nowadays they have become a process of recording a series of specific events occurred in an information system. Cooper et al. (1995) defined audit trails as any file that records the time users log in, from where they log in, what they try to do, and any other action a CIO might want to save for later analysis. In other words, audit trails can provide CIO with valuable information in tracking security violation and break-in attempts. Therefore, audit trails seriously contribute to a process verification of an information system, as well as to fraud prevention. Despite the important contribution of audit trails to information system security, an Australia wide survey in the Australian Commonwealth and State Governments revealed that most organisations approach audit trails with inconsistently and incomprehensively (Allinson, 2001).

2.4 Data encryption

Due to the extraordinary growth of the Internet and technology-enabled business activities, many organisations rely on encryption to protect sensitive information transmitted over the Internet and other networks. In the field of on-line applications and client/server computing, where the communications medium is TCP/IP, Kerberos protocol is commonly used (the name comes from Greek Mythology). Kerberos is an authentication system that is part of project Athena at Massachusetts Institute of Technology - MIT (MiUen et al., 1987) and it supports high level authentication in distributed information systems (Pfleeger, 2000). A user of a Kerberos enabled distributed FIS has the facility to log in once and uses a variety of services during a specific session, without the inconvenience of explicitly authenticating (Neuman and Ts’o, 1994). Kerberos has been adopted by many enterprises, universities and organisations, and implementations are available for all major operating systems (Butlera et al., 2006).

3. Methodology

Taking into consideration the above-mentioned theoretical and empirical background, an integrative survey was designed and took place in forty Greek large industrial plants (Table 4, Appendix 1). The main purpose of the survey is firstly, to examine thoroughly the infrastructure of each industrial plant; and then, to focus on the specific security issues of the observed distributed FIS, individually.
The survey was conducted by in-depth interviews with the CIOs and/or system administrators and afterwards by several observations on the spot. Thus, a first contact type of e-mail with an attached automated-electronic form was sent to many CIOs, system administrators and IT consultants in Greece. The particular electronic form informed the receivers about the subject, the questions and the purpose of the interview. Then, each enterprise completed the form and sent it back to the author by e-mail. After the first data gathering by e-mail, several interviews (some of them by telephone communication, due to the big distances) with the CIO of the firms were arranged in order to illuminate every obscure corner of the study. In addition, in some cases the final verification of the corporate data was achieved by the author thorough observation of the current distributed network infrastructure of the examined FIS. Eventually, all the collected data (gathered by e-mails, interviews and observations) were structured, tabulated and encoded by two different statistical software applications in the Process Simulations and Statistical Analysis Labs, of the Department of Petroleum & Natural Gas Technology, of Kavala Institute of Technology.

The content of the above data gathering was orientated into two sections. In the first section, the technical specifications of the observed computer networks were identified in order to ensure the existence and the operational conditions of a distributed FIS. Thus, the geographical scope of the network, the network topology, the type of data communication cables, the nominal data network speed, the type of router, the number of corporate servers, the type of servers and clients depended on use, the CPU (Central Processing Unit(s)) and the NOS (Network Operating System) of the servers, the CPU and the OS (Operating System) of the clients were examined. In the second section of the collected data, a security approach of the above defined distributed FIS took place. Hence, the first factor that was investigated was the type of the password the users choose for accessing FIS resources. A sample of 30 per cent of the users within the examined companies who participated in this survey was studied (more than adequate for statistical analysis). Four types of password authentication were checked: simple passwords (insecure passwords, which have small lengths and homogeneous characters), complex passwords (passwords with both complexity and length), complex passwords with specific expiration date and the use of smart cards (one of the best modern password techniques). The second examined security issue was the audit trail events of the FIS. Thus, five significant parameters were examined in the current survey: the audit trail generation, the audit trail retention, the audit trail storage, the existence of enhanced security mechanisms and the responsibility for audit trails (Allinson, 2001). Another examined security parameter was the use of Kerberos protocol in
the FIS and the relation of CIO’s/system administrator’s graduated studies with the information technology field. With regard to the latter parameter, it is noticeable that in some of the examined firms the CIO and the system administrator were the same person; and in other cases, there was only a system administrator.

4. Results and discussion

The main criterion of the sample selection was the FIS of every large Greek industrial plant to be based upon a distributed computer network, which consists of a switched Ethernet type of local area network (LAN) with a gateway to the Internet (Figure 1). Thus, the first section of data gathering (concerning technical network specifications) took place in order to ensure that the sample followed the requirements of the study. According to the first section of data gathering, it was found that apart from the corporate LAN, ten of the forty firms also used a wide area network (WAN) or a metropolitan area network (MAN). Nevertheless, the above isolated cases used separated gateways, which were dedicated for WAN or MAN use. Therefore, the above phenomenon did not affect the current survey. Though, there was a significant amount of useful outcoming information from the technical network specifications of the examined industrial plants (first section of the survey), the main scope of this research paper is not computer science, but the security approach of distributed FIS (second section of the survey).

![Figure 1. Network infrastructure of the examined distributed FIS.](image)

The first examined security factor of the distributed FIS was the reliability of the password authentication, which was used by the 30 per cent of the users within the examined firms. The results revealed that the 32.5 per cent of the sample used simple passwords, 37.5 per cent used
complex passwords and only the 30 per cent of the sample used complex passwords with specific expiration dates (Figure 2). It is worth mentioning that 5 per cent of those who used simple password claimed that they knew how to make complex passwords, but they were afraid of forgetting them; and the remainder of them (27.5 per cent) claimed that they had never been trained to use “strong passwords”. Another important finding was that the 30 per cent of those who used complex passwords did not use password age, because this option has been disabled by the system administrator; and the other 7.5 per cent disabled it by themselves for facility reasons. The lack of users’ training and the lack of time of the IT support department occupied with expired passwords are in line with the theoretical background (Warkentin, Davis and Bekkering, 2004; Schneier, 2000; Charoen, Raman and Olfman, 2005). Furthermore, Table 5 (Appendix 2) shows that there is a significant statistical association between the IT graduated studies of CIO/system administrator and the level of security of users’ passwords \[\chi^2(2)=10.95, p<.01\]. For instance, 92.3 per cent of the users, who used simple passwords, work in companies with non-IT graduates CIO/system administrators and the 66.7 per cent of the users, who used complex passwords with expiration date, worked in companies with IT graduates CIO/system administrators. The above observation reflects the fact that the users of the examined firms, whose CIO/system administrators were IT graduates, used more secure passwords than the users of the companies with non-IT graduates CIO/system administrators. Unfortunately, none of the examined enterprises used smart cards for password authentication; most of them believed that it was too excessive, expensive and also complicated technique.
Audit trail was the next examined variable in the security of a distributed FIS. Five important parameters of audit trails were examined in this survey (Allinson, 2001). The generation of audit trails by the companies and the proper attention to them was the first examined parameter. In other words how many companies wittingly not only generate audit trails by the use of software tools, but also retrace them. According to Table 3 (Appendix 1) only 30 per cent of the companies generated audit trails and paid the proper attention to them. Many CIO/system administrators stated that they could not undertake all the security-related duties they wanted due to the overwhelming daily FIS obligations. The next examined parameters (Table 3, Appendix 1) referred only to those companies that generate audit trails (i.e. 30 per cent of the initial sample). Thus, 66.7 per cent of the companies that generated audit trails retained them for up to 2 years and the rest of them for more that 2 years. Most of them (58.3 per cent) kept the audit trails on the same file server with the other corporate data, the 33.3 per cent used peripheral storage devices for audit trails retaining and only 8.3 per cent used a separated server for audit trails. Moreover, most of the firms (66.7 per cent) did not use security mechanisms (password authentication or data encryption) to protect the audit trails from unauthorised access; and only 33.3 per cent used password protection for accessing the folder of audit trails. The responsibility and the control of audit trails from a security perspective belonged equally to information system departments (41.7 per cent) and to system administrators (33.3 per cent); the responsibility for the audit trails of the remaining percentage belonged to the business owners, when none firm had established an audit department. Comparing the
results of the companies that generated audit trails with the IT graduated studies of their CIO/system administrators (Table 6, Appendix 2) there is a significant relationship \( \chi^2(1) = 10.178, p<.01 \). This seems to represent the fact that based on the odds ratio \( \text{odds ratio} = \frac{20/8}{2/10} = 12.5 \) (Field, 2005) CIO/system administrators were 12.5 times more likely not to be IT graduates if they did not used audit trails than if they used audit trails.

Another important security factor examined of the distributed FIS was the adaptation of Kerberos authentication system by the Greek private industrial plants. However, in spite of the fact that Kerberos is a system that supports authentication in distributed systems, only 15 per cent of the examined sample used it (Table 2, Appendix 1). It seems that Kerberos is not a popular system in Greece and most of the firms did not use it, because they did not know it. Consequently, even though the name Kerberos comes from Greek Mythology, the Greek private industrial plants did not prefer to use the Kerberos authentication system in their FIS.

5. Conclusions

Taking everything into consideration, several useful and remarkable conclusions could be drawn from the current survey. The lack of users’ training and the lack of time of IT support departments to spend on expired passwords are the main reasons that make users of a distributed FIS to use simple and insecure passwords. Moreover, the overwhelming daily FIS obligations force CIO/system administrators to be inadequate to their stern security-related duties as the audit trails generation and exploitation. In addition, the CIO/system administrators ought to stand not only upon their experiences, but also upon their educational provision. On the other hand, smart cards for password protection and Kerberos authentication system are not popular systems in Greece and most of the examined companies did not use them, because they did not even know them. Consequently, the Greek enterprises need to realise and take seriously the fact that security is not something extra, but a normal part of performing business. A better allocation of the information system department’s duties and also, the development of new IT departments that would be dedicated to specific duties, as audit trails, it would alleviate the CIO/system administrators’ burden and make them more productive and efficient. Hence, it is really wise for every company to develop security policies and to use the proper security tools and techniques for achieving integrity, reliability, availability and accuracy of its financial information system.
References


Appendix 1. Frequency tables

Table 2 Frequency table of password, Kerberos use and IT Graduate security variables of the examined FIS.

<table>
<thead>
<tr>
<th>Statistics</th>
<th>Password</th>
<th>Kerberos Use</th>
<th>IT Graduate</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>Valid</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>Missing</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Password</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid Simple</td>
<td>13</td>
<td>32.5</td>
<td>32.5</td>
</tr>
<tr>
<td>Complex</td>
<td>15</td>
<td>37.5</td>
<td>70.0</td>
</tr>
<tr>
<td>Complex with date</td>
<td>12</td>
<td>30.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>40</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Kerberos Use</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid No</td>
<td>34</td>
<td>85.0</td>
<td>85.0</td>
</tr>
<tr>
<td>Yes</td>
<td>6</td>
<td>15.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>40</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IT Graduate</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid No</td>
<td>22</td>
<td>55.0</td>
<td>55.0</td>
</tr>
<tr>
<td>Yes</td>
<td>18</td>
<td>45.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>40</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>
Table 3. Frequency table of the five parameters of audit trail security variable.

<table>
<thead>
<tr>
<th>Statistics</th>
<th>Audit trail generation</th>
<th>Audit trail retention</th>
<th>Enhanced security mechanisms</th>
<th>Responsibility for audit trails</th>
</tr>
</thead>
<tbody>
<tr>
<td>N Valid</td>
<td>40</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
</tbody>
</table>

### Audit trail generation

<table>
<thead>
<tr>
<th>Valid</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>28</td>
<td>70.0</td>
<td>70.0</td>
</tr>
<tr>
<td>Yes</td>
<td>12</td>
<td>30.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>40</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

### Audit trail retention

<table>
<thead>
<tr>
<th>Valid</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;2Yrs</td>
<td>8</td>
<td>66.7</td>
<td>66.7</td>
</tr>
<tr>
<td>&gt;2Yrs</td>
<td>4</td>
<td>33.3</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>12</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

### Audit trail storage

<table>
<thead>
<tr>
<th>Valid</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peripheral Storage Device</td>
<td>4</td>
<td>33.3</td>
<td>33.3</td>
</tr>
<tr>
<td>Separate files on same server as data</td>
<td>7</td>
<td>58.3</td>
<td>91.7</td>
</tr>
<tr>
<td>Separate server</td>
<td>1</td>
<td>8.3</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>12</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>
## Enhanced security mechanisms

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td>Not used</td>
<td>8</td>
<td>66.7</td>
</tr>
<tr>
<td></td>
<td>Password protected folder</td>
<td>4</td>
<td>33.3</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>12</td>
<td>100.0</td>
</tr>
</tbody>
</table>

## Responsibility for audit trails

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td>System Admin</td>
<td>4</td>
<td>33.3</td>
</tr>
<tr>
<td></td>
<td>Information system Dept.</td>
<td>5</td>
<td>41.7</td>
</tr>
<tr>
<td></td>
<td>Business owner</td>
<td>3</td>
<td>25.0</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>12</td>
<td>100.0</td>
</tr>
</tbody>
</table>
### Table 4 Profile of the firms (number of employees, years of firms’ experience in their field)

<table>
<thead>
<tr>
<th>Statistics</th>
<th>Employees</th>
<th>Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>N Valid</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>Missing</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Employees</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 100</td>
<td>12</td>
<td>30.0</td>
<td>30.0</td>
</tr>
<tr>
<td>100 to 199</td>
<td>20</td>
<td>50.0</td>
<td>80.0</td>
</tr>
<tr>
<td>200 or more</td>
<td>8</td>
<td>20.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>40</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Experience</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 5 years</td>
<td>4</td>
<td>10.0</td>
<td>10.0</td>
</tr>
<tr>
<td>5 to 10 years</td>
<td>12</td>
<td>30.0</td>
<td>40.0</td>
</tr>
<tr>
<td>More than 10 years</td>
<td>24</td>
<td>60.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>40</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>
Appendix 2. Cross-tabulations & chi-square analysis

Table 5. Cross-tabulation and chi-square analysis of variables: “IT graduated studies of CIO/system administrator” and “password”.

<table>
<thead>
<tr>
<th>IT Graduate</th>
<th>Password</th>
<th>Simple</th>
<th>Complex</th>
<th>Complex with date</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>Count</td>
<td>12</td>
<td>6</td>
<td>4</td>
<td>22</td>
</tr>
<tr>
<td>% within IT Graduate</td>
<td>54.5%</td>
<td>27.3%</td>
<td>18.2%</td>
<td>100.0%</td>
<td></td>
</tr>
<tr>
<td>% within Password</td>
<td>92.3%</td>
<td>40.0%</td>
<td>33.3%</td>
<td>55.0%</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>Count</td>
<td>1</td>
<td>9</td>
<td>8</td>
<td>18</td>
</tr>
<tr>
<td>% within IT Graduate</td>
<td>5.6%</td>
<td>50.0%</td>
<td>44.4%</td>
<td>100.0%</td>
<td></td>
</tr>
<tr>
<td>% within Password</td>
<td>7.7%</td>
<td>60.0%</td>
<td>66.7%</td>
<td>45.0%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>Count</td>
<td>13</td>
<td>15</td>
<td>12</td>
<td>40</td>
</tr>
<tr>
<td>% within IT Graduate</td>
<td>32.5%</td>
<td>37.5%</td>
<td>30.0%</td>
<td>100.0%</td>
<td></td>
</tr>
<tr>
<td>% within Password</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td></td>
</tr>
</tbody>
</table>

\(X^2=10.951, \text{ DF}=2, p=0.004\)
Table 6. Cross-tabulation and chi-square analysis of variables: “IT graduated studies of CIO/system administrator” and “audit trails”.

<table>
<thead>
<tr>
<th>IT Graduate</th>
<th>Audit trail generation</th>
<th>No</th>
<th>Yes</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>Count</td>
<td>20</td>
<td>2</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>% within IT Graduate</td>
<td>90.9%</td>
<td>9.1%</td>
<td>100.0%</td>
</tr>
<tr>
<td></td>
<td>% within Audit trail generation</td>
<td>71.4%</td>
<td>16.7%</td>
<td>55.0%</td>
</tr>
<tr>
<td>Yes</td>
<td>Count</td>
<td>8</td>
<td>10</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>% within IT Graduate</td>
<td>44.4%</td>
<td>55.6%</td>
<td>100.0%</td>
</tr>
<tr>
<td></td>
<td>% within Audit trail generation</td>
<td>28.6%</td>
<td>83.3%</td>
<td>45.0%</td>
</tr>
<tr>
<td>Total</td>
<td>Count</td>
<td>28</td>
<td>12</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>% within IT Graduate</td>
<td>70.0%</td>
<td>30.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td></td>
<td>% within Audit trail generation</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

($X^2=10.178$, DF=1, p=0.001)
Adequacy, Functionality and Reliability of Accounting Information Systems: An Empirical Research

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Abstract (only):  
The role of Accounting Information Systems (A.I.S.) is important and increasingly leading for nowadays enterprises. The organization of business processes in terms of either income and wealth, counting and forecasting, financial events recording and monitoring, or non-accounting needs servicing, necessitate the A.I.S. use by today’s and future enterprise. The current research attempts to evaluate the satisfaction of Greek enterprises by the use of these systems in terms of adequacy, functionality and reliability of their applications. The research was conducted in a group of Greek enterprises of different sizes from all the branches of the Greek economy. The primary results of this study allow as to derive important conclusions about the way that enterprises choose different types of A.I.S. and the satisfaction they get from the A.I.S. use, making the whole process of the A.I.S. use and satisfaction, a complex and composite procedural.

Keywords:  
Accounting Information Systems
Factors affecting ERP system effective implementation

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Abstract:  
Enterprise Resource Planning (ERP) systems are innovative Information Systems that reengineer current business practices and, therefore, cause extensive organisational change in the business environment of the adoptive firm. Although ERP systems were a novelty of the 1990s, its purpose evolves in time, making the research on the implementation of ERP technology an always contemporary subject. ERP systems may enhance productivity and working quality, since they offer integration, standardisation and simplification of multiple, complicated business transactions that interact under a common computer database. However, the implementation of such systems is not an easy task and requires significant changes in the firm’s internal environment. Given the difficulties and problems involved in the process of their implementation, ERP systems often fail to fulfil the expectations and needs of the company, since many organisations are not able to realise their promising benefits and justify the relevant investments. The present study calls for examination on the root of the problem, by identifying the critical factors that lead to the effective implementation of ERP systems. The main purpose of the study is the creation and the verification of a conceptual framework that connects various factors that play an important role on the effective implementation of an ERP system. The examination of the proposed
A conceptual framework was made with the use of a newly developed questionnaire. The questionnaire was distributed to a group of Greek companies that have implemented an ERP system. Information Technology (IT) managers were selected as the key respondents of the questionnaire, due to their experience and expertise. The questionnaire, consisting of 40 questions used to measure the seven (7) research variables, was distributed to 361 Greek companies. After the completion of the four month research period (September to December 2008), 108 usable questionnaires were returned (response rate = 31% approximately). The empirical data were analysed using the “Structural Equation Modelling” technique (Lisrel 8.74). The findings of the study demonstrate that consultant support is extremely crucial for the effective implementation of an ERP system. Consultants may improve the performance of ERP systems directly, with the use of their experience and technical expertise and indirectly, through the effective transfer and sharing of ERP system knowledge among various inter-organisational members. Moreover, results indicate that top management support is positively associated with conflict resolution and that user support positively influences both communication effectiveness and knowledge transfer. However, neither communication effectiveness and conflict resolution were found to directly influence ERP system effective implementation.

**Keywords:**
Enterprise Resource Planning (ERP), Internal support, External support, ERP system effective implementation, Structural Equation Modelling

**1. Introduction**

Individuals, companies and managers often face difficulties in comprehending the full spectrum of capabilities and attributes of ERP systems, due to the system’s complicated nature. Marnewick and Labuschagne (2005) argue that an ERP System should not only be regarded as an Information System (IS), but, in order to be effectively implemented, should be regarded as an integrated Business System that surrounds all business functions. The same scientists define ERP as a software package that combines both business processes and Information Technology (IT) features.

Nowadays, ERP systems are being increasingly adopted by organisations of any kind and size, in order to avoid technical obsolescence and create sustainable competitive advantages (Al-Mashari et al., 2003; Willis and Willis-Brown, 2002). Dillard and Yuthas (2006) note that most multinational firms are using ERP software packages and even more and more small and midsize companies are on the route of adopting them.

ERP system acquisition and implementation generally enhance productivity and working quality, since the system offers standardisation and simplification in multiple, complicated operational procedures across the company (Nah et al., 2001). Information can easily be transferred,
shared and exchanged among users who are even working at different business divisions (Kemp and Low, 2008). Thus, communication and coordination among separate business units can be more efficiently managed through the systematic interaction of daily business transactions (Amoako-Gyampah, 2007).

In spite of the attributes and major advantages provided by ERP systems, the implementation of such systems is not always effective. Most enterprises are not able to fully justify their investments in ERP software, since the bulk of ERP benefits remain hidden. In their survey, Marnewick and Labuschagne (2005) reported that 25 per cent of ERP installations exceed the initial cost and about 20 per cent cannot be completed. Moreover, ERP systems often fail to meet organisational goals soon after their implementation. The cause of the general disappointment, as regards ERP effectiveness, lies in a number of reasons, including mainly a misconception about the system’s potential (Marnewick and Labuschagne, 2005; Motwani et al., 2005).

The present study calls for examination on the root of the problem, by trying to identify the critical factors that lead to the effective implementation of ERP systems. The main purpose of the study is the creation and the verification of a conceptual framework that connects various variables that play an important and decisive role on the effective implementation of an ERP system. The conceptual framework that was developed adopts a holistic approach to ERP system implementation, sheds light in areas rarely investigated and leads to interesting practical implications.

2. The Conceptual Framework of the Study

The present study introduces a newly developed conceptual framework that investigates the way that human inputs (top management support, user support and consultant support) are linked to communication effectiveness, conflict resolution and knowledge transfer in the ERP consulting process, as well as the effects of these variables on the ERP effective implementation.

In more details, the conceptual framework of the study examines the causal relationships between seven (7) research variables:
(a) Top management support (human input – internal support),
(b) User support (human input – internal support),
(c) Consultant support (human input – external support),
(d) Communication effectiveness (ERP consulting process),
(e) Conflict resolution (ERP consulting process),
(f) Knowledge transfer (ERP consulting process),
(g) ERP system effective implementation (consequence).
The proposed conceptual framework is based on previous studies by Wang and Chen (2006) and Wang et al. (2007). The hypotheses of the study are presented below.

2.1. ERP consulting process

The consulting process that takes place during and after the implementation of an ERP system is of vital significance for every company (Wang and Chen, 2006). The following paragraphs discuss the three main factors that relate to the ERP consulting process: (a) communication effectiveness (Bloomfield and Danieli, 1995; Wang and Chen, 2006), (b) conflict resolution (King, 2005; Robey et al., 1993; Wang and Chen, 2006) and (c) knowledge transfer (Wang et al., 2007), as well as their effect on ERP system effective implementation.

2.1.1. Communication effectiveness

Effective communication is a strong foundation of a trustworthy relationship between external consultants and organisational members (Attewell, 1992). The more consultants and users understand each other, the more effective the communication becomes during the consulting process. Insufficient communication of users’ needs, goals and aspirations to the consultants may undermine the implementation of the ERP system (Fleck, 1993; Wang and Chen, 2006). Thus, we hypothesize that:

Hypothesis 1: A positive relationship exists between communication effectiveness and ERP system effective implementation.

The consulting process is an undertaking that, in order to be effective, constant communication with the client is needed (Lee and Kim, 1999). With effective communication, information can be transferred and exchanged easier between both parties who realise, in that way, that sustaining this relationship is at their best interest. Such relationship, accordingly, generates trust between the client company and the consultant company. As a result, the two companies become allies in a common effort to minimize conflicts that may arise in their cooperation (Lee and Kim, 1999; Morgan and Hunt, 1994; Wang and Chen, 2006). Thus, we hypothesize that:

Hypothesis 2: A positive relationship exists between communication effectiveness and conflict resolution.

2.1.2. Conflict resolution

The implementation of an ERP system is a time-consuming process. During that process certain conflicts may occur between users and consultants (King, 2005). Such conflicts will possibly affect in an adverse
way the output of the consultant-client relationship (McGivern, 1983). However, the emergence of disagreements during the implementation period should not be considered as a negative turn in the cooperation, but rather as a common incident during a long-lasting collaboration (Green, 1998). Effective management of conflicts may lead to an enhanced level of information exchange and group work, thus, improving the implementation of the ERP system (Scott and Kaindl, 2000). Thus, we hypothesize that:

Hypothesis 3: A positive relationship exists between conflict resolution and ERP system effective implementation.

2.1.3. Knowledge transfer

Knowledge transfer in the ERP consulting process can be described as a gradual procedure in which knowledge is being transferred from external consultants and vendors to the internal environment of the company (Wang et al., 2007). An increased level of knowledge concerning the ERP system will enable the company to exploit the new technology to its full potential and continue to achieve benefits from the use of the system in the future. Thus, we hypothesize that:

Hypothesis 4: A positive relationship exists between knowledge transfer and ERP system effective implementation.

2.2. External consultant support

Consultants play a major part in the ERP implementation challenge, since they have the technical knowledge and expertise to assist users in filling the unavoidable knowledge gap that derives from implementing a new ERP system. Under that logic, the consulting process becomes a necessity for any company that is willing to implement an ERP system (Freeman and Dart, 1993; Wang and Chen, 2006). The solutions that consultants offer during and after the configuration of the ERP system directly influence the effectiveness of the implemented ERP, independent of their interactions with their client (Wang and Chen, 2006). Thus, we hypothesize that:

Hypothesis 5: A positive relationship exists between consultant support and ERP system effective implementation.

In order to achieve high level communication with each client and be able to resolve conflicts that may probably arise, a consultant should be particularly skilled (McLachlin, 1999). A successful consultant possesses both sufficient technical background, as well as the ability to communicate knowledge and experience, in a way that he gains the client’s trust (McGivern, 1983; Wang and Chen, 2006). Only in such a case, the client feels safe and, as a consequence, a good level of communication and an
effective negotiation procedure during the whole implementation process is achieved (Wang and Chen, 2006). Therefore, we hypothesize that:

**Hypothesis 6**: A positive relationship exists between consultant support and communication effectiveness.

**Hypothesis 7**: A positive relationship exists between consultant support and conflict resolution.

ERP systems are complex in their nature, as well as in their implementation. Therefore, each company must acquire the adequate know-how and understanding of the system in order to fully exploit its potential. Consultant support from specialists who know in detail the ERP system and have the experience of how the system operates is crucial in order to achieve the required knowledge transfer to the company. The more extended the consultant support is, the more successful the transfer of knowledge to the adopting company will be (Bessant and Rush, 1995; Wang et al., 2007). Therefore, we hypothesize that:

**Hypothesis 8**: A positive relationship exists between consultant support and knowledge transfer.

2.3. Internal consultant support

However competent a consultant may be, ERP implementation will not run smoothly unless the members of the client organisation (top management and users) are committed to the adoption and the use of the ERP system (Wang and Chen, 2006).

2.3.1. Top management support

Top management support describes the extent to which executives managers of the adopting firm provide the attention, resources, and authority required for ERP implementation (Wang and Chen, 2006). Top management support is a prerequisite for the successful ERP system implementation. Top managers supervise the whole implementation procedure, enable resource distribution and support conflict management (Wang and Chen, 2006). Moreover, top management has the responsibility to align the new ERP system with the current business practices and prepare the employees for the change brought by the new technology. When top management works closely with various ERP users in the direction of the successful implementation of the ERP system, the communication between business groups is being enhanced and conflict resolution becomes attainable (Thong et al., 1996; Thong, 2001). Thus, we hypothesize that:

**Hypothesis 9**: A positive relationship exists between top management support and communication effectiveness.
Hypothesis 10: A positive relationship exists between top management support and conflict resolution.

Moreover, we hypothesize that a strong support from the top management towards the implemented ERP system will lead to enhanced knowledge transfer inside the adopting organisation (Boynton et al., 1994; Cohen and Levinthal, 1990):

Hypothesis 11: A positive relationship exists between top management support and knowledge transfer.

2.3.2. User support

User support refers to the psychological state of business users toward the changes caused by the implemented ERP system, as well as toward the use of the system for performing their tasks (Wang and Chen, 2006). The users of an ERP system are usually the ones required to adjust their daily working practices to the new system’s requirements. Apparently, becoming familiar with a new ERP system is not an easy task and involves hard working and patience from the part of users (McLachlin, 1999; Soh et al., 2000; Wang and Chen, 2006).

In order to favorably affect users’ perceptions about new technology, the real benefits and advantages of using the ERP system need to be continuously reminded (Umble et al., 2003). Otherwise, users are not motivated to support the ERP system in that they are not willing to cooperate with the consultants and assimilate the knowledge transferred to them. This situation provokes conflicts in the consultant-client relationship and hinders communication (Wang and Chen, 2006). Therefore, we hypothesize that a high degree of user support will strengthen communication effectiveness and conflict resolution:

Hypothesis 12: A positive relationship exists between user support and communication effectiveness.

Hypothesis 13: A positive relationship exists between user support and conflict resolution.

Finally, we hypothesize, with alignment to hypothesis 11, that a strong user support towards the implemented ERP system will lead to enhanced knowledge transfer inside the adopting organisation (Boynton et al., 1994; Cohen and Levinthal, 1990):

Hypothesis 14: A positive relationship exists between user support and knowledge transfer.

Figure 1 summarises all the above hypotheses, thus, presenting the proposed Conceptual Framework of the study.
Figure 1: The Proposed Conceptual Framework of the Study
3. Research Methodology

3.1. Sample of the study

The Conceptual Framework of the present study was tested with the use of a newly developed questionnaire on a sample of Greek companies that have implemented an ERP system. Data concerning companies that could possibly be included in the sample of the study were obtained via the web sites of the leading ERP system providers that operate in Greece (e.g Sap Hellas, Oracle Hellas, Synergy Hellas). Since no other database including companies using ERP systems exist, the use of the certain method was the only one able to provide usable information. Totally, 517 companies that have implemented an ERP system were identified.

3.2. Measures

The questionnaire of the present study is based on items (questions) that have been used by previous researchers (Jiang et al., 2000; Lee and Kim, 1992; Shin and Lee 1996; Wang and Chen, 2006; Wang et al., 2007). All questions were translated to Greek and then back to English by another person, so the detection and consequent improvement of any discrepancies was possible. The five point Likert scale was used for the measurement of all variables. The following Table demonstrates all seven variables and all items used for their measurement:

**Table 1:** The measurement of the variables of the study

<table>
<thead>
<tr>
<th>Variables</th>
<th>Number of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top management support</td>
<td>7</td>
</tr>
<tr>
<td>User support</td>
<td>6</td>
</tr>
<tr>
<td>Consultant support</td>
<td>10</td>
</tr>
<tr>
<td>Communication effectiveness</td>
<td>4</td>
</tr>
<tr>
<td>Conflict resolution</td>
<td>4</td>
</tr>
<tr>
<td>Knowledge transfer</td>
<td>4</td>
</tr>
<tr>
<td>ERP system effective implementation</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>40</strong></td>
</tr>
</tbody>
</table>

3.3. Data collection

The final questionnaire and a cover letter including all necessary clarifications, was sent to the IT managers of the companies of the sample. Information Technology (IT) managers were selected as the key respondents, due to their experience and expertise. Questionnaires were sent only after telephonic contact with the IT manager in each company has been established. In order to send the questionnaire and the necessary clarifications to the person contacted by telephone, fax, traditional mail, or electronic mail services were utilised.
After making all necessary telephone calls, 361 questionnaires were distributed to 361 companies that agreed to participate in the survey. The research period lasted four months (September to December 2008). Totally, 112 questionnaires were returned, and after realizing all necessary controls 108 were used for data analysis (data analysis was conducted with the use of the statistical packages S.P.S.S. 14.0 and Lisrel 8.74). The 112 returned questionnaires represent a very satisfactory response rate of 31%.

The majority (24.7%) of the companies of the sample belong to the ‘Informatics’ industry (sector), while 14.8% to the ‘Electronic’ and 12.3% to the ‘Food’ industry. Moreover, the 37% of the companies of the sample employ 101 to 500 employees, 30.9% employ 51 to 100 employees, while only 6.2% and 12.3% of the companies employ less than 50 and more than 1,000 employees respectively. Accordingly, the results indicate that the annual sales of the 32.1% of the companies of the sample are between 10,000,000 and 50,000,000 Euros, while the second larger category (29.6%) includes companies that have annual sales between 1,000,000 and 10,000,000 Euros. The majority of the respondent companies (34.6%) have been using an ERP system for more than two years, 29.6% less than two years and 35.8% less than one year. Finally, about half of the Greek companies of the sample (49.6%) have chosen ‘SAP Ltd’ as their ERP system provider and 26.7% 21.0% ‘Oracle Ltd’ and 23.7% have chosen another supplier.

3.4. Reliability and validity

The instrument (questionnaire) that was used in the present study was tested for both its content and construct validity. The control for the content validity was conducted prior to the beginning of the survey and included: (a) consultation with academics of the field, (b) consultation with experienced practitioners, and (c) pilot testing.

The control for the construct validity was conducted in two steps. Each of the seven research variables was evaluated (a) for its unidimensionality and reliability, (b) for the goodness of fit to the proposed research model.

The estimation of the unidimensionality of each of the seven variables was conducted using Explanatory Factor Analysis with the method of Principal Component Analysis. Moreover, for the estimation of the reliability of the research variables, the statistical measure Cronbach Alpha was used (the statistical package S.P.S.S. was used in both cases).
Estimation of unidimensionality and reliability

<table>
<thead>
<tr>
<th>Variables</th>
<th>Kaiser-Mayer-Olkin</th>
<th>Bartlett’s Test of Sphericity</th>
<th>Eigenvalue</th>
<th>Variance</th>
<th>Cronbach Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top management support</td>
<td>0,691</td>
<td>144,9*</td>
<td>2,656</td>
<td>77,31%</td>
<td>0,846</td>
</tr>
<tr>
<td>User support</td>
<td>0,716</td>
<td>169,5*</td>
<td>3,003</td>
<td>79,63%</td>
<td>0,894</td>
</tr>
<tr>
<td>Consultant support</td>
<td>0,663</td>
<td>91,9*</td>
<td>2,013</td>
<td>66,34%</td>
<td>0,736</td>
</tr>
<tr>
<td>Communication effectiveness</td>
<td>0,763</td>
<td>163,2*</td>
<td>2,520</td>
<td>63,85%</td>
<td>0,766</td>
</tr>
<tr>
<td>Conflict resolution</td>
<td>0,712</td>
<td>96,3*</td>
<td>2,112</td>
<td>58,58%</td>
<td>0,736</td>
</tr>
<tr>
<td>Knowledge transfer</td>
<td>0,836</td>
<td>236,3*</td>
<td>2,963</td>
<td>75,09%</td>
<td>0,891</td>
</tr>
<tr>
<td>ERP system effective implementation</td>
<td>0,779</td>
<td>163,3*</td>
<td>2,367</td>
<td>76,84%</td>
<td>0,821</td>
</tr>
</tbody>
</table>

*p<0.01

All tests concluded that all the scales used, after minor amendments (extraction of items), are valid and reliable (see Table 2 above for the main results).

Furthermore, the evaluation of the goodness of fit of each of the seven research variables to the proposed model was conducted using Confirmatory Factor Analysis, with the use of the statistical package LISREL 8.71.

<table>
<thead>
<tr>
<th>Variables</th>
<th>$X^2$</th>
<th>C.R.</th>
<th>V.E.</th>
<th>RMSEA</th>
<th>CFI</th>
<th>GFI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top management support</td>
<td>37,71</td>
<td>0,81</td>
<td>63%</td>
<td>0,0967</td>
<td>0,97</td>
<td>0,98</td>
</tr>
<tr>
<td>User support</td>
<td>13,58</td>
<td>0,83</td>
<td>68%</td>
<td>0,097</td>
<td>0,99</td>
<td>0,99</td>
</tr>
<tr>
<td>Consultant support</td>
<td>21,66</td>
<td>0,73</td>
<td>56%</td>
<td>0,095</td>
<td>0,96</td>
<td>0,99</td>
</tr>
<tr>
<td>Communication effectiveness</td>
<td>13,23</td>
<td>0,89</td>
<td>64%</td>
<td>0,096</td>
<td>0,99</td>
<td>0,97</td>
</tr>
<tr>
<td>Conflict resolution</td>
<td>19,49</td>
<td>0,91</td>
<td>78%</td>
<td>0,097</td>
<td>0,96</td>
<td>0,99</td>
</tr>
<tr>
<td>Knowledge transfer</td>
<td>9,69</td>
<td>0,87</td>
<td>64%</td>
<td>0,086</td>
<td>0,96</td>
<td>0,99</td>
</tr>
<tr>
<td>ERP system effective implementation</td>
<td>25,32</td>
<td>0,86</td>
<td>73%</td>
<td>0,099</td>
<td>0,97</td>
<td>0,97</td>
</tr>
</tbody>
</table>

*p=0.05

All tests conducted produced satisfactory results (see Table 3 above for the main results concerning the estimation of the goodness of fit). Finally, after the successful completion of the control for the construct validity of the questionnaire, the final score of each variable was calculated using the mean of the items used in each case.

4. Results

The Conceptual Framework of the present study suggests that top management support, user support and consultant support are positively related with ERP system effective implementation, through communication effectiveness, conflict resolution and knowledge transfer (see Figure 1
The examination of the Conceptual Framework and the verification of the 14 hypotheses was conducted with the use of the “Structural Equation Modelling Technique”. The certain multivariate technique was used because of its ability to simultaneously examine a number of depended linear relations, where one or more construct (variable) is both dependent and independent according to the relation it belongs (Hair et al., 1995; Kelloway, 1998). For the conduction of the appropriate analysis the statistical package LISREL 8.74 was used.

The estimation of the structural model was conducted with the Maximum Likelihood Estimation method, which is the most widespread method of estimation (Anderson and Gerbing, 1988; Kelloway, 1998). The Covariance Matrix was used as the table of entry, because the control of the hypotheses in the Structural Equation Modelling Technique is based on the hypothesis that the matrix that will be analysed is the Covariance Matrix. Thus, even though the use of the Correlation Matrix has widespread use in a lot of applications, the use of the Covariance Matrix is recommended (Kelloway, 1996). Finally, the extraction of the Standardised Completely Solution was requested.

To evaluate the fit of the overall model the chi-square value ($\chi^2 = 712.69$ with 447 degrees of freedom) and the p-value ($p = 0.05060$) were estimated. These values indicate a good fit of the data to the overall model. However, the sensitivity of the $\chi^2$ statistic to the sample size enforces to control other supplementary measures of evaluating the overall model, such as the “Normed-$\chi^2$” index (1.59), the RSMEA index (0.087) the CFI (0.95) and the GFI (0.93), that all indicate a very good fit. For the control of the measurement model the significance of the Factor Loadings, the Construct Reliability and the Variance Extracted were estimated. Results indicated that all loadings are significant at the $p<0.05$ level. Additionally, the Construct Reliability and the Variance Extracted Measures for all constructs are satisfactory.

The following Table illustrates all relations between research variables, as they have been determined by the hypotheses of the study (see paragraph 2). For the verification (or the rejection) of every research hypothesis, two controls have been conducted: (a) the value and the direction of the relation between the two latent variables and (b) the significance of the relation, indicated by the t-value, were examined. According to Hair et al. (1995), when the t-value is above 1.96 and below -1.96, the hypothesis is significant at the significance level of 5%. Otherwise, the hypothesis is statistically insignificant.

Results offer support to 8 research hypotheses (H2, H4, H5, H7, H8, H10, H12, H14), whilst 6 hypotheses are not verified by the empirical data (H1, H3, H6, H9, H11, H13). In more detail, results indicate that consultant support is positively associated with ERP system effective
implementation (H5), knowledge transfer (H8) and conflict resolution (H7). On the contrary, results failed to establish a relationship between communication effectiveness and conflict resolution, on the one hand, and ERP system effective implementation on the other (H1 and H3). Despite that fact, knowledge transfer within the organisation, the third ERP consulting process variable, seems to be critical for achieving high ERP system performance, since hypothesis 4 is verified. As for the top management support, the results of this study indicate that top management is only correlated with conflict resolution (H10), having no effect on communication effectiveness (H9) and knowledge transfer (H11). Finally, user support is positively associated with communication effectiveness (H12) and knowledge transfer (H14).

Table 4: Direct effects between research variables (hypotheses examination)

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Path</th>
<th>Effect</th>
<th>t-value</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>Communication effectiveness → ERP system effective implementation</td>
<td>-0.76</td>
<td>-1.46</td>
<td>Rejected</td>
</tr>
<tr>
<td>H2</td>
<td>Conflict resolution → Communication effectiveness</td>
<td>0.73</td>
<td>3.09</td>
<td>Accepted</td>
</tr>
<tr>
<td>H3</td>
<td>Conflict resolution → ERP system effective implementation</td>
<td>1.20</td>
<td>2.90</td>
<td>Rejected</td>
</tr>
<tr>
<td>H4</td>
<td>ERP system effective implementation → Knowledge transfer</td>
<td>0.15</td>
<td>2.36</td>
<td>Accepted</td>
</tr>
<tr>
<td>H5</td>
<td>Consultant support → ERP system effective implementation</td>
<td>0.41</td>
<td>2.46</td>
<td>Accepted</td>
</tr>
<tr>
<td>H6</td>
<td>Consultant support → Communication effectiveness</td>
<td>-0.09</td>
<td>-0.71</td>
<td>Rejected</td>
</tr>
<tr>
<td>H7</td>
<td>Consultant support → Conflict resolution</td>
<td>0.49</td>
<td>3.26</td>
<td>Accepted</td>
</tr>
<tr>
<td>H8</td>
<td>Consultant support → Knowledge transfer</td>
<td>0.22</td>
<td>2.35</td>
<td>Accepted</td>
</tr>
<tr>
<td>H9</td>
<td>Top management support → Communication effectiveness</td>
<td>-0.28</td>
<td>-2.00</td>
<td>Rejected</td>
</tr>
<tr>
<td>H10</td>
<td>Top management support → Conflict resolution</td>
<td>0.09</td>
<td>1.99</td>
<td>Accepted</td>
</tr>
<tr>
<td>H11</td>
<td>Top management support → Knowledge transfer</td>
<td>0.01</td>
<td>0.14</td>
<td>Rejected</td>
</tr>
<tr>
<td>H12</td>
<td>User support → Communication effectiveness</td>
<td>0.53</td>
<td>3.53</td>
<td>Accepted</td>
</tr>
<tr>
<td>H13</td>
<td>User support → Conflict resolution</td>
<td>0.04</td>
<td>0.29</td>
<td>Rejected</td>
</tr>
<tr>
<td>H14</td>
<td>User support → Knowledge transfer</td>
<td>0.22</td>
<td>2.46</td>
<td>Accepted</td>
</tr>
</tbody>
</table>

5. Summary and conclusions

The findings of this study demonstrate that the support of external consultants is crucial for the effective implementation of ERP systems. The assistance provided by external consultants is essential, even more important than that provided by top managers, a fact that implies the degree of trust and reliance that Greek companies have towards the
company that assists them in implementing ERP systems. Likewise, the contribution of the consultants’ support and involvement in the implementation process has also been verified in the study of Wang and Chen (2006).

The survey has, moreover, indicated that knowledge transfer is a significant factor for ERP system success. The study of Wang et al. (2007) have produced the same results. On the contrary, no relationship was found between communication effectiveness, conflict resolution and ERP system effective implementation. Wang and Chen (2006), also found no relationship between communication effectiveness and ERP system success, but established a relationship between conflict resolution and ERP system success. Apparently, the incorporation of knowledge concerning technical aspects of ERP systems is more important than effective handling of communication, as well as conflict resolution among organisational members of Greek companies.

Additionally, the role of top management support seems to be of less important that the one provided by users, since top managers assists only in the resolution of conflicts (a factor that has no relationship with ERP system effective implementation), while user support influences both communication effectiveness and, more importantly, knowledge transfer (a factor that is related with ERP system effective implementation). These findings are in line with the corresponding ones in the studies of Wang and Chen (2006) and Wang et al. (2007). In a practical level, the above findings imply that a company needs to ensure the support of the users of the ERP system in order to successfully implement such a system.

In general, the present study argues that consultant support and knowledge transfer are the two key factors for ERP system success. The consultants may improve the performance of ERP systems directly, through their experience and technical expertise and indirectly, through the effective transfer and sharing of ERP system knowledge among various inter-organisational members. In other words, the transfer of knowledge from the consultants may rise the level of know-how from the part of users, then users subsequently should be able to successfully maintain and further modify the ERP system without consultant engagement. Therefore, practical efforts in hiring the right consultants are essential, especially as the consulting fees in Greece are quite significant. Moreover, ERP adopting companies should improve their knowledge management capabilities in order to facilitate the transfer of knowledge from consultants more successfully. In order to pursue a successful ERP implementation and gain sustainable competitive advantage, companies need to develop their internal knowledge capabilities before implementing an ERP system. The building of these capabilities will ensure that the knowledge offered by consultants is properly disseminated throughout the organization.
Organizational practices, culture, and structure should be reinforced to address this necessity (Nonaka and Takeuchi, 1995).

6. Limitations and future research

A limitation of the present study is the relatively small size of the sample. This may be attributed to the nature of the population of the study (Greek companies that have implemented an ERP system), which is rather small and difficult to be defined due to lack of available data. In addition, IT managers were often hesitant to reveal inside information about the company’s policies, as well as information regarding the ERP system performance. Given that companies in Greece are mostly small and medium-sized, most of them do not have an autonomous IT department and are using external IT specialists to assist with the system’s implementation and operation. As a result, it was not always possible to contact the internal staff of each company, and, therefore, gather an overall and consistent evaluation of the ERP system implementation.

The present study has emphasised the vital role of the consultants in enhancing the performance of the ERP system, by means of their experience and the transfer of their knowledge and technical expertise to the ones who have acquired and use an ERP system. Further research on the effective implementation of the ERP systems is suggested with larger samples (such European countries) that would give more information and strengthen the initial outputs of the present research.

References


Measurement of Satisfaction of very small companies from their own I.T System

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Abstract:
The last few years the development of Information Systems is rapid. Even the small companies in Greece use in a great extend computers for their operational needs but there are certain questions that need to be answered. Are they satisfied from the services that it is provided to them by the IT system? Did it contribute to the improvement of the profitability and efficiency of the company? Is the degree of satisfaction influenced by the company’s sector, the size of the company and the characteristics of the user (gender, age, education and experience)? In order to be able to answer these questions, we have made a research in 237 very small Greek companies using a structured questionnaire. The results showed that the users of IT system are satisfied from the most of the services and facilities that are being offered. Furthermore the results showed that the company’s profitability improved after the use of computers.

Keywords:
I.T Systems; Small Companies; I.T Satisfaction; ANOVA

1. Introduction
In our daily life everything is constantly changing and we have to find ways to be able to fulfill all of our needs. Technology is a factor that can help us to improve our life because it has a great impact on business functions, education, healthcare, manufacturing, transportation, retailing, pure services and even war (Gunasekaran et al., 2006). Information
technology (IT), Information Systems (IS) and globalisation make the use of technology a prerequisite for all companies that wish to remain competitive (Chaffey and Wood, 2005).

According to Chaffey and Wood (2005) Information Technology (IT) was briefly described as “technology resources used for business information management”. Benemati et al. (1997) also defines it as a field that is characterised by rapid change, huge strategic impact and successful management of vital importance for every company or organisation. In any case every IT requires resources which are constituted by hardware, software and communication networks that are used for managing the most valuable commodity of the modern world which is information (Olugbode et al., 2007).

The rapid technological progress in hardware and software that has been achieved, made computers an absolutely necessary management tool for all businesses and especially for the small ones. The maturity of the technology and the rising number of experienced users, allowed small businesses to use various computer applications that improved the management in almost all business functions.

According to the literature, Information Technology (IT) enables a company to: (a) access the information needed in order to take operational and strategic decisions, (b) make efficient use of business resources, (c) take advantage of market opportunities and (d) obtain an effective market position in relation to rival companies (Dirks, 1994). Moreover, Information Technology (IT) has a worth mentioning impact on organisational performance (Sharma and Bhagwat, 2006). Sohal and Lionel (1993) conducted a study in 530 Australian businesses and found that Information Technology (IT) usage was positively related to organisational performance. According to Chen (1993) small businesses use computers mainly for operational and administrative tasks and less for strategic and decision making purposes.

According to Alexander (1993) important factors that influence the use of Information Technology are location, size and the nature of the business. Palvia and Palvia (1999) claim that owner characteristics, such as gender, age, educational level and computer skills, have a significant influence on small business compared to large companies.

The aim of this study is to determine the degree of users satisfaction by the IT system and moreover to define the owner’s and business characteristics that affect the satisfaction.

2. Determination and Measurement of IT Satisfaction

User satisfaction seems, and has been proven to be in many empirical studies, easier to measure than the measurement of direct impact of an Information System on organisational performance and profitability.
Moreover, there is an agreement among researchers that the concept of “satisfaction” is a more relevant measure than the “use of an Information System” (Zviran and Erlich, 2003).

The concept of satisfaction and its measurement have occupied an important size within the Information Systems (IS) discipline. Various scientists published a significant number of studies that have attempted to describe and measure (a) the overall satisfaction (evaluation) of the use of an IS system by its users, and (b) the most immediate factors that form this satisfaction (Doll et al., 1995; Doll and Torkzadeh, 1988, 1991; Torkzadeh and Doll 1991).

According to Swanson (1974) and Bailey and Pearson (1983), satisfaction from the use of the Information System leads to increased use, but not the reverse. That is because feelings, like satisfaction, can lead to behaviours and, behaviours can, therefore, lead to actions, namely increased use. Therefore, satisfaction has a predominant role and can be characterised as a “critical factor” for the success of an Information System (Doll and Torkzadeh, 1988). Moreover, the measure of user satisfaction has been used in the literature as a reliable substitute for the performance of an Information System. User satisfaction seems, from a logical point of view, quite reliable, in the sense that a successful Information System is the one that keeps its users satisfied. Additionally, the measure of user satisfaction is simple and very easy to apply within organisations (Melone, 1990). DeLone and McLean (1992) report that Bailey and Pearson (1983) along with their successors developed reliable tools of satisfaction measurement.

The importance of user satisfaction in the evaluation of the success of an Information System has driven many researchers to propose measurement tools of User Information Satisfaction (UIS). More specifically, Cyert and March (1963), Ginzberg (1981), King and Epstein (1983) and Powers and Dickson (1973) were the first researchers in the Information System literature that worked towards the development of the construct of user satisfaction. Initially, in the first empirical studies, the measurement of the User Information Satisfaction was achieved with the help of an overall measure of satisfaction (Larcker and Lessig, 1980; Gallagher, 1974).

DeLone and McLean (1992) argued that user satisfaction has been broadly used as a measure of Information System success for three main reasons: (a) because of the high degree of face validity of the construct, (b) because of its reliability, and (c) because of the unavailability of other appropriate measures. Cyert and March (1963), who were pioneers in suggesting the User Information Satisfaction concept as a measure of Information System success, believed that an Information System that satisfies the needs of its users leads to increased user satisfaction.
While the use of the Information Systems was getting more significant and popular, researchers, like Swanson (1974), started to propose measures of satisfaction in several dimensions. The numerous studies that were published in the 1970’s and 1980’s conclude in the existence of a correlation between use, user satisfaction and Information System success (Powers and Dickson, 1973; Swanson, 1974; Lucas, 1978). Despite the unanimity of the results, Bailey and Pearson (1983) argue that the studies above had not used a standard measure of satisfaction, making all comparison absolutely impossible. According to Leclercq (2007), the Information Systems literature was lacking, in a time when the importance of the concept of satisfaction had widely been accepted, a clearly established and validated measure of satisfaction. Moreover, the measures of satisfaction used in the early studies of the 1970’s and the 1980’s proved to be insufficient, since they failed to take into consideration the origins of the perceptions of individual users of Information Systems.

User Information Satisfaction instruments to the organisational context and, at the same time, state that sometimes it is more reliable to use one single overall measure of satisfaction, than using an ensemble of criteria adopted by various measurement instruments (Baroudi and Orlikowski, 1988). The argument supporting that perspective is that, sometimes, synthesised questions appear more reliable than the detailed ones. Finally, on the conceptual level, the measures of satisfaction have been criticised for lacking theoretical background (Goodhue, 1995).

The measurement of the User Information Satisfaction (UIS) construct has been conducted in many different ways. Although, various empirical studies adopted a single-item rating scale, such measurement has been strongly criticised and characterised as unreliable (Larcker and Lessig, 1980). According to the critics, single-item rating scales provide little information about the areas that make users feel satisfied or dissatisfied, and are, hence, of limited practical usefulness. As a consequence, multiple-item rating scales became more and more common in the Information Systems literature (Ives et al., 1983). In general, these multiple-item scales are of two types (Ives et al., 1983): (a) Scales of the first type focus on the product of the Information System. More specifically, they focus on the Information System content (relevance, accuracy) and on the fashion in which information is presented (mode, format) and (b) Scales of the second type include information about the support of the organisation in developing and maintaining the Information System, as well as information about the product of the Information System itself. This multiple-item instrument comprises of items like training, documentation, development procedures and systems maintenance, and items that are related to system content. Therefore, the certain instrument provides an indicator about the quality of information services that are provided by the corresponding
Information System.

The body of research that has been conducted on the concept of user satisfaction has led to the identification of specific, generally acceptable, dimensions of the certain variable. The factors of User Information Satisfaction that were revealed by Bailey and Pearson (1983) are connected to the properties of an Information System. The five factors that are considered as the most important are: (a) accuracy, (b) reliability, (c) timeliness, (d) relevancy, and (e) confidence in the Information System.

The short version of the User Information Satisfaction measure that was developed by Ives et al. (1983) includes three principal factors of user satisfaction: (a) the product of the Information System (quality of information supplied to users), (b) the support of the Information System (quality of services provided to users), and (c) the commitment of users and the adept knowledge of the Information System that is used (degree of understanding the various functions and aspects of the IS). Doll and Torkzadeh (1988) identified, in the empirical study they conducted, five principal factors of user satisfaction that are grouped into two dependent variables: (a) “quality of information” provided and (b) “ease of use” of the Information System.

Palvia and Palvia (1999) have used an instrument which is constituted by 12 factors in order to measure the satisfaction of small business user.

3. Research Methods

3.1 Sample and Data Collection

In order to achieve the objectives of this study, a survey was contacted by the use of a structured questionnaire, as research instrument, which was supplemented with personal interviews by the owner/manager of the company or the person responsible for operating the computers in the company. The random sampling technique was used for the collection of needed information and the final sample is constituted by 237 very small Greek companies.

3.2 Development and Validation of Research Instrument

As research instrument was used a questionnaire that consists of 4 parts. The first one refers to the demographic data of respondents, such as gender, age, educational level and previous experience in the use of computers. The second part contains 3 questions (sector, size, location) that describe the profile of the company’s. The demographic characteristics of respondents and the profile of the companies are presented in table 1.
Table 1: Demographic Characteristics and Profile

<table>
<thead>
<tr>
<th>Demographic of Respondents</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>59.1%</td>
</tr>
<tr>
<td>Female</td>
<td>40.9%</td>
</tr>
<tr>
<td>Age</td>
<td></td>
</tr>
<tr>
<td>Through 40</td>
<td>73.0%</td>
</tr>
<tr>
<td>More than 40</td>
<td>23.0%</td>
</tr>
<tr>
<td>Education</td>
<td></td>
</tr>
<tr>
<td>Elementary</td>
<td>8.4%</td>
</tr>
<tr>
<td>Medium</td>
<td>43.8%</td>
</tr>
<tr>
<td>High</td>
<td>47.8%</td>
</tr>
<tr>
<td>Experience</td>
<td></td>
</tr>
<tr>
<td>Poor</td>
<td>23.3%</td>
</tr>
<tr>
<td>Average</td>
<td>32.6%</td>
</tr>
<tr>
<td>Good</td>
<td>44.1%</td>
</tr>
<tr>
<td>Company’s Profile</td>
<td></td>
</tr>
<tr>
<td>Sector</td>
<td></td>
</tr>
<tr>
<td>Services</td>
<td>43.5%</td>
</tr>
<tr>
<td>Commercial</td>
<td>41.8%</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>14.7%</td>
</tr>
<tr>
<td>Size</td>
<td></td>
</tr>
<tr>
<td>[1-2]</td>
<td>58.2%</td>
</tr>
<tr>
<td>[3-5]</td>
<td>35.0%</td>
</tr>
<tr>
<td>[6-12]</td>
<td>6.8%</td>
</tr>
<tr>
<td>Location</td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>74.7%</td>
</tr>
<tr>
<td>Rural</td>
<td>25.3%</td>
</tr>
</tbody>
</table>

In the third part a set of twenty-one items that have been selected from the study of Palvia and Palvia (1999) were used in order to measure the small-business user satisfaction. Finally, in the fourth part three items were included for overall satisfaction evaluation. For each of the items the respondents were asked to declare their degree of agreement using a 5-point Likert scale, where: 1= Strongly Disagree, 2= Disagree, 3= Neutral, 4= Agree and 5= Strongly Agree.

Then, a test was conducted for the content validity of the questionnaire (content or face validity) that refers to the degree to which a
measure accurately represents what it is supposed to (Hair et al., 1995). For the test of construct validity, in the third and fourth part, was conducted: a) Exploratory Factor Analysis and b) Reliability Analysis. The Exploratory Factor Analysis (E.F.A) is applied when the structure of the model is not known or predetermined and the data are used in order to reveal it (Timm, 2002). For the extraction of the factors the method of Principal Component Analysis with Orthogonal rotation of the axes was applied and the Varimax rotation was used, which is, according to Sharma (1996) and Hair et al. (1995) one of the most popular methods of orthogonal rotation. The Bartlett’s test of Sphericity was used for the examination of appropriateness of data for factor analysis and Kaiser-Mayer–Olkin (K.M.O) measure was also used which is the most popular diagnostic measure and it provides the degree at which certain variables belong in the same factor (Sharma, 1996). Sharma (1996) notes that the K.M.O measure of sampling adequacy must be greater than 0,8. However, values greater than 0,6 are considered bearable. For the determination of the number of factors the criterion of eigenvalue was used according to which only the factors which the eigenvalue exceeds 1 are selected. Reliability measures the extent to which a variable or a set of variables is consistent in what it is intended to measure (Hair et al., 1995) and was calculated using Cronbach’s alpha index. Values of Cronbach’s a index greater than 0,7 are considered reliable (Spector, 1992; Nunnally, 1978). For the test of reliability and the factor analysis the statistical package of S.P.S.S 17.0 was used. The results of all the above mentioned tests are presented below in tables 2 and 3. More specifically, the factor analysis for the third part (small business user IT satisfaction) gave eleven factors and for the fourth part (overall satisfaction evaluation) gave one factor.

The values of all indicators that were reported previously are very satisfactory and consequently the factorial models that resulted are reliable. Moreover, Cronbach’s a index for all the factors is satisfactory ($a > 0.7$).
Table 2: Factor’s Analysis Results for small business IT satisfaction

<table>
<thead>
<tr>
<th>Items</th>
<th>Loadings</th>
<th>Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>The software that you have meets your needs</td>
<td>0.816</td>
<td>1st : Software Adequacy</td>
</tr>
<tr>
<td>The software is adequate to handle your processing needs</td>
<td>0.787</td>
<td>(SA)</td>
</tr>
<tr>
<td>The software can easily be modified, corrected or improved.</td>
<td>0.644</td>
<td>2nd : Software Maintenance</td>
</tr>
<tr>
<td>The information from the computer system meets your needs.</td>
<td>0.620</td>
<td>(SM)</td>
</tr>
<tr>
<td>The system provides reports that are just about what you need</td>
<td>0.778</td>
<td>3rd : Information Content</td>
</tr>
<tr>
<td>You are satisfied with the system’s accuracy.</td>
<td>0.733</td>
<td>(IC)</td>
</tr>
<tr>
<td>The output are presented in a useful format.</td>
<td>0.702</td>
<td>4th : Information Format</td>
</tr>
<tr>
<td>The information presented is clear.</td>
<td>0.813</td>
<td>(IF)</td>
</tr>
<tr>
<td>The system is user friendly.</td>
<td>0.688</td>
<td>5th : Ease of use</td>
</tr>
<tr>
<td>The system is easy to use.</td>
<td>0.796</td>
<td>(EU)</td>
</tr>
<tr>
<td>The system is easy to learn.</td>
<td>0.841</td>
<td>6th : Timeliness</td>
</tr>
<tr>
<td>The system is easy to access.</td>
<td>0.808</td>
<td>(TM)</td>
</tr>
<tr>
<td>You get the needed information in time.</td>
<td>0.644</td>
<td>7th : Security and Integrity</td>
</tr>
<tr>
<td>The system provides up-to-date information</td>
<td>0.884</td>
<td>(SI)</td>
</tr>
<tr>
<td>The system provides for the security of data</td>
<td>0.780</td>
<td>8th : Documentation</td>
</tr>
<tr>
<td>The system includes features for preventing and reducing user errors</td>
<td>0.639</td>
<td>(DC)</td>
</tr>
<tr>
<td>Good manuals/ procedures exist to aid in running and using the system</td>
<td>0.731</td>
<td></td>
</tr>
</tbody>
</table>

(continued)
Good manuals/procedures exist to fix the system if it breaks down. 0.822

There is help available from vendors in case of hardware malfunction. 0.941

The quality of training has been superior. 0.861

There is easy access to training and education facilities to help in utilizing the system. 0.785

K.M.O = 0.917

Bartlett’s test of sphericity:

<table>
<thead>
<tr>
<th>Approx. Chi-square</th>
<th>df</th>
<th>Sig.</th>
<th>Total Variance Explained</th>
</tr>
</thead>
<tbody>
<tr>
<td>3036.736</td>
<td>210</td>
<td>0.001</td>
<td>86.7%</td>
</tr>
</tbody>
</table>

Table 3: Factor’s Analysis Results for small business overall evaluation

<table>
<thead>
<tr>
<th>Items</th>
<th>Loadings</th>
<th>Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>The system is successful</td>
<td>0.885</td>
<td>Overall Evaluation(OE)</td>
</tr>
<tr>
<td>You are satisfied with the system</td>
<td>0.935</td>
<td></td>
</tr>
<tr>
<td>The system has met your expectations</td>
<td>0.925</td>
<td></td>
</tr>
</tbody>
</table>

K.M.O = 0.734

Bartlett’s test of sphericity:

<table>
<thead>
<tr>
<th>Approx. Chi-square</th>
<th>df</th>
<th>Sig.</th>
<th>Total Variance Explained</th>
</tr>
</thead>
<tbody>
<tr>
<td>469.736</td>
<td>3</td>
<td>0.001</td>
<td>83.8%</td>
</tr>
</tbody>
</table>
After the confirmation of reliability and validity of the questionnaire, the factors that were created constituted the base of the statistical analysis for the extraction of the results. The factors of satisfaction and overall evaluation are obtained by averaging the items contained in the factor.

### 3.3 Data Analysis and Results

From the analysis of the data certain general and useful conclusions have resulted. The mean, median, standard deviation and coefficient of variation scores are reported in table 5. Note that small values represent lack of satisfaction while scores more than three represent higher levels of satisfaction. Thus, the satisfaction is positive for all the factors as the score is higher than three and the same happens for the overall evaluation. The five highest satisfaction areas are in the following order: Information content, Information format, Software accuracy, Information accuracy and Timeliness. In other words, the small-business users are generally satisfied with the IT system. The highest areas of dissatisfaction are “training and education” and “documentation”. Similar results resulted also from the work of Palvia and Palvia (1999). The coefficient of variation is quite high, that means that the degree of satisfaction is quite different among the respondents.

<table>
<thead>
<tr>
<th>Factors</th>
<th>Cronbach’s $a$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st : Software Adequacy (SA)</td>
<td>0.865</td>
</tr>
<tr>
<td>2nd : Software Maintenance (SM)</td>
<td>-</td>
</tr>
<tr>
<td>3rd : Information Content (IC)</td>
<td>0.772</td>
</tr>
<tr>
<td>4th : Information Accuracy (IA)</td>
<td>-</td>
</tr>
<tr>
<td>5th : Information Format (IF)</td>
<td>0.784</td>
</tr>
<tr>
<td>6th : Ease of use (EU)</td>
<td>0.905</td>
</tr>
<tr>
<td>7th : Timeliness (TM)</td>
<td>0.704</td>
</tr>
<tr>
<td>8th : Security and Integrity (SI)</td>
<td>0.722</td>
</tr>
<tr>
<td>9th : Documentation (DC)</td>
<td>0.821</td>
</tr>
<tr>
<td>10th : Vendor Support (VS)</td>
<td>-</td>
</tr>
<tr>
<td>11th : Training and Education (TE)</td>
<td>0.791</td>
</tr>
<tr>
<td>Overall Evaluation (OE)</td>
<td>0.901</td>
</tr>
</tbody>
</table>

Table 4: Cronbach’s a index
It is very important to mention that the 66% of the respondents declared that the company’s profitability has improved after the use of the IT system.

In order to determine the effect of business characteristics on IT satisfaction an ANOVA test was conducted, with each characteristic as independent variable and each factor of satisfaction as dependent variable. The F-values for all the ANOVA tests are shown in Table 6. From the results it appears that only the sector (services, commercial, manufacturing) has an effect in most factors of satisfaction. On the other hand there are no significant differences in IT satisfaction among the various sizes (1-2, 3-5, 6-12 employees) and locations (urban, rural). The overall evaluation is stable among the sectors, sizes and locations.

Table 5: Basic Statistics

<table>
<thead>
<tr>
<th>Factors</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>C.V</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st : Software Adequacy</td>
<td>3.97</td>
<td>0.741</td>
<td>18.64%</td>
<td>4.00</td>
</tr>
<tr>
<td>2nd : Software Maintenance</td>
<td>3.79</td>
<td>0.995</td>
<td>26.25%</td>
<td>4.00</td>
</tr>
<tr>
<td>3rd : Information Content</td>
<td>3.99</td>
<td>0.723</td>
<td>18.10%</td>
<td>4.00</td>
</tr>
<tr>
<td>4th : Information Accuracy</td>
<td>3.93</td>
<td>0.838</td>
<td>21.34%</td>
<td>4.00</td>
</tr>
<tr>
<td>5th : Information Format</td>
<td>3.98</td>
<td>0.658</td>
<td>16.51%</td>
<td>4.00</td>
</tr>
<tr>
<td>6th : Ease of use</td>
<td>3.87</td>
<td>0.829</td>
<td>21.38%</td>
<td>4.00</td>
</tr>
<tr>
<td>7th : Timeliness</td>
<td>3.92</td>
<td>0.737</td>
<td>18.80%</td>
<td>4.00</td>
</tr>
<tr>
<td>8th : Security and Integrity</td>
<td>3.61</td>
<td>0.909</td>
<td>25.14%</td>
<td>3.50</td>
</tr>
<tr>
<td>9th : Documentation</td>
<td>3.29</td>
<td>0.989</td>
<td>30.06%</td>
<td>3.50</td>
</tr>
<tr>
<td>10th : Vendor Support</td>
<td>3.73</td>
<td>1.013</td>
<td>27.13%</td>
<td>4.00</td>
</tr>
<tr>
<td>11th : Training and Education</td>
<td>3.28</td>
<td>0.977</td>
<td>29.72%</td>
<td>3.50</td>
</tr>
<tr>
<td>Overall Evaluation</td>
<td>3.92</td>
<td>0.681</td>
<td>17.37%</td>
<td>4.00</td>
</tr>
</tbody>
</table>
Table 6: ANOVA for Business Profile

<table>
<thead>
<tr>
<th>Factors</th>
<th>Sector</th>
<th>Size</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Software Adequacy</td>
<td>13,254**</td>
<td>0,294</td>
<td>0,015</td>
</tr>
<tr>
<td>Software Maintenance</td>
<td>7,766**</td>
<td>0,314</td>
<td>0,164</td>
</tr>
<tr>
<td>Information Content</td>
<td>4,743*</td>
<td>0,294</td>
<td>1,175</td>
</tr>
<tr>
<td>Information Accuracy</td>
<td>1,302</td>
<td>0,007</td>
<td>0,015</td>
</tr>
<tr>
<td>Information Format</td>
<td>1,434</td>
<td>0,439</td>
<td>1,628</td>
</tr>
<tr>
<td>Ease of use</td>
<td>5,603**</td>
<td>0,418</td>
<td>0,069</td>
</tr>
<tr>
<td>Timeliness</td>
<td>0,383</td>
<td>0,169</td>
<td>2,209</td>
</tr>
<tr>
<td>Security and Integrity</td>
<td>4,074*</td>
<td>0,136</td>
<td>0,048</td>
</tr>
<tr>
<td>Documentation</td>
<td>3,852*</td>
<td>0,128</td>
<td>0,000</td>
</tr>
<tr>
<td>Vendor Support</td>
<td>1,597</td>
<td>0,883</td>
<td>0,356</td>
</tr>
<tr>
<td>Training and Education</td>
<td>11,101**</td>
<td>1,818</td>
<td>0,108</td>
</tr>
<tr>
<td>Overall Evaluation</td>
<td>1,783</td>
<td>0,799</td>
<td>0,002</td>
</tr>
</tbody>
</table>

* Significant at 0.05 level
** Significant at 0.01 level

For the determination of the effect of owner characteristics on IT satisfaction the same technique was conducted with each characteristic as independent variable and each factor of satisfaction as dependent variable. In the table 7 are presented the F- values for all the ANOVA tests. Contrary to the company’s characteristics, the owner’s characteristics seem to have greater impact on IT satisfaction. The characteristic gender (male, female) has an impact only on the factor “vendor support” while in all cases, females exhibit a higher level of satisfaction than males. This finding is somewhat surprising, as most studies suggest that males are more dominant to the use of computers technology. The characteristic age (through 40, more than 40) has an impact on “software adequacy”, “ease of use”, “documentation” and “training and education”. The characteristics Education (elementary, medium and high) and Computing Skills (poor, average and good) have an impact on the same seven out of eleven factors of satisfaction and on overall evaluation. As it were expected owners with high educational level and good experience have higher level of satisfaction than owners with low educational level and low experience in the computers technology.
Each one of the eleven factors expresses the degree of user’s satisfaction from the system that it is being used by the company. The factor “overall evaluation” expresses the overall degree of satisfaction. In order to determine which of the eleven factors affects most in the formation of the factor “overall evaluation” a Regression Analysis was conducted with “overall evaluation” as dependent variable and all the other factors as independent variables. As regression analysis method was selected the “stepwise method” in order to construct a regression model only with the independent variables that contribute sufficiently in the explanation of the dependent variable.

The results of regression analysis are reported in tables 8, 9 and 10.

<table>
<thead>
<tr>
<th>Factors</th>
<th>Gender</th>
<th>Age</th>
<th>Education</th>
<th>Comp. Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>Software Adequacy</td>
<td>1,675</td>
<td>4,805**</td>
<td>17,519**</td>
<td>14,657**</td>
</tr>
<tr>
<td>Software Maintenance</td>
<td>0,038</td>
<td>0,264</td>
<td>11,641**</td>
<td>11,641**</td>
</tr>
<tr>
<td>Information Content</td>
<td>0,006</td>
<td>0,128</td>
<td>5,039**</td>
<td>5,039**</td>
</tr>
<tr>
<td>Information Accuracy</td>
<td>0,229</td>
<td>0,641</td>
<td>0,752</td>
<td>0,752</td>
</tr>
<tr>
<td>Information Format</td>
<td>0,791</td>
<td>0,103</td>
<td>1,842</td>
<td>1,842</td>
</tr>
<tr>
<td>Ease of use</td>
<td>2,024</td>
<td>7,738**</td>
<td>17,305**</td>
<td>17,305**</td>
</tr>
<tr>
<td>Timeliness</td>
<td>0,825</td>
<td>0,010</td>
<td>0,409</td>
<td>0,409</td>
</tr>
<tr>
<td>Security and Integrity</td>
<td>0,769</td>
<td>0,537</td>
<td>2,617*</td>
<td>2,617*</td>
</tr>
<tr>
<td>Documentation</td>
<td>1,704</td>
<td>3,529*</td>
<td>6,966**</td>
<td>6,966**</td>
</tr>
<tr>
<td>Vendor Support</td>
<td>4,868**</td>
<td>0,185</td>
<td>0,559</td>
<td>0,559</td>
</tr>
<tr>
<td>Training and Education</td>
<td>2,633</td>
<td>3,831*</td>
<td>8,638**</td>
<td>8,638**</td>
</tr>
<tr>
<td>Overall Evaluation</td>
<td>0,715</td>
<td>0,150</td>
<td>3,396*</td>
<td>6,652**</td>
</tr>
</tbody>
</table>

From the table 8 results that the 65.4% of variation in the overall evaluation are explained by the variation of seven factors (SA, TM, DC, IA, EU, SI, IC). A value of 1.892 for the Durbin-Watson statistic indicates that there is no serious problem of autocorrelation.
Table 9: ANOVA

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>71,728</td>
<td>7</td>
<td>10,247</td>
<td>61,725</td>
<td>0,000&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Residuals</td>
<td>38,016</td>
<td>229</td>
<td>0,166</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>109,744</td>
<td>236</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The F-statistic (Table 9) is significant as the p-value for the F is less than 0,0005. That means that the independent variables help to explain the variation in the dependent variable.

Table 10: Regression coefficients

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>Std. Error</th>
<th>Beta</th>
<th>t</th>
<th>Sig.</th>
<th>Tolerance</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>0,575</td>
<td>0,178</td>
<td></td>
<td>3,229</td>
<td>0,001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IC</td>
<td>0,125</td>
<td>0,060</td>
<td>0,132</td>
<td>2,070</td>
<td>0,040</td>
<td>0,371</td>
<td>2,698</td>
</tr>
<tr>
<td>EU</td>
<td>0,147</td>
<td>0,045</td>
<td>0,179</td>
<td>3,294</td>
<td>0,001</td>
<td>0,512</td>
<td>1,955</td>
</tr>
<tr>
<td>SI</td>
<td>0,086</td>
<td>0,043</td>
<td>0,114</td>
<td>1,992</td>
<td>0,048</td>
<td>0,458</td>
<td>2,183</td>
</tr>
<tr>
<td>TM</td>
<td>0,137</td>
<td>0,049</td>
<td>0,148</td>
<td>2,775</td>
<td>0,006</td>
<td>0,533</td>
<td>1,878</td>
</tr>
<tr>
<td>DC</td>
<td>0,115</td>
<td>0,035</td>
<td>0,167</td>
<td>3,280</td>
<td>0,001</td>
<td>0,584</td>
<td>1,711</td>
</tr>
<tr>
<td>IA</td>
<td>0,149</td>
<td>0,051</td>
<td>0,183</td>
<td>2,942</td>
<td>0,004</td>
<td>0,392</td>
<td>2,554</td>
</tr>
<tr>
<td>SA</td>
<td>0,118</td>
<td>0,051</td>
<td>0,128</td>
<td>2,312</td>
<td>0,022</td>
<td>0,491</td>
<td>2,037</td>
</tr>
</tbody>
</table>

<sup>a</sup>Dependent Variable: OE

The results in table 10 show that only seven out of eleven factors are statistically significant and are included in the regression model. The factors that affect most the “overall evaluation” are the “information accuracy” and “easy of use” as their regression coefficient are 0,149 and 0,147 respectively. On the other hand the “security and integrity” factor with coefficient 0,086 is the factor that affect less the “overall evaluation”.

The regression model that has resulted from the analysis is presented below:

\[ OE = 0,575 + 0,125 \times IC + 0,147 \times EU + 0,086 \times SI + 0,137 \times TM + 0,115 \times DC + 0,149 \times IA + 0,118 \times SA. \]

The Tolerance and V.I.F statistics (Table 10) indicate that there is no problem of multicollinearity among the independent variables as the value of V.I.F for all the variables is less than the usual threshold of 10 (Hair et al, 1995).

Conclusions

The extensive use of computers even from the very small companies is nowadays a reality. In Greece where the small companies constitute the
main part of economy the development of use of computers were rapid and as resulted from this study the degree of satisfaction from the use is quite high. The major part of the owners believes that the use of an I.T system has improved their productivity and profitability.

The factors from which they are more satisfied are the “information content”, “information accuracy” and “information format”. The area of IT dissatisfaction among small-business users is “training and education”. Among the factors that determine the profile of the company only the “sector” differentiates importantly the degree of satisfaction in some I.T satisfaction factors such as “software adequacy”, “software maintenance” e.t.c. The characteristics of the users influence more the I.T satisfaction factors. Especially the “educational level” and “computing skills” influence seven out of eleven factors. The characteristic “gender” is not an important factor of differentiation as it was expected.

As a final note, we focused on “very small business” and during our research we noticed that there is a lack of similar researches. We hope that in the future this segment will get the attention that it deserves.

References


**Topic:**

**Business Clusters**

<table>
<thead>
<tr>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business clusters in wellness tourism: the case of Greece</td>
<td>Dimitris G. Lagos, Mihail N. Diakomihalis, Eleni A. Didascalou</td>
</tr>
<tr>
<td>Networks for innovative collaboration in Sweden and Bulgaria</td>
<td>Maya Paskaleva, Diana A. Antonova</td>
</tr>
<tr>
<td>The changing face of the tobacco cluster in Northern Greece</td>
<td>Ioannis S. Tourtouras, Anna P. Chatzimichali, Vassilios D. Tourassis</td>
</tr>
<tr>
<td>Good practice in opportunity recognition and entrepreneurial process of start ups: some considerations and suggestions (ABSTRACT ONLY)</td>
<td>Irene Fafaliou, Jason Anagnostopoulos</td>
</tr>
</tbody>
</table>
Business clusters in wellness tourism: the case of Greece

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Abstract:
The main argument of the cluster theory is that the higher the geographical concentration of an industry is, the more competitive becomes this industry. The main principle accounting for the formation of business clusters is that of cooperation, which allows for the development of business synergies having a multiplying effect on the results of the cooperating enterprises. Business clusters in wellness tourism are accomplished through a network of multiple activities offered by enterprises and entities related to one another by common interests with a medium/long-term engagement horizon and expected benefits. A review of the international experience revealed that there is sufficient space for the development of business clusters in the special tourism form of wellness tourism. Greece is a country meeting the conditions required for the development of wellness tourism and the creation of a competitive advantage for its tourism product.

Keywords:
Business clusters in wellness tourism, tourism competitiveness, local and regional development, tourism policy
1. Introduction

Competitiveness is the ability of an enterprise to operate better and more effective than its rivals. Competitiveness acquires a more thorough and less questionable meaning when it refers to the level of an industry, i.e. a particular sector of economic activity. According to M. Porter (1990:73) an industry or economic activity sector is considered competitive when the majority of its enterprises produce qualitative products and sell them to the consumers at affordable prices, thus meeting any excess demand.

M. Porter argues that long-term attractiveness of an industry depends on the resultant of five forces, which represent the operational environment of the individual enterprises and affect the results of their exploitation. The interaction of those five forces (namely the threat of new enterprises entering the industry, the power of the suppliers, the power of the customers, the threat of the various substitutes and the intense competition) determines to a great extent the ability of those industry enterprises to operate in a viable and effective way. Consequently, it is clear that the changes in the above five vectors determine the attractiveness of the market as a whole or the attractiveness of the market’s individual components and contribute to the making of its strategic planning. As important the industry is for the determination of an enterprise's performance, the same important is also the operational framework of this industry, which is set by the conditions of the “competitiveness diamond”. Applying this model illustrates that competitiveness depends on the following factors:

- the supply of sufficient –both quantitative and qualitative- production factors;
- the existence of a satisfactory –in terms of quantity and quality- internal demand;
- the existence of competitive supporting and related services;
- the existence and operation of an appropriate institutional framework supporting and reinforcing the competition in the industry.

These vectors determine how attractive the industry is, whereas to a great extent they also define the Return on Assets, since they determine the amount of capital that must be invested as well as its return. Of course, some special features of the enterprises continue to play an important role along with the resources of each individual enterprise.

The above reference framework includes also the cluster theory which in the past few years has come to the focus of the scientific discussion and aims at expanding entrepreneurship and creating a competitive advantage through the development of innovative business actions. The cluster theory
is a new approach of the economic science, which opposes to the classical theory of the location or position of enterprises. Methodologically speaking, it is based on the “competitiveness diamond” and the analysis of the five forces and re-evaluates the way enterprises achieve competitiveness (Assmo 2008:101-102).

The issue of business clusters was first mentioned by the Economist Alfred Marshall back in 1890, who based his research on the concept that the economic success of a nation depends to a great extent on the concentration of specialised activities at a local level, a fact that leads to the formation of localisation economies through automated economic procedures (1920). In the 1930s, Schumpeter (1934) highlighted the role of entrepreneurship for economic activity through the formation of innovative business clusters. In the 1990s, the issue of the clusters reappeared at the economic scene as a result of the research work of Michael Porter (1990, 1998), who argued that the regional economic concentration of business lines combined with their specialisation can maximise the abilities offered by technology, new markets and other external factors, contributing thus to the reinforcement of competitiveness.

The clusters are a concept covering a wide range of different business structures. Michael Porter (1998:78) accounts for the most popular definition of clusters as “geographically proximate group of interconnected companies and associated institutions in a particular field”. Several other researchers (Padmore and Gibson 1998:627, Lyon and Atherton 2000:4, Piperopoulos 2005) defined business clusters in a way similar to the one introduced by Porter.

Tourism is an economic activity contributing to the shaping of the GNP, the increase of employment and the acquisition of foreign currency. Tourism enterprises engage in many fields of the economic activity and support the production web of each destination area. The new emerging international strategy in tourism development is the enrichment of the tourism product and the differentiation of tourism supply through the promotion of the special and alternative forms of tourism, which continuously establish new terms and conditions for the generation of national added value and the achievement of a competitive advantage.

It is obvious that the promotion of wellness tourism is an essential development parameter both within Europe and worldwide, since it is related to the new motives as well as the preferred destinations of the tourists. At the global level, in order to face the impact of globalisation, many hotels enrich their tourism product or establish cooperations, form networks or business clusters.

The objective of this paper is to review the international experience on business cluster formation in the field of wellness tourism, to provide a
critical evaluation of the current state of clusters in the Greek tourism
industry and to reach conclusions and make tourism policy proposals.

The concept of tourism clusters is the basis for the development of the
model for assessing the impact of tourism on local products, on economy,
social, environmental and cultural competitiveness and sustainability in a
given region (Da Cunha S.K., Da Cunha J. C., 2005).

The framework of methodology applied for the fulfilment of the
research’s aim is the descriptive analysis and the critical evaluation of the
business clusters phenomenon. This framework appertains better to the
distinctiveness of the subject under study, since it allows the determination
of the causation of the emerging phenomenon of business clusters in
international level, while providing comparability and a value framework
for further development in regions or countries which have the necessary
prerequisites for respective development.

2. Business Cluster Theory and Tourism Competitiveness

As it is known, the business location theory argues that industrial
production is a system with interrelated entities and operations based on
the concept that concentrations are not a new phenomenon; on the
contrary, they lie behind a particular behaviour pattern according to which
companies select a place to host their premises based on the criterion of
easy access to raw materials and procurements and/or cost reduction.
Nowadays, this approach has led to intentionally selecting a location next
to other enterprises, in a familiar environment. The result is that enterprises
gain access to an environment ensuring a high level of innovation, creating
increased specialisation, allowing continuous and steady development of
new products and services, attracting specialised personnel and offering
access to knowledge and information. This new way of literally positioning
enterprises constitutes the theoretical framework of clusters at an
international level and attracts the scientific interest to both its theory and
its practical implementation. Clusters based on this approach can be
considered as a new model opposed to the previous approach of spatial
planning of an enterprise location.

The theory behind clusters clearly indicates their connection to the
competitiveness of those enterprises. Under the scope of tourism
economics, this connection is a major issue due to the intense competition,
the current financial crisis as well as the unrestricted operation of tourism
enterprises in a steadily expanding globalisation framework.

The competitiveness of tourism enterprises is affected by many
different factors and shaped according to the ability of such enterprises to
meet the demand for tourism products (portfolio representing experiences)
in a better way than their competitors.

Based on the first approach, the attempt to retain high rates of demand growth focuses on providing low prices. This choice hinders the achievement of profitability, investment and the improvement of the level of quality of offered services. It is obvious that a tourist destination, aiming to retain or improve its position in the global tourism market, cannot support its competitiveness exclusively on prices, because there is a relative difficulty in waging a price war.

According to the second approach, competitiveness improves when the quality of services offered increases more than the cost (value for money). Upgrading the quality and differentiating the tourism product are actions that can retain the high levels of demand at a competitive tourism destination. The quality of the services rendered is mainly dependent on infrastructure and human resources.

We believe that the second approach is more related to the theoretical and empirical framework of business clusters in the field of wellness tourism, since it is more likely to create added value throughout the entire network of the tourism industry and to promote the local tourism development.

3. International Experience from Cluster Development

In Europe, the policies for the development of business clusters point mainly towards urban industry. Such policies are drawn at a central government level but they are particularised and implemented by regional and local authorities that are definitely more familiar with the particularities of their areas. With the exception of Italy and Great Britain, these policies are based mostly on promoting state funding projects for the formation of cooperation networks. In Spain, policies are drawn and implemented entirely by regional authorities (Cornett 2008: 226-231).

Local customers, Related industries and New technologies or innovative companies can be a driving force of profitable and successful industrial business clusters (Weiermair K., Steinhauser C., 2003). Examples can be found already in the 70s and 80s in Prato and Modena of Northern Italy; the Manzano chair producer cluster; the wine cluster in California, USA; the glass products cluster in Bresle Valley, France; etc. (Perrow 1992:455-456, Aranguren – Larrea – Parrilli 2007:151), the golf equipment cluster in San Diego, which has its roots in southern California’s aerospace cluster.

The UK “Healthy Lifestyle Tourism Cluster” experience is employed to discuss the process and the implication of network and cluster development in tourism. However, the development of clusters should not
be seen as a simple and spontaneous process due to the nature of businesses involved, but as a very complex process linked to strong stakeholder collaboration (Novelli et al, 2006).

Business cluster formation in tourism industry is part of the general framework of each country’s policies (Roelandt – Hertog, 1999). However, despite the poor results we have experienced until today on an international level, it cannot be doubted that their growth course has been rather satisfying. The increasing tourism competition forces many countries to adopt policies for the strengthening of tourism clusters in order to create an added value and to ensure having a competitive advantage. Such examples are found in countries with intense tourism activity based on SMEs (e.g. Italy, Spain, Switzerland, Austria, Denmark, Portugal).

4. Business Cluster Development in Wellness Tourism

The term well-ness, as it was defined in 1961 by the American physician Halbert Dunn, was the outcome of the composition of the words “wellbeing” and “fitness”. The great personal contentment achieved through the “wellbeing” and “fitness” of the human body and mind, called “high-level wellness” (Nahrstedt 2002, in Weiermair K., Steinhauser C., 2003).

The international tourism terminology and practice (Dunn 1959, Travis 1984, Greeberg-Dintiman 1977, Mueller-Kaufmann 2001) has adopted the term Wellness Tourism to refer to “the sum of relations and situations developed by people travelling urged by the motive to maintain or improve their health”. During their trips they stay in specialised hotels having the necessary professional know-how and providing care and a package of services combining fitness, beauty services, healthy menus, meditation, spiritual activities, education and others (Smith – Kelly 2006). Wellness tourism is an expansion of health and spa tourism.

Nahrstedt (2002) considers the wellness hotels in Germany, Austria and Switzerland being the initiators of the wellness movements in Europe (Weiermair and Steinhauser, 2003).

As people are becoming more and more aware of their health, the spa industry seems to have become a vital component of hotel services worldwide. Spa visits and wellness are growing products and tourist product packages, which meet the demands of most individual tourists and tourist agencies. On one hand, consumers have come to think of spa services as standard hotel services and are familiar with them. Hotel lines advertise their spa facilities and wellness, which are present in any newly opened “full service/upscale” hotels. These spa and wellness products are addressed to all types of clients from young to old, from single to married, with families, conferences and congresses (www.visiteuropeanspas.com/article//wellnesstourism).
On the other hand, traditional spa leaders are concerned about the future of the industry in its classic form as part of a comprehensive health system. Up to now, spa resorts until now had similar business and operational conditions. Traditional spa hotels fear sophisticated competition and in an effort to set themselves apart from competition and maintain exclusivity, they employ the appellation of “medical wellness”, certificates, and so on. The leaders of the field are also worried about long-term stays, the loss of interest from the health care sphere, the loss of motivation by qualified health care providers as well as the loss of possibility to generalize the results of wellness treatment (www.visiteuropeanspas.com/article//wellnesstourism).

Europe has at least 1,000 spa locations in almost all countries, countless facilities and programs. They are often a vital economic factor. Due to the unification of Europe a future dynamic growth is expected in the specific industry. The interest of the EU-Commission is evident in the projects published and financed, concerning wellness and spa.

As revealed by developments observed within the European territory during the past decade, the market of wellness tourism expands into two discrete, but still related, branches:

- **health resorts** emphasising at the general improvement of human body condition (medical treatment, rehabilitation, hospitalisation in clinics, etc.), i.e. “healing tourism”.

- **spa resorts** aiming mainly at providing medical services to individuals for the rehabilitation from various illnesses (healing vacation, keeping a good shape, wellness, aesthetic treatments, etc.), i.e. “health and natural living tourism”.

The above branches of wellness tourism are not meant only for patients or senior citizens; they also address to healthy, younger individuals who feel the benefits arising from regular exercise, nutrition improvement and in general from a healthy way of living. As a rule, they are located in locations of exceptional beauty, close to tourist attraction points, whereas they might also have thermal waters, but not necessarily. They offer a great range of medical and health services, such as modern well-equipped gyms, special nutrition programmes for diet and beauty, medical checks, various sports according to the season and the location, massage, sauna, recreation areas, as well as technical equipment for natural healing methods, such as bath therapy, thalassotherapy, inhaling therapy, clay therapy, etc. Therefore, as wellness tourism becomes more popular both in Europe and worldwide, we notice that it includes all services related to heath, special nutrition, exercise and special therapies, such as anti-stress and anti-smoking therapies, psychotherapy, kinesiotherapy, relaxation, etc. Opposed to the above, the US tourism industry often uses the term “Spa” to describe a wider and less specific product. The International Spa
Association (ISPA) has divided the various kinds of “Spas” into the following categories:

- Club Spas, which are the modern evolution of fitness centres and aim mainly at improving one's fitness on a daily basis.
- Cruise Ship Spas, which are in fact cruises taking place on luxurious cruisers offering face and body treatments as well as healthy nutrition.
- Day Spas, which are the evolution of beauty centres.
- Destination Spas, which offer high quality accommodation and customised programmes for health improvement and natural living. According to their point of interest, they are divided as follows:
  - New Age and Holistic Emphasis, focussing on alternative therapeutic methods, vegetarianism and nutrition promising a long life.
  - Weight Loss Emphasis, focussing on the loss of weight.
  - Sports and Adventure Emphasis, focussing on outdoor sports.
- Medical Spas, which offer medical treatments and have specialised personnel and medical equipment for rehabilitation and/or healing of various illnesses.
- Mineral Springs Spas, which have premises with mineral thermal springs or sea waters used as a base for various therapies (hydrotherapy, bath therapy, clay therapy).
- Resort/Hotel Spas, which offer a wide range of beauty and good condition services. Such services can be considered as a supplementary part of the tourism package.

The market appears to have reached its saturation point following this unprecedented boom. The first signs of warning appeared in the “Wellness Sensor”. In comparison with previous research, it indicated that many services and products of spa facilities are rarely used. The number of providers, especially in Eastern Europe continues to grow. Low-cost providers force further price reductions. Germany, the largest wellness market is skeptical about future development in traditional markets. In Austria, a country with the highest number of per capita providers, 80 new wellness hotels were opened in 2004 and 2005. The number of these facilities is now around 750 and the Austrian market seems to be full. According to estimates from “The Leisure Time Institute” the demand for wellness products by German visitors has been reduced. According to institute research “South Tyrol”, providers in Italy have gained ten percent share of the market, even though the impression was that Italy with the exception of specific regions and outstanding projects had missed this spa trend. In Poland a large number of wellness centers have been created with the use of EU funds. It is estimated that over the next few years 45-50 new providers will add up to already existing ones. The Poles convinced many foreign tourists, Germans for example who make up more than 60% of
visitors in many hotels, as well as domestic ones to take advantage of other offers such as free transfers from the airport to the hotel. Significant modernizations have taken place in traditional spas, the majority of which are in private hands. Slovakia a country offering spa services with professional marketing and reasonable prices, has recorded an increase in demand from Germany of 12% in 2005 in comparison with only 8% in the Czech Republic during the same period. The Slovenian government acknowledging the significance of wellness tourism on the economy, supported the development of infrastructure pertaining to the industry. Budapest having a nearby airport created “Wellness in the City”, took advantage of its position and profited from it. In Cyprus the fear from avian flu resulted in a decrease in the demand of spa services of a 9 percent German share. Turkey faced a similar situation, in addition to a visitors’ put off by a major construction boom. Switzerland, a country with the most expensive prices, experienced a 3% growth over 2002 and an 11% share of German guests. It additionally offers a new “Luxury Catalogue” in spa facilities and the case of Switzerland comes to prove that quality and services are the most significant factors. Ireland and Britain are seeking for new clients. Spas in these countries are five-star resorts and one of the premier facilities is the Spa at Pennyhill Park, one of the largest in Europe with an area of 9,000. Wellness resorts in these countries offer luxury accompanied by professionalism. The Public Private Partnership Gran Canaria Spa & Wellness project launched in Spain was partly financed by the EU. It includes 14 facilities. On the island of Madeira the “body.mind.madeira” association created 16 wellness resorts. The German organization “Deutscher Wellness Verand”, an organization which promotes unified quality standards for the wellness industry and has already facilitated countries like Poland, Slovenia and Russia create standards, was invited to act as advisor. Experts from this organization believe that quality standards will help hotel owners become familiar and oriented in the wide selection of the wellness industry products and help the present atmosphere of growing competition as well as offer the clients reasonable prices for stays in faraway destinations (www.visiteuropeanspas.com/article//wellnesstourism)

In terms of statistics, in 1997 the travellers from Europe made in total 270 million trips abroad (with at least one overnight stay). Out of them, a total of 3.1 million trips were related to health and wellness. Health and wellness trips are only a very small percentage (1%) of the trips abroad made by European citizens.
5. Chances to develop clusters in wellness tourism

According to Eurostat information, the Greek economy has no organised business clusters in wellness tourism. However, an unofficial and restricted networking of a rather conventional nature has been noted (Piperopoulos 2005).

The formation of clusters in wellness tourism is based mainly on the principle of cooperation. Cooperation allows the development of business synergies, which in turn account for the multiplying effect of the results of the cooperating tourism enterprises. By means of collective actions tourism enterprises can achieve results that would be impossible for each one of them to achieve separately. Having as their major target to improve the competitiveness of the enterprises (especially of the small and medium ones), the contribution of clusters in wellness tourism emphasises on the following points:

- Transfer of know-how among tourism enterprises;
- Launching new tourism products / services in the production procedure / rendering of services;
- Cost reduction through rationalisation of the operational structure, the specialisation and the achievement of scale and scope economies;
- Access to new markets and immediate response to the changing conditions of tourism products and services demand;
- Increase of productivity and competitiveness;
- Introduction of new tools and methods for the promotion of sales.

In the case of wellness tourism development in Greece, it is estimated that clusters could be formed on two different levels and aiming at different goals.

I. At a national level, hotel units – which already have high quality wellness infrastructures - could cooperate both with other similar hotel units and with other entities, such as specialised travel agents, professional unions, national institutions, etc. for the creation of clusters, in order to promote Greece as a wellness destination for tourists in the global tourism market.

II. At a local / regional level, clusters having geographical features can be formed, based on the cooperation of small and medium tourism
enterprises featuring mainly a developmental nature. A typical example is the formation of a cluster in a mountainous destination which can consist of rural tourism enterprises, enterprises producing and trading local products, local government institutions, various environment protection and viable development unions, various cultural institutions, etc. Wellness tourism in such a kind of cooperation will have a supplementary role and can develop along with the rendering of other tourism products aiming at promoting the local characteristics (agricultural accommodations, climate therapy and/or hydrotherapy centres, exploitation of thermal springs, religious paths, walking tourism, hiking, local products, such as handworks, food, etc.).

6. Conclusion and policy proposals for the development of wellness tourism clusters

Despite the fact that the concept of clusters is dated back in the 19th century, it is ascertained that there is still an international unwillingness concerning their development. Leaving out the few existing successful examples that we need to learn from, there is no systematically organised procedure and policy on a European level that could strengthen their formation in the tourism industry. However, in the case of wellness tourism, an increasing trend for the formation of clusters has been noted worldwide, since clusters enrich tourism supply and provide a competitive advantage to tourism industry.

More particularly, hotel enterprises of the Greek tourism industry are characterised by a lack of cooperation -both at a national and at a regional level- concerning the formation of wellness clusters, despite the fact that the necessary prerequisites are met. The majority of the actions implemented concern mainly the creation of business “networks” rather than wellness tourism clusters. Even so, Greece has several wealth-producing tourism resources that can be utilised and to which the good practices developed at the international business scene can be applied. For this reason, an action frame is required, which will support the private business activity and generate the corresponding culture to encourage the demand. Of course, this requires organised actions to promote innovative tourism business cooperation networks. Furthermore, it is necessary to facilitate the communication among the various tourism enterprises, the state and the universities, thus encouraging the cooperation for innovation development and making the participants interested in the benefits that can arise by such clusters.

The above analysis illustrates that the Greek tourism strategy and policy must also turn to the development of wellness clusters within the
tourism industry as well as to the creation of an appropriate institutional environment. In particular, the following measures are suggested:

- Establishment of an institutional and organisational wellness tourism framework, which must have as its main target the quantitative and qualitative development and more specifically the control and supervision of the production and selling of this tourism product.
- Establishment of a non-governmental organisation (management institution) with individual entities of local nature.
- Funding the wellness tourism both through state investments and through subsidies, state financing, loans. We suggest the integration of wellness tourism activities to some European initiatives or programmes.
- Designing integrated networking actions depending on local needs. The following points are incorporated here:
  1. Analysis and geographical tracking of concentrated branches at a local level through the help of local governments.
  2. Consulting the enterprises, their representatives and other bodies in order to discover which needs can be met through networking and
  3. Carrying out promotional campaigns for the better understanding of the concept of networking and the establishment of trust and cooperation relations among the enterprises.

We expect that the aforementioned actions in wellness tourism could help to a particular extent to the generation of added value, which is allocated both to the network of enterprises in question and to many other entities and/or organisations of a local society, thus contributing to the local social and economic growth.

References


Industrial Networks for Innovative Collaboration in Sweden and Bulgaria

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Abstract:
Given the dynamically changing conditions of work and competition for the companies, and the growing significance of creation, exchange and transfer of knowledge (CETK), the present article investigates industrial networks for innovative collaboration and knowledge in a conventional type of production in Sweden and Bulgaria, combining quantitative and qualitative research methods.

Keywords:
Networks, collaboration, innovations, conventional industries

1. Introduction
The current stage of economic development is characterized by dynamic changes and increased competition between organizations. Emphasis is given to technological development, which leads to accumulation of knowledge or to higher levels of comprehensiveness of information. New products, processes, technologies and interrelations, different from the previous ones in nature, type, status and quality, keep emerging. Besides, the industry in the so called developed economies is being transformed from one based on processing of raw materials and production to one of a post-industrial society, based on processing of information and knowledge. Competition and collaboration acquire new dimensions, and often the saying “One for all, all for one” is paramount for the intensive knowledge flows aimed at creating successful innovations. Those changes, combined with globalization and technological advances, are a source of uncertainty
for the enterprises. As a consequence of this uncertainty, the companies become ever more dependent on their participation in strategic alliances, industrial networks for collaboration, etc. They go beyond the boundaries of the organizations as mechanisms for creating new knowledge and innovations, maintaining a competitive advantage.

The scientific developments dedicated to CETK through collaboration networks are mostly aimed at branches of economy, characterized by intensive R&D activities, such as ICT and biotechnologies. Contrary to this tendency, the OECD, points out that a relatively small part of the value added is due to the high tech industries, while the remaining part is generated by medium and low level technological productions (Tunzelmann & Acha, 2005). That is why, in the current article the accent is on the networks for collaboration and knowledge in the conventional type of production, which, at first glance, seems non-dynamic and is defined as low technological - laying of electrochemical and conversion surface treatments with functional and decorative purposes (ECSTFDP). It is a specific process, whose final results are hard to control and are characterized with abundant flows of knowledge between various interested parties (Πασκαλέα, 2008). The present article investigates the behavior of enterprises from this branch in Sweden and Bulgaria in view of creating industrial networks for collaboration and innovations using a set of specific parameters for the innovations, based on the interaction between industrial enterprises and other interested parties, with the purpose of enhancing their competitiveness.

2. Networks for Collaboration

In a broad sense, industrial networks for collaboration (NC) are defined as successful organizational structures for the formation, exchange and transfer of knowledge within a specific industry (Arbonies & Moso, 2002; Asheim, 2004; Aylward, 2004; Bell, 2005; Bröker et al, 2003; Cappellin, 2003; Cooke, 2003; Orstavik, 2004). According to Brenner (2001), the process of CETK is more intensive where there is asymmetry between the abilities and competence of the companies and a more advanced technology, used by their competitors (in Πασκαλέα, 2006a). Based on this assumption, it is argued that this discrepancy could be reduced significantly through networking, while the less developed industrial enterprises benefit from NC to the largest extent. The participation of industrial enterprises in NC gives them access to more resources and new markets; it also allows them to maintain costly functions like R&D. NC are voluntary structures with mutual benefits for all participants, which motivates the collaboration between different subjects. According to Porter
(1990), besides collaboration, competition is also included as something very useful for the networks as a whole, or the region where they function.

In Bulgaria, The Ministry of Economics introduces the term NC (or cluster as a specific type of NC) defining it in similar terms as Poulymenakou & Prasopoulou (2004), as a group of companies and productions related by a common strategic goal within a specific industry (Ванев и Вучков, 2006; Паскалева, 2006b; ЦИР, 2005).

The above-mentioned definitions of NC emphasize on several key features. The first one is the mobility of the tacit knowledge in the network, materializing itself in goods and services that can be sold. Secondly, the structure of NC is both horizontal and vertical, and both have positive influence on growth. Thirdly, through the NC a common cognitive frame is created, which educates all participants while each subject preserves its identity. Last but not least, the above-mentioned definitions emphasize on the innovative process requiring integration and combination of various kinds of knowledge. Besides, the differences between the individual subjects are part of the evolution process since the various competences are not static but develop continuously on the basis of collaboration in the networks. The development of the competences of each subject, together with the benefits from the NC, depend heavily on the ability to find appropriate partners, to acquire the knowledge related to innovations, and to maintain the relations in the network. Moreover, Cappellin (2003) argues that the more individuals, industrial enterprises, organizations and institutions participate in a unified NC, the larger its economic value and its innovation capacity. Based on this, the NC are viewed as networks of constantly learning organizations using also non-market mechanisms for coordinating their activities with those of other companies and institutions generating knowledge within the frames of a specific industry. Moreover, a special emphasis is laid on mutual trust and social capital (De Wit & Meyer, 2005). NC help to maintain variety, and overcome the lack of flexibility and inertia, while the flows of knowledge are much more intensive and turn into a ground for encouragement of innovations, exchange and development of new technologies. The organizations are not just gaining knowledge from the environment, but they also generate it as a result from the interaction. For the industrial enterprises participation in those networks is not an alternative but a first strategic choice.

3. Method and research hypothesis
The method used for collecting empirical data is a survey since it has been widely used in the literature about investigating questions related to innovations and establishing of NC (Манов, 2001). It has been sent to the
whole aggregate (59 companies) in South Sweden\(^1\) and to 210 companies in North Central and Northeastern regions in Bulgaria\(^2,3\). Besides, expert interviews has been used as a widely applied qualitative method in order to complete, compare and clarify the survey results, as well as to provide another point of view and in-depth analysis (Massa et al, 2003).

**Summary of survey data**

<table>
<thead>
<tr>
<th>Phase</th>
<th>Location</th>
<th>Period (month, 2007)</th>
<th>Population Size</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>South Sweden</td>
<td>01-03</td>
<td>59</td>
<td>Survey</td>
</tr>
<tr>
<td>2</td>
<td>North Central and Northeastern regions in Bulgaria</td>
<td>05-10</td>
<td>210</td>
<td>Survey</td>
</tr>
<tr>
<td>3</td>
<td>South Sweden</td>
<td>02-10</td>
<td>10</td>
<td>Expert in-depth interviews</td>
</tr>
</tbody>
</table>

The sample formed for the purpose of the survey done as part of the present research, includes a considerable number of SMEs, which often lack knowledge. As a result, they are trying to obtain access to it through exchange and transfer, and, combining it with what little knowledge they have, they create some new cognitive content. This is an interesting aspect of the CETK in the light of the innovations in SMEs, as well as the comparison of the latter to the innovations in large organizations and the recognition of CETK as a prerequisite for the formation of a network for collaboration. In this way it is possible to argue that the knowledge flows have an important role for the studied industrial enterprises, no matter how large they are and in which country they operate. Besides, knowledge is viewed as a process while emphasizing its creation, exchange and transfer through intensive flows. As a result of all this, new knowledge is generated when the subjects that acquire it relate it to their own understanding and interpretation while its exchange and transfer is carried out between individuals and/or organizations, but not before the tacit knowledge is transformed into explicit. This leads to the formulation of the following hypotheses:

**H1:** The industrial enterprises with ECSTFDP in Sweden and Bulgaria use intensive knowledge flows (CETK);

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\(^1\) South Sweden includes the territories east, west and south of the two biggest lakes in the country – Vänern and Vättern.

\(^2\) For greater clarity, the term Bulgaria will be used interchangeably with North Central and Northeastern regions of Bulgaria, and South Sweden as Sweden.

\(^3\) See Ilashkina (2008) for more detailed overview of the survey methodology.
**H2:** The degree of interaction and collaboration between industrial enterprises with ECSTFDP and other economic subjects in Sweden and Bulgaria is a key factor for the formation of industrial networks;  

**H3:** Innovations and R&D of the industrial enterprises with ECSTFDP in Sweden and Bulgaria are influenced in a positive way by CETK and the collaboration between various interested subjects;  

**H4:** There are differences between the Swedish and the Bulgarian companies with ECSTFDP concerning CETK;  

**H5:** The SMEs demonstrate a higher degree of interaction and collaboration through knowledge flows from the large companies.  

**H6:** The size of the industrial enterprises with ECSTFDP, their age and the country of operation, do not have a significant impact on the factors, which have a positive influence on innovations and R&D.

The main criterion used to form the sample was that the companies should have ECSTFDP as part of their main activity, according to the Statistical classification of EU economic activities (NACE), or the National classification of economic activities, respectively, or based on their own view.

The response rate for Sweden was 54,24%, and for Bulgaria - 41,43%. For the whole survey the response rate is 44,24%. The data divided by country are a mirror reflection for each country with a predominant number of SMEs in the sample (Table 2).

The biggest part of the participants surveyed (35,29%) define their companies as producers of end goods; 29,41% point out that they produce end goods and components, and 10,92% - only components; while 21,01% declare themselves as subcontractors. It is interesting to note that most Swedish enterprises define themselves as subcontractors, while the Bulgarian ones consider themselves producers of end goods and services.

<table>
<thead>
<tr>
<th>Industrial enterprises (no employees)</th>
<th>Small (0-49)</th>
<th>Medium (50-249)</th>
<th>Large (over 250)</th>
<th>Missing</th>
<th>Total questionnaires</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total (pcs)</td>
<td>65</td>
<td>34</td>
<td>10</td>
<td>10</td>
<td>119</td>
</tr>
<tr>
<td>Total (%)</td>
<td>54,62%</td>
<td>28,57%</td>
<td>8,40%</td>
<td>8,40%</td>
<td>100,00%</td>
</tr>
<tr>
<td>Bulgaria (6p.)</td>
<td>45</td>
<td>24</td>
<td>9</td>
<td>9</td>
<td>87</td>
</tr>
<tr>
<td>Bulgaria (%)</td>
<td>51,72%</td>
<td>27,59%</td>
<td>10,34%</td>
<td>10,34%</td>
<td>100,00%</td>
</tr>
<tr>
<td>Sweden (6p.)</td>
<td>20</td>
<td>10</td>
<td>1</td>
<td>1</td>
<td>32</td>
</tr>
<tr>
<td>Sweden (%)</td>
<td>62,50%</td>
<td>31,25%</td>
<td>3,13%</td>
<td>3,13%</td>
<td>100,00%</td>
</tr>
</tbody>
</table>
With the help of SPSS\(^1\), a reliability test has been carried out, used to determine the scales internal consistency, i.e. how much free of errors every scale is (Манов, 2001). Following the recommendations of Nunnally (1978), a minimum level of 0.7 of Cronbach’s quotient \( \alpha \) for each scale is needed to be able to define it as reliable and to include it in the subsequent analysis (in Pallant, 2005). This quotient shows the average correlation between all questions that form the scale, i.e. to what extent each one measures the variable (attribute) set. In the present survey seven essential questions (scales) in total have a proven internal reliability and compatibility with values of Cronbach’s quotient \( \alpha \) over 0.7. They can be claimed as reliable scales (parameters) with the sample surveyed. The results from the test for reliability of scales are shown in Table 3. Only two components don’t demonstrate internal compatibility of the scales according to the reliability test – competences of the company (CKC) and collaboration with the competition (CCC). Nevertheless, as Pallant (2005) points out, the values of Cronbach’s quotient \( \alpha \) are influenced by the number of minor questions included in the scale and demonstrate tendency to lower outcome when the questions are fewer than ten. Following the recommendations of Briggs and Cheek (1986), using SPSS the mean inter-item correlation values show that CCC and CKC have reliable scales (in Pallant, 2003).

On the completion of the above-mentioned tests and analyses, some indexes are formed on the basis of calculating the mean values of all minor questions forming one main component (question), and thus creating nine essential variables (quality parameters), reflecting the innovations and the knowledge flows for the companies of ECSTFDP – CKC, CEBC, MSC, IDC, IFC, KSC, CFC, CCC, PKEC (the abbreviations correspond to those included in Table 3). The KSC variable is formed by the combination of the scales of questions describing the significance and frequency of using the knowledge resources in ECSTFDP in order to reduce the number of variables in the analysis

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\(^1\) The data has been processed with this program by one of the authors during her specialization in Jönköping International Business School, Sweden in the time period between 09.2006 - 06.2007.
Table 3 Results from scales internal reliability analysis

<table>
<thead>
<tr>
<th>Question No</th>
<th>Variable</th>
<th>Abbreviation</th>
<th>Cronbach’s Alpha</th>
<th>No of items</th>
<th>Influence on dependent variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>Company competence (independent variable)</td>
<td>CKC</td>
<td>0,688</td>
<td>5</td>
<td>(+)</td>
</tr>
<tr>
<td>19</td>
<td>Company environment and behavior (independent variable)</td>
<td>CEBC</td>
<td>0,747</td>
<td>15</td>
<td>(+)</td>
</tr>
<tr>
<td>20</td>
<td>Market situation (independent variable)</td>
<td>MSC</td>
<td>0,75</td>
<td>17</td>
<td>(+)</td>
</tr>
<tr>
<td>21</td>
<td>Company innovations and R&amp;D (dependent variable)</td>
<td>IDC</td>
<td>0,801</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Innovation factors (independent variable)</td>
<td>IFC</td>
<td>0,878</td>
<td>12</td>
<td>(+)</td>
</tr>
<tr>
<td>23+24</td>
<td>Knowledge sources combined (independent variable)</td>
<td>KSC</td>
<td>0,893</td>
<td>26</td>
<td>(+)</td>
</tr>
<tr>
<td>25</td>
<td>Collaboration factors (independent variable)</td>
<td>CFC</td>
<td>0,876</td>
<td>9</td>
<td>(+)</td>
</tr>
<tr>
<td>26</td>
<td>Collaboration with competitors (independent variable)</td>
<td>CCC</td>
<td>0,551</td>
<td>5</td>
<td>(+)</td>
</tr>
<tr>
<td>27</td>
<td>Places for knowledge exchange (independent variable)</td>
<td>PKEC</td>
<td>0,835</td>
<td>10</td>
<td>(+)</td>
</tr>
</tbody>
</table>
4. Results

To determine the relationship between the innovative activity in the industrial enterprises, the degree of interaction and collaboration through knowledge flows between various subjects in the companies with ECSTFDP in Sweden and Bulgaria, the relations between the basic variables are investigated in the present research using a linear correlation quotient – r. These relations are calculated for the entire sample (H1), then it is divided in two based on a certain indication (1. the country where the company is operating, and 2. the size of the company), in order to determine the differences in the two cases (H4 and H5). The results from the in-depth interviews and descriptive statistics from the survey are presented in the Appendix.

The results show that there exists a weak (r = 0.10 to 0.29), average (r = 0.30 to 0.49) and strong (r = 0.50 to 1.0) positive correlation between the variables under investigation. The only variables without any correlation between them are the market situation (MSC) and the collaboration with the competition (CCC). The strongest positive correlation is between knowledge sources (KSC) and innovation factors (IFC). The latter are also strongly influenced by the collaboration factors (CFC), the environment and behavior factors (CEBC) of the industrial enterprises with ECSTFDP. CEBC is strongly influenced by the innovations and R&D (IDC), as well as the collaboration factors (CFC).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pearson correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CKC</td>
</tr>
<tr>
<td>Sig. CKC</td>
<td>.464</td>
</tr>
<tr>
<td>Sig. CEB C</td>
<td>.000</td>
</tr>
<tr>
<td>Sig. IDC</td>
<td>.375</td>
</tr>
<tr>
<td>Sig. IFC</td>
<td>.402</td>
</tr>
<tr>
<td>Sig. KSC</td>
<td>.477</td>
</tr>
<tr>
<td>Sig. CFC</td>
<td>.508</td>
</tr>
<tr>
<td>Sig. CCC</td>
<td>.459</td>
</tr>
<tr>
<td>Sig. PKE C</td>
<td>.273</td>
</tr>
</tbody>
</table>

Table 4. Linear correlation quotient, general
<table>
<thead>
<tr>
<th></th>
<th>Sig. (2-tailed)</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MISS</strong></td>
<td>.202 (*)</td>
<td>.375 (**)</td>
<td>.442 (**)</td>
<td>.207 (*)</td>
<td>.308 (**)</td>
<td>.232 (*)</td>
<td>.434 (**)</td>
</tr>
<tr>
<td></td>
<td>,028</td>
<td>,000</td>
<td>,000</td>
<td>,025</td>
<td>,001</td>
<td>,012</td>
<td>,000</td>
</tr>
<tr>
<td><strong>IDC</strong></td>
<td>,350 (**)</td>
<td>,535 (**)</td>
<td>,442 (**)</td>
<td>,351 (**)</td>
<td>,443 (**)</td>
<td>,393 (**)</td>
<td>,493 (**)</td>
</tr>
<tr>
<td></td>
<td>,000</td>
<td>,000</td>
<td>,000</td>
<td>,000</td>
<td>,000</td>
<td>,000</td>
<td>,000</td>
</tr>
<tr>
<td><strong>IFC</strong></td>
<td>,273 (**)</td>
<td>,508 (**)</td>
<td>,207 (*)</td>
<td>,351 (**)</td>
<td>,593 (**)</td>
<td>,586 (**)</td>
<td>,281 (**)</td>
</tr>
<tr>
<td></td>
<td>,003</td>
<td>,000</td>
<td>,025</td>
<td>,000</td>
<td>,000</td>
<td>,000</td>
<td>,000</td>
</tr>
<tr>
<td><strong>KSC</strong></td>
<td>,459 (**)</td>
<td>,477 (**)</td>
<td>,308 (**)</td>
<td>,443 (**)</td>
<td>,593 (**)</td>
<td>,527 (**)</td>
<td>,458 (**)</td>
</tr>
<tr>
<td></td>
<td>,000</td>
<td>,000</td>
<td>,001</td>
<td>,000</td>
<td>,000</td>
<td>,000</td>
<td>,000</td>
</tr>
<tr>
<td><strong>CFC</strong></td>
<td>,240 (**)</td>
<td>,549 (**)</td>
<td>,232 (*)</td>
<td>,445 (**)</td>
<td>,586 (**)</td>
<td>,527 (**)</td>
<td>,362 (**)</td>
</tr>
<tr>
<td></td>
<td>,009</td>
<td>,000</td>
<td>,012</td>
<td>,000</td>
<td>,000</td>
<td>,000</td>
<td>,010</td>
</tr>
</tbody>
</table>
A strong positive correlation has also been detected between KSC, places for knowledge exchange (PKEC) and collaboration factors (CFC). It is essential that the variables researched have a minimum of mean positive correlation with the company innovations and R&D.

All registered weak, average and strong correlations are interesting because they confirm that some of the variables surveyed are part of a process, i.e. they are not necessarily independent of each other.

The correlation quotients have been re-calculated after the data have been delineated by company size and country (H4 and H5). Concerning company size, the analysis has determined that the number and strength of correlations between the variables is greater for SMEs than for large industrial enterprises. Most correlations determined for SMEs are positive average, followed by strong and weak positive correlations. These results are identical with the general case, where the average correlations are predominant. For the big companies the correlations calculated are only strongly positive. Their number is much smaller compared to that of SMEs, with the biggest impact of KSC and CKC, and the strongest positive correlation between KSC, IFC and CFC. For SMEs the most important variables are CEBC, MSC and IFC, and the strongest positive correlation is between CEBC and CFC. For SMEs the most important variables are CEBC, MSC and IFC, and the strongest positive correlation is between CEBC and CFC. Concerning innovations and R&D (IDC), in SMEs they are strongly influenced by CEBC, MSC, and PKEC; to an average extent by CKC, KSC, CFC, and CCC; and to a small extent by IFC. In the big industrial enterprises the same variable (IDC) does not show any correlation to the remaining parameters. The results described are interpreted by the fact that SMEs have a simplified structure; they rely on mutual trust and have fewer resources available, which forces them to search actively for ways to get access to missing information, knowledge
and resources. The great number of positive correlations is an index that SMEs balance between several parameters (variables), when their knowledge flows and innovation activities, respectively, are concerned. This proves the great extent to which SMEs rely on the knowledge flows, i.e. CETK (H5). This is a prerequisite for creating industrial knowledge networks. Notably, when calculating the correlations based on country, their number for Swedish companies is much smaller, compared to the number of Bulgarian ones (H4). Besides, they are only average and strong, with the average correlations prevailing. Concerning the Bulgarian enterprises, the correlations prevailing are average positive, followed by strong and weak. It is noted specifically that the innovations and R&D (IDC) in the Swedish ECSTFDP are strongly influenced by CKC, CEBC and not so strongly by CCC and PKEC. In Bulgaria, the variables influencing IDC are CEBC, CFC, CCC, and to a smaller extent, MSC, IFC, KSC. In both countries the collaboration with the competition, environment and company behavior are essential for ICD. The strongest positive correlation among the variables for the Swedish companies is between sources (KSC) and places for exchange of knowledge (PKEC), while for the Bulgarian companies it is between the innovation factors (IFC) and the sources of knowledge (KSC).

The above-mentioned results necessitate the investigation of the relation between CETK, company innovations and R&D, i.e. how well CKC, CEBC, MSC, IFC, KSC, CFC, CCC and PKEC stipulate IDC in the sample surveyed. It is of paramount importance to define the variables which best predetermines or stipulates IDC using the variables in the survey.

A standard multiple regression has been carried out among company innovations (IDC) as a dependent variable and company competences (CKC), environment and company behavior (CEBC), market situation (MSC), innovation factors (IFC), knowledge sources (KSC), collaboration factors (CFC), collaboration with competition (CCC) and places for exchange of knowledge (PKEC), all of them like independent variables (H3).

The analysis shows that 40,7 % of the variations of IDC (Adjusted R square) = 0.407, significance (sig) = 0.000) is determined by CKC, CEBC, MSC, IFC, KSC, CFC, CCC and PKEC. In the present survey the recommendations of Tabachnick and Fidell have been observed (2006) and the adjusted determination quotient (adjusted R Square) has been reported instead of the determination quotient (R square), since it provides a more realistic idea of the relevance between the regression model used and the sample surveyed. The values of the determination quotient (R-square) in most cases are too optimistic about the relevance of the regression model used (Pallant, 2005).
The greatest contribution to predicting IDC (the dependent variable) is made by PKEC (standardized coefficient $\beta = 0.224$). A smaller contribution is made by CFC, MSC, CEBC, CKC, CCC. Regardless of this, only PKEC, CFC and MSC have a unique statistically significant contribution (sig. < 0.05) for predicting the company innovations in the companies with ECSTFDP. It is important to note that the values of standardized coefficient $\beta$ show the average standardized unit change of the dependent variable as a result of the one standardized unit change of the respective independent variable (Манов, 2001).

The next step of the regression analysis is to test whether the selected set of independent variables will foresee the variation of IDC to a great extent if the possible effects of the company’s age and its size in the country of its operation are controlled (H6). This is executed through the so-called hierarchical multiple regression analysis. The results show that after the variables for company age, size and country of operation, the model accounts for $3.6\%$ (Adjusted R Square $= 0.036$) of the variation ($0.036 \times 100$). After introducing (adding) the remaining factor variables (CKC, CEBC, MSC, IFC, KSC, CFC, CCC and PKEC), the model as a whole accounts for $39.8\%$ of the IDC variation (Adjusted R square) $= 0.398$, significance (sig) $= 0.000$). All independent variables account for $39.9\%$ ($0.399 \times 100$) different from the variation of IDC (change of determination quotient (R Square changed) $= 0.399$, significance (sig) $= 0.000$), even when the effects of company age, their size and the country of their operation are controlled statistically. This is a statistically significant contribution as the value change for sig. F (0.000) shows. As a whole, the model including all independent variables (company age, size and country of operation, CKC, CEBC, MSC, IFC, KSC, CFC, CCC and PKEC) is significant [F(11, 90) = 7.066, sig. 0.000]. The uniquely statistically significant contributions of the independent variables repeat the results of the standard multiple regression even when the effects of company age, are controlled, with the exception of the PKEC factor. The latter has no statistically significant contribution to foreseeing IDC, if size and company age, as well as country of operation are taken into account. This shows that the market situation (MSC, standardized coefficient $\beta = 0.237$) and the collaboration factors (CFC, standardized coefficient $\beta = 0.228$) have a statistically significant effect on innovations and R&D of industrial enterprises irrespective of the country of operation, their size and age.

4. Conclusion

The Swedish and Bulgarian companies with ECSTFDP offer an interesting foundation for investigation of intensive knowledge flows in a traditional production and comparison between the two countries (see the Appendix).
CETK between different subjects depend to a great extent on the collaboration and interaction between them (which confirms H1 and H2).

1. Compared to large companies, SMEs display a higher tendency for interaction and collaboration through knowledge flows, especially with respect to investing in R&D and innovations, which is a prerequisite for creating industrial networks of knowledge (which, in turn, confirms H5). Companies with ECSTFDP undertake mostly small improvements, such as new combinations in product-service or new applications of existing products (see the Appendix).

2. The industrial enterprises with ECSTFDP in Sweden are extremely active in the management of knowledge and innovations. In Bulgaria the companies expect support and initiative for the generation of university networks, governmental organizations and other subjects, and the collaboration is developed on the premise of production cost reduction, new products and knowledge, a level of technological development achieved and a greater effect of the resources invested (see the Appendix).

3. Between the Swedish and Bulgarian companies with ECSTFDP there exist differences concerning CETK, as well as innovations and R&D (H4). In Sweden the latter are strongly influenced by the company competences (CKC), as well as company environment and behavior (CEBC). Collaboration with competition (CCC) and places for knowledge exchange (PKEC) have a weaker influence. In Bulgaria the variables affecting IDC are company environment and behavior (CEBC), collaboration factors (CFC), collaboration with competition (CCC). The market situation (MSC), innovation factors (IFC), and knowledge sources (KSC) have a weaker influence.

4. The innovations and R&D of industrial enterprises with ECSTFDP are positively affected by places for knowledge exchange (PKEC), followed by collaboration factors (CFC), market situation (MSC), company environment and behavior (CEBC), company competences (CKC) and collaboration with competition (CCC). Of those only PKEC, CFC and MSC have a unique statistically significant contribution to innovations based on the interaction between industrial enterprises and other interested subjects with the purpose of increasing their competitiveness (which partially confirms H3).

5. The main variables which have an impact on innovations and R&D while size and age of the enterprises, as well as the country of operation, are taken into account have been investigated during the analysis. A considerable impact of the collaboration factors (CFC) and market situation (MSC) has been identified. To those are added places of knowledge exchange (PKEC), without taking into account the effect of the industrial enterprise characteristics mentioned initially (which partially confirms H6).
6. The results obtained show that the factors for collaboration and interaction (CFC) between various interested subjects are most important for increasing the innovation activity in industrial enterprises with ECSTFDP, irrespective of size, age and country of operation (H2). This shows presence of conditions for the establishment of industrial network.

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Appendix

Descriptive statistics and expert interviews

The main markets and their relative share in the sales of the companies have also been investigated through open questions since the export activities are considered to be a key parameter of innovation activity (see in Beise-Zee & Rammer, 2006). The data from the investigated sample show that the industrial enterprises generate their sales on national (average value 43% of the sales) and regional markets (average value 34% of the sales), while only 23% of the sales are realized on international markets. This trend is valid for the two countries investigated. These findings are also confirmed by the expert interviews. This fact is not considered to be an obstacle for the flows of knowledge and the innovation activities in the industrial enterprises with ECSTFD since their production is concentrated in specific regions which are close to the biggest clients. For the companies with ECSTFD in Sweden, for example, Volvo, Scania, etc., the concentration of automobile industry predetermines the low level of export activities which emerges from the survey too. Besides, the industrial enterprises with ECSTFD do not manufacture end products but supply plated components, which are assembled or fitted (for example in automobiles), and only after that are they exported. This accounts for the fact that the results on the export of the companies are not high.

![Graph showing the share of sales on a national level (%)](image)

Fig. 1 Share of sales on a national level (%)

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*Proceedings of the 5th HSSS Conference, Xanthi, Greece, 2009*
The most attractive international markets for the companies with ECSTFDP in the sample are in Europe (an average of 79.6% of the international sales). This is not surprising because of the free trade between the EU member-states, as well as the shorter distances and the lower shipping expenses in Europe, respectively. An additional reason is the specific production in ECSTFDP including the substantial risk of corrosion of the plated parts during sea transportation due to high humidity; most of the companies are trying to avoid this risk.

The intensity of R&D and the expenses incurred are considered to be another reliable index for the intensive knowledge flows and innovation activities of the companies (see Wei et al., 2005). The expert interviews show that the innovations play an important role for ECSTFDP. The majority of experts argue that it is the new processes with their level of quality maintained that account for the stability of big clients’ orders, which are not redirected to countries with lower production and labor costs like China. They point out that the innovations are necessary due to the increased environmental regulations and the ensuing ban on some of the previous processes. Besides, the compatibility of the latter is based solely on price, while it is the new products that provide the necessary growth for ECSTFDP. Hence the investigations on the annual costs of the companies incurred from the budget for their own R&D.

In the sample, the greater part of the enterprises (42.86%) invest between 1% and 5% annually, while just 4.20% of the respondents invest over 21% per year, all of them being from Bulgaria. Moreover, according to the results from the questionnaire, an average of 51.48% from the top managers are involved in R&D and innovations, while the average, linear and other management levels involved are considerably fewer – average for each level 20.85%, 6.80% and 7.94%, respectively. The results are a mirror reflection for both countries surveyed. The explanation for this is the specific features of this sample, which consists mainly of SMEs. Thus the deficiency of resources for investment in R&D is confirmed. It is also concluded that the companies with ECSTFDP are involved mainly in production line expansion, modification of existing products or organizational innovations. In relation to the expenses for R&D and product differentiation for the period 2004-2006, experts argue that the sum allotted annually from the company budgets for this purpose has increased. They explain this mainly with the changes in industrial production and the increased regulatory requirements for environmental protection.
What percentage from the company budget is used for R&D within the company annually?

The freedom for collaboration, firstly with customers and then with competitors and suppliers, is indicated as the main factor providing favorable medium for development of innovations and R&D. The experts point out that the size of the company affects this process considerably because the smaller the company is, the harder it proves to be for it to influence its customers, who usually provide specifications and technical requirements for the surface treatment. According to the experts, the clients possess neither the competences necessary for the active selection, nor the knowledge to create viable assignments; that’s why they usually copy old versions of the specifications. Not considering the surface treatments as their main business, they gradually assign this production to affiliated suppliers. For this reason, the unification of companies and all interested subjects in a singular organization like SYF, which fulfills the role of a “mediator” between them, becomes crucially important, together with the increase of clients’ knowledge, as well as the knowledge of employees in companies for ECSTFDP. Concerning the surface treatments, some additional factors favorable for innovations and R&D appear to be the EU requirements; the government financing and support; the profitable interest rate; the reduced bureaucracy; the collaboration with universities for the development of competences and creating technologies in the countries themselves (in this case Sweden and Bulgaria), instead of buying those from other countries (namely, from Germany, Italy, the USA).

The expert interviews show that there are four types of innovations in ECSTFDP while new products are developed. The first type is new processes developed on the basis of increased environmental protection requirements. They also include all improvements in the waste-water purification plants of the industrial enterprises for ECSTFDP. The second type is organizational innovations related to providing complete logistics solutions and quality customer service. They are evoked by the desire of the companies to add value to their products with the purpose of keeping their customers. The third type is other new processes induced by the
requirements of the large clients and the change in their industrial production based on the latest technological developments. The fourth type is changes in the equipment currently used aimed at achieving a better control and reducing the current production costs. Experts emphasize that the innovations implemented are a novelty for Sweden, but not on a world scale. This also refers to Bulgaria, which follows the world leaders in ECSTFDP.

Another important aspect is the participation of industrial enterprises with ECSTFDP in client developments of new products from the very beginning of the process so that parts with optimal shape for applying plating can be created, which will guarantee the quality, i.e. integrated design of parts, technologies and production tools. According to experts, this happens too late at present, only after the design has been finished by the client R&D units, where in most cases there is insufficient or even lacking knowledge on the surface treatment types and properties, as well as on the requirements which guarantee quality. To present, there is no universal plating process, applicable to various parts and answering the numerous requirements, which can solve the above-mentioned problems.

In addition to the expert interviews, the innovations and R&D in the companies have been investigated through the questionnaire applying for a period of three years (2004-2006). The majority of respondents (77,4%) have chosen Agree or Strongly agree for the statement that there is technological development in ECSTFDP; 58% declare that improvements/modifications of existing products have taken place; 51,2% have offered new or improved products/services and processes, while 50,4% even estimate that all innovations in the company have been developed independently. Most of the industrial enterprises surveyed (33,6%) demonstrate self-confidence that they have presented a greater number of new products faster than their biggest competitors during the period under investigation (2004-2006). Only a small number of the enterprises (6,7%) have waited for the competition to introduce a new product, so that they can copy it. In complete compliance with the expert interviews, for 35,3% of the sample enterprises the main strategies for preserving the markets already conquered are the technologies, which confirms that 50,4% have developed innovations mostly independently. This is a proof that the skills for creating new products, services and processes are assumed as excellent by 42,9%; for 31,10% there exist convenient conditions for R&D; 28,6% hire personnel for R&D. On the other hand, a smaller percentage (31,10%) of the respondents have chosen Agree or Strongly agree for the statement that all innovations in their companies have been developed in collaboration with other companies, while 33,60% have bought technologies; 12,60% have taken over other enterprises, and 22,70% have used license agreements for access to new
technologies. A preferred version for this (13.4% - Agree or Strongly agree) is the registering of joint ventures, while 17.7% of the surveyed claim that all innovations in the companies have been developed mainly by other organizations. The results from the field survey, confirmed also by the expert interviews show that the companies with ECSTFDP are relatively active in the market launch of new or improved products for the period under investigation. This is due mainly to the specific features of ECSTFDP, for which a new type of plating with different properties or improved quality can be introduced into production only through the change of chemical substances and voltage, without a general replacement of existing equipment. To the same effect are the claims that at least one new process is introduced annually, mostly in collaboration with the suppliers of chemicals (interview with Mr. Schimanke, on 2007.03.25.). The high results found for the individual development of innovations are attributed to the organizational innovations for adding value to the products and providing better customer service, as well as using equipment for a comprehensive control over the production and reducing the costs.

The collaboration with the competition is an important factor for the intensive flows of knowledge, i.e. CETK. It is one of the strengths of the SMEs which are trying to overcome the shortage of resources through collaboration with other companies. Despite those theoretical assumptions, the expert interviews show that collaboration between competitive companies is extremely rare and depends to a large extent on the personal contacts and trust between the industrial enterprises. Some of them even define it as “mission impossible”, but point out that the increased unity of action can turn into strength for ECSTFDP. The collaboration between companies with ECSTFDP and chemical suppliers is much more common due to the availability of resources for R&D in the latter.

According to the respondents, the technological development level achieved is the most important factor for collaboration (73.10% - important and very important), followed by: reducing the costs for production, new products and new knowledge acquisition (71.50%); trust and amicable relationship between top managers (69%); larger benefit from the funds invested for collaboration (66.40%); condition of material and non-material infrastructure (63.90%); similar professional jargon (63.8%) and opportunities for frequent personal meetings (56.30%). In the end, some less important factors are the technological superiority of the other company for collaboration (44.50%) and the distances between the partner organizations (30.30%).

What is striking in the comparison between Sweden and Bulgaria using these indexes is the difference in the priorities of the managers from ECSTFDP in the two countries. In the Scandinavian country what matters most is the technological development level achieved, the trust and
friendliness between the top managers and the opportunities for frequent meetings, which illustrates the significance of the social networks and personal relations as a competitive advantage of SMEs. On the other hand, what matters most in the Balkan country is the reducing of production costs, as well as the costs for new products and knowledge; the level of technological development achieved and a greater result from the resources invested.

Investigating the level of collaboration (municipal, regional, national and international) and the desired partner organization, universities and research institutes are most preferred (30,30%), as well as consultants at a national level (28,60%), followed by industrial chambers and associations at a regional (23,50%) and national (22,70%) level. Less attractive are science parks and business incubators (18,50%) at a national level, competitive companies at a national and international level (17,60% each). The least attractive collaboration partner is the public sector at all levels. On comparing the two countries under investigation, the general results coincide concerning national universities and institutions being placed in a leading position in both countries. For Sweden some important partners at regional level are also industrial chambers, associations and business incubators, while at national level consultants, science parks and other competitive companies are considered. For the Bulgarian industrial enterprises with ECSTFDP, some important partners at a national level are industrial chambers, consultants and science parks, and, to a lesser degree, laboratories for quality control.

At the same time, expert interviews show that the role of universities and research centers in Sweden for innovations in ECSTFDP is relatively insignificant. They point out that with respect to new technologies and processes, the industrial enterprises are the active part for developing of joint projects. The attention of universities and research centers is directed mainly to problems of company management and marketing, so that they are not treated as automatic line of subsequent tanks with different solutions. According to experts, these institutions have to play the role of ‘mediator’, similarly to SYF, between the different subjects interested in ECSTFDP. One of the main reasons for this situation in Sweden is the fact that the suppliers of chemicals are extremely active in the development of new products for ECSTFDP. This fact predetermines the active role of the industrial enterprises themselves in relation to technological problems and innovations.
References in the Appendix


The changing face of the tobacco cluster in northern Greece

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Abstract:
Cluster-based economic development is increasingly viewed as a focal point of policy-makers and researchers. A regional cluster may be defined as a geographic concentration of interdependent firms, that operate together to facilitate growth and innovation. Companies prefer to cluster, rather than being isolated, in order to work more effectively and to achieve higher rates of productivity. This paper focuses on the agro-industrial cluster of tobacco in Northern Greece, a traditional leader of economic growth for the region. This empirical study examines the set of cluster actors that operate in production, processing and trade of tobacco. The geographic concentration of economic activities regarding tobacco in Northern Greece and the related economic developments in regional economy are discussed, as the first step towards identifying the pertinent success factors as well as future trends.

Keywords:
Cluster policy, tobacco cluster, regional prosperity
1. Introduction

In an economic environment, where the competition is becoming more international and more intense, the generation and development of business clusters ranks high on the agenda of governments around the world. Clusters are viewed as regional agglomerations of companies, universities and research institutions, government agencies, financial institutions in a particular field, related linked by commonalities and complementarities (Porter, 1990). Recent empirical evidence shows that small and medium enterprises (SMEs) located in clusters become more competitive than they could in isolation, because of better collective effectiveness.

In a global competitive world, where the trend is to break business operations and outsource them in many different countries, business cluster policy argues that regional prosperity can be achieved through the concentration of activities in the same geographic area. In today’s economy map a common location is no longer considered as a source of competitive advantage, however cluster research points out that location still remains critical to the growth and the development of whole industries (Porter, 1998).

In this paper we present the basics theories on business cluster policy and discuss expensively the case of tobacco cluster in Northern Greece. Additionally, the case of another tobacco cluster in Brazil is summarized in order to investigate the broader trends in the field. The main scope of the study is to underline that cluster-based policy is a fundamental element of regional prosperity and should be a focal point for economic growth for politicians and policy-makers internationally.

2. Cluster Policy

Companies are not the only constitute members in a cluster. Government, through public institutions fund and support the cluster’s activities, but not define the general strategy (Porter, 2000). Universities and research institutes (URIs) contribute to the better education of students and professionals in order to become later a part of labor pool (Jaffe, 1989). Moreover, institutions which are initiated by government or cluster companies are responsible to secure the collaboration between cluster members and upgrade the business-environment conditions (Solvel, Lindqvist and Ketels, 2003). Finally, financial institutions (FIs) influence significantly the cluster performance, fostering certain business evolutions and taking investment decisions based solely on profit maximising criteria.
It is widely accepted that the benefits that firms can enjoy from being members of a cluster come in three main sources. Firstly, it is easier for a company to attract more skilled workers and specialized suppliers, because of the increased prestige and attractiveness (Amiti and Cameron, 2007). Secondly, there is a pool of labor that provides a better access to experienced employees, specialized information, public goods and demanding customers. Finally, there are knowledge spill-overs through different channels that can lead to the diffusion of information. Furthermore, companies, being locating close to others, achieve higher levels of productivity (Boasson and MacPharson, 2001). The collaboration with specialized suppliers contributes to the reduction of reaction times. Firms within clusters become more innovative. The geographical proximity provides a strong environment that enables the creation of new ideas and the turning of these ideas into new products and services. In addition, clusters provide an environment that promotes the entrepreneurship and as a result new companies become more reliant to external suppliers and customers (Porter, 1998).

Nowadays, economists consider business clusters as a basic tool to understand the economic strength of a region. The positive relationship between strong cluster portfolios and successful economic performance can be proved precious for the economic development of a region. (Solvell and Ketels, 2006). A great number of business clusters has been identified all over the European Union. Institutions and initiatives supported by the European Commission aspire to inform and assist the key stakeholders in
the field, like company managers, policymakers, researchers and relevant associations. According to European Cluster Observatory, a tobacco cluster is operating in the area of Northern Greece, which occupies 3,426 employees. (European Cluster Observatory)

3. Historical review

Tobacco has more than three centuries long history in Northern Greece. Since 1715, tobacco from this area was well known for its individual taste, aroma and quality. Life and tradition have always been closely associated with the cultivation of tobacco. From 1860 to 1925 tobacco traders were travelling to the West in order to co-operate with international firms (www.sekap.gr). Before the Second World War the tobacco industry was thriving and during this period many tobacco plants-warehouses were built and the majority of the population was working in the tobacco value chain. After the war the conditions were mature enough for the establishment of SEKE S.A., the cooperative union of Greek tobacco products. SEKE established a cigarette factory, aiming at the purchase, storage and resale of tobacco not only to domestic but also to foreign markets. In 1975 SEKAP S.A., the Greek cooperative cigarette manufacturing company was established by the cooperation of tobacco producers. SEKAP is an industrial-commercial company operating in the areas of manufacturing, selling cigarettes and tobacco products.

During the same period another firm was established in this region. In 1975 SEVATH was founded; the cooperative industrial company for the development of Thrace, while in 1977 its first factory for tomato processing was founded. In 1979 SEVATH also founds a graphic arts industrial facility intended for the package of industrial products. In this graphic arts industrial facility cigarette boxes and packages were printed.

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![Timeline](image)

**Figure 2** Timeline

4. Actors of the cluster

Rather than simply grouping the tobacco industry in Northern Greece, the tobacco cluster provides a vital force for the development and the growth of its actors. SEKAP as an anchor actor is set in the centre of the cluster collaborating effectively and driving the development of the other actors.

The tobacco sector, cultivation and processing, in Northern Greece is very significant. Apart from the people that are directly engaged in tobacco
activities, cultivation and processing have strong linkages in the regional economy. According to 2003 records, 9,618,727 kg of tobacco were produced in Rodopi/Soufli, 3,442,771 kg were produced in the Xanthi area and finally 1,897,187 kg in Drama/Kavala/Pangeo region. The Tobacco growers in Northern Greece used to deliver all their tobacco production in SEKE. SEKE is responsible for the first processing of the tobacco leaves, drying and cutting. SEKAP continues the processing of the tobacco, adding flavor, manufacturing cigarettes and packs them using packs printed in the graphic art lab of SEVATH. Finally, retail shops and other local services (e.g., security) extensively support the cluster.

![Diagram](Image)

**Figure 3** Actors of the tobacco clusters in Northern Greece

### 5. Regional Prosperity

There is a strong positive relationship between the measure of cluster strength and regional prosperity. It is often observed that due to the creation of a cluster, many regions - lagging significantly behind others more advanced - become more competitive and can reach higher levels of productivity (Solvell and Ketels, 2006). More especially, in the case of Greek tobacco cluster, its operation contributes significantly to the economic development of Northern Greece. First of all, while the unemployment rate is continually growing, inhabitants of the region can be occupied more easily in a cluster-member, either in a company or in an institution. The increase of jobs constitutes one of the major factors of the area’s development. The establishment of the tobacco cluster except for its key role to the unemployment problem is also essential to attract more incomes to the region. The cluster offers an efficient environment that firms can locate their business activities in order to improve their turnover.
Finally, this geographic concentration provides healthy conditions for investment and increases the reputation and prestige of the region. This may result in the attraction of more firms, skilled employees and specialized suppliers moving into the cluster, improving its competitiveness and the region’s prosperity too.

6. Tobacco Cluster in Brazil

Another example of tobacco cluster is the cluster of the Rio Pardo Valley in the South of Brazil, whose main activities are the tobacco growing, storage, processing and the export of unmanufactured tobacco and primary processed tobacco. Within the boundaries of this cluster, more than 9,000 workers and 70,000 growers are occupied in order to process 380,000 tons of leaf tobacco. The tobacco cluster plays a key role in the region’s prosperity and development. It contributes to the attraction of foreign revenues at regional level and plays a vital role in the state tax revenue at regional level. More than 80% of the value added generated in the region is held by the tobacco cluster, while the sales of this cluster represents the 10% of the total exports from Rio Grande do Sul, one of the three states in the South Region of Brazil. Sixteen companies related to production and sales of tobacco products constitute this cluster. Some of them are locally owned SMEs, while the majority of these firms are large subsidiaries of MNCs (Multinational Corporation), which play a substantial role in the tobacco production and information diffusion within the cluster. The purpose of the SMEs is to contribute to the productive process through the supplying of unmanufactured or primary processed tobacco. The existence of branches of MNCs in the cluster, which are responsible for the most important phase of tobacco value-chain, related to R&D activities, marketing or international trading reduce the importance of local companies in terms of production and innovation. Phillip Morris is the only firm inside the cluster that manufactures exclusively cigarettes. In addition, it accounts for 15% of the cigarette domestic market in Brazil and constitutes the main exporter to Latin America, Europe and Asia.

The interactions between growers and tobacco companies in the cluster are fundamental for its efficient operation. The collaboration between smallholders and tobacco processing firms is carried through the “integrated production system”. More specifically, growers who participate to this “agreement” are obliged to provide the companies with all their leaf production and follow the technical guidelines of technicians (managers, supervisor and instructors), who are aware of new technologies related to planting and new varieties of tobacco. In the terms of “integrated production system”, smallholders and tobacco processing firms have mutual commitments. On one hand, the companies have to provide the growers with seeds and agricultural pesticides facilitate the transport from
the fields to the tobacco warehouses, intermediate loans with official banks and give technical assistance through instructor teams. On the other hand, smallholders are in charge of defining the volume and the quality of crop and the production costs according to firms’ requirements (Vargas, 2001).

7. Present Circumstances

It is widely recognized that nowadays the tobacco cluster in Northern Greece is not sufficiently strong and does not have the impact that had in the past. The present situation of this cluster implies the crisis of the tobacco sector, resulting from the policy of developed countries towards smoking. This anti-tobacco policy adopted recently by the European Union (E.U.) has a great impact in the tobacco cluster. The Greek government recently took measures forbidding smoking in public places to limit the tobacco consumption. As a result the market of tobacco is continuously shrinking affecting particularly negatively the clusters worldwide. This policy aiming at the decrease of cigarette consumption and the restriction of tobacco marketing drives the world tobacco industry to turn to new markets like Asia and Eastern Europe, where such measures have not been taken yet. Contrary to tobacco cluster of the Rio Pardo Valley in Brazil that is focused to these markets in order to replace the declining revenues, Greek tobacco cluster continues to collaborate mainly with domestic clients (95%).

Additionally one of the actors of the cluster does no longer exist. SEVATH graphic art laboratory does no longer operate. SEVATH shut down for economic reasons and recently the graphic arts lab stopped operation. The package is now purchased from another Greek company located in Athens.

Finally, growers received subsidies to stop the tobacco growth and be encouraged to move to other cultivations. That way, growers secure their incomes without handling tobacco and are able to start an alternative cultivation. Since there is no longer enough Greek tobacco, the cluster had to turn mainly to foreign growers. The foreign tobacco leaves imported from Malawi, Brazil, Argentina and Italy reach now 90% of the raw material.

8. Conclusions

Clusters - the concentration of specialized skills, important information, related companies, institutions and demanding customers - have become the focal point of policymakers the last decades. It is widely accepted that cluster – based policy, that is focused on the long-term economic growth, has a lot of potential. Especially in a period of economic crisis, companies prefer to cluster in order to obtain gains that are difficult to tap from distance. Despite the advantages that derived from a cluster environment,
the tobacco cluster in Northern Greece, contrary to the one in South of Brazil is not enough antagonistic to keep pace with the most competitive players in the field. The performance of Greek tobacco cluster is mainly related to the Greek general policy against tobacco. The Greek legislation, under the shield of European Union, forbids the smoking in public places and discourages tobacco cultivation; two determinants factors for the cluster’s evolution. The performance of the specific cluster should not be perceived as a typical example of a cluster’s future, considering the general policy about tobacco and the particular conditions that exist in the region. Finally, European Union, through European Commission supports cluster development across Europe establishing joint public-private research groups and supporting regional cluster initiatives.

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Good practice in opportunity recognition and entrepreneurial process of start ups: some considerations and suggestions

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Abstract (only):
The entrepreneurial process is mainly opportunity driven and for this reason the ability of nascent entrepreneurs to identify business opportunity constitutes one of the most significant factors for their survival and success. Despite its importance, the opportunity recognition process is underdeveloped and marginalized both in the academic literature and education. This reality is often depicted in the large failure percentages of new business ventures. The present paper tries to fill this gap by exploring methods that help people enhance their skills and capabilities in recognizing sustainable business opportunity and understanding better the real problems of managing a new business. In particular, this paper’s purpose is to investigate ways for building up ‘structured discussions’ in the formulation phase of business start ups in classroom environments. To this end, we employ methodologies used in the Operational Research domain, that is the ‘Cause Mapping’ developed by Eden and Ackermann (1998) and the ‘System Dynamics’ approach. Our findings entailed from best practices in the field offer useful and valuable insights to both Universities students and teachers in entrepreneurship.

Keywords:
Entrepreneurship; opportunity recognition; start ups; cognitive mapping; system dynamics.
Internet banking user acceptance: evidence from Greece and Bulgaria

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An Integrated system to reform world financial crisis by facilitating EU auditing license test with virtues evaluation

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Overconfident investors and trading activity: a behavioural perspective and empirical results

*Dimitrios Kourtidis, Prodromos Chatzoglou, Željko Šević*

The role of a bank’s internal processes in improving its performance

*Maria Mavri, Katerina Dimaki, Vasilis Angelis*

Client selection criteria for banks in Greece

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Conceptual approaches to co-operative banking and customers satisfaction drivers

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Internet Banking user acceptance: Evidence from Greece and Bulgaria

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Abstract:
Up to now, research studies in Greece and Bulgaria have not paid sufficient attention in exploring the reasons affecting the acceptance of Internet Banking services in those countries. Using the decomposed Theory of Planned Behaviour (decomposed TPB) and based on data collected from a sample of 247 respondents of both countries – 118 from Bulgaria and 129 from Greece, we found, in general, an overall good fit of the sample while the hypotheses acceptance varied from country to country. Overall, we showed that in both countries, subjective norm, along with attitude and perceived behavioral control, were able to explain adequately the users’ behavioral intention.

Key words:
Internet Banking, User acceptance, decomposed Theory of Planned Behaviour, Behavioural Intention.

1. Introduction
During the last decades the banking sector has proved to be highly competitive. One reason could be that it is only in the last years that the
banks have decided to adopt marketing techniques (Durkin and Howcroft, 2003). Since there is a constant struggle among the banking institutions to maintain and acquire a greater proportion of their clientele, they have turned to Information Technology (IT) in order to find alternative sources to attract new customers. The first “virtual bank” is the Automatic Teller Machine (Liao et al., 1999), which was introduced in 1960 in US banks. Another term used in academic literature instead of virtual banking is the term “non-branch bank” (Liao et al., 1999; Shih and Fang, 2004). The introduction of the ATMs was followed by the development of Phone Banking Services, mail services and, ultimately, the formation of Internet Banking distribution channel (Shih and Fang, 2004). Internet Banking, along with Mobile Banking, are the latest innovations in the banking sector and are regarded as supplementary distribution channels.

Since there is significant lack in relevant research both in Greece and Bulgaria, we intend with this study to investigate users’ acceptance of Internet Banking services in the two countries. In order to identify user acceptance of Internet Banking services, this study adopted and tested the decomposed Theory of Planned Behaviour (TPB). The rest of the paper is structured as follows: the main concepts on internet banking are presented in section two while the theoretical background is discussed in section three. The research model and the hypotheses are developed in section four while research methodology and empirical results are presented in section five. Finally, section six concludes the study.

2. Internet Banking

Rotchanakitumnuai and Speece (2003) make clear that Internet Banking allows customers to have direct access to their financial information and to undertake financial transactions without the need to visit a bank. Hence, websites demonstrating or advertising the banks’ products do not allow the user to conduct transactions that are not considered as Internet Banking services (Pikkarainen et al., 2004). Additionally, a bank’s website that provides only information inquiry transactions, such as checking the balance of a deposit account or the payment amount of a credit card, and does not allow monetary transactions, is also not characterised as Internet Banking (Sayar and Wolfe, 2007).

2.1 Providers’ perspective

Even though the banks worldwide have invested billions in developing Internet Banking services, there is still need for ATMs to withdraw cash and it is necessary to visit a bank branch in order to sign contracts or mortgages. Nevertheless, Internet Banking technology is an intermediary that offers many actual, social and psychological advantages to the
institution, which has invested in it (Sayar and Wolfe, 2007). The most important factor that led banks to turn to the particular distribution channel is the savings in transaction cost and maintenance, especially when it is compared to the traditional branch network (Shih and Fang, 2004). Moreover, with the construction of an appealing, effective and useful web site, banks are able to attract prospect “Web-based” customers and existing Internet users (Rotchanakitumnuai and Speece, 2003) and retain their existing clientele (Sarel and Marmorstein, 2003) by offering alternative and more specialised services.

Even though the benefits of using Internet Banking are facilitating and indisputable, surveys conducted during the last years have found that the actual users of Internet Banking are still a tiny proportion of the aggregation of bank customers (Sarel and Marmorstein, 2003; Gerrard et al., 2006), excluding Scandinavian economies (Pikkarainen et al., 2004).

2.2 Customers’ perspective

Several surveys have proved that Internet Banking is a rather costless distribution channel from the customers’ point of view (Rotchanakitumnuai and Speece, 2003; Shih and Fang, 2004; Pikkarainen et al., 2004). Moreover, Internet Banking is a convenient and effective application which allows any individual customer – retail or corporate – to manage his/her accounts 24 hours a day, it is accessible from any location, as long there is access to Internet, and the information provided is current and immediate without any intermediary situation needed (Tan and Teo, 2000). The fact that there is an increasing number of bank customers with recourse to Internet Banking, indicates the tendency to a more self-service mode, because traditional branch banking demands more time and effort (Pikkarainen et al., 2004; Jaruwachirathanakul and Fink, 2005) and accommodates the procedures (DeYoung et al., 2007).

On the other hand, a sounder question about the customers’ perception on Internet Banking would be: “What are the main factors that discourage individuals use and benefit from Internet Banking?” Gerrard et al. (2006) studied the barriers to the adoption of Internet Banking from bank customers, and concluded that the most important factors are: lack of trust in Internet and Internet transactions, no perceived need to adopt Internet Banking (inertia), lack of knowledge about the specific service and lack of experience, inaccessibility to Internet and pricing concerns (access to internet requires PC as well as appropriate software and hardware), and IT fatigue (due to every day contact with PC in work). Other studies revealed as dominant factors of Internet Banking user acceptance the individual’s social influence, computer self-efficacy and demographic characteristics (Durkin and Howcroft, 2003).
3. Theoretical Background

This study is based on the decomposed Theory of Planned Behaviour (decomposed TPB), developed by Taylor and Todd (1995). Decomposed TPB is, respectively, based on the traditional Theory of Planned Behaviour (TPB), combined with the Theory of Reasoned Action (TRA) and Technology Acceptance Model (TAM).

3.1 Theory of Reasoned Action (TRA)

Fishbein and Ajzen (1975) demonstrated TRA as a model in social psychology that can explain virtually any human behaviour. It assumes that individuals are usually quite rational and make systematic evaluation of information made available to them. TRA includes the following general perceptions: (a) attitude, (b) subjective norm, (c) behavioural intention, and (d) behaviour. Moreover, Fishbein and Ajzen (1975) identified two factors affecting the individual’s intention: The first one is the personal evaluation – positive or negative – that the person has set as a standard, and refers to attitudes, while the second factor is the person’s perception of the social pressure put on him/her in order to realise or not the requested task, and is represented by the use of subjective norm.

3.2 Traditional Theory of Planned Behaviour (TPB)

The TPB was introduced by Ajzen (1985). TPB encompasses the TRA and extends it. Both theories establish that behaviour is a direct function of behavioural intention (Shih and Fang, 2004). However, the TPB differs from the TRA, since it includes a new construct, the Perceived Behavioural Control (PBC). PBC has been added to account for conditions where the individuals have no control over their behaviour. Ajzen (1991, p. 188) give the following definitions for attitude, subjective norm and PBC:

- **Attitude**: Refers to the degree to which an individual has a favorable or unfavorable evaluation of appraisal of the behaviour in question.
- **Subjective Norm**: Refers to the perceived social pressure to perform or not to perform the behaviour.
- **Perceived Behavioural Control**: Refers to the perceived ease or difficulty of performing the behaviour and it is assumed to reflect past experience as well as anticipated impediments and obstacles.

3.3 Technology Acceptance Model (TAM)

TAM is based TRA and TPB. According to Davis (1989), who initially proposed TAM, it is based on two determinants: Perceived Usefulness and Perceived Ease of Use. “Perceived usefulness refers to the degree to which
a person believes that using a particular system would enhance his or her job performance”, whereas “perceived ease of use refers to the degree to which a person believes that using a particular system would be free of effort” (Davis, 1989, p. 320). Luarn and Lin (2005) claim that both TRA and TPB are basically psychological theories concerning human behaviour, while TAM is an application specified to IS usage. Therefore when academics do some kind of research on how users accept or reject information systems (IS) they usually tend to adopt TAM (Jaruwachirathanakul and Fink, 2005).

4. Research Model and Research Hypothesis

The decomposed TPB has been selected as the guiding framework for the current research model. The most important reason for this is the findings of Taylor and Todd’s research (1995) where they compared TPB and decomposed TPB and concluded that there is an added value as a result of the decomposition, in terms of increased explanatory power and a better, more precise, understanding of the antecedents of behaviour. Moreover, the fact that this model incorporates constructs like compatibility and trialability, among others, which were originally proposed by other theories such as Innovation Diffusion Theory (IDT), enhances its validity. Thus, decomposed TPB is preferred from the traditional TPB.

According to IDT, relative advantage refers to the degree that the examined innovation (in this case, Internet Banking) provides higher advantages that supersede the practices of its forerunner (Teo and Pok, 2003). These advantages may incorporate several factors such as user satisfaction, image enhancement, convenience and economic profit (Rogers, 1983).

Compatibility represents “the degree to which the innovation fits with the potential adopter’s existing values, previous experience and current needs” (Shih and Fang, 2004, p. 216). Taylor and Todd (1995) stated that when the attributes of an innovation tend to correspond perfectly to users’ needs, then it is more probable for these users to adopt the innovation. Tan and Teo (2000) indicate that Internet Banking is compatible with the average profile of the modern day banking customer, who is already familiar with the Internet and computer–literate. Hence, it is expected that a computer–oriented individual is more likely to perceive Internet Banking to be more compatible with his/her lifestyle.

Rogers (1983) defined trialability as the degree to which one can experiment with an innovation on a limited basis before making an adoption or rejection decision. He argued that if customers are given the opportunity to test, learn and experiment the Internet Banking application on a limited basis, then certain doubts and fears might be overcome.
Based on different motivation theories, socio-economic factors can be categorised in two groups, according to the source and nature of the acquired outcome: the extrinsic and intrinsic motivation. Extrinsic motivation occurs when the tested performance of an activity is realised because it is perceived to provide benefits that are distinct from the activity itself. Paradigms of extrinsic motivations are perceived usefulness (PEU) and perceived ease of use (PU), two determinants of attitude. The outcome of these two factors has a direct positive or negative impact on the usage of the IT package, thus, they are perceived as economic factors regarding attitude (Hsu and Chiu, 2004). On the other hand, intrinsic motivation refers to the realisation of an activity for no other reason than the pleasure of its own performance. The realisation or otherwise of an intrinsic motivational factor is not anticipated to affect economically the IT package, thus, intrinsic factors are considered non economic factors regarding attitude (Hsu and Chiu, 2004).

Perceived playfulness is a typical example of intrinsic motivational factors. The term was introduced in IT literature from Davis et al. (1992) and Igbaria et al. (1994) and it is a value that is usually tested through TAM-based models. Like perceived playfulness, PEU and PU are traditionally the key factors of the TAM, but there is a plethora of past literature (Hsu and Chiu, 2004; Lin, 2007; Teo and Pok, 2003; To et al., 2008), which confirm the significance of these determinants in models based on decomposed TPB. Taylor and Todd (1995) stated that PEU is a factor that affects mainly non-experienced users of the innovation, while the individuals who are familiarised with the usage of the innovation have “overcome” the need of software convenience and they look for attributes of the innovation that will improve their work environment and the total usefulness of the innovation. Therefore, it is hypothesised that:

**H1:** Relative advantage will have a positive impact on an individual’s attitude.

**H2:** Compatibility will have a positive impact on an individual’s attitude.

**H3:** Trialability will have a positive impact on an individual’s attitude.

**H4:** Perceived playfulness will have a positive impact on an individual’s attitude.

**H5:** Perceived ease of use (PEU) will have a positive impact on an individual’s attitude.

**H6:** Perceived usefulness (PU) will have a positive impact on an individual’s attitude.

Subjective norm is usually separated in interpersonal and external influences (Lin, 2007 and Bhattacherjee, 2000). Others tested a different approach by classifying subjective norms into peer influence, business
relation’s influence and superiors’ influence (To et al., 2008). Interpersonal influences enclose beliefs “imposed” on the individual from friends, family and generally his/her narrow social circle, whereas external regards influential beliefs retrieved by mass media, field experts, government and others. In the current study, we choose to qualify for subjective influences only the beliefs expressed by the individual’s close environment. Therefore, it is hypothesised that:

\textbf{H7:} Subjective influences will have a positive impact on an individual’s subjective norm.

Self-efficacy along with facilitating conditions and controllability combined or solely, comprise three of the most significant constructs of perceived behaviour control (PBC). Previous literature presents the term of Internet self-efficacy (ISE) as a substitute construct instead of the original self-efficacy of Ajzen. Self-efficacy, however, is a central concept of Albert Bandura’s social cognitive theory, which is defined as ‘people’s judgments of their capabilities to organise and execute courses of actions required to attain designated types of performance’ (Bandura, 1986, p. 361). Investigating the factors affecting Internet self-efficacy, Lassar et al. (2004) found that ISE is positively related to actualised innovation – opinion leadership, frequency of web usage, individual’s income and use of Internet for utilitarian purpose, whereas hedonic (for enjoyment purpose) use of web affects negatively ISE (Lassar et al., 2004). In any case, recent literature confirms that Internet self-efficacy is a powerful determinant of PBC. Facilitating conditions is a concept originally proposed by Triandis (1977) theory of interpersonal behaviour. Facilitating conditions of Internet Banking embody all the physical (time and money) and technical resources that are required in order to establish Internet connection and realise the Internet Banking service (Hernandez and Mazzon, 2006). Improved facilitating conditions of Internet Banking are expected to assist potential or existing users adopt and perform Internet Banking services with greater pleasure. Therefore, we hypothesise that:

\textbf{H8:} Internet self-efficacy (ISE) will have a positive impact on an individual’s perceived behavioural control (PBC).

\textbf{H9:} Facilitating conditions will have a positive impact on an individual’s perceived behavioural control (PBC).

Ajzen (1985) claimed that attitude is the primal factor of key influence to the behavioural intention of an individual. Additionally, it is worth to be mentioned that Ajzen (1991, p. 188) claims that ‘the relative importance of attitude, subjective norm, and perceived behavioural control in the prediction of intention is expected to vary across behaviors and situations’. However, attitude is the key construct in TRA, TAM, TPB and
decomposed TPB models (Shih and Fang, 2004) and we consider it like this. Previously, it was stated that attitudinal beliefs, along with subjective norm and perceived behavioural control, are the components of an individual’s behavioural intention in traditional TPB approach (Ajzen and Madden, 1986). According to the previous scholars, attitude is defined as the belief that performing a specific action will lead to a specific outcome, weighted by an evaluation of the appeal of the outcome (Taylor and Todd, 1995, p. 140). It is apparent that when an individual’s attitudinal belief about an object, service or innovation is high, there is a greater possibility that it will affect positively his/her behavioural intention (To et al., 2008). Thus,

\textbf{H10:} Attitudinal beliefs will cause a positive impact on an individual’s behavioural intention.

It is clearly stated in the literature (see Taylor and Todd, 1991) that Subjective norm is (a) one determinant of intention (along with the attitude and perceived behavioural control) and (b) formed as individual’s normative belief concerning particular referent weighted by the motivation to comply with that referent. Moreover, subjective norm reflects on the individuals the perception of what the opinions of his/her narrow social environment are on whether he/she should or not perform the under investigation task, therefore, it is directly and positively related to the user’s behavioural intention (Tan and Teo, 2000). Thus, the hypothesis is developed as follows:

\textbf{H11:} Subjective norm will cause a positive impact on an individual’s behavioural intention.

Ajzen (1985) made an amendment of his initial theory of reasoned action (TRA) by adding a new determinant of behavioural intention, the Perceived Behavioural Control (PBC) developing the Theory of Planned Behaviour (TPB). PBC refers to the perceived ease or difficulty of performing the behaviour and it is assumed to reflect past experience as well as anticipated impediments or obstacles (Ajzen, 1991, p. 188). The power of the specific value in explaining behavioural intention can be retrieved, if we test the two theories, TRA and TPB, and compare their explanatory power. However, it should be kept in mind that PBC has a predictive utility only in the cases when the behaviour is not fully under the volitional control of the individuals, i.e. it is not hundred per cent up to them to do something. If individuals believe that the behaviour examined is under their volitional control, then PBC has no influence of behaviour (see: Armitage and Conner, 2001). Despite all this, we focus in the fact that there is significant superiority of TPB against TRA in almost every research. See for example at: Taylor and Todd (1995), Shih and Fang
(2004), Hung and Chang (2005) and Lin (2007). The greater is the perception of an individual that he/she is in a position to control his/her behaviour in the specific performance, the greater the possibility to affect positively his/her behavioural intention is. Thus, the hypothesis is developed as follows:

**H12**: Perceived behavioural control (PBC) will cause a positive impact on an individual’s behavioural intention.

A graphical representation of the above analysis is presented in Figure 1.

![Graphical representation of the model](image)

**Figure 1** Graphical representation of the model
5. Research Methodology

5.1 Data collection

The study was conducted during the first semester of 2008 in both Greece and Bulgaria. The participants in this survey were all Internet users, regardless of whether or not they used Internet Banking. Two hundred questionnaires were distributed in each country: In Greece the questionnaires were distributed in the capital Athens (approximately 4 million citizens), Thessaloniki (approximately 1.2 million citizens) and Kavala, a medium-sized city in Northern Greece with a population reaching 80,000 citizens. Respectively, in Bulgaria the questionnaires were distributed in the capital Sofia (approximately 1.3 million citizens), the next most populated city of Bulgaria, Plovdiv (approximately 380,000 citizens) and in a developing city, Sandanski, with a population reaching to 30,000 citizens. From the total of 400 questionnaires, 247 responses were obtained as complete and usable – 129 responses from Greece and 118 from Bulgaria. The response rate was 61.75%.

The majority of the respondents of internet users in Bulgaria are male (67.8 per cent) whereas in Greece this percentage is equally distributed between male and female citizens (male: 52.7 per cent, female: 47.3 per cent). Tables 1 and 2 below show the different brackets of the ages of the subjects and their responses as to whether or not they use the Internet Banking services. In our study’s sample, it is clear that both in Greece and Bulgaria most of the Internet users belong in the bracket of ages between 25 and 35. Citizens older than 45 years seem that have not yet adopted the use of Internet in extend degree.

Another useful observation is that the Internet has been widely introduced to the Bulgarian citizens only in recent years. Most of the respondents (77.1 per cent) claim that they have been using the Internet for only the past 3 years (or less). On the contrary, the Internet appears to be a part of every day life of the 63 per cent of the Greek respondents who have used the Internet for more than 3 years and more intensely than the Bulgarians (45 per cent of the Greek respondents are connected to the Internet for more than 10 hours per week) (see Tables 3 and 4).

Moreover, an important factor affecting in negative way the use of Internet and Internet Banking in Bulgaria, is the difficulty of Bulgarian households to obtain PCs in their homes (see: http://www.nsi.bg/IKT_e/IKT.htm). According to the Bulgarian National Statistical Institute (data refers to 2007), only 23.3 per cent of Bulgarian households have direct access to a personal computer. Our study also verifies this output, since only 26.3 per cent of Bulgarian respondents replied that they have access to the Internet from their home – 49.2 per
24.6 per cent access the Internet from an Internet Café. On the other hand, more than the half (62.8 per cent) of Greek households own a PC (see Tables 5 and 6).

**Table 1.** Frequencies and percentages regarding ages of the Greek respondents and whether or not they use Internet Banking

<table>
<thead>
<tr>
<th>Age</th>
<th>Do you use Internet Banking?</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>18-24</td>
<td>7</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>24.1%</td>
<td>75.9%</td>
</tr>
<tr>
<td>25-35</td>
<td>43</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>58.1%</td>
<td>41.9%</td>
</tr>
<tr>
<td>36-45</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>72.7%</td>
<td>27.3%</td>
</tr>
<tr>
<td>46-55</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>46.2%</td>
<td>53.8%</td>
</tr>
<tr>
<td>&gt; 56</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>50.0%</td>
<td>50.0%</td>
</tr>
<tr>
<td>Total</td>
<td>65</td>
<td>64</td>
</tr>
<tr>
<td></td>
<td>50.4%</td>
<td>49.6%</td>
</tr>
</tbody>
</table>
Table 2. Frequencies and percentages regarding ages of the Bulgarian respondents and whether or not they use Internet Banking

<table>
<thead>
<tr>
<th>Age</th>
<th>Do you use Internet Banking?</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>18-24</td>
<td>Count</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Percentage</td>
<td>56.5%</td>
</tr>
<tr>
<td>25-35</td>
<td>Count</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Percentage</td>
<td>22.2%</td>
</tr>
<tr>
<td>36-45</td>
<td>Count</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Percentage</td>
<td>26.8%</td>
</tr>
<tr>
<td>46-55</td>
<td>Count</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Percentage</td>
<td>100.0%</td>
</tr>
<tr>
<td>&gt; 56</td>
<td>Count</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Percentage</td>
<td>0.0%</td>
</tr>
<tr>
<td>Total</td>
<td>Count</td>
<td>43</td>
</tr>
<tr>
<td></td>
<td>Percentage</td>
<td>36.4%</td>
</tr>
</tbody>
</table>
Table 3  Frequencies and percentages regarding the time that the Greek residents access their Internet services

<table>
<thead>
<tr>
<th>How much time are you connected to the Internet?</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 1 hour per week</td>
<td>5</td>
<td>3.8</td>
</tr>
<tr>
<td>1 – 4 hours per week</td>
<td>20</td>
<td>15.5</td>
</tr>
<tr>
<td>4 – 10 hours per week</td>
<td>46</td>
<td>35.7</td>
</tr>
<tr>
<td>More than 10 hours per week</td>
<td>58</td>
<td>45.0</td>
</tr>
<tr>
<td>Total</td>
<td>129</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 4  Frequencies and percentages regarding the time that the Bulgarian residents access their Internet services

<table>
<thead>
<tr>
<th>How much time are you connected to the Internet?</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 1 hour per week</td>
<td>28</td>
<td>23.7</td>
</tr>
<tr>
<td>1 – 4 hours per week</td>
<td>35</td>
<td>29.7</td>
</tr>
<tr>
<td>4 – 10 hours per week</td>
<td>25</td>
<td>21.2</td>
</tr>
<tr>
<td>More than 10 hours per week</td>
<td>30</td>
<td>25.4</td>
</tr>
<tr>
<td>Total</td>
<td>118</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 5  Frequencies and percentages regarding the places where Greek residents can have access to their Internet Banking services

<table>
<thead>
<tr>
<th>I have access to the Internet Banking services from:</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>My House</td>
<td>81</td>
<td>62.8</td>
</tr>
<tr>
<td>My Working Place</td>
<td>40</td>
<td>31.0</td>
</tr>
<tr>
<td>An Internet Café</td>
<td>6</td>
<td>4.7</td>
</tr>
<tr>
<td>Another Place</td>
<td>2</td>
<td>1.6</td>
</tr>
<tr>
<td>Total</td>
<td>129</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 6  Frequencies and percentages regarding the places where Bulgarian residents can have access to their Internet Banking services

<table>
<thead>
<tr>
<th>I have access to the Internet Banking services from:</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>My House</td>
<td>31</td>
<td>26.3</td>
</tr>
<tr>
<td>My Working Place</td>
<td>58</td>
<td>49.2</td>
</tr>
<tr>
<td>An Internet Café</td>
<td>29</td>
<td>24.6</td>
</tr>
<tr>
<td>Another Place</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Total</td>
<td>118</td>
<td>100.0</td>
</tr>
</tbody>
</table>
5.2 Measurements

The questionnaire consists of 48 questions that represent the model hypotheses. Thirty-three of them are used to explain the independent variables of the model (relative advantage, complexity, trialability, perceived playfulness, perceived ease of use, perceived usefulness, subjective influences, Internet self-efficacy and facilitating conditions), while the other fifteen questions illustrate the dependent variables (attitude, subjective norm, perceived behavioural control and behavioural intention). Table 7 presents all the items.

**Table 7 Questionnaire Items**

<table>
<thead>
<tr>
<th>Construct</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relative Advantage</td>
<td>X1  The use of Internet Banking saves time</td>
</tr>
<tr>
<td></td>
<td>X2  The use of Internet Banking has more advantages</td>
</tr>
<tr>
<td></td>
<td>X3  The use of Internet Banking offers me personalised services</td>
</tr>
<tr>
<td></td>
<td>X4  Internet Banking enables me to have access to timely information</td>
</tr>
<tr>
<td></td>
<td>services</td>
</tr>
<tr>
<td>Compatibility</td>
<td>X5  Internet Banking is compatible with my lifestyle</td>
</tr>
<tr>
<td></td>
<td>X6  Using Internet Banking fits well with the way I like to manage my</td>
</tr>
<tr>
<td></td>
<td>finances</td>
</tr>
<tr>
<td></td>
<td>X7  Using Internet Banking to conduct banking transactions fits into</td>
</tr>
<tr>
<td></td>
<td>my work profile</td>
</tr>
<tr>
<td>Trialability</td>
<td>X8  I want to be able to use Internet Banking on trial basis to see what</td>
</tr>
<tr>
<td></td>
<td>it can do</td>
</tr>
<tr>
<td></td>
<td>X9  I want to be able to try Internet Banking for one month</td>
</tr>
<tr>
<td>Perceived Playfulness</td>
<td>X10 I find the use of Internet interesting</td>
</tr>
<tr>
<td></td>
<td>X11 I find the use of Internet enjoyable</td>
</tr>
<tr>
<td></td>
<td>X12 I find the use of Internet exciting</td>
</tr>
<tr>
<td></td>
<td>X13 I find the use of Internet funny</td>
</tr>
<tr>
<td>Perceived Ease of Use</td>
<td>X14 Learning to operate Internet Banking would be easy for me</td>
</tr>
<tr>
<td></td>
<td>X15 I find it easy to do what I want in Internet Banking</td>
</tr>
<tr>
<td></td>
<td>X16 Interaction with Internet Banking doesn’t require lot of mental</td>
</tr>
<tr>
<td></td>
<td>effort for me</td>
</tr>
<tr>
<td>Perceived Usefulness</td>
<td>X17 Using Internet Banking would improve my performance in conducting</td>
</tr>
<tr>
<td></td>
<td>my banking transactions</td>
</tr>
<tr>
<td></td>
<td>X18 Using Internet Banking would improve my productivity in banking</td>
</tr>
<tr>
<td></td>
<td>transactions</td>
</tr>
<tr>
<td></td>
<td>X19 Using Internet Banking would enhance my effectiveness in conducting</td>
</tr>
<tr>
<td></td>
<td>banking transactions</td>
</tr>
<tr>
<td>Subjective Influences</td>
<td>X20 My family would think that I should use Internet Banking</td>
</tr>
<tr>
<td></td>
<td>X21 Generally, I want to do what my family thinks I should do</td>
</tr>
<tr>
<td></td>
<td>X22 My friends would think that I should use Internet Banking</td>
</tr>
<tr>
<td></td>
<td>X23 Generally, I want to do what my friends think I should do</td>
</tr>
<tr>
<td>Internet Self-Efficacy</td>
<td>X24 I feel confident that I can complete an Internet Banking transaction</td>
</tr>
<tr>
<td></td>
<td>X25 I feel confident visiting the Web-site by entering its address</td>
</tr>
<tr>
<td></td>
<td>X26 I feel confident navigating the bank’s Web-site by following</td>
</tr>
<tr>
<td></td>
<td>hyperlinks</td>
</tr>
<tr>
<td></td>
<td>X27 I feel confident finding information regarding Internet Banking via</td>
</tr>
<tr>
<td></td>
<td>search engines</td>
</tr>
<tr>
<td></td>
<td>X28 I feel confident finding information about Internet Banking in Web-</td>
</tr>
<tr>
<td></td>
<td>sites or portals</td>
</tr>
</tbody>
</table>
Items / Questions of Independent Variables

The questions X1 – X4, which were used to measure relative advantage, along with questions X5 – X7 (complexity) were retrieved from the studies of Shih and Fang (2004), and Tan and Teo (2000). Questions X8 and X9 (trialability) were adopted from Tan and Teo (2000) while X10 – X13 (perceived playfulness) from Hsu and Chiu (2003). Items X14 – X16 (perceived ease of use) and X17 – X19 (perceived usefulness) were retrieved from a study conducted by Wu and Chen (2005), and they were slightly moderated in order to fit our study. Items X20 – X23 (subjective influences) were adopted from the questionnaire of Shih and Fang (2004), X24 – X30 from Hsu and Chiu (2004) (slightly modified) and, finally, items X31 – X33 were retrieved from the study of Lin (2007).

Items / Questions of Dependent Variables

All questions used for our study to measure the dependent variables: attitude, subjective norm, perceived behavioural control and behavioural intention (items Y1 – Y15), were entirely adopted from Shih and Fang (2004). In the investigation model, only behavioural intention could be considered to serve as dependent variable. However, attitude, subjective norms and perceived behavioural control are considered as dependent variables in relation to their predictors (see: figure 1).
5.3 Factor Analysis

In order to determine the validity of the questionnaire we conducted factor analysis for the two samples (Greek and Bulgarian). The value of KMO index is 0.654 for the Greek sample, which is greater than 0.5 and slightly lower than 0.7, and therefore, we will proceed with the factor analysis. A total of thirteen factors with eigenvalues greater than 0.884 were identified, which explain 82.991 per cent of the total variance. On the other hand, the Bulgarian KMO index was found to be 0.717, which makes it an excellent sample for conducting factor analysis. In the Bulgarian sample thirteen factors with eigenvalues greater than 0.576 have been found, which explained 93.177 per cent of the sample total variance.

5.4 Reliability Analysis

The internal consistency of the questionnaire was assessed by examining the coefficient alpha scores. With regard to the Greek sample, Table 8 below indicates that, apart from facilitating conditions (0.370 < 0.70), all the remaining constructs appeared to have good internal consistency with values that varied from 0.698 (normative influences) to 0.900 (subjective norm).

<table>
<thead>
<tr>
<th>Factors</th>
<th>Cronbach’s Alpha Greek</th>
<th>Cronbach’s Alpha Bulgaria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relative Advantage</td>
<td>0.724</td>
<td>0.716</td>
</tr>
<tr>
<td><strong>2 Compatiblity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trialability</td>
<td>0.851</td>
<td>0.721</td>
</tr>
<tr>
<td>Perceived Playfulness / Perceived Enjoyment</td>
<td>0.895</td>
<td>0.760</td>
</tr>
<tr>
<td>Perceived Ease of Use</td>
<td>0.800</td>
<td>0.861</td>
</tr>
<tr>
<td>Perceived Usefulness</td>
<td>0.809</td>
<td>0.796</td>
</tr>
<tr>
<td>Normative Influences</td>
<td>0.698</td>
<td>0.390</td>
</tr>
<tr>
<td>Internet Self – Efficacy</td>
<td>0.889</td>
<td>0.974</td>
</tr>
<tr>
<td>Facilitating Conditions</td>
<td><strong>0.370</strong></td>
<td><strong>0.493</strong></td>
</tr>
<tr>
<td>Attitude</td>
<td>0.888</td>
<td>0.900</td>
</tr>
<tr>
<td>Subjective Norm</td>
<td>0.900</td>
<td>0.923</td>
</tr>
<tr>
<td>Perceived Behavioural Control</td>
<td>0.832</td>
<td>0.783</td>
</tr>
<tr>
<td>Behavioural Intention</td>
<td>0.874</td>
<td>0.898</td>
</tr>
</tbody>
</table>

1 Analytical results on total variance for both samples are available upon request.
2 See table 7 for the items of each construct - Analytical results for both samples are available upon request.
On the other hand, the Bulgarian sample showed that both facilitating conditions ($\alpha = 0.493 < 0.70$) and normative influences ($\alpha = 0.390 < 0.70$) had low levels of internal consistency, whereas the other items appeared to be consistent, with values that varied from 0.716 (relative advantage) to 0.923 (subjective norm).

5.5 Confirmatory Factor Analysis

To test the structure of the questionnaire, a Confirmatory Factor Analysis (CFA) was performed. The results from this analysis showed that the model fit the data (Greek and Bulgarian) reasonably well. Table 9 indicates the total of the under investigation indices, the respective values of each sample, and the indicative values of acceptance.

<table>
<thead>
<tr>
<th>Indexes</th>
<th>Values for Greek Sample</th>
<th>Values for Bulgarian Sample</th>
<th>Indicative Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>$X^2$</td>
<td>1050.00</td>
<td>1175.72</td>
<td></td>
</tr>
<tr>
<td>$X^2/df$</td>
<td>1.0174</td>
<td>1.1393</td>
<td>$&lt; 3.00$</td>
</tr>
<tr>
<td>CFI</td>
<td>1.00</td>
<td>1.00</td>
<td>$&gt; 0.90$</td>
</tr>
<tr>
<td>GFI</td>
<td>0.81</td>
<td>0.70</td>
<td>$0.50 &lt; GFI &lt; 1.00$</td>
</tr>
<tr>
<td>AGFI</td>
<td>0.79</td>
<td>0.66</td>
<td>$0.50 &lt; AGFI &lt; 1.00$</td>
</tr>
<tr>
<td>RMSEA</td>
<td>0.009</td>
<td>0.035</td>
<td>$&lt; 0.10$</td>
</tr>
<tr>
<td>RMSR</td>
<td>0.14</td>
<td>0.20</td>
<td>$&lt; 0.10$</td>
</tr>
</tbody>
</table>

The previous results indicate that, apart from the RMSR index, which is not acceptable for both samples, all the other indices presented good fit for the Greek and the Bulgarian sample.

In addition to the previous measurements, we produced the standard estimates of the samples, and the T-student statistic calculations of each hypothesis. By the extent of the solutions we were able to evaluate whether or not each construct and hypothesis was in a position to measure adequately the sample’s structure. When a hypothesis’ standardised value is negative, then the null hypothesis is not valid. However, in order to have more certified results, we had to combine the outputs of the standard estimates of the samples with the solutions of the T-student statistic calculations of each hypothesis. Values of the solutions coloured red

---

1 Analytical results from LISREL for Goodness of Fit Statistics for both samples are available upon request
indicate low levels of significance. Thus, there were four cases we could expect:

(i) Positive standardised solution and significant T-values.
(ii) Negative standardised solution and significant T-values.
(iii) Positive standardised solution and non-significant T-values.
(iv) Negative standardised solution and non-significant T-values.

In the first case we accepted the null hypothesis, in the second we rejected the null hypothesis, whereas if the third and forth cases occurred, the null hypothesis was partially accepted or rejected, respectively. Tables 10 and 11 display the final decisions for every hypothesis we tested in the current study, for the Greek and Bulgarian sample, respectively.

**Table 10** Hypotheses test outputs with path coefficients (Greek Sample)

<table>
<thead>
<tr>
<th>Hypotheses</th>
<th>Standardised Solution</th>
<th>T-Values</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1: Relative advantage has a positive impact on an individual’s attitude.</td>
<td>-0.11</td>
<td>-0.37</td>
<td>Reject</td>
</tr>
<tr>
<td>H2: Compatibility has a positive impact on an individual’s attitude.</td>
<td>-0.08</td>
<td>-0.36</td>
<td>Reject</td>
</tr>
<tr>
<td>H3: Trialability has a positive impact on an individual’s attitude.</td>
<td>-0.08</td>
<td>-0.66</td>
<td>Reject</td>
</tr>
<tr>
<td>H4: Perceived playfulness has a positive impact on an individual’s attitude.</td>
<td>0.03</td>
<td>0.20</td>
<td>Partially accept</td>
</tr>
<tr>
<td>H5: Perceived ease of use has a positive impact on an individual’s attitude.</td>
<td>0.80</td>
<td>2.92</td>
<td>Accept</td>
</tr>
<tr>
<td>H6: Perceived usefulness has a positive impact on an individual’s attitude.</td>
<td>0.13</td>
<td>0.50</td>
<td>Partially accept</td>
</tr>
<tr>
<td>H7: Subjective influences have a positive impact on an individual’s subjective norm.</td>
<td>0.89</td>
<td>5.34</td>
<td>Accept</td>
</tr>
<tr>
<td>H8: Internet self-efficacy has a positive impact on an individual’s perceived behavioural control</td>
<td>-0.12</td>
<td>-0.51</td>
<td>Reject</td>
</tr>
<tr>
<td>H9: Facilitating conditions have a positive impact on an individual’s perceived behavioural control</td>
<td>1.12</td>
<td>5.43</td>
<td>Accept</td>
</tr>
<tr>
<td>H10: Attitudinal beliefs cause a positive impact on an individual’s behavioural intention</td>
<td>0.05</td>
<td>0.31</td>
<td>Partially accept</td>
</tr>
<tr>
<td>H11: Subjective norms cause a positive impact on an individual’s behavioural intention.</td>
<td>0.04</td>
<td>0.40</td>
<td>Partially accept</td>
</tr>
<tr>
<td>H12: Perceived Behavioural Control causes a positive impact on an individual’s behavioural intention.</td>
<td>0.59</td>
<td>3.38</td>
<td>Accept</td>
</tr>
</tbody>
</table>
### Table 11 Hypotheses test outputs with path coefficients (Bulgarian Sample)

<table>
<thead>
<tr>
<th>Hypotheses</th>
<th>Standardised Solution</th>
<th>T-Values</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1: Relative advantage has a positive impact on an individual’s attitude.</td>
<td>0.68</td>
<td>1.29</td>
<td>Partially accept</td>
</tr>
<tr>
<td>H2: Compatibility has a positive impact on an individual’s attitude.</td>
<td>-0.74</td>
<td>-1.03</td>
<td>Reject</td>
</tr>
<tr>
<td>H3: Trialability has a positive impact on an individual’s attitude.</td>
<td>-0.23</td>
<td>-1.02</td>
<td>Reject</td>
</tr>
<tr>
<td>H4: Perceived playfulness has a positive impact on an individual’s attitude.</td>
<td>-0.26</td>
<td>-0.54</td>
<td>Reject</td>
</tr>
<tr>
<td>H5: Perceived ease of use has a positive impact on an individual’s attitude.</td>
<td>0.29</td>
<td>0.42</td>
<td>Partially accept</td>
</tr>
<tr>
<td>H6: Perceived usefulness has a positive impact on an individual’s attitude.</td>
<td>0.83</td>
<td>2.61</td>
<td>Accept</td>
</tr>
<tr>
<td>H7: Subjective influences have a positive impact on an individual’s subjective norm.</td>
<td>0.80</td>
<td>6.10</td>
<td>Accept</td>
</tr>
<tr>
<td>H8: Internet self-efficacy has a positive impact on an individual’s perceived behavioural control</td>
<td>2.50</td>
<td>2.48</td>
<td>Accept</td>
</tr>
<tr>
<td>H9: Facilitating conditions have a positive impact on an individual’s perceived behavioural control</td>
<td>-1.64</td>
<td>-1.75</td>
<td>Reject</td>
</tr>
<tr>
<td>H10: Attitudinal beliefs cause a positive impact on an individual’s behavioural intention</td>
<td>0.25</td>
<td>1.42</td>
<td>Partially accept</td>
</tr>
<tr>
<td>H11: Subjective norms cause a positive impact on an individual’s behavioural intention.</td>
<td>0.09</td>
<td>0.57</td>
<td>Partially accept</td>
</tr>
<tr>
<td>H12: Perceived Behavioural Control causes a positive impact on an individual’s behavioural intention</td>
<td>0.44</td>
<td>1.93</td>
<td>Partially accept</td>
</tr>
</tbody>
</table>
Figures 2 and 3 display the modifications performed in the initial model of our study, indicating the hypotheses confirmed in each country.
6. Discussion and Conclusions

The findings of our study showed, primarily, that both Greece and Bulgaria exhibit a good fit of adjustment and that the tested model, exploring both samples, have quite strong explanatory power.

Analytically, it is shown that in both countries, attitude, subjective norm and perceived behavioural control can satisfactorily explain the primary construct (behavioural intention). Even though past studies have identified low significance of subjective norm in Internet Banking user acceptance (Shih and Fang, 2004; Hsu and Chiu, 2004), our study contradicts this finding. Subjective norm, along with attitude and perceived behavioural control were able to explain adequately the users’ behavioural intention. The fact that subjective norm has been found significant in both countries can be justified, as it is observed by Todd and Taylor’s (1995), that it is more possible for subjective norm to be
significant, when applied to individuals with low levels of experience. Regarding attitude, relative advantage was found significant in Bulgaria and non-significant in Greece. According to previous studies on Internet Banking, relative advantage is one of the most powerful constructs of attitude. This outcome was a contradiction, since we would expect that Bulgarian respondents would claim that relative advantage was not significant and the Greeks the opposite.

Compatibility and trialability have been rejected since they failed to explain adequately the attitude in both countries. The reason why compatibility was not considered from the users as non-significant factor of attitude was probably the fact that in both countries the Internet was introduced during the last decade. Even though the residents of Greece are more familiarised with the Internet, apparently they do not consider this way of conducting banking transactions to be compatible with their way of life. For the Bulgarian respondents it was an expected outcome, since the Internet is considered as a luxury in Bulgaria (Kossev, 2005). On the other hand, trialability concluded in a paradox, since even if it is also a characteristic attribute of the inexperienced users, it did not seem to affect significantly attitude in Greece and Bulgaria.

Perceived playfulness was found significant in Greece and non-significant in Bulgaria. This was also an outcome we did not expect; perceived internet enjoyment is more powerful for the users that turn to the internet for amusement. Thus, since the internet has only been introduced in the last decade in Bulgaria and that it is only in recent years that its usage has been promoted by the Bulgarian government, it would be anticipated that the majority of the respondents would use the Internet for entertainment purposes and not for their work. The Greek respondents seem to choose the Internet mainly for entertainment purposes instead of a job assistant tool.

Perceived ease of use and perceived usefulness were found to have great significance and they positively explain the attitude in both samples; this result is compatible with past studies (Hung and Chang, 2005; and Lin, 2005). It is an expected assumption since the individual’s perceived ease of use and usefulness are very important factors, especially when the innovation to which it is referring is a secondary, supplementary technology.

Regarding subjective norm, its only component, subjective influence, was found highly significant in both countries consistent with past studies (see: Tan and Teo, 2000; Wu, 2004 and Shih and Fang, 2004).

As for the Perceived behavioural control, the results were completely different in the two samples of our study: In Greece Internet self-efficacy was found non-significant, whereas facilitating conditions hypothesis was accepted. The Bulgarian respondents, on the opposite hand, claimed that
internet self-efficacy was a significant construct of PBC, while facilitating conditions was not.

In conclusion, our results may have implications for research and practice. Since there is lack of prior research on the intention to adopt Internet banking in both countries, our study could be considered as the stimulus for further research, with perhaps, different sample and more complex models. Moreover, this study could even be extended and applied in other countries operating in similar conditions to explore if comparable results are achieved.

Some suggestions for further research could be the enclosure of trust, security and perceived risk as determinants of attitude and how they affect the individuals in adopting Internet Banking services. Moreover, we could attempt to decompose Perceived Behavioural Control into Self-efficacy, Government Support and Technological support. This segmentation of PBC is retrieved by the study of Hernandez and Mazzon (2006), which was performed in Brazil, an emerging economy, with remarkable results.

Past research has shown that internet banking provides banks with a competitive advantage via the improvement of the quality of customer services and by the reduction of the operational costs. Since the decomposed TPB indicates the factors which are important to the adoption of internet banking, one may consider that the results of this study have both managerial and marketing implications for practitioners.

Internet banking has started to become broadly accepted. So, to develop, maintain, and improve customer relationships is a vital factor for the today’s competitive world. Thus, the revealed results of this study give a signal of what should be consider as important factors affecting the adoption of internet banking in both countries. Our proposal is either to validate or further explore relevant factors through further research and focused on those results to properly advice the communities.
References


An Integrated system to reform world financial crisis by facilitating EU auditing license test with virtues evaluation

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Abstract:  
European Union defined professional ethics as on of the test necessary to auditing professional license. All Auditing chartering bodies and companies are unique responsible for the world financial crisis. Crisis is not a crisis but a punishment according to a prophecy from 1930. Damascenus defined 237 virtues years ago and we incorporated these virtues into a EUDIT system. Apart from the euphemism it tests professional ethics, the tenth EU commandment of auditing license. Three subsystems are in development now: University Lecture, Curriculum Analysis, Linguistics investigation and Forensic Investigation.

Keywords:  
Auditing, Software Design and Development, Internet fraud, Authoring Tools and Methodology, Collaborative Knowledge Construction, Computational linguistics

1. EU DIRECTIVE FOR STATUTORY AUDIT
EU directive for auditing profession describes accurately the following: in Article 4: The competent authorities of a Member State may grant professional ethics and independence only to natural persons or firms of good repute.
In article 8:
(a) general accounting theory and principles;
(b) legal requirements and standards relating to the preparation of annual and consolidated accounts;
(c) international accounting standards;
(d) financial analysis;
(e) cost and management accounting;
(f) risk management and internal control;
(g) auditing and professional skills;
(h) legal requirements and professional standards relating to statutory audit and statutory auditors;
(i) international auditing standards;
(j) professional ethics and independence.

We focus only to article 10. [3]

2. WORLD FINANCIAL CRISIS (=JUDGMENT)

I have to appose a significant answer to a letter that explains today’s world financial crisis and find the solution that world leaders and scientists are looking for.: 

The crisis is a Greek word, and means trial (judgment). John (5,22) writes: «αλλὰ την κρίσιν πάσαν δόθηκε τῷ υἱῷ» (=all crisis gaven to the SON) and «νῦν κρίσις εστὶ τού κόσμου τούτου», (=now crisis is over this world). Until now the European populations used the word “trial”, instead of the word “crisis”, whenever disasters are bursted into. Now a new word replaced the old, and comprehensible he became incomprehensible. When flood, war or fell epidemic, earthquakes, drowning and other disasters are appear, people said: “Divine trial!”. And this means: crisis through droughts, crisis through floods, through wars, through epidemics etc.

Our current financing difficulty is considered by the people as a Divine judgment, although it is only the world financial crisis. So you ask me for the cause of actual crisis, or actual Divine trial! The cause for the droughts, the floods, the epidemics and other whippings of our generation are the cause for the financial crisis. The apostasy of persons from the God. Humanity caused this crisis, and the God it allowed, so that it wakes up the persons, to make conscious, intellectual and turn to them into Him. In our modern sins-modern will be the crisis. And indeed the God used in a modern way in so that realize him modern persons: it struck the banks, the grants, economies, the stock exchange. He overthrown the table of transactions in the all world, as He did in the temple of Jerusalem. He caused unusual panic between tradesmen. It caused confusion and fear.

He made all these in order to wake up the proud small heads of wise men of Europe and America, in order to self-realize their position.
And from the comfort of their harbors of material certainty to remember their souls, to recognize their anomy and to kneel Paramount God, the live God. Up to when will last the crisis? As long as the spirit persons it remains without change. Until the profound guilty of this crisis they resign in front of Omnipotent. Until the persons and the populations remember, the non understandable word “crisis”, they translate in their language, and penitence they shout: “the divine trial”!

However the above apposition is neither mine nor even from our century. It belongs to Velimirovic Nicholas bishop of Ohrid, a town few kilometers from my Kozani university homecity. It was written a century ago 1929 as an answer to a spiritual child of saint Nicholas. [17]. He also declared a similar statement at Ecumenical Council during the inter-Orthodox commission that was held in 1930 at Vatopedi Monastery on Mount Athos. [18].

The above exact words describe the recent financial arrhythmia of world economy. Financial auditors was the only vehicle of the God judgment. For years they violated all kind of regulations and they only kneel to money. We propose to apply the above wise words in European auditing as a major next step.

3. VIRTUES DEFINITION
The man and his virtues is a very old story. Started as a fairytale when Hercules chosen the virtue road. The serious dominating version of A.C. times belongs to Petros Damascenus as interpreted by others: [5,6].

There are 237 virtues in four main areas. All above 237 virtues was very difficult to translated in common English. There are a lot of reasons for this complexity: The Hellenic language domination in this field, Christianity schism, pure dogmatic issues but most of all the inability to attempt such a difficult translation without my spiritual father blessing.

3.1. Personal virtues
3.2. Virtues to God

3.3. Social Virtues
The EU ten commandments define ten tests towards the EU auditing license. Tests is another word for exams. Therefore all candidates must pass appropriate examinations in a straightforward procedure that happens millions times every day worldwide. For example to test the financial analysis knowledge of the candidate we use written exam, oral interview, case study test and similar investigation tools. However the tenth commandment examinations cannot be treated like the other nine. The differences are:

- Scientific and technical knowledge of ethics does not guaranty by any means an associate behavior in front of the difficulties of auditing.
- Students or professionals have the illusion of power with all nine subjects useful knowledge. Therefore a self depreciation is necessary even through the ethics commandment.
- It represents the most crucial factor for the Auditing license, the cornerstone of any economic and government plan.
- Ethics itself is more important than all the wealth of this world.

To test “professional ethics and independence” a different approach is necessary. This A more specific virtue test could vary from field test to university lecture. Adoption of our ideas by various auditing licensee parties is not possible. Organizations like: International Accounting Standards Board, Institute of Internal Auditors, International Financial Reporting Standards, CIA, ACCA and all the fancy names of auditing failed to their primary scope: to preserve nations and people wealth. We here, today propose a tiny system to be hired from all these shiny brand names of auditing.

5. EUDIT INSTEAD OF AUDIT
The euphemistic prothema of EU (eu means good in Greek language) is combined with the “Audit” lemma and we have the perfect combination of “Audit”. [16]
EU=good
DIT= auDIT
EUDIT is primarily an auditing education system with auditing subsystems. To test “professional ethics and independence” our approach is necessary. Our core engine is Dmascenus virtue definition but at a future stage other methodologies could be incorporated.

5.1. University Lecture
The auditing license candidate takes a teaching supplementary assignment to a University classroom. The procedure is:
- A student finds the teaching subject by selecting randomly a number from 1 to 237.
- The teacher teaches 20 minutes the selected subject.
- The teacher answer to students questions for 20 minutes.
- Questioning is crucial in order to reveal the true teacher beliefs.
- Finally students fill in an appropriate form for the lecture given.

The candidate antiphasis during its agony to persuade a demanding auditorium are analyzed and the hidden truth is revealed:
- The candidate knowledge for ethics
- His actual opinion about ethics issues.
- His willingness to apply these in his professional life.
- The potential to affect his personality.

5.2. Curriculum Analysis
Auditing license candidate detailed curriculum contains vital information for the virtue and ethics. The concept is to use auditing techniques to investigate personality. Curriculum transactions are fed into EXCEL, Topcats or IDEA according to each software standards. We seek for discrepancies and we use normal methodology: Identifying exceptional items, Stratification, Checking calculations, Cross-matching data, Testing for gaps and duplicates, Exceptional Sampling.

The methodology weakness is that the accuracy is depended from input data. It is necessary a significant amount of personal information.

5.3. Linguistics investigation
Another methodology is Linguistic analysis over electronic bibliography of the beneficiary. A subsystem of the virtues is compared with the text attributes and a writer psychography is generated.
5.4. Forensic Investigation

A forensic criminal investigation could facilitate the procedure but we faced a number of theoretic, analysis and programming problems. 

EUDIT system is running today under pre-alpha test and did not gain significant results or attention primarily for reasons like:

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Overconfident investors and trading activity: A behavioural perspective and empirical results

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Abstract:
This study attempts to group investors (individuals and professionals) into different segments based on their level of overconfidence (as a psychological bias) and, then, to examine whether and how this bias drive their investment behaviour. The behavioural finance literature suggests that overconfidence, indeed, influences investment behaviour. In the same line, this research performing a cluster analysis, using a representative survey of 345 investors in Greece, identified two main segments of investors: Overconfident investors and Underconfident investors. A comparative analysis between these two segments identified some differences in the trading behaviour of investors depending on the segment they belong to. Moreover there is an association between investors’ clusters and various demographic, socioeconomic characteristics and trading behaviour.

Keywords:
Overconfidence; Trading behaviour; Psychological bias; Behavioural finance

1. Introduction
Traditional finance theories, such as Efficient Market Theory (Fama, 1965a; 1965b) and Modern Portfolio Theory (Markowitz, 1952), support the hypotheses of rational investors and efficient markets. However, it is obvious that there are irrational investors in the market, making random transactions that can not adequately be explained by traditional finance theories (Chang, 2008).

Many scholars, such as Kahneman and Tversky (1979), believe that the study of psychology and other social science theories can shed considerable light on the efficiency of financial markets, as well as explain
many stock market anomalies, market bubbles and crashes. Thus, a relatively new theory, called behavioural finance, has emerged in an attempt to understand the human psychological biases that are related to the financial markets. In contrast to traditional finance which examines how people should behave in order to maximize their wealth, behavioural finance investigates how people actually behave in a financial setting (Nofsinger, 2005).

The behavioural finance literature has developed a number of behavioural concepts that explain investment behaviour. This paper selects and reviews Overconfidence bias to classify investors into profiles and, then, to compare their level of overconfidence with their trading behaviour. More specifically, this study examines whether different level of Overconfidence leads to differences in the investment behaviour and trading performance among the group of investors with different profiles. The research framework that is suggested by this study will, hopefully, help investors understand how Overconfidence affects their investment decisions.

2. Literature Review

2.1 Overconfidence

Overconfidence causes investors to be too certain about their own abilities and not to sufficiently weight the opinion of others. Also, they overestimate the precision of their private information signals (Daniel et al., 1998; Gervais and Odean, 2001). Furthermore, overconfident investors underreact to new information, or overweight the value of new information and they hold unrealistic beliefs about how high their returns will be (Barber and Odean, 2000). Chen et al. (2004) examined brokerage accounts in China and reported that individual investors exhibit a bias of overconfidence. Moreover, Yates (1990) claims that overconfidence bias has been observed in many professionals. Glaser et al. (2005) have found that investment professionals are more overconfident than students. Putz and Ruenzi (2008) have also shown that fund managers are prone to overconfidence.

While Allen and Evans (2005) suggest that experience does not limit overconfidence, Gervais and Odean (2001), Locke and Mann (2001) and Menkhoff et al. (2006) claim that experience and learning can limit overconfidence. However, Ekholm and Pasternack (2008) have found that overconfidence decreases with experience and also with investor portfolio size. Additionally, Philip (2007) examining a sample of individuals found that experience makes people to develop better self-assessments and that a combination of success and inexperience may lead to higher overconfidence. However, literature have shown that experienced investors
are more likely to be overconfident than relatively inexperienced investors (Heath and Tversky, 1991; Frascara, 1999; Maciejovsky and Kirchler, 2003; Glaser et al., 2003; Griffin and Tversky, 1992; Obernarcher and Osler, 2008).

Glaser and Weber (2007) argued that there are three aspects of overconfidence: miscalibration, better than average effect and illusion of control. Miscalibration is the tendency to overestimate the accuracy of one’s own information (Biais et al., 2005; Philip, 2007; Teigen and Jorgensen, 2005). According to Lichtenstein et al. (1982), people think that their knowledge is more precise than it really is. Apart from miscalibration, there are three other facets of overconfidence (better than average effect, illusion of control, illusion of knowledge). The facet of better than average effect based on people’s perception that their abilities are above average relative to others (Svenson, 1981; Taylor and Brown, 1988, Glaser and Weber, 2007), and the illusion of control leads people to be excessively optimistic about the future (Langer, 1975; Presson and Benassi, 1996; and Weinstein, 1980). Illusion of control also refers to the people’s tendency to overestimate the extent to which one can influence external events. People often wrongly believe that they can affect the outcome of uncontrollable events (Nofsinger, 2002).

Another significant psychological factor that increases overconfidence bias is the ‘illusion of knowledge’. People spend too much time and money on investment related information. Investors, who spend a considerable amount of money (or time) gathering data, will be persuaded that their actions are rational. Realising that it would be unrealistic to spend so much time gathering useless data, investors think that their data are useful and, therefore, tend to overestimate the precision of their knowledge. This phenomenon is called ‘illusion of knowledge’ (Barber and Odean, 2001). Once we know something it is hard for us to realise that what we know may be less than obvious to others who are less informed. Barber and Odean (2002) have documented that the Internet has brought changes to investing which may increase the overconfidence of on-line investors by providing illusion of knowledge and an illusion of control.

In spite of the fact that some studies have found no difference in overconfidence between men and women (Lundeberg et al., 2000; Deaves et al., 2003; Biais et al., 2005), the literature suggests that men are apparently more predisposed to overconfidence than women (Lundeberg et al., 1994; Barber and Odean, 2001). Barber and Odean (2001), found that males trade 45 percent more actively than females, incur higher transaction costs and, as a consequence, earn lower returns, while Shu et al. (2004) have shown that, even though men trade more excessively than women, their performance is not dramatically lower than that of women. In addition, Barber and Odean (2000) argue that men’s higher overconfidence
in their judgement leads them to trade more and to take riskier positions than women.

The current research assumes that Overconfidence leads to higher trading frequency and volume. Glaser and Weber (2007) as well as Grinblatt and Keloharju (2009) suggest that overconfident traders trade more frequently. Also, they report that individual investors whose trades respond stronger to past returns, trade more often in general. Glaser and Weber (2007), using data of online individual investors, found that high overconfidence (measured by better than average effect) is related to high trading frequency. Also, Deaves et al. (2003) performed an asset market experiment to test whether overconfidence leads to an increased trading activity. They document that overconfidence causes additional trading frequency and volume. They used trading data from online brokerage accounts of individuals and psychometric data obtained from the same group of investors who responded to an online questionnaire, and they correlated various measures of trading activity with a number of overconfidence related metrics. They found that the ‘better-than-average’ effect is associated with more frequent trading. However, they also found that, contrary to the predictions of Odean (1998b) and Gervais and Odean (2001), ‘miscalibration’ does not lead to high trading frequency.

Moreover, literature supports that overconfidence increases trading volume (DeBondt and Thaler, 1995; Odean, 1998a,b,1999; Gervais and Odean, 2001). Glaser and Weber (2007) concluded that “The higher the degree of overconfidence of an individual investor the higher her or his trading volume” (Glaser and Weber 2007, 13). Statman et al. (2006) argue that after high returns the subsequent trading volume will be higher as investment success increases the degree of overconfidence. Also, Statman and Thorely (1999) claim that high stock returns correlates with a high trading volume. Dow and Gorton (1997) have found that trading volume increases when individuals and insiders are overconfident. Additionally, Gervais and Odean (2001) found that overconfident investors trade too aggressively and this increases the expected trading volume. Several other studies also suggest that overconfidence leads to greater trading activity (Daniel et al., 2001; Hirshleifer and Luo, 2001; Wang, 2001; Scheinkman and Xiong, 2003).

Research has shown that overconfidence leads not only to an increased trading activity but also to increased probabilities of taking wrong decisions (e.g. buying the wrong stocks). Fenton-O’Creevy et al. (2003), using a sample of professionals, have documented that overconfidence has a negative impact on trading performance. Philip (2007) has found that higher overconfidence generally leads to poorer trading performance. Additionally, Biais et al. (2005), measuring the degree of overconfidence (through miscalibration) of 245 participants, in
an experimental financial market under asymmetric information, have shown that overconfidence reduces trading performance. Miscalibration leads to excessively aggressive trading strategies and poor performance (Benos, 1998; Odean, 1998b; Daniel et al., 1998).

Odean (1999) also reports that individual investors’ performance reduces when they trade more frequently. Odean (1998b) supports that an individual overconfident trader makes biased judgments that may lead to lower returns. On the other hand, DeLong et al. (1990) and Wang (2001) support that overconfident investors earn higher returns than less confident investors.

Huang and Goo (2008) have found that investment atmosphere affects mood and mood affects overconfidence and stock trading. When there is a happy investment atmosphere, investors are more optimistic, undertake higher risk, and they are overconfident. Overconfident investors believe they can achieve high returns, thus they trade often and they underestimate the associated risks (Benos, 1998; Wang, 2001). Additionally, Kahneman and Riepe (1998) claim that overconfidence causes people to overestimate their knowledge and underestimate the risks. As a result of underestimating risk, overconfident investors hold more risky assets. Barber and Odean (2001) and Chuang and Lee (2006) argue that individual overconfident investors underestimate risk and trade more in riskier securities. The excessive risk-taking that overconfident investors undertake can lead to higher than necessary trading volume, as well as poorer trading performance (Philip, 2007).

Moving a step forward, research on overconfidence is subjected to criticism. Gigerenzer (1991) argues against the robustness of the overconfidence phenomenon. His criticism is based on the notion that overconfidence should be measured differently. Specifically, he writes: “Ask people for their estimated relative frequencies of correct answers and compare them with the true relative frequencies of correct answers, instead of comparing the latter frequencies with confidences” (Gigerenzer 1991, p. 89). Similarly, Juslin et al. (2000) assert that overconfidence can be examined from the same set of data, showing that the outcomes are actually moderated by the research method used. Klayman et al. (1999) highlight that overconfidence depends on how the experimenters ask their questions, what they precisely ask, and whom they ask. Additionally, overconfidence is stronger when the questions to the participants are difficult and also increases with the personal importance of the task (Frank, 1935).


3. Research Theoretical Discussions

3.1 Hypotheses development

This study attempts to group investors (individuals and professionals) into different segments based on their overconfidence level and, then, to examine whether, as well as how, this bias drive their investment behaviour. The behavioural finance literature associates overconfidence with investment behaviour. This study makes an attempt to confirm the relationship between these factors, also taking into account differences in the investors’ profiles (high or low confidence) and their trading behaviour. Initially, the following hypotheses are proposed (Table 1). A graphical representation of the above mentioned hypotheses leads to the development of the following research model (Figure 1).

Table 1: Hypotheses

<table>
<thead>
<tr>
<th>A/A</th>
<th>HYPOTHESES</th>
<th>Supporting Literature</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Overconfidence positively affects trading volume.</td>
<td>DeBondt and Thaler, 1995; Odean, 1998; Odean, 1999; Glaser and Weber, 2007; Deaves et al., 2003; Gervais and Odean, 2001; Dow and Gorton, 1997; Statman et al., 2006; Statman and Thorely, 1999</td>
</tr>
<tr>
<td>2</td>
<td>Overconfidence positively affects trading frequency.</td>
<td>Grinblatt and Keloharju, 2009; Alemanni and Franzosi, 2006; Deaves et al., 2003; Glaser and Weber, 2007</td>
</tr>
<tr>
<td>3</td>
<td>Overconfidence positively affect trading performance</td>
<td>DeLong et al., 1990; Wang, 2001</td>
</tr>
<tr>
<td>4</td>
<td>Overconfident people invest in risky stocks</td>
<td>Nofsinger, 2002; Benos 1998; Odean, 1998; Wang, 2001; Philip, 2007; Kahneman and Riepe, 1998; Barber and Odean, 2001a</td>
</tr>
<tr>
<td>5</td>
<td>Investment experience positively affects overconfidence</td>
<td>Gervais and Odean, 2001; Locke and Mann, 2001; Menkhoff et al., 2006; Philip, 2007; Ekholm and Pasternack, 2008; Heath and Tversky, 1991; Frascara, 1999; Maciejovsky and Kirchler, 2003; Glaser et al., 2003; Griffin and Tversky, 1992; Obernarcher and Osler, 2008</td>
</tr>
<tr>
<td>6</td>
<td>Men are more overconfident than women</td>
<td>Lundeberg et al., 1994; Barber and Odean, 2001a</td>
</tr>
</tbody>
</table>
3.2 Questionnaire design

A structured questionnaire was constructed and used as the main survey instrument. Overconfidence is measured by seven items (5-point likert scale) that have been adapted from Wood and Zaichkowsky (2004). The second section includes questions about participants’ stock transactions (in their private portfolio). There are six questions included, collecting information about their portfolio value, stock volume, stock returns, profitable transactions, and frequency of stock transactions. Additionally, ten questions focus on information about people’s investing behaviour, such as types of stocks held and sources of investment information. Moreover, twelve demographic and socioeconomic items are included in this section. A factor analysis is used to determine if the proposed factors should be retained (Table 2). All the necessary statistical tests have been performed to verify construct validity and to confirm the reliability and validity of the research instrument. The Cronbach alpha statistic has been used to determine the degree of consistency among the measurements of each construct. The final constructs and their internal reliability are shown in Table 2.

The questionnaires were distributed to individuals who make stock transactions and had at least two transactions in 2007 on the ASE (Athens Stock Exchange), as well as professional investors (including portfolio analysts as well as stockbrokers) who work in various investment companies in all over the country (in order to achieve a good geographical distribution).

The total number of the questionnaires returned was 373. However, 28 questionnaires (individuals) were omitted since some questions had been left unanswered. Thus, the total number of valid questionnaires was 345. Of these, two hundred and thirty five questionnaires were filled from individuals (66 percent response) and one hundred and ten questionnaires were filled from professionals (25 percent response).
Table 2: Questionnaire design

<table>
<thead>
<tr>
<th>Construct</th>
<th>Supporting literature</th>
<th>Items</th>
<th>KMO</th>
<th>Cronb. alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overconfidence</td>
<td>Wood and Zaichkowsky (2004)</td>
<td>7</td>
<td>0,817</td>
<td>0,801</td>
</tr>
<tr>
<td>Stock transactions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Volume</td>
<td>2</td>
<td>0,5</td>
<td>0,465</td>
</tr>
<tr>
<td></td>
<td>Frequency</td>
<td>2</td>
<td>0,5</td>
<td>0,571</td>
</tr>
<tr>
<td></td>
<td>Performance</td>
<td>2</td>
<td>0,5</td>
<td>0,741</td>
</tr>
</tbody>
</table>

4. Analyses of results

4.1 Cluster Analysis-Two cluster solution

Cluster analysis examines whether respondents scored similarly on a set of variables and seeks to identify a set of groups with the greatest possible distinction (Keller and Siergist, 2006). This study used K-means cluster analysis because this method is appropriate (unlike hierarchical clustering) for large datasets (N>250). A range (2-5) of clusters was tested and the greatest distinctiveness (with the appropriate significance) among the groups was provided by a 2-cluster solution: Overconfident investors, with high degrees of overconfidence, and Underconfident investors, with low degrees of overconfidence. The results suggest that 2 significant subgroups exist within the investors’ sample, each with different overconfidence level (Table 3). In addition, an ANOVA test has shown a statistically significant difference (p<0.05) between the two clusters overconfidence construct (Table 3). We also ran crosstabulations between clusters for several demographic and trading characteristics. As it is probably expected, investors with different profiles differ as far as their attitude toward stock trading is concerned. A detailed discussion of the findings from these analyses is provided in the next sections.

Table 3: Psychological biases and personality traits

<table>
<thead>
<tr>
<th></th>
<th>Average</th>
<th>Overconfident</th>
<th>Underconfident</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Means</td>
<td>St.D.</td>
<td>Means</td>
<td>St.D.</td>
</tr>
<tr>
<td>Overconfidence</td>
<td>24,00</td>
<td>5,12</td>
<td>27,98</td>
<td>2,82</td>
</tr>
</tbody>
</table>
4.2 Profile Analysis - biases and demographics

As it is expected, Overconfident investors have significantly higher degree of Overconfidence (mean 27.98) than Underconfident investors (mean 19.51). Similarly, with other researchers’ findings (Lundeberg et al., 1994; Barber and Odean, 2000, 2001) that men are apparently more predisposed to overconfidence than women (Table 4), it is found that Overconfident investors’ cluster (91 percent) include more men than the cluster of Underconfident investors (75 percent). The majority of the investors in the sample are young (62 percent of them are less than 45 years old), and do not differ much, as far as this characteristic, within the two groups. Overconfident investors, also have a better educational level (79 percent hold at least a University degree) than Underconfident investors (only 15 percent of them hold a Master degree, while 35 percent of them are high-school graduated). Furthermore, Overconfident investors earn higher income (58 percent of them earn more than 30,000 euros annually) than Underconfident investors (only 40 percent earn more than 30,000 euros annually).

Table 4: Demographic and socioeconomic profile of Clusters

<table>
<thead>
<tr>
<th>Gender</th>
<th>Average</th>
<th>Overconfident</th>
<th>Underconfident</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>83%</td>
<td>91%</td>
<td>75%</td>
<td>0.000</td>
</tr>
<tr>
<td>Female</td>
<td>17%</td>
<td>9%</td>
<td>25%</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td>0.163</td>
</tr>
<tr>
<td>25-35</td>
<td>29%</td>
<td>28%</td>
<td>30%</td>
<td></td>
</tr>
<tr>
<td>36-45</td>
<td>33%</td>
<td>36%</td>
<td>29%</td>
<td></td>
</tr>
<tr>
<td>46-55</td>
<td>24%</td>
<td>25%</td>
<td>22%</td>
<td></td>
</tr>
<tr>
<td>56-65</td>
<td>12%</td>
<td>8%</td>
<td>16%</td>
<td></td>
</tr>
<tr>
<td>&gt;65</td>
<td>3%</td>
<td>3%</td>
<td>3%</td>
<td></td>
</tr>
<tr>
<td>Educational level</td>
<td></td>
<td></td>
<td></td>
<td>0.000</td>
</tr>
<tr>
<td>High-school</td>
<td>27%</td>
<td>21%</td>
<td>35%</td>
<td></td>
</tr>
<tr>
<td>University</td>
<td>48%</td>
<td>45%</td>
<td>50%</td>
<td></td>
</tr>
<tr>
<td>Master</td>
<td>25%</td>
<td>34%</td>
<td>15%</td>
<td></td>
</tr>
<tr>
<td>Income level</td>
<td></td>
<td></td>
<td></td>
<td>0.000</td>
</tr>
<tr>
<td>&lt;15.000</td>
<td>9%</td>
<td>7%</td>
<td>12%</td>
<td></td>
</tr>
<tr>
<td>15.000-30.000</td>
<td>41%</td>
<td>35%</td>
<td>48%</td>
<td></td>
</tr>
<tr>
<td>30.000-50.000</td>
<td>28%</td>
<td>27%</td>
<td>29%</td>
<td></td>
</tr>
<tr>
<td>50.000-100.000</td>
<td>19%</td>
<td>26%</td>
<td>11%</td>
<td></td>
</tr>
<tr>
<td>&gt;100.000</td>
<td>3%</td>
<td>5%</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td></td>
<td></td>
<td></td>
<td>0.000</td>
</tr>
<tr>
<td>Professionals</td>
<td>32%</td>
<td>48%</td>
<td>15%</td>
<td></td>
</tr>
<tr>
<td>Individuals</td>
<td>68%</td>
<td>52%</td>
<td>85%</td>
<td></td>
</tr>
</tbody>
</table>
Table 5: Basic trading patterns

<table>
<thead>
<tr>
<th></th>
<th>Average</th>
<th>Overconfident</th>
<th>Underconfident</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Means</td>
<td>Means</td>
<td>Means</td>
<td></td>
</tr>
<tr>
<td>Portfolio value</td>
<td>69.411</td>
<td>102.254</td>
<td>32.311</td>
<td>0.000</td>
</tr>
<tr>
<td>Stock volume</td>
<td>8.916</td>
<td>11.216</td>
<td>6.318</td>
<td>0.017</td>
</tr>
<tr>
<td>Stock Returns</td>
<td>14.08%</td>
<td>17.81%</td>
<td>8.08%</td>
<td>0.014</td>
</tr>
<tr>
<td>Profitable stock</td>
<td>55.77%</td>
<td>59.58%</td>
<td>51.47%</td>
<td>0.001</td>
</tr>
<tr>
<td>transactions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.3 Profile Analysis-trading behaviour

Overconfident investors (46 percent) includes more professional investors than the Underconfident investors (15 percent). This is not a surprise since there are findings indicating that professionals are more overconfident than individuals (Glaser et al., 2005; Putz and Ruenzi, 2008). Since the cluster with the higher number of professionals is this of Overconfident investors, then it is expected that Overconfident profile then it is expected that Overconfident investors have more years of investment experience (67 percent of them have more than 10 years of investment experience) than Overconfident investors (only 30 percent of them have more than 10 years of investment experience). This is also supported from the literature where can also be found a positive association between investment experience and Overconfidence (Heath and Tversky, 1991; Frascara, 1999; Maciejovsky and Kirchler, 2003; Glaser et al., 2003; Griffin and Tversky, 1992; Obernarcher and Osler, 2008).

Most of the investors from both clusters prefer long-term investments, followed by medium-term investments. A small percentage only, prefers the short-term investments. Amazingly, regarding the investment strategy, both groups of investors seem to prefer the “wait and see” policy (53 percent and 70 percent of the Overconfident and Underconfident investors respectively).

What was probably not expected is the high percentage (49 percent) of Overconfident investors who insist on buying stocks with poor performance, while only 34 percent of Underconfident investors exhibit similar behaviour. A possible explanation for this is that Overconfident investors probably are more optimistic and they rarely abandon their hopes that their choices would be justified. Another, statistically significant difference between these two groups is that Overconfident investors rely more heavily on fundamental, technical analysis and balance sheets, than Underconfident investors, who rely more on other information sources,
such as Newspapers and TV news. As far as the stock trading behaviour (Table 6) is concerned, most (80 percent) of the Overconfident investors check stock prices daily, while the Underconfident investors check prices with significantly lower frequency (only 41 percent of them check prices daily). Similarly with other researchers’ findings (Glaser and Weber, 2007; Grinblatt and Keloharju, 2009; Deaves et al., 2003) who have found that overconfident investors trade (Table 5) more frequently, it is found that Overconfident investors trade significantly more frequently (30 percent of them make stock transactions at least weekly) than Underconfident investors (9 percent make stock transactions weekly and 60 percent of them make stock transactions semi-annually).

Examining the differences among the two groups of investors, as far as portfolio value, stock volume, stock returns, and profitable stock transactions are concerned, it is found that Overconfident investors’ portfolio value is significantly higher (102,254 euros on average) than that of Underconfident investors (32,311 euros on average). Additionally, Overconfident investors have significantly higher stock volume (11,216 euros per transaction) compared with Underconfident investors (6,318 euros per transaction) which is in line with the findings of Glaser and Weber (2007), DeBondt and Thaler (1995), Dow and Gorton (1997), Odean (1998a,b,1999), Gervais and Odean (2001).

Similarly with other researchers’ findings (DeLong et al., 1990; and Wang, 2001), Overconfident investors’ stock returns are significantly greater (17.81 percent) than the Underconfident investors are achieved by (8.08 percent) and, also, Overconfident investors reports significantly more profitable stock transactions than the Underconfident investors (59.58 percent and 51.47 percent respectively).

**Table 6: Trading pattern of Clusters**

<table>
<thead>
<tr>
<th>Years of investment experience</th>
<th>Average</th>
<th>Overconfident</th>
<th>Underconfident</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;5 years</td>
<td>17%</td>
<td>11%</td>
<td>24%</td>
<td>0.000</td>
</tr>
<tr>
<td>5-10 years</td>
<td>34%</td>
<td>22%</td>
<td>46%</td>
<td></td>
</tr>
<tr>
<td>&gt;10 years</td>
<td>49%</td>
<td>67%</td>
<td>30%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Times checked stock prices</th>
<th>Average</th>
<th>Overconfident</th>
<th>Underconfident</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily</td>
<td>62%</td>
<td>80%</td>
<td>41%</td>
<td></td>
</tr>
<tr>
<td>Weekly</td>
<td>17%</td>
<td>9%</td>
<td>28%</td>
<td></td>
</tr>
<tr>
<td>Fortnightly</td>
<td>2%</td>
<td>2%</td>
<td>2%</td>
<td></td>
</tr>
<tr>
<td>Monthly</td>
<td>10%</td>
<td>7%</td>
<td>13%</td>
<td></td>
</tr>
<tr>
<td>Quarterly</td>
<td>9%</td>
<td>2%</td>
<td>16%</td>
<td></td>
</tr>
</tbody>
</table>

(continued)
<table>
<thead>
<tr>
<th>Frequency of stock transactions</th>
<th>Daily 12%</th>
<th>18%</th>
<th>5%</th>
<th>0.000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weekly</td>
<td>8%</td>
<td>12%</td>
<td>4%</td>
<td></td>
</tr>
<tr>
<td>Fortnightly</td>
<td>7%</td>
<td>9%</td>
<td>5%</td>
<td></td>
</tr>
<tr>
<td>Monthly</td>
<td>18%</td>
<td>22%</td>
<td>14%</td>
<td></td>
</tr>
<tr>
<td>Quarterly</td>
<td>14%</td>
<td>16%</td>
<td>12%</td>
<td></td>
</tr>
<tr>
<td>Semi-annually</td>
<td>41%</td>
<td>23%</td>
<td>60%</td>
<td></td>
</tr>
<tr>
<td>Investment horizon</td>
<td></td>
<td></td>
<td></td>
<td>0.196</td>
</tr>
<tr>
<td>Long term</td>
<td>56%</td>
<td>53%</td>
<td>59%</td>
<td></td>
</tr>
<tr>
<td>Medium term</td>
<td>31%</td>
<td>32%</td>
<td>30%</td>
<td></td>
</tr>
<tr>
<td>Short term</td>
<td>13%</td>
<td>15%</td>
<td>11%</td>
<td></td>
</tr>
<tr>
<td>Investment policy*</td>
<td></td>
<td></td>
<td></td>
<td>0.9722</td>
</tr>
<tr>
<td>Stop loss</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
<td></td>
</tr>
<tr>
<td>Max profit</td>
<td>17%</td>
<td>23%</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>Target price</td>
<td>16%</td>
<td>23%</td>
<td>7%</td>
<td></td>
</tr>
<tr>
<td>Wait and see</td>
<td>61%</td>
<td>53%</td>
<td>70%</td>
<td></td>
</tr>
<tr>
<td>Investment information*</td>
<td></td>
<td></td>
<td></td>
<td>0.713</td>
</tr>
<tr>
<td>TV news</td>
<td>37%</td>
<td>40%</td>
<td>33%</td>
<td></td>
</tr>
<tr>
<td>Newspaper</td>
<td>40%</td>
<td>39%</td>
<td>41%</td>
<td></td>
</tr>
<tr>
<td>Balance Sheet</td>
<td>34%</td>
<td>51%</td>
<td>14%</td>
<td></td>
</tr>
<tr>
<td>Fundamental Analysis &amp; Technical analysis</td>
<td>36%</td>
<td>55%</td>
<td>15%</td>
<td>0.000</td>
</tr>
<tr>
<td>Financial Announcements</td>
<td>34%</td>
<td>41%</td>
<td>27%</td>
<td></td>
</tr>
<tr>
<td>Internet</td>
<td>28%</td>
<td>53%</td>
<td>25%</td>
<td></td>
</tr>
<tr>
<td>Financial Analysts</td>
<td>19%</td>
<td>15%</td>
<td>29%</td>
<td></td>
</tr>
<tr>
<td>Friends</td>
<td>12%</td>
<td>7%</td>
<td>19%</td>
<td></td>
</tr>
<tr>
<td>Relatives</td>
<td>4%</td>
<td>3%</td>
<td>6%</td>
<td></td>
</tr>
<tr>
<td>Rumors</td>
<td>12%</td>
<td>11%</td>
<td>14%</td>
<td></td>
</tr>
<tr>
<td>Investment decision making</td>
<td></td>
<td></td>
<td></td>
<td>0.452</td>
</tr>
<tr>
<td>Athens stock exchange</td>
<td>35%</td>
<td>32%</td>
<td>37%</td>
<td></td>
</tr>
<tr>
<td>stock prospects</td>
<td>22%</td>
<td>24%</td>
<td>20%</td>
<td></td>
</tr>
<tr>
<td>personal/psychological reasons</td>
<td>4%</td>
<td>5%</td>
<td>3%</td>
<td></td>
</tr>
<tr>
<td>Returns</td>
<td>25%</td>
<td>17%</td>
<td>15%</td>
<td></td>
</tr>
<tr>
<td>International stock exchanges</td>
<td>11%</td>
<td>14%</td>
<td>8%</td>
<td></td>
</tr>
<tr>
<td>liquidity</td>
<td>12%</td>
<td>8%</td>
<td>15%</td>
<td></td>
</tr>
</tbody>
</table>

*The respondents can choose more than one answer
Cluster analysis identified two investor profiles, the Overconfident and Underconfident investor profile, with each one of them exhibiting different trading behaviour. The results of the analyses show that the higher the investors’ overconfidence level, the higher the performance of these investors on stock trading. Therefore, high overconfidence seems to positively influence stock returns (Overconfident investors’ profile results). These investors own higher value portfolios, trade higher volumes of stocks and make transactions more frequently compared to the investors from the other profile. On the other hand, Underconfident investors underperform in stock markets, trade rarely and their major characteristics, compared to the investors in the other cluster, are the low scores of Overconfidence bias. The above results are similar with other researchers’ findings (Grinblatt and Keloharju, 2009; Glaser and Weber, 2007; Gervais and Odean, 2001). Furthermore, there is a statistically significant and positive relationship between overconfidence and portfolio value.

Additionally, our findings show that higher value portfolios lead to higher trading volume, which is in line with Glaser (2003) and, also, that there is a statistically significant association between higher value portfolios and higher performance. In addition, similar to Statman and Thorely’s (1999) findings, we argue that high stock returns are correlated with high trading volume. Thus, high trading frequency and high stock volume do not negatively affect investment performance but may lead, under specific conditions, to a better performance.

This is an exploratory study to be used as a starting point for the understanding of specific characteristics of investors (including both individuals and professionals) and their trading behaviour. The results show that high scores on Overconfidence are associated with high scores on aspects of trading behaviour such as trading performance, trading frequency and trading volume. Unfortunately, one may assume that the above characteristics lead to a winning strategy in stock markets. This study may provide investment advisors with a framework to understand clients’ attitude and thus allow advisors to give better advices to their clients depending on each client’s profile. Ultimately, it may help investors understand how biases and traits affect investment decisions and thus they may be able to become aware of and overcome them. One major limitation of this study is that it is based on the self-assessed biases, traits and trading behaviour of each respondent. It is important for future research to be directed towards collecting more objective data as far as these crucial parameters are concerned.
References


The Role of a Bank’s Internal Processes in Improving its Performance

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Abstract:
In today’s retail banking environment, where the high diversity of products and services tailored to customers’ differing needs is becoming the norm, the willingness and ability to help customers and provide prompt services, becomes the new competitive edge of a bank’s network. Furthermore, the hard competition forces banks to set up and put into effect all the necessary decision support systems that will enable them to evaluate their performance and effectiveness. Traditional measures of bank profitability, ROA and ROE, are beset with problems of allocating assets, equity and net income. Some of the more common approaches in branch performance analysis have been budgeting (that is, a tool of management accounting) and measuring total deposits. We argue that improving the processing of all inputs in a bank’s production model will eventually improve the bank’s efficiency and performance, as perceived by its customers. Those inputs include human recourses, such as managerial and clerical personnel and products, such as current accounts, saving accounts, credit applications and trade related services. The objective of this paper is to:

- Suggest a way of representing a bank’s set of internal processes.
- Define a measure for the quality of a bank’s products and services, as a function of the various inputs to the bank’s production model and their processing.
Examine how improving those inputs and their processing, will improve the quality of a bank’s products and services and hence its performance. The theoretical findings will be applied to selected bank processes.

Keywords:
Bank Products and Services, Process and Service Design

1. Introduction

Banks are currently facing an increased competition due to two different reasons:
- the entrance of financial and insurance firms in the traditional banking market
- the wide range of products and services offered to the public.

As a consequence, the banking industry strives to succeed by placing the issue of fastly changing customers’ needs high up in their agenda (Krishnan et al., 1999). Understanding the needs of their customer’s and reacting to the changes of their behaviour, aid banks and financial institutions to face the hard competition. Enhancement of existing relationships with customers is of pivotal importance to banks, since attracting new customers is known to be more expensive. The manager’s goal in a service organization is to keep customers satisfied at a reasonable cost.

Several factors have been identified through literature concerning customer satisfaction. Many researchers (Winstanley, 1997; Ndubisi, 2006) built on Parasuraman et al., (1988) traditional model of customer satisfaction determined that factors like “reliability”, “security”, “functionality”, “accuracy”, and “speed” responsiveness”, “competences”, “assurance”, “trust”, of bank services effect bank customers’ behavior.

The match between service demand and capacity has a substantial impact on financial institution’s profitability because of waiting time-effects on demand and the surplus capacity-effects on operating margins. (Andrews and Parsons, 1989). A service design research should consider the information needs of managers related to waiting lines (the operations view) and customer satisfaction (dissatisfaction) with waiting times (Davis Maggard, 1990). The linking variable between operations and marketing views is the objective of adding value (Heskett, 1994).

Bitran & Mondschein, (1997) affirm that in service industries, the provision and delivery of the product occur simultaneously; in other words, services are “consumed” the instant they are “produced”. This intangibility of services means that they cannot be inventoried as tangible goods are. This lack of inventory has two main consequences. First, service facilities
may be idle for long periods and second, large queues may build up at peak times. Moreover, the random fluctuations of both arrival times and level of demand will cause queuing to occur even if, on average, the demand does not exceed the capacity of the service facility. A number of mechanisms may be used to match a limited supply of services with an unpredictable demand for those services. These mechanisms differ in the complexity of their design and implementation; some require only qualitative analysis while others call for mathematical models or analytic tools like simulation, queuing theory, and mathematical programming. In additional perceptual mechanisms, which alter only the customer's perceptions of the organization's performance, may also be used to maintain customer satisfaction when delays in service are unavoidable. Most service firms will want to use a mix of these mechanisms.

Due to empirical evidence systems from manufacturing operations are instrumental in improving service quality, increasing productivity and enhancing responsiveness to customers. Service operations have often been distinguished from manufacturing operations on the basis of the higher labor content of service jobs.

For over fifty years, a cornerstone of manufacturing practice has been to separate complex tasks into a collection of simple ones and exploit the economies of scale. Service industry practice has in many cases followed the same path by redesigning jobs, by removing jobs from front office staff, by standardizing some of them and often centralizing a number of them in some remote back office. Service organizations such as banks have many problems and challenges that can be addressed by manufacturing and operations management methods. In a service organization, a number of mechanisms may be used to match a limited supply of services with an unpredictable demand for them.

In the early ‘70s Levitt exhorts managers to take a “production-line approach to service,” stating that services can be improved by applying manufacturing wisdom: standardizing processes and replacing employee discretion with technology. Consequently, one should accomplish the “industrialization of service” by separating tasks into multi-task jobs, using division of labor to achieve efficiencies, and centralizing the specialized tasks to achieve scale economies. Levitt argues that such changes will lead to improvements in both conformance quality and cost.

The objective of this study is to: (1) suggest a way of representing a bank’s set of internal processes (2) define a measure for the quality of a bank’s products and services as a function of the various inputs to the bank’s production model and their processing and (3) examine how improving those inputs and their processing, will improve the quality of a bank’s products and services and hence its performance.
The remainder of this paper is organized as follows: Section 2 introduces the concept of a bank’s Basic Image, presents the factors affecting it and suggests ways of improving them and hence improving the bank’s performance. Section 3 outlines the methods used to represent a process in the manufacturing sector and presents ways of transplanting them into the service sector. Section 4 applies those methods in a typical bank process and finally section 5 summarizes the managerial implications and makes suggestions for further research.

2. The Concept of a Bank’s Image

The growth of a bank depends on its power to “retain” and “pull” customers; this power depends on what we call the Image of a bank. Customers choose a given bank on the basis of their perception of the bank's relative attractiveness. Their choice is therefore, a function of a multitude of factors. At each time instant the bank «sends out» its Image and depending on its impact on the customers, the bank may be considered as “attractive” or not.

However, one may argue that since customers «receiving» the Image of a bank belong to various distinct groups and are sensitive to different factors, the impact of the bank's Image on the members of each particular group will be different. Whilst this is plausible, empirical evidence suggests that all groups of potential customers react similarly to a basic set of factors; more precisely, a set of minimum standards, largely common to all groups, must be satisfied if the bank is to be considered as a potential final choice by any of them. To reconcile these two views we refine the concept of a bank's Image by introducing the following two concepts: the Basic Image and the Specific Image (Angelis, 1981).

The Basic Image of a given bank measures the degree to which this bank satisfies a set of basic criteria common for all customers. A bank satisfying those criteria is considered, by all potential customers, as worth a closer examination and as a potential final choice. The Specific Image of a given bank, as perceived by a particular group of existing or potential customers, measures the degree to which customers, belonging to that particular group, consider this bank as their final choice.

At this point it should be mentioned that the growth of a bank may be expressed both in absolute or relative terms. In the latter and most interesting case the development pattern of a given bank is compared to that of a hypothetical bank, which is referred to as the “typical” bank and expresses, as far as possible, an average of the main banks of a similar type to that of the study. In this paper we shall be looking at the relative development patterns of a bank. Hence, all the factors affecting its images (Basic and Specific) should be expressed in relative values as compared to the corresponding values of the “typical” bank.
2.1 Basic Image

Every bank has a double function to perform; design a wide range of quality services and make them reachable to its customers in an easily accessible and financially affordable way. Those two functions may not always be compatible. The quality of the services offered, may in some cases, increase their cost while a greater variety of services offered may require a wider distribution network.

On the basis of the above, the factors controlling a bank’s Basic Image may be divided in two groups according to whether they concern the variety and the quality of the services offered or their physical accessibility and financial affordability. The factors of the first group (i.e. Bank’s Credibility, Variety of Services, Quality of Services) properly quantified and scaled, give a measure of the status of the bank and the services offered. This measure is referred to Status and Services Indicator \( (SI) \). Similarly, the factors of the second group (i.e. Interest Rates of Deposit accounts, Interest Rates of Loan accounts and cards, Points of Sales), give a measure of bank services accessibility and cost. This measure is referred to Reachability Indicator \( (RI) \).

Hence a bank’s Basic Image may be expressed as a function of these two conflicting Indicators as follows

\[
BI = \varphi (SI, RI)
\]

The expression of a bank’s Basic Image as a function of these two Indicators is not accidental. The main advantage of such an expression is that it can be used to underline, and eventually describe, the conflict which may characterize the development of a bank.

Continuing our analysis we will concentrate on the problem of theoretical shape of the graph of bank’s Basic Image. This graph is a function of two variables and it must therefore be three dimensional. In order to get a first feeling of the shape of the graph the following observations, describing the way in which the two indicators operate, are made

i. The higher the Status and Services Indicator of a bank, the more attractive its basic Image.

ii. The lower the Reachability Indicator of a bank the less attractive its basic Image.

iii. If the Status and Services Indicator of a bank is continuously increasing but at the same time its Reachability Indicator is decreasing, the Basic Image of the bank may be either attractive or non-attractive and sudden changes in its state may be expected.

Observation (iii) is the most interesting because it implies that the graph and hence the Basic Image function is discontinuous. To study this
function Catastrophe Theory has been employed, a general mathematical theory, which is particularly applicable in cases where continuous underlying forces result in discontinuous and divergent phenomena. This function has been discussed in full detail in some previous paper (Mavri et al, 2009).

2.2 Improvement of a bank’s Basic Image

As we can see from the definition of a bank’s Image this may become more attractive by improving at least one of the two indicators.

Regarding the Status and Services Indicator the key points for its improvement are enrichment of the services offered and improvement of their quality. In today’s retail banking environment, where a more sophisticated consumer with limited bank loyalty is becoming the norm, customer service quality is an indispensable competitive strategy. Service quality is a function of the extent to which this service matches customers’ expectations and of the way it is delivered. The first depends on the proper market segmentation whereas the second on the staff and the processes used.

Regarding the Reachability Indicator, the key point for its enhancement is improving the services accessibility (better location of traditional branches, evolution of alternative distribution channels such as web and mobile banking) and affordability (less expensive products). Customized products which satisfy customers’ needs and could be easily accessed at a reasonable cost, either though traditional branch network, or through alternative channels, may lead to more satisfied customers. Hence the basic issues related to reachability are location and product pricing.

Location is a key issue for banking industry. Every bank management team has to think about the location of branches or ATMs, as this can increase the utilization of the service facilities. In addition, although the cost of installation and maintenance of automated teller machines is high, banks have to install them as the customers carry out a number of their transactions in ATMs.

Pricing is another key issue for banking industry and one of the most common mechanisms for influencing demand. As banks apart from traditional branches network, use and alternative delivery distribution channels, such as mobile and web banking, they are currently facing the complex task of determining the right prices to charge a customer for a product or a service. This task requires that a bank knows not only its own operating costs and availability of supply but also how much the customer values the product and what the future demand would be.

Our emphasis in this paper is placed on improving a bank’s Basic Image by enhancing its internal processes.
3. Manufacturing and Services processes

A service outcome is never the result of a single moment of co-production between service provider and consumer; it is a result of a series of interactions and operations that have contributed to the final service-product. All these interactions are part of a greater eco-system of actors and the services they simultaneously consume and provide called a service system. Some have referred to the service system as a value-net (Crawford et al.).

In this paper we assume that a service system can effectively be represented as a manufacturing system. More specifically we claim that any service offered by a bank to its client could be designed, developed and delivered following a procedure identical to those used in manufacturing enterprises. A manufacturing organization in order to develop a product, it has to decompose the whole manufacturing task into several subtasks based on manufacturing characteristics and process planning of the complex parts. Figures 1 and 2 below describe the decomposition of a task to its subtasks. Each subtask in Figure 2 contains more than one manufacturing procedures.

![Directed Network of subtasks](image1.png)

**Figure 1**: Directed Network of subtasks

![Network of multiple procedures in subtasks](image2.png)

**Figure 2**: Network of multiple procedures in subtasks
Metters & Vargas, (2000) point out that as in a manufacturing firm, the procedure is to separate complex, multi-task jobs into many simpler jobs, standardize the work, and use specialized labor and technology to achieve scale economies. If tasks were “merely segregated but not centralized in a service environment, the back office activities might still need to be staffed based on the whims of the customer, with some days being busy and others slack for any particular service site. When the back office work is centralized, the slack days of some offices are offset by the busy days of others, allowing for a more predictable work flow and lessening the need to have added workers on the job just in case a randomly busy day occurs.

The concept of collaborative manufacturing chain is proposed for the manufacturing of complex products in a networked manufacturing environment in order to optimize deployment of manufacturing resources. We assume that this concept can optimally improve procedures of design-develop-offer products in services organizations like banks.

By decomposing bank’s internal processes in its tasks, the bank management team can control them, improve them and understand the ways in which the service system affects quality. A bank by improving its process picks up its efficiency, its productivity and satisfies more and more its customers. As service quality is measured by the gap between customer’s expectation of the service and her actual experience, the determination of the task which may provide a satisfaction problem seems to be important.

This richer view of a bank service system implies a similar enlargement of the line of visibility, which takes into account the multi-channel nature of service offerings and the information drivers within a service system. A service system embodies many possible service value chains, each of which contributes in the design of a service offered to bank clients.

Finally the network graph is valuable in order to capture the many different actors, relationships and services that compose the performance of bank.

4. Application of the proposed methodology
The methodology presented in the previous section is now applied to a typical bank process, that of a loan application. After receiving the loan application and checking that a number of conditions are satisfied i.e. employment and income verification, collateral valuation, etc., the loan officer forwards this application to the Credit Risk Department, which in cooperation with the Technical Aid and Law Departments, decides about the approval/rejection of this loan application. Once the loan application has been approved, the Law Department in cooperation with the Contracts
Department prepares the contract which is then signed by both the bank and the customer. All the steps described above are represented in the graph shown in Figure 3.

This is a directed network graph, like the one described in the previous section, which decomposes a complex multi-task process into a number of simple tasks. The main benefits of this graph are the following:

- It gives an overall view of the process, thus leading to its better understanding. On the other hand, as the process is split into a number of simple tasks it helps the process owner to identify any critical points and bottlenecks.
- It facilitates the evaluation of the process. The evaluation criteria include:
  - Completion time (total/per task)
  - Number of employees involved (total/per task)
  - Number of departments involved
  - Percentage of work load carried out at the front office
  - Percentage of work load carried out at the back office
  - Labour cost (total/per task)
  - Full cost (total/per task)

Furthermore, if more processes or all the processes of an organization are represented on the same graph this helps both the process owners but also the overall system’s administrator to identify any interrelationships, overlappings or tasks common in more than one processes. Such observations are crucial since they may act as the basis for redesigning the processes in such a way as to improve their performance but also the overall system’s performance.

5. Conclusions – Suggestions for further research

In today’s retail banking environment, where a more sophisticated consumer with less bank loyalty is becoming the norm, customer service quality is a competitive strategy. Satisfying customer needs however is not an easy task and in order to overcome this difficulty, banks borrow manufacturing practices in an effort to improve their performance and the quality of products and services offered.

The objective of this study was to suggest a way of representing a bank’s set of internal processes, define a measure for the quality of a bank’s products and services and examine how improving the inputs into a bank’s production model and their processing, will improve the quality of
a bank’s products and services and hence its performance. The methodology presented was then applied to a typical bank process.

An area of future research would be to further elaborate on this, as well, as on other processes, evaluate the performance of each task and the quality of its outcome, as well as the performance of the whole process and the quality of its end products and finally redesign the process accordingly.
Figure 3: Bank Loan Application Process
References

Client selection criteria for banks in Greece

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Abstract: 
The modern bibliography accepts the interdependence between the variables “banking offering” and “client satisfaction”. In our days where competition among banks is rapidly developed and changes day by day according to the innovative products that every bank offers, clients choose among a variety of products and services that are satisfying their demands. This research focuses on the reasons why clients choose a bank; these reasons might be economic profit or their satisfaction from the offers that are provided. The basic question that must be answered is the reason why clients choose a particular bank and the relationship that the bank wants to create with them. The research was realized with closed questionnaire outside of bank branches in central spots of cities. It presents the findings of a study performed on data that shows us, that the dimension “client satisfaction” is an important factor that the banks have to consider, in order to attract more clients.

Keywords:  
Customer satisfaction, Banking Marketing, Sale Services, Choice Criteria  

1. Introduction  
The most important point that characterizes the banking system the last decade is the need for a new customer-banking system relationship. Day by day the demanding is growing and customer’s role is continually upgraded inside the banking system because of the constant competition. As a result, banking marketing focuses on the interpersonal relationship between the
organization and the customer and the role of bank branch is continually changing.

The outcome of planning and implementation of new systems for providing better services to customers is the creation of secure methods that will follow the needs, the expectations and the value of the customer. Competition and environmental changes must be seriously considered by each manager of the organisation as they can change over preferences and expectations of customers. It is worldwide obscured that disappointed customers, who cannot find a way to express their complaints, are more vulnerable to competition. On the other hand, those who have found the way become the most powerful weapon of promotion. The attempt of planning and implementation of a new philosophy in the customer-banking system relationship needs support of appropriate statistics and managerial methods (Ladbrokes, 2001).

The last decades in Greece the factor ‘customer satisfaction’ has played a major role in banking marketing. In this study an attempt is made to study and evaluate all the factors that contribute in customer’s satisfaction; the reasons and all the criteria that make them decide among all the bank branches.

2. Review of the literature

Nowadays banking system stands in the core of many changes and evolutionary process. The deregulation of market, the mass offer of products and services, the expanded use of technology and globalization, augmented the antagonism and forced banks to adopt new methods concerning quality, in their attempt to maintain their market share and increase their profit.

The need for new customers and preservation of the oldest, obligated banks to apply new methods in order to serve theirs turns. It is a fact that high service quality in banking system provides “antagonistic advantage” (Karasavaidou, 2004). Customers are more satisfied with services when organizations adopt an imperative for customer satisfaction, or organizational policies and practices chiefly concerned with service quality (Parkington & Schneider, 1979; Schneider & Bowen, 1985; Schneider et al., 1980).

Oliver’s (1993) review of the issues suggests that service quality is antecedent to satisfaction and is non-experiential in nature (i.e. similar to attitude which can be formed from other sources such as word of mouth communications). Although the multi-attribute nature of both constructs is well recognized, more emphasis has, over recent years, concentrated on identifying the attributes and broad dimensions of service quality.
The dimension of satisfaction refers to all of the characteristics of the service, which give value to the customer and contribute in configuration of satisfaction or dissatisfaction.

Although the constructs service quality and satisfaction are sometimes used interchangeably; a substantial amount of research has sought to establish the nature of the relationship between them (see, for example, Bitner, 1990; Cronin and Taylor, 1992; Parasuraman et al., 1994).

There are several methods for measuring customer satisfaction. One of those is Service Quality (Servqual) that is a general method for measuring the service quality. It measures the gap between customer expectations and experience.

(Smith, 2000) suggests that, in addition to outcome, three elements of service process: access/convenience, human elements (combining both instrumental and expressive qualities) and tangibles affect consumers’ choice criteria.

Another method is the American Customer Satisfaction Index (ACSI) is an economic indicator that measures the satisfaction of consumers across the U.S. economy. It is produced by the National Quality Research Center (NQRC) at the University of Michigan in Ann Arbor, Michigan. This is an international economic index that defines the basic satisfaction parameters using the knowledge of the market.

The last decade customer needs have been multiplied and all the banks are making efforts to satisfy them by developing several techniques (i.e. e-banking, ATM, phone banking). These alternatives systems cost much less to the organization. Furthermore, these methods offer more qualitative services to customer as the customer does not have to stand and wait in the queue as he can have access in banking services from everywhere. For all these reasons these systems offer extra value to the service (Papaioanou, 2004).

There is substantial research within the financial service literature (see, for example, McKechnie, 1992; Thwaites and Vere, 1995) to support the view that access/convenience is a dominant criterion both for choice of institution and for subsequent satisfaction. “Ease of use” is another term, often used by researchers, which emphasizes the need for convenience in service delivery.

Previous research (see, for example, Leblanc, 1990; Moutinho and Brownlie, 1989; Howcroft, 1991) has suggested that some consumers have positive attitudes towards ATMs based on dominant perceptions of convenience/accessibility/ease of use. Additionally, Leonard and Spencer (1991) found that consumers perceive that ATMs are indicative of success and contribute towards a positive organizational image.

Alternatively, a number of negative attitudes towards ATMs have been identified. Earlier research by Murdock and Franz (1983) for
example, has emphasized the psychological/social risk involved in their usage.

Based on a research of Data RC, that was constructed with the aim of defining customer satisfaction and perception towards banking system in Greece, the results were satisfying, as it was noticed an increased movement between 2005 and 2007 in sale services provided in Greece (Louloudis, 2008).

Finally the aspect that “internet and alternative systems have downrated the bank branch” belongs to the past. At the moment, banks are redefining the role of bank branch and coinstantaneously are redefining the role of alternative systems. “The harmonic coexistence of different channels” underline Mr Pexlivanidis, “not only effectively serve the goal of reducing cost, but also serve effectively the needs of the customer offering increased level services” (Papaioannou, 2004).

3. Methodology

In this research, we will examine the central question that is: “are the customers satisfied from the banking services offered in Greece?”.

The research was realized with closed questionnaire outside of bank branches in central spots of cities. 550 questionnaires have been distributed, from which 461 outside of 5 different bank branches in Greece.

This questionnaire is created based on the scale which customers are satisfied from the provided banking services combining with the client commitment and choice criteria. The customers were asked to answer the 1-8 rating scale questions that determine the “customers’ satisfaction”.

The statistic analysis of data was generated with the method Chi-Square Test with the aid of SPSS statistic program. In this specific study we will examine if one characteristic affects the other or not.

4. Results

The questions in which we focalised were:

- Are you totally satisfied from the products your bank provides?
- Are you totally satisfied from the services that your bank employees provide?
- Are you totally satisfied from the process time?

We also examined the possible relationship between the answers and the following variables:

- Gender – Are you totally satisfied from the products your bank provides?
- Gender – Are you totally satisfied from the services that your bank employees provide?
- Age – Are you totally satisfied from the process time?
- Age – Are you totally satisfied from the services that your bank employees provide?

For the completion of the analysis we used the aid of following hypotheses:

\[ H_0 : \] a relation between the two variables exists

\[ H_1 : \] a relation between the two variables does not exists

**Chi-Square Tests:** Gender - Are you totally satisfied from the products your bank provides?

<table>
<thead>
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<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
</tr>
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<td>Pearson Chi-Square</td>
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<td>0.354</td>
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<td>0.342</td>
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<td>Linear-by-Linear</td>
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<td>0.644</td>
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<td>Association</td>
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<tr>
<td>N of Valid Cases</td>
<td>461</td>
<td></td>
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</tbody>
</table>

We observe that the \( \chi^2 = 7,760 \). The value of significance is 0.354>0.05 as a result we accept the hypothesis \( H_0 \) according to which the relation between the satisfaction from the provided products and the gender exists.

**Chi-Square Tests:** Gender – Are you totally satisfied from the services that your bank employees provide?

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>df</th>
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<td>Pearson Chi-Square</td>
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<td>0.194</td>
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<td>Likelihood Ratio</td>
<td>10,162</td>
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<tr>
<td>Linear-by-Linear</td>
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<td>0.203</td>
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<tr>
<td>Association</td>
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<td></td>
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<tr>
<td>N of Valid Cases</td>
<td>461</td>
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<td></td>
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</tbody>
</table>
We observe that the $\chi^2 = 9,911$. The value of significance is $0,194>0,05$, as a result we accept the hypothesis $H_0$ according to which the relation between the satisfaction from the employees and the gender exists.

**Chi-Square Tests:** Age – Are you totally satisfied from the process time?

<table>
<thead>
<tr>
<th>Chi-Square Tests</th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
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<tr>
<td>Pearson Chi-Square</td>
<td>4,627</td>
<td>7</td>
<td>.705</td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>4,659</td>
<td>7</td>
<td>.701</td>
</tr>
<tr>
<td>Linear-by-Linear Association</td>
<td>.191</td>
<td>1</td>
<td>.662</td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>461</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

We observe that the $\chi^2 = 4,627$. The value of significance is $0,705>0,05$, as a result we accept the hypothesis $H_0$ according to which the relation between the satisfaction from time process and the age exists.

**Chi-Square Tests:** Age – Are you totally satisfied from the services that your bank employees provide?

<table>
<thead>
<tr>
<th>Chi-Square Tests</th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>31,114</td>
<td>28</td>
<td>.312</td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>29,616</td>
<td>28</td>
<td>.382</td>
</tr>
<tr>
<td>Linear-by-Linear Association</td>
<td>.016</td>
<td>1</td>
<td>.901</td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>461</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

We observe that the $\chi^2 = 31,114$. The value of significance is $0,312>0,05$, as a result we accept the hypothesis $H_0$ according to which the relation between the satisfaction from the employees and the age exists.
5. Conclusions

In this paper, we presented an efficient way of understanding how some criteria can affect the customers’ satisfaction by the banks. In order to measure the satisfaction, we utilised the two dimensions of gender and age.

The level of control of gender concerning with the satisfaction from the services that the bank employees provide and from the products that a bank provides, influences the customers’ answers, as we observe from the results.

Similarly, the age can influence the satisfaction of each customer which is received by the satisfaction from the services that the bank employees provide and the satisfaction by the products a bank provides. Consequently, we can support the idea that there is a relation between the gender and the age with the other two variables.

To explore practically the ideas presented in this paper, we conducted an SPSS analysis. The results shown, analytically, in the tablets above.

On the whole, the satisfaction of each customer depends on the age and the gender of each one. However, in order for our results to be more complete, further research should be undertaken to establish a more specific option.

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Conceptual approaches to cooperative banks and customer satisfaction drivers

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Abstract:
Perceived quality and satisfaction are service and culture specific. Customer satisfaction in the service sector has been connected to service quality. The knowledge of the customers’ perception is a source of value creation for an organization and plays a major role in the development of core competences and dynamic capabilities. The knowledge of the drivers of customer satisfaction is an important strategic parameter in the financial services sector. In this paper, we focus upon the development of a conceptual framework of customer satisfaction for cooperative banks as a tool in their strategy for differentiation from commercial banks. In this framework, customer satisfaction drivers such as identity, social responsibility, pricing, servicing, support, communication and trust are enumerated in detail as the core around which the competitive advantage, profitability and ultimately survival of cooperative banks is built.

Keywords: Cooperative banks, Customer satisfaction drivers.

4. Introduction

Customer satisfaction in the banking sector has been linked to service quality (Avkiran, 1994; LeBlanc and Nguyen, 1988; Blanchard and Galloway, 1994) and it is widely accepted that provision of high quality services is vital to business success (Voss et al., 2004; Vilares and Coehlo, 2003; Van der Wiele et al., 2002). For banks, service is the core around which their competitive advantage, profitability and survival are built.
Nowadays, it is difficult to find a bank that does not introduce improvements concerning its service quality (Soteriou and Stavrinides, 2000; Newman 2001; Wang et al., 2003).

Therefore, the knowledge of their customers and member / customers, which is a source of value creation for an organization, plays a major role in the development of core competences and dynamic capabilities of cooperative banks as well as in their strategy for differentiation from commercial banks. The knowledge of the drivers of customer satisfaction is an important parameter of this knowledge. The sense of satisfaction drivers has to be conceptualized in order to be measured.

In the modern industrial word, socio- economic initiatives which do not belong to neither the public sector nor the private profiteering sector are noticed. They are recorded in a special field called pluralistic social economy.

The form of the cooperative institution was first found in Europe 150 years ago and it is estimated that, today, there are about 11.000 cooperative banks in 22 countries. Their branches are over 55.000 and their members are about 35.00.000 (Agelopoulos, 2008).

Cooperative institution is a particular and globally formed type of economic activity. It is amenable to specific rules that combine effectiveness with social sensitivity. As characteristically has been said, cooperatives are “an economic system with social substance”.

The cooperative bank differential in relation to their competitors is that in a cooperative bank the shareholders - members/ customers, based in the principle of democratic management which entails “one person - one vote”, elect their administration. This results in avoidance of existence of conflicted interests which may arise between shareholders and customers in another share capital company.

Cooperative banks have started developing in Greece since the beginning of 1990s and, today, 16 cooperative banks operate in Greece, 14 of which operate on prefecture level and two on state level.

Cooperative banks, based on two basic principles of the cooperative concept, have the maximization of the benefits of their associates, who are both their owners and customers at the same time, as their main goal.

On the basis of the character of the cooperative banks institution, the main criterion for the evaluation of cooperative banks is not the maximization of profit but the level of serving their members’ interests. The price, investments and labor policy of cooperative banks is tailored to correspond to this criterion.

Their philosophy according to a statement by the Cooperative Bank Union of Greece, is to provide obtainable high quality services being profitable but not profiteering organizations.
Cooperative banks only do business with their members and can deal with any kind of banking operations expect for underwriting. They exceptionally do business with non members when it comes to secondary bank transactions or when a member takes part in these transactions as well. Till September 2006 they could do business exclusively with its members, other credit institutions and the Greek State. Since the authorization was given by the Bank of Greece on 1st of September 2006 (Law 3483/7-8-06), the cooperative bank has also been able to do business with non members up to the amount of 50% of its loans or its deposits (Karafolas and Katarachia 2008).

It is a special feature of the cooperative banks that they mainly approach small companies and private entities offering products adjusted to the local conditions and needs.

Compared to other banks they are small and they have the advantage of knowing the local market, being in close contact with the people, having good knowledge of the needs of focal societies and having flexibility in their decisions due to their autonomy. Therefore, they can cope with the continually changing environment and achieve innovative forms of the competitive advantage.

However, the main competitive advantage of a cooperative bank over the other banks is its members. This is an advantage that cannot be copied by its rivals. The attitudes, the beliefs, the knowledge and the views of the members play an important role in their behavior toward the bank and affect the efficiency of the businesses (Birchall and Simmons 2004; Bhuyan 2007).

Cooperative banks have to invest in the cultivation of their relationships with both their members/customers and their customers/prospective members, putting all their customers in the center of their business policy. Credibility in services depends mostly on the development of personal relationships contrary to the credibility in tangibles (Macintosh and Lockshin, 1998).

Rendering of services – all the more so, rendering of services by a cooperative bank – is a personal relationship and the company should find ways of evaluation of the level of rendered services because it has been found that one cannot manage and improve what one hasn’t measured (Ho, 1995).

5. Conceptual approach to customer satisfaction drivers

Customer satisfaction measurement, as it has been proved on research level, must not be based exclusively on “constants”. Therefore, regardless of the similarities between different systems, every country and every company should make adjustments.
It has been argued that service quality can be both a simple one-dimension structure within a certain framework and a complicated multi-dimensional structure within other frameworks (Babacus and Boller, 1992). According to Chumpitaz and Swaen (2002), the number and the nature of the dimensions of service quality depends directly on the service examined. Because of this it is suggested that model measurements specified for each field would be more suitable than a single general scale (Babakus and Boller, 1992; Van Dyke et al., 1997; Caro and Garcia, 2007). Also Furrer et al. (2000) justify that the importance and conception of service quality depends largely on the customer’s values and beliefs which may change from one culture to another.

Reviewing the research literature concerning the up to date formed actualities it is pinpointed that, as suggested by the researchers, service quality can be defined by the conception of each one or all the customers regarding 1) the technical and functional quality of an organization, 2) the service product, the service rendering and the service environment or 3) the reliability, the responsiveness, the awareness, the security and the physical elements connected to a service experience, 4) the image, the value, the price and social responsibility (Avkiran, 1994; Bahia and Nantel, 2000; Athanasopoulos et al., 2000; Mihelis et al., 2001; Aldlaigan and Buttle, 2002; Sureshchandar et al., 2002; Karatepe et al., 2005; Jabnoun and Khalifa, 2005; Angelis et al., 2005).

The cooperation institution is an institution that includes feelings and is based on a different substratum than the one the private sector is based on.

From our point of view, the cooperative branch of banking services is differentiated because of the cooperative culture and the cooperative values which are adopted, put into practice and concern the bank as well as its customers accordingly.

When we refer to the satisfaction factors concerning a customer of a cooperative bank we have to take into consideration that this customer is a banker- negotiator- supplier or investor at the same time, according to the cooperative principles.

Within this framework, dimensions such as cooperative identity, cooperative social responsibility, pricing, service, understanding/support, relationship with the personnel, communication and trust concerning cooperative banks may be of special importance to their customers.

The concept of the dimension called “identity” refers to the set of the differentiating features that define what something is, who someone is and allow their recognition (Babiniotis, 2005). Although, in the international bibliography, the term “identity” is found to be referred to different conceptual purposes (e.g. the beliefs, the speech, the capabilities or the structures), in the case in question we refer to the company identity/character of the bank, that is the “cooperative identity” as it is
communicated by the cooperative banks and is perceived by the customers. If these special features of the company identity, such as strategy, functional philosophy, knowledge etc. do not fall into line with what is actually experienced, the expected results are not ideal for the organization, for example, the employees do not feel committed, the customers are dissatisfied and, generally, there follows functional atrophy (Cornelissen et al., 2007).

The concept of the dimension called “social responsibility” refers to the principles and values which characterize a cooperative bank. It refers to the social sensitivity and responsibility of the cooperative bank toward the parties directly concerned which is mainly developed in the value – production- delivery of service chain and affects it. According to Tsoukas (2008), “a company is not just an economic machine but it is first and foremost a social institution with the intention of creating wealth as well as other unintentional consequences that accompany the creation of wealth. A social creation such as a company becomes an institution the moment it is imbued with values further the ones connected to its functional needs”. The banking institution includes the value system in which they operate as well as the value system they themselves create. Theoretically, cooperative banks, as collective entities, actively intervene on a local level, especially through financing the rural economy of the local community and the SEM, as well as promoting the social completion and educational programs. In accordance with their value system they focus on their members and their main goal is to satisfy the needs of these members and develop their financial and social activities.

The concept of the dimension called “pricing” and rendered services, having as reference point the perceived value, concerns the relation between quality and price of the range of services rendered by the bank according to its goals and its company identity. Since the customers’ negotiation power is not great in relation to the bank, the customer considers the bank as an “enacted thief” that, taking advantage of its power, offers much less than it takes. As the dissatisfaction with the rendering of services becomes greater, customers usually turn to other banks to find more advantageous terms of cooperation (Farquhar and Panther, 2007). Theoretically and because of their non-profiteering orientation, cooperative banks have the ability to offer their customers low prices to their advantage and, at the same time, offer a wide range of services. This way, satisfying the customer’s feelings about the existence of a balance between the rights and the obligation of the parties involved, they make the customers consider that their long cooperation with the bank will result in profits not only for the bank but for themselves as well.

The concept of the dimension called “service” is conveyed as (1) service aiming at convenience, help or solving a problem or (2) the
satisfaction of needs, ambitions, goals etc. (Babiniotis, 2005). Banking products or services adapted to each customer’s needs, which offer utility using modern means and procedures and ensure convenience and promptness in his needs servicing, concern the value customers attribute to time and are criteria of great importance for the evaluation of the cooperation choice. A satisfactory solution to a customer’s problems is considered as sufficient prerequisite by itself and the promptness which problems are dealt with and solved gives significant added value to bank customers. Cooperative banks, being of local character, have the ability to know the market and the people’s needs and, therefore, are able to provide products adapted to customers’ needs. This directness can directly affect the transaction speed.

The concept of the dimension called “understanding and support” is interpreted as the complete, clear and in depth perception that gives the potential for reliable knowledge, distinction and correlation of data or awareness of someone’s position and the offer of help in the form of opinion or recommendation someone words in order to help or guide others to chose the best course of action (Babiniotis 2005). A customer does not have the necessary knowledge to fully understand financial issues and needs consultative support. The correct diagnosis of the customer’s needs, the offer of advice (prevention stage) and the intervention (coping with stage) is necessary on the bank’s side to protect the customer from his inability, whenever it exists, to evaluate and manage such issues.

The concept of the dimension called “relationship with the personnel” concerns the interaction between the personnel of the bank and the customers, from the aspect of the customer, though. Strandvik and Liljander (1994) claim that “when we talk about consumer services the focus must be on the side of the customers”. According to Babiniotis (2005) a relationship is the emotional, mental or physical bond developed between people. There are different relationship structures that can be chosen to be examined so that the possible positive effect on customers would be evaluated. Gremler and Brown (1998) determine five different inclusive factors as the most appropriate and call them interpersonal bonds: familiarity, care, friendship, rapport and trust. The more the customer feels that these interpersonal bonds are strong, the more he feels no need to risk and abandon this relationship for a new, possibly better, one. In cooperative banks where the customers are at the same time partners, the personal relationship between the customer and the bank, theoretically, becomes closer.

The meaning of the dimension “communication” concerns the communication by the service provider to the consumer but not vice-versa. It is interpreted as the procedure through which a transmitter A (bank) transmits information, thoughts, ideas or feelings to a receiver B
(customer) with the aim of acting on them in a way that can cause the development of ideas, acts or feelings to them and eventually affect their situation and behavior (Bourantas, 1992).

As a rule, the bank customer, who uses or wants to use a product or a service, doesn’t have the knowledge (know-how) and the information their provider has as regards the properties, the features and the procedures concerning the product or the service. The information provided to the customer aims at supplying them with the information that will allow them to make consciously and responsibly their decision whatever it is. On the contrary, insufficient information or misleading information-advertising from the side of the bank leads or is likely to lead the consumer to decisions which would not be taken if there was sufficient and correct information.

“Trust” is the faith in reliability, honesty, ability, value etc. someone has. The sense of “trust in a person” can be conveyed by a lot of words which vary in meaning depending on the object of trust, such as reliable, trustworthy, safe, discreet etc. (Babiniotis 2005).

Moorman et al. (1993) define the meaning of trust as the willingness to rely on a partner you do business with, in whom someone has unreserved confidence. Zineldin (1995) underlines the fact that the sense of trust governs the banking sector because bank services involve more risk and uncertainty compared to other businesses. bank customers, generally, are not familiar enough with financial products to be confident. They often are aware of undue terms in the contracts, unjustified charges, opacity (e.g. file charges, fines for early settlements, commission and charges for withdrawal of money etc.) and they feel week and insecure. Because of the difficulty customers have in pre-evaluating bank services, the trustworthiness of the bank services, the trustworthiness of the bank and the extent of customers’ trust in it are crucial factors of the customers’ preference and maintenance of their cooperation with the bank (Malhorta et al. 1994), as the bank satisfies the security feeling from both financial and emotional view.

6. Conclusions

The focus throughout this paper has been on the conceptual approach to the cooperative bank customer satisfaction drivers.

Since cooperative banks, combining effectiveness with social sensitivity, differ from the other types of banks and the perceived quality and satisfaction are service and culture specific, the cooperative model affects the definition of customer satisfaction drivers.
It is attempted important dimensions such as cooperative identity, cooperative social responsibility, pricing, service, understanding/support, relationship with the personnel, communication and trust, to be conceptually defined and be referred to conceptual purposes identical with cooperative culture and values which are adopted, applied and concern the cooperative bank and its customers accordingly.

References


Global networks of locations and cultures. Greek cultural tradition on the internet and the cyberspace

*Ioannis Karydas, Ioannis Apostolakis*

Cost-benefit analysis for the expansion of a Greek E-Shop in Balkans – case study of Bulgaria

*Andreas Bitros, Dimitrios Malandrakis, Antonios Ventouris*

The policy framework of network and information security in the European Union new challenges and prospects *(ABSTRACT ONLY)*

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Managing collaboration complexity in e-government services: lessons learnt from systems theory *(ABSTRACT ONLY)*

*Konstadinos Kutsikos, Gerasimos Kontos*

Managing e-government services: an overview of emergent strategy models *(ABSTRACT ONLY)*

*Spyros Angelopoulos, Fotis Kitsios, Vassilis Moustakis*
Global Networks of Cultures: Greek cultural tradition on the Internet and the Cyberspace

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Abstract:
A group of portals/sites and cultures create global cultural networks and eventually a Net of Culture all over the world is created. This network constitutes an original synthesis, concerning the interaction of cultural portals/sites along with their communities, giving a very important parameter to the comprehension and representation of the Greek culture, particularly during unknown and dark periods of its history.

This paper aims to study the contribution of a variety of important cultural data to the expression of a new perception in the promotion and the intercommunication of the Greek cultural tradition, along with its global role in the society of knowledge through the Internet and the Cyberspace. Trying investigation of the above mentioned dimensions and data in the case of Greek cultural set of locations, communities and cultures, there were found several web sites/portals with subjects relevant to the Greek cultural activities and the corresponding institutional and innovative applications on culture subjects.

After the relative research and analysis of the most important web portals/sites, which report to specific Research Centers of Greek culture in Greece and abroad, the most crucial observation is that new methods and techniques of data treatment that concern the distinction and projection of the cultural content of the past are already being developed.

The methodology of research is related to the secondary exploitation of an abundance of elements and studies, from various resources, accumulated in the electronic libraries of respective research institutes. From this aspect, it can be characterized as a content analysis of Internet relative cultural metadata. Initially, a selection of the most important Greek culture web pages was gathered as, for example, the Research Centre of Medieval and More Contemporary Hellenism of the Athens Academy, the Institute of Modern Greek Research of the National Research Institution, the digital libraries of Greek and foreign Universities, the
Greek Institute of Venice etc., and after relative content analysis a significant number of metadata was resulted, researches and elements to evaluation. The following dimensions were emphasized by the results of research: The greatest part of these contents concern the Antiquity, but, important aspects also report more recent period of Greek culture, for example the period of the Ottoman Empire. Most frequently, the relative researches and libraries are constituted by the interest of personal activities of Greek individuals, as well as teams of specialized institutes or people who prefer or deal actively with the Greek culture. The dimension of discussion forums with a cross-effective way is presented, today, in many cases of relative web pages, while the forms and their structure present great fluctuations as well.

In conclusion, the structure and management of the cultural data through the Internet, as also the global and communicational interventions required for the Greek culture, are feasible and particularly useful in our days. As to the main question, whether similar research practices can be applied today in Greece, corresponding to local, cultural research and academic institutions, within the existing frame of national cultural policy, we answer affirmatively, but the difficulties of a relative argument should also be prevalent, particularly in the level of Greek local self-government. On the whole, the cross-correlation of local-cultural tradition and national cultural and museum practice should be rephrased in the case of world Greek cultural networking.

**Keywords:**
Greek cultural tradition, World Cultural Networking, Cultural research institutions on the Internet.

**Introduction**

The aim of this paper is, to investigate initially the “virtual return” in the Byzantine Medieval and in post Byzantine Ottoman Greek cities and their cultural tradition. Afterwards, through this “virtual” travel to the place and the time of the Greek culture, the appointment and the recombining of the Greek cultural identity, a new perception in the promotion and the intercommunication of the Greek cultural tradition on the Internet and its global role in the knowledge society through the Internet and the Cyberspace is presented. Finally, the creation of the Virtual Medieval and Ottoman Greek settlements, in a clearly artificial way, aims at attracting more visitors and tourists, despite the real research and comprehension of cultural phenomena.

This tendency, first seen in the USA, during the 1930s, was extended in the fast pace in several European regions such as Italy, France, Germany, also in Greece and in many other countries. The structure and management of the cultural virtual sites and their respective equivalents of “virtual” applications in the Cyberspace, while being multiplied with rapid rates, develop a new role of the Internet and allow some innovative
proposals concerning the Greek cultural and its presence in a regional and world level.

While big demographic groups allocate access to enormous numbers of information, this development appears to affect, to an important degree, the frame of constitution and the promotion of local urban cultural expression. It also appears to contribute in innovative services on behalf of various local, research and museum-cultural institutions, as in the case of digital applications in museums, libraries, research and cultural centers, studying different locations and historical periods, while in all cases it connects the particular cultural tradition to present and also to the cultures of the entire planet. The Internet possibilities for the promotion and study of local culture and the corresponding applications were recognized in the international community, almost by its appearance. Furthermore, the prospects of global research networking, the networks of research cultural centers, extend these possibilities.

Trying investigation of the above mentioned dimensions and data in the case of Greek cultural set of locations, communities and cultures, there were found enough web portals/sites with subjects relevant to the Greek cultural activities and the corresponding institutional and innovative applications on culture subjects.

New needs for “virtual” cities and museums

In the beginning of the 21st century, in a critical technological and scientific progress point for a digital rebirth of culture and art in the Internet, the new technologies and the new – innovative systems of information and communication technology still allow more precise representations of older cultural sites and seasons (Avraham, 2004; Batty, 1997; Castels, 1996; Davis, 1990; Donath, 1997, Gibson & Watson, 1995, Wirth, 1938). The representation and the study of sites is attempted today, beyond the “conventional” sources, through the most modern representing sciences and the technologies of “virtual” reality (Karidas, 2007, Engeli, 2000; Everard, 2000; Aurigi & Graham, 1997). More analytically, with these technologies, we can draw important elements for the intellectual reflection with the old Tradition, but also for their effect in the Modern Greek communities, in the natural urban and in the “virtual” level. Through the significances of pictures, of “virtual” reality and the Cyberspace emerges the process that will much better elect the Greek cultural particularity in the modern season (Ntavou 2008, Karidas 2007).

The significance of monuments and the management of local traditions and histories, as also the fragmentary study of monuments, mainly, through the subsidies the same sovereign European model of Hellenic space approach, offered certain possibilities and gave the spark for a more essential dialogue with regard to the possibilities of cultural
delivery of Greek communities. The reasons for such an effort are many and related to the possibility for the deepening in authentic teachings, in forms, pictures and style, that shines up to today, but also with the possibility of growth of modern “virtual” museums, that is to say of a museum applications, that combine the natural reformation with a travel in the most authentic forms and ways of life of season, that can be offered as knowledge to the modern visitor.

New needs, new uses and new proposals for cities and museums emerged and changed radically the exhibition programs of city procreativity, of the museums and their exhibits. In such a way cultural products are offered they re-define the relation of a person and the museum space and the equivalent exhibition programs, but also with the culture, sciences, the settlements and more generally, environment and nature.

The recognition of both sides of the local culture, an exterior environment of an internal psychology clarifies that, it is possible to approach the continuation of local culture, through conditions often unfavorable, difficult but in all cases in periods of sovereignty.

Finally, the interest is shifted by the bullets of mental/rational constitution of individual and psychological, intellectual frame, from which spring the fables, dreams, forms, impetuses and sentiments, to give the qualitative characteristics of each cultural variation.

This psychological dimension expresses the cultural quality of certain concrete communities and settlements, through their faculty to comprehend and to express these deeper sides of the local tradition, reduced in archetypes and representations, but also in wider cultural frames, in a cultural universality, particularly important in the history of human culture (Weiss, 2000; Beer,1975; Moscovici, 1981).

**New problems**

However, a line of problems emerges that concern the representation and comprehension of older times and places in the contemporary studies. The main problem is connected with the comprehension difficulty of culture and places of the past, of the culture of community in each period of the current researcher. More specifically:

- There is a big difficulty in the effort of finding reliable sources, information and data in order to represent particularities of the local, social and economic conditions, the local environment and culture, local space of configuration of cities and towns of each time.
- There is an even bigger difficulty in the finding of pictures, fables, representations, most authentic religious convictions and rituals, communities and places of report.
Another difficulty is to represent the “life” and the “work”, of the important and charismatic social and intellectual forms of season and each place, often secret and inaccessible, difficulties that emanate from the lack of relative authentic sources, or because of an older scientific bias concerning with the cultural study.

We can understand from this description the wide intellectual field in which the teachers of the past had access. Still we realize these teachers were searching for an intellectual treasure capable to express the balance between the matter/nature and the spirit, between the soul and the body, between visible and the invisible world, between dark and light.

**Research hypothesis**

In the most modern scientific efforts we can refer to digital settlement, “virtual” communities, digital museums and others. Through the relative “virtual” applications and the web pages in the Internet, are offered sources, documents, intellectual and instructive material, books, pictures, that allow a “virtual” travel in the Greek Byzantine, Medieval and Ottoman, history, but also more generally, in the Greek literature, philosophy, theology and scientific research. With this extensive information and knowledge that permits the new technologies to shape those technological applications of depicting reality of place, we can synthesize personalities, the Greek faculties, and the settlements.

**Methodology**

In this point it should be stressed out that, with regards to the available searching methods and techniques, the study of cultural geography of cities and their networks, is constituted round a wide field of interdisciplinary approaches and technological proceedings.

These are techniques that draw their elements from the structure of built-up webs and the aesthetics of forms or from historical sources, from currents of art and architecture of places, or from the analysis of intellectual leadership of place, settlement or region (Karidas, 2007).

In the last case, there is an effort for the comprehension and interpretation of influences that involve the lettered and religious leaderships to their work, the conditions of action to their choices and shape the framework of the local populations.

More analytically, in the “traditional” studies of place and culture, the main interest is turned to individuals, their work, the architecture, the settlement or the monument of past and there is also an effort to comprehend them, through archival, written, sources and lists, through archaeological and architectural imprinting’s or through the conclusions of secondary sources, studies, researches, testimonies.
On the other hand, this ascertainment does not mean that there are no sufficient sources, but these sources should be treated with more scientific personal effort of search, often in difficult and hard to transverse regions. The monuments, the buildings and the settlements, as aspects of the archaeological and architectural research on the spot and imprinting, particularly when the written sources are absent, constitute main interlocutors of researchers, to reveal respectively more general social and cultural phenomena.

Globally, it is an effort of interpretation in a way that the local communities, through the important writers and the artists of season, perceive representation of the various processes of reality and thus create culture.

The most recent studies or efforts for a representation of a Medieval or Ottoman settlement or department of settlement are made for cultural reasons, despite of scientific, archaeological, historical or urban reasons. The mansions, the castles, the squares, the faculties, the simplest rural, residences, the buildings of various uses, the churches and the monasteries, the libraries and the laboratories, even the materials, frequent stone, that the residents left behind, compose the historical and cultural environment and change entire buildings and settlements in museums and well maintained spaces aiming at the touristic growth of place.

Results

Trying investigation of the above mentioned dimensions and data in the case of Greek cultural set of locations, communities and cultures, there were found several web sites/portals with subjects relevant to the Greek cultural activities and the corresponding institutional and innovative applications on culture subjects.

After the relative research and analysis of the most important web portals/sites, which report to specific Research Centers of Greek culture in Greece and abroad, the most crucial observation is that new methods and techniques of data treatment that concern the distinction and projection of the cultural content of the past are already being developed.

The methodology of research is related to the secondary exploitation of an abundance of elements and studies, from various resources, accumulated in the electronic libraries of respective research institutes. From this aspect, it can be characterized as a content analysis of cultural relative data (Weber, 1991).

Initially, a selection of the most important Greek culture web pages was gathered as, for example, the Research Centre of Medieval and More Contemporary Hellenism of the Athens Academy, the Institute of Modern Greek Research of the National Research Institution, the digital libraries of Greek and foreign Universities, the Greek Institute of Venice etc, and after
relative content analysis a significant number of metadata was resulted, researches and elements to evaluation.

The following dimensions were emphasized by the results of research:

1. The greatest part of these contents concern the Antiquity, but, important aspects also report the most recent period of Greek culture, for example the period of the Ottoman Empire.

2. Most frequently, the relative researches and libraries are constituted by the interest of personal activities of Greek individuals, as well as teams of specialized institutes or people who prefer or deal actively with the Greek culture.

3. The dimension of discussion forums with a cross-effective way is presented, today, in many cases of relative web pages, while the forms and their structure present great fluctuations as well.

More analytically, after the relative search and the analysis of almost 700 portals/sites, the most important observation is that the biggest part of these actions concern the region of Attica-Athens, after interesting personal activities of specialised institutions, while, the dimension of attendance of discussion with an interactive way is presented only in few cases.

The cross-correlation of local environment of cultural delivery and museum practice is examined in certain examples - good practices, while it remains the proposal for the case of wider Hellenic space.

Examples of portals/sites related subjects with regard to the Greek cultural delivery, particularly the most recent orthodox Christian tradition were examined in internet Cultural Centre of Church of Greece. In this portal, interconnections are offered with content that vary from general cultural facts, figurative interventions, up to the music and the organisation of intellectual discussions, in Greek, but also in European level.

A Greek portal, entitled “Libraries”, with content with regard to the libraries and their development in the history of various cultural formations of West was examined.

It is about data that include archival and photographic material for books and infrequent publications, from the papyrus and the parchment in the paper, with rich illustration and architectural drawings based in the archaeological excavations, even portraits of wise men or scholars libraries and reports to the various intellectual currents of successive seasons.

With regard to the collection and the digitalization of archival material aiming at the appointment and the study of Greek cities, it should to reported that the program of appointment of schools of Constantinople, from the 18th century up to the dues of decade 1950 and the big and violent Greek “expense” from the City.

It is a program that began in 1995 and was continued for one decade, in which a line of Universities participated, research institutions and
cultural unions, with responsible supervision of the University of Athens. It concerns recording historical and architectural materials of unique value, round the daily and religious life of Greek communities.

These data were stored in a data base and were categorized aiming their easy retraction, but also in printed and digital form and were delivered to the Patriarchate of Constantinople.

The reported examples in other European deliveries, are many such as e.g. in the proposal for the “virtual” historical city in the Netherlands, with title NWO Project.

The relative program, materialized in 2006 in Holland and Belgium, is reported in the possibilities of “virtual” depiction and presentation with regard to the historical cities, the buildings and their spaces, from 16th until the 19th century, for various uses, was followed the following steps of approach:

- The collection and treatment of historical, archaeological and cartographic sources with regard to the cities and their cultural characteristics, in a concrete time period.
- The digitalization of historical sources, per case of study.
- The visualization/virtual imprinting of historical cities and their cultural characteristics.
- The coding of the cases above.

Finally, in application of the last years are presented relative “virtual” models for intellectual, religious or national communities in the Internet. We can report the case of Spanish “Crystal Community”, that with “virtual” way participates in the rituals and the teachings of Catholic Church. To the users of the “virtual” church a possibility is provided of manufacturing their own “virtual” church, with choices from relative drawings, while various forums exist, but also current lists and other contents, round the intellectual continuity of Christianity.

Conclusions
With regard to the possible effects of previous seasons in the current conditions of constitution of Greek communities in physics and in their virtual network expression, we can stress out the following:

A. Today, as the social constitution and development, supported by the new world network economic and developmental reality, the new technologies and the Internet, seeks for the particular cultural and religious reality of each region, a new role for the local culture, for holy and intellectual is possible, in the digital electronics virtual dimension. In this way each local community accepts powerful effects from older “virtual” depictions and deliveries, that until recently were not possible. Progressively the reality and the “manufactured” realities constitute a new
reality for each local and cultural constitution, for each particular settlement and his communities.

B. Respectively, the processes of constitution of equivalents of “virtual” communities are in the position to lead to the reconstruction of its policy of - social reality, through the quality of form and the aesthetics of picture and they lead to a spectacular metamorphosis of modern society conditions and modern religious and intellectual life in it.

C. The composition of the local and world culture, aspires, as far as possible, contributes to a better and quality human life in the environment of a modern city, in contradiction to the prospects of religious fanaticism that give birth and climax in the modern urban neighborhoods, particularly downgrading from them.

D. The future hope allows a modern return in the ideas of wise men of saint scholars and their particular, religious and cultural diversity of knowledge to return beautifully as poetic as ever to urban daily life, can open a window in tomorrow that is very near. In the opposite case, one scary, demonic and ugly tomorrow will give an end to a splendid human promise, a tradition and a culture, the Greek Tradition that has accomplished and survived for almost four thousand years. The bases for a new approach of Community interactions and forms of Modern Greek settlements are placed, though this study needs more analysis.

References
Cost-Benefit Analysis and Simulation of a Greek E-Shop 
expanding in the Balkans – Case Study of Bulgaria

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Abstract:  
This research will try to do a follow up to our previous study, regarding the expansion of a Greek e-shop in Bulgaria, which was presented at the 6th Conference of the Management Science and Technology department of the Athens University of Economics and Business. The term "e-shop" includes shops which operate solely through the Internet, and are not part of a chain of normal stores, which perform retail or wholesale sales directly to consumers. The preceding definition does not exclude stores that act as deliverance and customer services points. The size of the company could be best described as small or medium (SME).

To begin with, we examine the necessary level of investment, as well as the operating costs of an e-shop, such as promotion expenses, the site’s translation and configuration costs and costs occurring from the transportation of goods (logistics). Furthermore, we try to estimate the shop’s revenues, which will be used for the investment’s evaluation method. Finally, we investigate issues related to the distribution and promotion of an e-shop which performs in the international market.

The differentiation from our earlier work stems from the fact that distribution, advertising, and generally operating issues will be examined through the use of a simulation program, in order to ensure the reliability of the data. Furthermore, since the first data for the fiscal year 2009 are now available, we will strengthen our economic analysis by examining the impact of the financial crisis in the Bulgarian market. Finally, a new evaluation method will be used, instead of the investment coverage period (perhaps the Present Net Value method).
Through this analysis we will try to determine whether an investment of a Greek e-shop in the Bulgarian market is profitable, by examining both the data from the market research and the results from the evaluation model, and how long will the initial investment’s coverage period be.

Keywords:
E-shop, Greek, Bulgaria, investment, Bulgarian market, expansion.

1. Introduction – Previous Paper

1.1. Market Research

In our previous paper, we made an analysis of the Bulgarian pc market, the Bulgarian economy and the expenses and investments which are needed, in order to develop an e-shop there. We will try to make a brief summary of the points raised below.

The Bulgarian pc market has a very low level of penetration, which is clearly illustrated by the percentage of the population that uses a computer at home (23.3% in 2007) and the percentage of people having an Internet connection (25% in 2008, 21% of which has broadband connection). However, although 60% of the Bulgarian population had not touched a pc until 2007, the rising rates of pc and Internet usage give as an evidence of an emerging IT market (e.g. the Internet connection increase rate was 6% in 2007, with a tendency to rise even more). The two primary target groups are the segments 16-24 (32%) and 24-32 years old (27%), which mainly use the Internet for communication, social networking and sometimes for shopping too. Although there are some problems with the English language, Bulgarian users score 13%, 15% and 7% in the 3 segments of the Eurostat’s test for pc activities (E-skills of individuals, Eurostat database), while the E.U. 27 average is 29%, 23% and 8% and there is evidence from pc-related magazines and exhibitions that there is a strong core of approximately 100,000 dedicated pc users. Finally, the payments security problems’ percentage is extremely low, reaching only 0.3%, showing that Bulgarian users have a relative security in their transactions.

In contrast to the consumers’ situation, the B2B sector is a completely different case. Enterprises seem to feel that Internet is rather a necessity and not a luxury since 88.1% of them have pc’s connected to the Internet (Information and Communication Technologies Usage and E-Commerce in Enterprises, National Statistical Institute of Bulgaria, 2007). The main use of it is for e-government services and CRM systems. However, only 20.4% of the employees use a pc, which shows that, although many companies have pc’s, only a small part of their employees use them. Furthermore, there is a rising need for replacing old devices, which is strengthened by the fact that the market is rather new. Finally, organizations like the
Bulgarian Association of Information Technology seem to take the right steps to the direction of technological improvement, by introducing various acts.

In order to define our competition we depended on Google AdWords, which helped us to find the keywords used by the Bulgarian e-shops for advertisements, and we visited the top Bulgarian e-shops’ pages, as defined by the Alexa website ranking and Custom Search on Google. We found that the majority of these e-shops have a rather user non-friendly interface, with old products, which are usually available after a week or more. Although the prices in the mid-price category are lower than those of Greek e-shops, premium products cost significantly more. This is mainly due to the product cycle, since low and mid-price models in Bulgaria are not sold in Greece anymore, while high-price models in Bulgaria are considered medium-price models in Greece. This allows us possibly, to have a larger margin profit, since this is considered a niche market.

1.2 The Bulgarian Economy

The state of the Bulgarian economy can be described as promising, yet risky. Our analysis starts with the real GDP increase rate (growth rate), which remains stable at 4,2% from 2000 up to 2004 (National Accounts, National Statistical Institute of Bulgaria). From 2004 and until 2008, the growth rate is constantly over 6%, which indicates the rather fast growth of the Bulgarian economy and also the improvement of the welfare of the country. The real GDP per capita follows the same progress, which, together with the income per household rate (which has increased over 200% between 2000 and 2008) strengthens our previous presumption that the country’s welfare is improving. However, due to the financial crisis, we expect a significant drop in the growth percentages, since banks are reducing their loans, as a result of a stricter loan policy.

Bulgaria has another positive feature which further indicates a promising economy: the impressive decrease of unemployment. Although the percentage was extremely high in 2001 (19,9%), by 2007 it has reached 6,9%. This dramatic decrease added some “points” to the nation’s economic policy and enhanced the consumption from low and medium social layers. The well-planned economic policy is also indicated by the decrease of the interest rates of the 10years government’s bonds, which have decreased from 8,26% in 2000 to 3,8 in 2005. The Bulgarian currency, called lev, is connected to the euro at an exchange rate of 1 euro=1,9558 leva. However, Bulgaria will not enter the European Monetary Union until 2011, because of the inflation issues it faces.

The greatest problem, as referred above, is the high and unstable inflation. Starting from 10,3% in 2000, it reaches a significant low of 2,3% in 2003, and then rises to 12% in 2008. This absence of stability is actually
the reason why the entrance into the European Monetary Union has been delayed, at least until 2011, although there are voices supporting that Bulgaria should enter as soon as possible (P. De Grauwe, G. Schnabl, 2004). This is the reason why we identify the Bulgarian economy as “risky”, since the significant rise of prices can influence the entrance of a non-native enterprise in a negative way.

The economic crisis has shown its first signs on the Bulgarian economy. The industrial confidence percentages were -5.9% at January and -5.8% at February, while the industrial production rate dropped to -13.3%. However, we could interpret the unemployment’s decrease to 5.6% as a possible sign of a well-sustained development.

In the previous research we also tried to compare the Bulgarian economy to the Greek one. We found that the Greek economy has both higher real GDP and higher household incomes, thus providing a higher welfare for its citizens. The Bulgarian growth rates may be higher than the respective Greek ones, but if we compare this to the much higher Bulgarian inflation the difference is eliminated. The big difference however between the two economies is the unemployment rates, since the 5.6% Bulgarian rate is significantly lower than the Greek one.

1.3 Investments, expenses and revenues’ analysis

In order to define the investments and the expenses that will be needed in order to develop in Bulgaria, we addressed the issue of product transportation (logistics or Place, from the 4 P’s of the marketing mix). After contacting several logistics companies, we found that the average price for transporting a home pc ranges from 9 to 12 Euros, and for laptops from 7 to 10 (all prices refer to transfer by trucks, which is the most efficient way to transport goods to a nearby country). Since the e-shop, to which we refer, is relatively new, and the market is not yet developed, we decided not to try the two other ways of transporting goods, which are a) to set up a private distribution network, which is only ideal for nearby countries and can create a strong brand image and b) to set up a selling point, or a network of selling points, which will distribute the products. These methods are ideal for consumers which are not used to buy products solely from the Internet (they are not used to the absence of a physical store). Both ways include significant investment costs and expenses, so they are not the best way to distribute products in the beginning of the expansion.

The promotion strategy, since we suppose that the firm is of small size with no significant budget for advertising, is based on Google AdWords. For our analysis we use Google tools as well as data from Eurostat and e-shop.gr. We designed an advertising campaign in Adwords, with a yearly budget of 1.500€ to 1.825€, a CPC (Cost per Click) of approximately 1€,
24 keywords, both in English and Bulgarian and we targeted the market of Bulgaria. These number resulted to 1095-1825 visits per year, which, by using a 2% conversion rate (the conversion rate of e-shop.gr for 2004, reduced to half), resulted to 22-37 buys per year from Google advertising. However, since most promotion on the Internet uses word-of-mouth marketing and the Bulgarian users are used to blogs and social media, we strongly advice to take advantage of these two ways of promotion, which have almost zero costs and are extremely effective.

The investment we have to make in order to expand to Bulgaria is basically the modification of our already existing webpage to one that will be friendlier for Bulgarians. Therefore, we need to acquire a Bulgarian URL (.bg) and to change the language and pricing display (menus, welcome page, and all texts except from product descriptions, prices are in leva and not Euros). Finally, we need to have an IP filter, which will define the country in which the user is located by its IP. The above investments will cost us around 2.030€. Of course, there may be additional investments, depending on the store’s future performance, but these are not subject of our study.

Regarding the tax expenses, the Bulgarian VAT is 14%, and we do not include the Greek taxes applied to businesses, since we have not indicated the type of the enterprise (S.A., Ltd etc.).

One major problem we had with our previous study was that we were not able to define the revenues, due to the fact that we had no relevant data from Bulgarian e-shops. We collected though some interesting data, such as the percentage of the GDP spent for IT products (2% in 2007, whereas the Greek one is only 1.2%) and the available per household income (4399€ in 2008, of which 4139€ was the amount used for consumption). In this study however, and by using the Vensim PLE software, we were able to define the possible monthly revenues, therefore strengthening our investment evaluation method.

Finally, in order to define whether the expansion has any prospects or not, we used the investment coverage period method, supposing that we want to have the investment covered in two years. The method indicated that, with a margin profit of 25%, a second year’s inflation of 12% and advertising expenses of 3.650€ for the two years, we need 10,716.98€ for the first and 12,003.02€ for the second year, in order to cover the investment. This means that, if we set the average price to 600€ we need approximately 18 units sold per year, a number that can be covered solely by Google advertising. However, and since this method is not very descriptive, we decided to use the Net Present Value method in this follow-up, which will be described below.
2. The Vensim Model

In this follow up of the previous paper, we tried to have secure results about the general operation of the e-shop (including revenues, expenses and earnings), so that we can determine if the investment is profitable or not. Therefore we used the Vensim PLE software, by which we created the following simulation model:

![Diagram of the E-Shop Vensim Model](image)

**Picture 1** The E-Shop Vensim Model

In this model there are two main rates and a box variable-level, Total Revenues, Total Expenses and Earnings. The first two run on a monthly basis, while the Earnings variable accumulates the difference between them. The time step for the model is 1 month and the duration is 24 months (2 years). Underneath the basic equation (Earnings=Total Revenues-Total Expenses) are the rest variables of the model, which are separated into two categories, constant variables and auxiliary variables. Constant variables (which include Income, Income towards consumption, Google Visitors, Other Visitors, Site’s Conversion Rate, CPC, Laptop’s cost per package, Home Pc’s cost per package, Margin Profit, Greek Inflation, Bulgarian Inflation, VAT, Competition, Home Pc’s Average Price, Laptop’s Average Price and Laptop’s Percentage) are first-step variables, meaning that they do not depend on other variables to determine their number. On the other hand, auxiliary variables (Attitude towards consumption, Realistic Conversion Rate, Advertising Budget, Visitors, Buyers, Laptop product cost, Home Pc product cost, Total product cost, CPP, Logistic Expenses, VAT Expenses, Home Pc’s Percentage, Average Price, Competition’s Effect, Revenues and Expenses) are determined by other constant or auxiliary variables, therefore we cannot determine their number in any case. The arrows show the relationships between the variables.
If we divide the whole model into two parts, the Revenues part and the Expenses part and focus on the Revenues part, we will see that the Revenues variable depends on the Average Price and Buyers variables. The Buyers variable depends on three main auxiliary variables, Realistic Conversion Rate (which is the site’s conversion rate divided by the consumers’ tendency towards consumption), Competition’s effect (which is a sum of many factors that influence the competition, including a random normal variable, which describes the random changes of the competitors) and Visitors (which are influenced by the two types of visitors, which also follow a random normal distribution, since it is hard to change these numbers by will). The Average Price variable depends on many variables, but, since Laptop’s Percentage and Home Pc’s Percentage are rather random variables, and the Bulgarian Inflation is determined by the Bulgarian state (and therefore is stable), we may say that only two variables play an important role, Laptop’s and Home Pc’s Average Prices, which are determined by the company itself. In order to have a complete view of this part, we have to add that the Site’s Conversion Rate can be changed in indirect ways by the company (for example, by optimizing the site’s source code, or by improving the shop’s user interface), which is extremely difficult to measure.

The second part of the model is the Expenses part. This variable is determined by the four types of expenses, Total product cost, Logistic Expenses, Advertising Budget and VAT Expenses. Logistic Expenses have to do with two variables which are influenced by the Greek logistics companies, the Laptop’s and Home Pc’s cost per package, which, if multiplied with the relevant percentages, give us the Cost Per Package, or CPP. The Advertising Budget depends on the CPC (Cost Per Click) we will pay for Google Advertising (which in this model indicates the amount we will pay in order to get the visitors instead of our competitors – this means that higher CPC reduces our competition, but does not increase significantly visitors, because it cannot create demand) and on the number of visitors (clicks). The Total product cost is mainly determined by another variable that the company influences, the Margin Profit, and, finally, VAT Expenses are mainly determined by the state.

From the previous analysis we have outlined the seven important variables: 4, which are directly influenced by the company (Laptop and Home Pc’s Average Prices, CPC and Margin Profit), 2, which are influenced by other companies (the expenses for transferring the goods) and 1 which is influenced in an indirect way by the company. These variables will be used below in order to describe the model.
3. Methodology

We created 15 scenarios, all related to these 7 crucial parameters and based on a basic scenario, named scenario 1. Each following scenario changes one or two variables from the basic scenario, so as to determine the effect of those changes. All 7 variables are constant, and take only one numeric data for the whole simulation.

Our basic scenario (Scenario 1) is based on the following assumptions:

Site's Conversion Rate = 2%, CPC= 1 €, Laptops Package Cost=8€, Home PC's Package Cost= 10€, Laptops Average Price = 620€, Home PC's Average Price is 610€, Profit Margin = 0,25%

In the table below we can see the scenarios, the variable changed and the new value:

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Changed Variable</th>
<th>Change from Normal Situation</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>Normal</td>
<td>None</td>
</tr>
<tr>
<td>S2</td>
<td>Home PC Price Increase</td>
<td>Home Pc Average Price=630</td>
</tr>
<tr>
<td>S3</td>
<td>Laptop Price Increase</td>
<td>Laptop Average Price=640</td>
</tr>
<tr>
<td>S4</td>
<td>General Increase on Prices</td>
<td>Home Pc Average Price=630, Laptop Average Price=640</td>
</tr>
<tr>
<td>S5</td>
<td>General Decrease on Prices</td>
<td>Home Pc Average Price=590, Laptop Average Price=600</td>
</tr>
<tr>
<td>S6</td>
<td>Decrease on Home PC Prices</td>
<td>Home Pc Average Price=590</td>
</tr>
<tr>
<td>S7</td>
<td>Decrease on Laptop Prices</td>
<td>Laptop Average Price=600</td>
</tr>
<tr>
<td>S8</td>
<td>Increase of Conversion Rate</td>
<td>Conversion Rate=0,03</td>
</tr>
<tr>
<td>S9</td>
<td>Decrease of Conversion Rate</td>
<td>Conversion Rate=0,01</td>
</tr>
<tr>
<td>S10</td>
<td>Margin profit Increase</td>
<td>Margin Profit=0,3</td>
</tr>
<tr>
<td>S11</td>
<td>Margin profit Decrease</td>
<td>Margin Profit=0,15</td>
</tr>
<tr>
<td>S12</td>
<td>CPC Increase</td>
<td>CPC=1,1</td>
</tr>
<tr>
<td>S13</td>
<td>CPC Decrease</td>
<td>CPC=0,9</td>
</tr>
<tr>
<td>S14</td>
<td>Logistic Expenses Increase</td>
<td>Home Pc Package Cost=11, Laptop Package Cost=9</td>
</tr>
<tr>
<td>S15</td>
<td>Logistic Expenses Decrease</td>
<td>Home Pc Package Cost=9, Laptop Package Cost=7</td>
</tr>
</tbody>
</table>

For the evaluation of the investment we used the Net Present Value method for the 15 scenarios. Below are the assumptions we made:

- We assume that the investors want a capital performance of 10% each year. This means that the capital’s cost is 10%.

- We use only real data, in order to eliminate the effect of the Greek Inflation on our investment.

- We do not include the taxes which are applicable for Greek corporations. This happens because the company might be an incorporated company (S.A.), a personal company etc.
The Greek inflation is 2.71% for the first year and 1.97% for the second one.

In order to accept each scenario, the Net Present Value must be higher than 0 (meaning that our real net profit, after we include the capital’s cost, must be higher than the initial investment).

We do not take into account other investments that might happen in the future.

The equation we used for the method is the following:

\[
Net Present Value = \sum_{t=0}^{T} \frac{Net \ Cash \ Flows_t}{(1 + r)^t} - CI
\]

where \( C \) is the Capital’s cost (the investors’ minimum acceptable performance), \( t \) is the number of periods and \( CI \) is the investment’s cost. In Table 2 we can see the Net Present Values of the 15 scenarios:

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Earnings</th>
<th>Net Present Value</th>
<th>Status</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>6,518,23 €</td>
<td>3,328,88 €</td>
<td>Approved</td>
<td>6</td>
</tr>
<tr>
<td>S2</td>
<td>5,579,36 €</td>
<td>2,556,95 €</td>
<td>Approved</td>
<td>11</td>
</tr>
<tr>
<td>S3</td>
<td>6,277,58 €</td>
<td>3,140,80 €</td>
<td>Approved</td>
<td>9</td>
</tr>
<tr>
<td>S4</td>
<td>5,482,39 €</td>
<td>2,473,70 €</td>
<td>Approved</td>
<td>12</td>
</tr>
<tr>
<td>S5</td>
<td>6,490,51 €</td>
<td>3,302,10 €</td>
<td>Approved</td>
<td>7</td>
</tr>
<tr>
<td>S6</td>
<td>6,731,81 €</td>
<td>3,502,04 €</td>
<td>Approved</td>
<td>4</td>
</tr>
<tr>
<td>S7</td>
<td>6,285,36 €</td>
<td>3,135,78 €</td>
<td>Approved</td>
<td>10</td>
</tr>
<tr>
<td>S8</td>
<td>10,047,12 €</td>
<td>6,239,11 €</td>
<td>Approved</td>
<td>1</td>
</tr>
<tr>
<td>S9</td>
<td>2,267,78 €</td>
<td>-190,58 €</td>
<td>Not approved</td>
<td>14</td>
</tr>
<tr>
<td>S10</td>
<td>9,233,48 €</td>
<td>5,604,77 €</td>
<td>Approved</td>
<td>2</td>
</tr>
<tr>
<td>S11</td>
<td>1,087,73 €</td>
<td>-1,222,90 €</td>
<td>Not approved</td>
<td>15</td>
</tr>
<tr>
<td>S12</td>
<td>7,126,66 €</td>
<td>3,819,75 €</td>
<td>Approved</td>
<td>3</td>
</tr>
<tr>
<td>S13</td>
<td>5,129,07 €</td>
<td>2,176,41 €</td>
<td>Approved</td>
<td>13</td>
</tr>
<tr>
<td>S14</td>
<td>6,428,06 €</td>
<td>3,253,36 €</td>
<td>Approved</td>
<td>8</td>
</tr>
<tr>
<td>S15</td>
<td>6,608,39 €</td>
<td>3,404,41 €</td>
<td>Approved</td>
<td>5</td>
</tr>
</tbody>
</table>

4. Results

The most crucial parameters according to our simulation are margin profit, conversion rate, pricing and CPC. Margin profit is, according to our simulation, the most positive influencing parameter. An increase of 1% may create a 3.42% increase on earnings. An increase on the margin profit
can be achieved if our simulated e-shop manages to position its’ products as premium, thus allowing it to increase its’ prices. A decrease on Margin profit has a great negative impact on earnings, with an identical ratio of correlation.

The second most important parameter is the Conversation Rate, which boosts the site’s overall performance. On the other hand, we can observe that a drop in the Conversion Rate can put the viability of the e-shop in danger. Conversion Rate is an indicator that can be controlled up to an extent by the company, but it needs great amount of time and money.

Another milestone for our simulated e-shop is pricing strategy. We can see that the decrease of prices can create a competitive advantage, but we have to bear in mind that there is a thin line between reasonable prices and suspiciously low prices, which is totally dependent on the consumers’ perception.

CPC is a complicated parameter that reflects the volume of competition and it influences ours simulated e-shop advertising budget. From our simulation, we observe that an 1% increase on CPC will generate 1,5% more earnings.

Finally we observe the relative low impact of the logistics expenses, supposing that we use outsource the logistic process, on the overall profitability of the e-shop.

To sum up, the keys to success for a Greek e-shop on the Bulgarian market are the following:

- Careful pricing policy.
- Implementation of SEO techniques.
- Well-planned business agreements with logistics companies.
- CPC, which will create competitive advantages but will not drive the advertising budget out of control.
- Successful positioning as a retailer of premium product, which will allow the e-shop to achieve greater margin profit.

5. Conclusion – Further Research

The results from this study, as well as from its predecessor, indicate the high potentials of the Bulgarian market. In this follow up, we strengthened our estimations, since 13 of the 15 scenarios were approved, while the two which were not approved, could have covered the investment in the 3rd year. The Bulgarian market research showed an emerging market with great potentials which, according to Porter’s theory of The Five Forces
give us the advantage of entering a market before other competitors do so. By concentrating on the important variables referred above, we can be almost sure that the investment will already be profitable by its second year, therefore allowing us to reinvest capitals, in order to make the competitors’ entrance even more difficult. Finally, although the Bulgarian economy has to deal with some issues, including the inflation, the steps that are taken by the state are in the right direction, and the entrance in the European Union (and hopefully in the European Monetary Union soon) will further improve all the economic rates.

A possible direction for a further research could be an experiment with a real Greek e-shop, in order to observe visitors’ behavior and to collect real data, in order to cross check our theory and to improve our e-shop simulation model.

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Alexa.com.
Google.com.
The policy framework of network and information security in the European Union new challenges and prospects

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Abstract (only):  
Network and Information Security has become a key challenge for policy makers, but finding an adequate policy response is becoming an extremely complex task. Networks are converging, are increasingly interconnected, they partly use the same infrastructure so the legal provisions (telecommunications framework and data protection law) need to be applied effectively in a rapidly changing environment. Data breaches and communications security if addressed as a national approach have the risk of producing a fragmentation and inefficiency across Europe.

Differences in national approaches and lack of systematic cross-border cooperation substantially reduce the effectiveness of domestic countermeasures and have the potential to increase vulnerabilities and risks. So there is need to integrate national policies in a more European and global dimension.

Furthermore it is important to integrate a Network and Information Security Strategy within the European Union which will influence the creation of standards, policy guidelines and cooperation for promoting information security and which will ensure the division of responsibilities between the various actors in the field of information security.

A new Information Security Strategy will lay the foundation for improved cooperation guiding information security efforts towards shared goals.

Keywords:  
Network and information security, Network and Information security strategy, critical and information infrastructure protection, communications privacy, confidentiality
Managing collaboration complexity in e-government services: lessons learnt from systems theory

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Abstract (only):
During the last decade, government agencies have placed special effort in developing portals and offering online services. Despite compelling benefits, initial “take-up” survey results are anything but promising. In addition, emerging sociopolitical activities present complex and dynamic challenges that demand a more flexible perspective of what constitutes the appropriate framework towards the next generation of e-government service provision.

In such a framework, successful e-government services and applications will depend on the ability of multiple organizations to collaborate towards shared objectives using data network infrastructure as a mechanism for process management and coordination. The key determinant challenge that defines the efficiency and effectiveness of such a structure is managing the collaboration complexity that stems from the heterogeneity of stakeholders and the different resources they cede. This is not only a management issue but a technological challenge as well, given the enabling role that networking technologies will play in this structure.

Current research approaches for harnessing collaboration complexity in the e-government discipline remain highly varied, fragmented and empirically weak. It is the aim of this paper to bridge this gap by presenting a complexity management framework for e-government service provision, based on contributions from other scientific disciplines that harness collaboration complexity in equivalent dynamic situations. To that extent, authors examined the contribution of Systems Theory, Network Theory and Complexity Theory for managing complexity in dynamically fluid environments. Based on a comparative analysis, authors select the “Viable Systems Model –VSM” – a branch of Systems Theory, as it systematically unfolds the necessary and sufficient functions required for managing collaboration complexity. The VSM components and their interactions and interdependencies are discussed and constitute the template required to assess the functionality of a an e-government service transformation model that accounts for the characteristics of the second generation of e-government service provision.
and differentiates upon specific collaboration complexity management practicalities derived from the Viable Systems Theory discipline. After describing the cornerstones of this model, we discuss certain guidelines for mapping collaboration complexity into an implementation framework for developing corresponding e-government services.

**Keywords:**
E-government, organizational transformation, collaboration, complexity management, systems theory, viable systems model
Managing e-government services: An overview of emergent strategy models

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Abstract (only):
Management is what makes e-Government successful by coordinating the use of corporate resources, managing relationships and empowering strategic alliances. However, current e-Government methodologies and models used are only tailored to specific requirements. This restrains the ability to compare cases and draw valuable conclusions as to how to improve e-Government and its performance measurements. Therefore, the authors are attempting to address the issues faced by surveying the models consisting of effective practices in e-Government and information technology integration management and support. The study provides in depth overview of the current status of e-government models and links with emerging information technology.

Keywords:
e-government, strategic frameworks, public services, emerging technologies
**Topic:**

**Social Policy**

Attitudes of female university students towards marriage and associated factors in contemporary Greece

*Kostas Rontos*

Social systems theory and research infrastructures

*John Kallas*

Developmental social policy and social research

*Nikos Nagopoulos*

Modeling the impact of social interactions on the decision making process: Comprehensive Framework

*Eleni Kitrinou*

The phenomenon of economic responsibility

*Olev Raju*
Attitudes of female university students towards marriage and associated factors in contemporary Greece

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Abstract:
An attempt was made in this article to explore the attitudes towards marriage and the factors presenting a significant association with these attitudes which contemporary Greece has been encountering during the last years. In order to meet these objectives, a questionnaire of 43 mainly closed-type questions was completed by a sample of 220 female university students and descriptive statistics, non parametric tests and a logistic regression model were employed for data analysis. According to the survey’s data analysis, the majority of young female students keep positive attitudes towards marriage. However, the reasons they believe that lead nowadays a woman to marriage are different in comparison to the past. Changing attitudes towards marriage are also explored in terms of their attitude towards a possible future cohabitation instead of marriage, in parallel to the fact that they are in favor of marriage. Attitudes towards marriage seem to be associated with the students’ intention to undertake marital commitments and obligations, their attitudes towards cohabitation, the current labor market conditions, and mother’s educational level.

Keywords:
Age at marriage, Attitudes towards marriage, Greece, Socioeconomic, explanatory factors, University students

1. Introduction
Marital attitudes are defined as the situation of being in favour or against marriage. In fact, attitude is a complex mental state involving beliefs, feelings, values, dispositions to act in a certain way, towards or backwards marriage in our case (Clarkberg et al 1995). The aforementioned beliefs and values lead to getting married or postponing the decision to get married or, finally, keep people outside the marriage procedure.

In modern societies, there is a change of attitude towards marriage, with the age of marriage getting considerably higher, owing to the higher priority given towards other activities such as education, work, career and leisure. Numerous research studies have been conducted throughout all
the world, indicated that in most places the age of marriage is getting higher and higher (Voland and Dunbar 1997; Perreira 1991; Lofstedt et al 2005; Hong 2006).

According to official measures, the mean age of first marriage among women increased by 1-4.5 years between 1990 and 2000 in European and Northern American countries (UNECE 2003). In most of these countries the mean age of first marriage was 25 years old and over in 2000/2001, while in some other countries, such as Sweden, Denmark, Iceland and Switzerland the relative age exceeded 30 years (UNECE 2003). In Asia, there are countries, such as Japan, Hong Kong and Singapore, where the mean age of marriage among women exceeds 27 years, while in Africa, Libya reaches 29 years. In Greece, the mean age of marriage for women increased by 1.9 years between 1990 and 2000 and reached 26.6 years in the end of the decade (U.N. 2000). According to our data processing on the national vital statistics produced by the National Statistical Service of Greece (N.S.S.G 2005), in 2005 the relevant indicator reached 29 years.

Nowadays, cohabitation constitutes a significant alternative pattern against marital status, not only as a stage before two young people get married, but also as a permanent situation even between older adults, aged 51 and over (Brown et al 2006). According to the 2000 Census in the USA, about 1.2 million older adults are cohabiting (Brown et al 2005). Studies have found that remaining single is in fact the alternative to cohabitation, with many cohabitants hardly ever thinking of marriage (Manning and Smock 2005). It is true that cohabitation has appeared in societies with different types and as a new and a very rapidly spreading phenomenon is still mostly unexplained. From the 6 types of cohabitation suggested by Heyveline and Timberlake (2004), the present study is dealing with the type “alternative to marriage”, studying the possibility of people living together but outside marriage.

In Greece the number of weddings falls gradually from an annual average of 73,500 in the decade 1961-70 and 70,540 in the decade 1971-80 to 62,260 and 56,876 in the decades 1981-90 and 1991-2000 respectively. The crude maternity rate (the number of marriages per 1000 inhabitants) falls from 9.7 in the early Post World War II period to about 5.5 in recent decades (NSSG 2005). Although the number of marriages declines, cohabitation has appeared, but it is not yet considered a type of marital status in Greece. World Values Survey (W.V.S, 1999) for Greece, carried out in 1999, shows that 63 % of the total sample was legally married to their partner, but the rest 37 % were not defined by the survey as cohabitants.

WVS (1999), has also revealed that 84.3 % of the Greeks disagree with the aspect that marriage is an out-dated institution, while only the
15.7% agree with it. Male and female people present almost the same frequency as young people aged 15-29 years old. The next age group of 30-49 years old considers marriage as an out-dated institution in a higher frequency (18.9 %). Among Greeks of higher educational level, 15.0 % consider marriage as an out-dated institution, while in those with low educational level (elementary) the ratio falls to 9.0 %.

Attitudes towards marriage, family and children are historically associated with a great number of factors, such as: religion and race, social class, economic and living conditions, educational level, employment patterns especially of women, the cost of living and children growing, conditions in the housing market, area of residence, urbanization level, sensitivity of societies to demographic problems, social and demographic policy implemented, the family’s origin type and size, general political and economic environment as well as social patterns concerning women and their role in society, “the myths around marriage”, experience of marriage breakdown, individualism, etc” (Sauvy 1974; Redwood 1983; Chaudhury 1984; Lasthaeghe and Meekers 1987; Zucker-Rouvillois 1987; Zablan 1988; Fiolova and Tucek 1997; Smock et al 2004; Mauldon 2005).

Among these factors, the changing role of women in modern societies and more specifically women’s pursuit of higher education and career are crucial in the decision to get married, create family and bear children. Women's growing interest in Higher Education and attendance has been the key factor in the change of roles between genders, as well as in the shift of marriage attitudes and behaviour. According to a study conducted in the United States and Germany which has followed a family economics approach, the hypothesis has confirmed that the higher the educational level of women the more marriage rates fall not only during education but also after graduation as well (Bruderi and Diekmann 1994).

However, in the former Eastern Germany area different marriage patterns were observed by the study, indicating the influence of differences in the institutional context. Even in the early ’90s, the use of qualitative methods and the analysis of Italian women’s biographies coming from different cohorts (Blossfeld and Rose 1992) revealed that the level of education has had a negative impact on Italian women's marriage patterns. This effect has been established owing to women’s growing economic independence, increasing, as a result, the age of marriage. For China, correlation analysis yields that higher educational attendance is related to later age of marriage and is negatively correlated with fertility. This correlation makes educational factors influence the implementation of policies towards the decline of fertility (Zhan 1995). Basu (2002) has critically examined the “quite uniquely universal negative relation between education and fertility” and has noted that the “mechanisms
behind this relation continue to intrigue and to fascinate”. Therefore, after accepting that gender equalities lie behind the education-fertility relationship, she tries to describe some other mechanisms to explain this relationship. Apart from the educational level of the young woman itself, her parents’ educational level is also likely to influence her attitudes towards marriage. It is true that parents, and more specifically mothers, transfer their attitudes towards marriage, education or career to their young daughters. Hence, it is expected that a well educated mother tends to give priority to her daughter’s studies and career over marriage and children at a young age.

Furthermore, the modern woman aspires to join the labour market and, why not, pursue a successful career, exactly as a man. In fact, this new role adds up to the role assigned by tradition to women, i.e. that of getting married and becoming a mother, as the vast majority of women are expected both to make a career and get married and becoming mothers (Novack and Novack 1996). Research work by Kerpelman and Schvaneveldt (1999) found that women express their intention for early engagement in both work and family roles. However, the typical case is that education comes as a first priority, followed by work and career and then marriage, family and children. As a result, the age of marriage rises and family formation starts several years later or - in some cases – it never happens, as a consequence of complete involvement in work and career. This order of priorities is also typical in contemporary Greece, as young women are strongly encouraged to get involved in higher education and follow a career exactly like young men, rather than get married and bear children (as dictated by parents and society several decades ago). Things get more complicated in Greece when higher education is considered as a basic step to social recognition and all young people- both male and female- try to enter University or a Higher Technical School. Additionally, almost all students are thinking of pursuing postgraduate studies, which in Greece is regarded as an indispensable qualification to ensure employment. In fact, nowadays young women have to face both old and new beliefs about the importance of education – attempt to join labour force and pursue a career on one side and get married and have children on the other side. However, the result is most of the times unsuccessful. This dual role of the young woman is complicated and has serious impact on social equilibrium, on the relationship between sexes, as well on marital and fertility patterns. The complexity and seriousness of this new dual or multiple feminine role has motivated scientists from different disciplines to analyze this issue and to suggest planning processes which could combine all roles (Rand and Miller 1972; Witzman 1994; Adams et al 1996; Livingston et
Another factor that seems to be associated with attitudes towards marriage is the decreasing willingness of young people to undertake commitment and make the sacrifices marriage and children usually involve. The question is if, instead of such responsibilities, young people prefer independent life and are more interested in their personal welfare and social unfolding. If this is the case, are we in front of a changing social pattern, where the traditional institution of marriage and the wish for childbearing are gradually substituted by the desire for personal happiness and freer lifestyle (Morsa 1985, Wilson 2002).

The changing working conditions in contemporary labour markets (Blau et al 2000), as well as the inadequate state policies to support marriage and fertility are also of growing importance in modern societies (Zucker-Rouvillois, 1987; Roussel and Thery 1988, Kohler et al 2002, Pinnelly and Di Cesare 2005,). Unemployment, underemployment and “non permanent forms of employment”, currently faced by young people, have a negative impact on the decision of marriage and childbearing. (See Parliament of Australia Report, 1998).

The urbanization level in the place of origin is also indicated as a significant factor that influences attitudes towards marriage, the dual role of woman, the age of marriage, etc. Research work has found out that the higher the urbanization level the lower the preference for marriage and an early age for family (Montgomery et al 2003, Choe et al 2004).

At last but not least, the changing young women’s attitudes towards marriage over time should be examined as an important predictive factor, as research studies reveal significant differences (Rand and Miller 1972). Differences between attitudes and final behavior are also indicated in several studies (Ajzen and Fishbein 1977, Martin and Parashar 2006) making the age of young woman a factor that should be examined in the marital and childbearing patterns.

In this framework, the present study was designed to answer two central research questions: (i) which are the attitudes of young female university students in Greece towards marriage? (ii) According to the above young women’s view, which is the significance of certain factors associated with these attitudes, such as the pursuit of higher education, employment, career and personal welfare instead of marriage commitments, the changing conditions in labour market towards flexible types of work and the inadequate policy action that the state has undertaken in support of marriage? The association of certain characteristics such as age, urbanization level, parents’ education level and the income of young women is also examined. Additionally, the study had tried to construct a model which would use most of the above
factors, and would provide the demographic, socio-economic and attitudinal profile of student groups which present higher probability of being in favour of marriage in comparison to others.

Finally, after examining all the above issues concerning attitudes towards marriage we try to offer evidence on present and future conservative, changing or modern manners, as revealed by the beliefs and intentions of highly educated women in the Greek society. We think that the study of such issues in a southern, rather traditional society, as Greek society is, in comparison to other European societies, will yield interesting results in the framework of a changing world and will shed light to the “conflict” between marriage-family-children pattern and education-work-career-personal wellbeing pattern. Moreover, the study will give information about the young educated women’s opinion on labour market conditions and the influence they exert on their decision of getting married.

2. Methodology

2.1 Target Population

For the purposes of this study, female university students were selected. That part of the population, consisting of educated and modern young people are suitable to express their pursuit of further education, to reveal their expectations about future employment with the new market conditions, as well as to express their opinion about the role of state. All these views are associated with their attitude towards marriage and children. Beyond that, there is no doubt that every social change starts from young and educated university students, a fact that makes them the most appropriate persons to express any new attitude for the future lifestyle. Proof that female university students are appropriate to constitute the statistical population for the study of changing marital attitudes worldwide, is the frequent use of them already in several studies, which investigate: their life structure decisions (Jonson and Jaccard 1981), their balance expectations for the future career, marital and parental identity (Kerpelman and Schvaneveldt 1999), their perceptions of future marital patterns of work and family integration (Hallet and Gilbert 1997), the anticipated work-family conflict among college students in relation to a number of factors as gender, sex roles, career commitments and marital commitments (Livingston et al 1996), and the degree of stability among junior high, high school and college female students concerning education, occupation, marriage and life plans (Rand and Miller 1972). Men have been excluded from this study, as it is women’s attitudes that are rapidly changing nowadays and because this is the aim of study in this particular research.
2.2 Sample’s Selection, Sampling Method and Methodological Tool

In order to elicit information regarding the attitudes of the target population towards marriage, fertility and divorce, a research was conducted by appointed students of the Sociology Department of the Aegean University, during April and May 2006. The sample of the research consisted of 220 single females, studying in different departments of the university. Stratified, random sampling was used and the department and the year of study were defined as the stratification criteria. The Probability Proportional to Size (PPS) sampling technique defined the number of respondents among strata.

As the selected sample includes Students coming only from the University of the Aegean and not from all universities all over Greece, the results of the present survey should be generalized to national level with relative attention. The fact that University of the Aegean students come from different places all over Greece allows generalisation of the results to national level with a certain degree of reliability. Data were selected by experienced and well trained students of the University of the Aegean by interviewing each sample unit.

A questionnaire of 43 mainly closed type questions was filled in by every student participating in the sample. The attitude of the sample students towards marriage (in favor/against), the number of children they wished to have and the appropriate age of marriage were of central importance in this survey.

2.3 Methods of Data Analysis

Descriptive statistics and chi-squared tests were used to give answers to the research questions. It should be stressed out that independence tests, such as chi-square tests, assume that the various attributive factors work quite independently, in order to determine the dependent variable under consideration, which in our case is the marital attitudes of the sample units.

As mentioned in the introduction, in order to extract more satisfactory and complicated results concerning research question (ii), multivariate analysis had to be employed. Towards this direction, the Logistic Regression Model was used in the analysis of students’ attitude towards marriage. The Logistic Regression family provides a powerful tool for the examination of discrete decisions or views on social sciences, as these models assume that all attributive factors determine the variable examined simultaneously (Bishop et al 1975, Nerlove and Press 1973; McCullagh and Nelder 1983; Cox and Snell 1989, Hosmer and Lemeshow 1989).
Moreover, a Logistic Regression Model estimates the probability with which a certain event will happen or the probability of a sample unit with certain characteristics (expressed by the categories of the predictor variables) to have the property expressed by the value 1 of the dependent variable $Y_i$. The estimation of this probability is performed by using the cumulative logistic distribution:

$$P(Y = 1) = F(b) = \frac{1}{1 + e^{-(b_0 + b_1 x_1 + b_2 x_2 + \ldots + b_n x_n)}} \quad (1)$$

### 2.4 Regression Method Application

The dependent variable $Y$ is a dummy variable with value 1 if the student is in favor to marriage and value 0 if otherwise. A first group of independent variables are: age, place of origin, mother’s educational level and student’s level of income. Students’ intention to overcome the commitment of marriage, their opinion about the extent to which career can affect the decision to get married, the extent to which non permanent work can affect the decision to get married, the possibility of opting for cohabitation instead of marriage in the future and, finally, their opinion about the degree to which the State supports marriage, all these constitute a second group of independent factors. All independent variables are introduced as categorical. Their categories are given in Table 1. The selection of the particular factors as explanatory, in the present model was made partly according to their importance of the students’ attitude to marriage, as developed into the introduction and partly according to their significance at the separate chi-square test that had preceded.

### 3. Results

#### 3.1 Students’ General Characteristics

The mean age of the 220 students was 20.54±0.24 years, ranging from 18 to 30. Their median year of attendance was 2.5. A detailed description of the students and their family characteristics as well as their opinion about main issues on marriage/cohabitation is presented in table 1.
Table 1. Variables examined for association with attitudes to marriage, their values and values’ frequency (N=220)

<table>
<thead>
<tr>
<th>Variables and values</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-21</td>
<td>71</td>
<td>32.3</td>
</tr>
<tr>
<td>22-25</td>
<td>87</td>
<td>39.5</td>
</tr>
<tr>
<td>26 and more</td>
<td>62</td>
<td>28.2</td>
</tr>
<tr>
<td>total</td>
<td>220</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Year of attendance</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First or second</td>
<td>110</td>
<td>50.0</td>
</tr>
<tr>
<td>Third of forth</td>
<td>92</td>
<td>41.8</td>
</tr>
<tr>
<td>Getting the degree or attending M.Sc</td>
<td>18</td>
<td>8.2</td>
</tr>
<tr>
<td>total</td>
<td>220</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Mothers’ educational level</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elementary School</td>
<td>25</td>
<td>11.4</td>
</tr>
<tr>
<td>High School</td>
<td>23</td>
<td>10.5</td>
</tr>
<tr>
<td>Senior High School</td>
<td>100</td>
<td>45.5</td>
</tr>
<tr>
<td>University or Higher Technical School</td>
<td>72</td>
<td>32.7</td>
</tr>
<tr>
<td>total</td>
<td>220</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Size of City of origin</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metropolitan Areas&lt;sup&gt;a&lt;/sup&gt;</td>
<td>57</td>
<td>25.9</td>
</tr>
<tr>
<td>Cities with population over than 25,000</td>
<td>81</td>
<td>36.8</td>
</tr>
<tr>
<td>Cities and Towns with population less than 25,000</td>
<td>81</td>
<td>36.8</td>
</tr>
<tr>
<td>25,000</td>
<td>219</td>
<td>100.0</td>
</tr>
<tr>
<td>total</td>
<td>220</td>
<td></td>
</tr>
<tr>
<td><strong>Family type</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single parent type</td>
<td>21</td>
<td>9.5</td>
</tr>
<tr>
<td>Typical narrow&lt;sup&gt;b&lt;/sup&gt;</td>
<td>172</td>
<td>78.2</td>
</tr>
<tr>
<td>Extend&lt;sup&gt;c&lt;/sup&gt;</td>
<td>27</td>
<td>12.3</td>
</tr>
<tr>
<td>total</td>
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<tr>
<td><strong>Brothers or Sisters</strong></td>
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<tr>
<td>Yes</td>
<td>195</td>
<td>89.4</td>
</tr>
<tr>
<td>No</td>
<td>23</td>
<td>10.6</td>
</tr>
<tr>
<td>total</td>
<td>218</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Fathers’ educational level</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Did not finish elementary School</td>
<td>3</td>
<td>1.4</td>
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<tr>
<td>Elementary School</td>
<td>30</td>
<td>13.6</td>
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<tr>
<td>High School</td>
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<td>15.9</td>
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<tr>
<td>Senior High School</td>
<td>70</td>
<td>31.8</td>
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<tr>
<td>University or Higher Technical School</td>
<td>82</td>
<td>37.3</td>
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<tr>
<td>total</td>
<td>220</td>
<td>100.0</td>
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</table>
Source of income

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>Work</td>
<td>10</td>
<td>4.5</td>
</tr>
<tr>
<td>From parents</td>
<td>171</td>
<td>77.7</td>
</tr>
<tr>
<td>Both</td>
<td>39</td>
<td>17.7</td>
</tr>
<tr>
<td>Total</td>
<td>220</td>
<td>100.0</td>
</tr>
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Size of income (in €)

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<table>
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<tbody>
<tr>
<td>Less than 300</td>
<td>48</td>
<td>22.0</td>
</tr>
<tr>
<td>301-600</td>
<td>107</td>
<td>49.1</td>
</tr>
<tr>
<td>601-900</td>
<td>44</td>
<td>20.2</td>
</tr>
<tr>
<td>900 and more</td>
<td>19</td>
<td>8.7</td>
</tr>
<tr>
<td>Total</td>
<td>218</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Possibility for cohabitation preference instead of marriage

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<table>
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<tr>
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<tbody>
<tr>
<td>Yes</td>
<td>130</td>
<td>59.6</td>
</tr>
<tr>
<td>No</td>
<td>88</td>
<td>40.4</td>
</tr>
<tr>
<td>Total</td>
<td>218</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Intention to undertake marital commitments and obligations

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<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>Completely</td>
<td>100</td>
<td>45.5</td>
</tr>
<tr>
<td>Partly</td>
<td>76</td>
<td>34.5</td>
</tr>
<tr>
<td>Hardly or no intension</td>
<td>44</td>
<td>20.0</td>
</tr>
<tr>
<td>Total</td>
<td>220</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Students’ opinion about negative impact of career on marriage decision

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Very High</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High enough</td>
<td>49</td>
<td>22.3</td>
</tr>
<tr>
<td>Moderate</td>
<td>114</td>
<td>51.8</td>
</tr>
<tr>
<td>Low or no impact</td>
<td>46</td>
<td>20.9</td>
</tr>
<tr>
<td>Total</td>
<td>220</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Impact of non permanent work on their future marriage decision

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Very High</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High enough</td>
<td>91</td>
<td>41.4</td>
</tr>
<tr>
<td>Moderate</td>
<td>61</td>
<td>27.7</td>
</tr>
<tr>
<td>Low or no impact</td>
<td>28</td>
<td>12.7</td>
</tr>
<tr>
<td>Total</td>
<td>220</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Students’ opinion about the radical type of the measures that the State has taken to encourage young people to get married.

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes, completely</td>
<td>2</td>
<td>0.9</td>
</tr>
<tr>
<td>Partly</td>
<td>76</td>
<td>34.5</td>
</tr>
<tr>
<td>Not at all</td>
<td>142</td>
<td>64.5</td>
</tr>
<tr>
<td>Total</td>
<td>220</td>
<td>100.0</td>
</tr>
</tbody>
</table>

a Athens Metropolitan Area and Thessaloniki Metropolitan Area.
b Parents and children.
c Other relatives (grand parents, etc) live with parents and children
Source: Survey carried out in 2006 specifically for this study.

All students were unmarried and, thus, had no personal experience about marriage. However, the fact that they came from different family types and backgrounds presupposes indirect experience on the issue. 78.2 % of them came from a typical two-parent narrow family, 12.3 % came from extended families, while 9.5 % grew up in single-parent families. Additionally, 88.6 % of them had brothers or sisters, mainly one brother (50 %) or two brothers (26.4 %).

3.2 Students’ attitudes towards marriage

Most of the students were in favor to marriage (81.8 %), while the rest 18.2 % were against it. Emotional reasons (66.4 %), the belief in the institution of marriage (59.5 %) and social reasons (46.4 %) were the three basic reasons which lead a woman to marriage according to students’ opinion. Financial or religious reasons were of lower importance (Table 2).

Table 2. Reasons which lead a woman to marriage according to the female students’ opinion N=220 a

<table>
<thead>
<tr>
<th>Reasons</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connected with the institution of marriage</td>
<td>131</td>
<td>59.5</td>
</tr>
<tr>
<td>Sentimental</td>
<td>146</td>
<td>66.4</td>
</tr>
<tr>
<td>Social</td>
<td>102</td>
<td>46.4</td>
</tr>
<tr>
<td>Financial reasons</td>
<td>55</td>
<td>25.0</td>
</tr>
<tr>
<td>Religious</td>
<td>27</td>
<td>12.3</td>
</tr>
<tr>
<td>Other</td>
<td>13</td>
<td>5.9</td>
</tr>
</tbody>
</table>

a: The 220 students were asked to choose up to three reasons
Source: Survey carried out in 2006 specifically for this study.
In the same time, more than half (59.6 %) declared that they would mostly opt for cohabitation rather than marriage and almost all agree (91.4 %) that, nowadays, young people take the decision to get married with more difficulty than in the past. Additionally, most of the students against marriage declare that they could choose cohabitation as an alternative (87.5 %), while among those who declared in favour of marriage, about half (53.4 %) of them stated at the same time a preference for cohabitation. High statistical significance between attitudes towards marriage and attitudes towards cohabitation was indicated by the association test implemented (Chi-square=15.804, df=1, p=0.00<0.001). Further study in students’ future preference for cohabitation as a union formation showed that it was independent to their age (chi-square=2.53, df=2, p=0.28>0.05).

3.3 Factors associated with the attitudes towards marriage

Descriptive statistics are firstly given for a number of factors discussed in the introduction and are not introduced yet in the data analysis. The desire to pursue a successful career, the intention of young women to undertake the commitment and the obligations of the marriage, the non permanent types of work and the efficiency of the policies to encourage marriage are the basic factors of this kind. 22.3 % of the students believed that career is a very strong negative factor in the decision to get married and have family, while another 51.8 % considered the above negative factor strong enough. The intention to fully undertake marriage commitments and engagements was expressed only by 45.5 % of the students, while the opinion that lack of permanent work could influence to a great extent or to a certain extent their decision for marriage was expressed by the 18.2 % and 41.4 % respectively. Finally, less than 1 % believed that the State had taken radical measures to encourage young people towards marriage (Table 1).

The association of certain factors with the attitudes towards marriage was tested using separate Chi-square tests (Table 3). The age, the year of attendance and the influence of non permanent work on the decision to get married were significantly associated with young students’ attitudes towards marriage (p<0.05). High statistical significance appeared to their mothers’ educational level (p=0.004<0.01) and extremely high statistical significance appeared in their preference for cohabitation instead of marriage and in their intention to undertake marriage commitments and engagements (p=0.00<0.0001). The statistical association of attitudes towards marriage with the size of the origin city, with the source of income and with the students’ opinion about the negative influence of career on marriage decision remained unclear (0.05<p<0.10). Finally, the type of family of origin, the existence of brothers or sisters, the fathers’
educational level, the size of income and students’ judgement of the measures taken by the State to encourage young people to get married were independent to “attitudes towards marriage” (p>0.10).

Table 3. Chi-square test results between “attitudes toward marriage” and several categorical explanatory variables concerning female students (N=220)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Chi-square value</th>
<th>Degrees of freedom</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>7.44</td>
<td>2</td>
<td>0.024</td>
</tr>
<tr>
<td>Year of attendance</td>
<td>6.17</td>
<td>2</td>
<td>0.046</td>
</tr>
<tr>
<td>Mothers’ educational level</td>
<td>13.35</td>
<td>3</td>
<td>0.004</td>
</tr>
<tr>
<td>Size of City of origin</td>
<td>5.06</td>
<td>2</td>
<td>0.08</td>
</tr>
<tr>
<td>Family type</td>
<td>2.41</td>
<td>2</td>
<td>n.s</td>
</tr>
<tr>
<td>Brothers or Sisters</td>
<td>1.36</td>
<td>1</td>
<td>n.s</td>
</tr>
<tr>
<td>Fathers’ educational level</td>
<td>3.50</td>
<td>4</td>
<td>n.s</td>
</tr>
<tr>
<td>Source of income</td>
<td>5.195</td>
<td>2</td>
<td>0.074</td>
</tr>
<tr>
<td>Size of income</td>
<td>1.41</td>
<td>3</td>
<td>n.s</td>
</tr>
<tr>
<td>Cohabitation preference instead of marriage</td>
<td>15.80</td>
<td>1</td>
<td>0.00</td>
</tr>
<tr>
<td>Availability for marital commitments and obligations</td>
<td>71.94</td>
<td>2</td>
<td>0.00</td>
</tr>
<tr>
<td>Students’ opinion about negative impact of career on marriage decision</td>
<td>6.68</td>
<td>3</td>
<td>0.083</td>
</tr>
<tr>
<td>Influence of non permanent work on marriage decision</td>
<td>7.53</td>
<td>3</td>
<td>0.05</td>
</tr>
<tr>
<td>Students’ opinion about the radical or not radical measures that the State has taken to encourage young people to get married.</td>
<td>2.56</td>
<td>2</td>
<td>n.s</td>
</tr>
</tbody>
</table>

a The values of the variable “attitudes toward marriage” were “in favour” and “against”

Source: Survey carried out in 2006 specifically for this study
3.4 Modelling association and predicting probabilities for attitudes towards marriage

x² test in cross tabulated data assumes that the various casual factors work quite independently from each other in determining the variable examined and for this reason it is not considered to be satisfactory for multivariate analysis and for probabilities prediction. A Logistic Regression Model was constructed to meet these objectives.

Table 4. Detailed empirical results from the estimation of the Logistic Regression Model (N=220)

<table>
<thead>
<tr>
<th>Variables entered the model</th>
<th>Values</th>
<th>Code</th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>df</th>
<th>Sig.</th>
<th>Exp(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Possibility for Cohabitation preference instead of marriage</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>-</td>
<td>1.46</td>
<td>.491</td>
<td>8.932</td>
<td>1</td>
<td>.003</td>
<td>.231</td>
</tr>
<tr>
<td>No (ref)</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Intention to undertake marital commitments and obligations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Completely</td>
<td>1</td>
<td>4.06</td>
<td>9</td>
<td>.695</td>
<td>34.30</td>
<td>1</td>
<td>.000</td>
<td>58.474</td>
</tr>
<tr>
<td>Partly</td>
<td>2</td>
<td>2.53</td>
<td>3</td>
<td>.506</td>
<td>25.09</td>
<td>3</td>
<td>.000</td>
<td>12.591</td>
</tr>
<tr>
<td>Hardly or no intention (ref)</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Impact of non permanent work on their marriage decision</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very High</td>
<td>1</td>
<td>-</td>
<td>201</td>
<td>.630</td>
<td>102</td>
<td>1</td>
<td>n.s</td>
<td>.818</td>
</tr>
<tr>
<td>High enough</td>
<td>2</td>
<td>1.34</td>
<td>7</td>
<td>.575</td>
<td>5.483</td>
<td>1</td>
<td>.019</td>
<td>3.848</td>
</tr>
<tr>
<td>Moderate</td>
<td>3</td>
<td>1.45</td>
<td></td>
<td>.584</td>
<td>.062</td>
<td>1</td>
<td>n.s</td>
<td>1.156</td>
</tr>
<tr>
<td>Low or no impact (ref)</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
a. Variable entered on step 1: Intention to undertake marriage’s commitment and obligations, variable entered on step 2: Possibility for Cohabitation preference instead of marriage, variable(s) entered on step 3: Influence of non permanent work on their marriage decision.

b. Variables not in equation: Age, mother’s education level, Size of City of Origin, size of income, students opinion about the negative impact of career on marriage decision and student’s opinion about the radical type of the measures that the state has taken to encourage young people to get married.

Source: Survey carried out in 2006 specifically for this study

The basic results of the application of the Logistic Regression Model are given in Table 4. The values of each explanatory variable are presented in Table 1.

The model has a strong explanatory function, with the generalized likelihood ratio test statistic being $\chi^2 = 171.545$, df = 6, $p = 0.00<0.0001$. The suitability of the equation is also indicated by the statistical insignificance of Hosmer and Lemeshow Test ($\chi^2 = 3.72$, df = 8, $p = 0.881 > 0.05$). The values of Cox and Snell R square coefficient ($0.55 > 0.5$), as well as of Nagelkerke R square coefficient ($=0.733 > 0.5$) are additional indicators for the model’s strong explanatory function.

Among the explanatory variables, the intention of students to undertake marriage commitments and engagements ($\text{wald stat}=43.79$, $p=0.00<0.001$), the preference to cohabitate instead of getting married ($\text{wald stat}=8.93$, $p=0.003<0.01$), and the influence of non permanent work on marriage decision ($\text{wald stat}=7.71$, $p=0.05$) have a significant impact on the dependent variable, each time a variable is gradually added in the model in a three-stage procedure. When the three variables were added to the model, Nagelkerke R square coefficient increased from 0.68 to 0.708 and then to 0.733, showing the contribution of each one to the explanatory ability of the model. Constant term was not of significance and was, thus, excluded from the model. Conditional Forward Stepwise procedure kept the rest explanatory variables out of the model, as they were statistically insignificant (see note 2 of Table 4).

Students which had opted for cohabitation instead of marriage appeared to have a lower probability to be in favor of marriage ($b_{(1)} = -1.467$).

Students who declared the intention to undertake the obligations of marriage in full ($b_{(1)} = 4.069$) or partly ($b_{(2)} = 2.533$) appeared to have positive coefficient $b$, which means that $b$ coefficient of the reference category (a little or no intention) was negative and equal to the sum of $b$’s of all other categories $b_{(3)} = (4.069 + 2.533) = -6.602$). Taking into consideration the rules about the meaning of the $b$ values, it is clear that
students who were more or less determined to undertake the obligations of marriage belonged to the group that tended to have a positive attitude towards marriage. The above result, i.e. that the probability of having a positive attitude towards marriage decreases as the intention in consideration is moving from the complete acceptance to no acceptance, is typical, as positive values of \( b \)'s are continuously decreasing.

Students who thought that non permanent work would negatively influence their decision towards marriage to a great extent (\( b_{1} = -0.201 \)) seem to be against marriage in comparison to the next two categories. This result should not be evaluated, as Wald statistic was insignificant for \( b_{1} \) and \( b_{3} \) coefficients (Table 4). Nevertheless, the whole variable should be kept in the model and \( b_{2} \) coefficient should be used for probability prediction purposes, as both appeared statistically significant.

The prediction of the probabilities for student groups belonging to certain combinations determined by the categories of significant explanatory variables are also an extremely useful output of the Logistic Regression Model. For instance, for a female student who would prefer, in the future, cohabitation instead of marriage, has the intention to undertake completely the commitments and the obligations of a marriage and who considers that non permanent work would negatively influence her decision for marriage to a great extent has a probability of 99.8 % to be in favor of marriage, according to the applied model. In the same way, probability decreases to 91.78 % if the value “intention to undertake completely the commitments … of marriage” is replaced by the next value of the variable ‘intention to undertake partly the commitments…..”. Probabilities can be produced for several combinations of the values of the variables included in the model using formula 1.

### 3.6 Priority to marriage and age of marriage

The vast majority of the students (89%) considered as their first priority to successfully complete their university studies, by obtaining their first degree, and then to proceed to postgraduate studies, while only the 9.6% declared that their entrance in the labor market was their first priority. Less than 1% of the respondents from all years of studies had marriage as a priority. The 77.8% of the students attending a Master’s course answered that they intended to proceed to even higher studies after the acquisition of their Master degree. For the 66.4% of these postgraduate students the most suitable age for marriage is ranging from 25 to 29 years old. For the 26.4% of the total population asked, the ideal age of marriage is even higher, as it ranges from 30 to 34 years old. The age group 20-24 was stated only by the 5% as a suitable age for marriage, while no preference was recorded for the
The mean age at marriage which arises comes up to 28.34 years old.

**Table 5.** Female students by their attitudes towards marriage and age suitable for marriage

<table>
<thead>
<tr>
<th>Attitudes towards marriage</th>
<th>Age most suitable for marriage according to students’ opinion</th>
<th>%</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Up to 24</td>
<td>25-34</td>
<td>35 and more</td>
</tr>
<tr>
<td>Against</td>
<td>-</td>
<td>92.5</td>
<td>7.5</td>
</tr>
<tr>
<td>In favour</td>
<td>6.1</td>
<td>93.3</td>
<td>0.6</td>
</tr>
<tr>
<td>Total</td>
<td>5.0</td>
<td>93.1</td>
<td>1.8</td>
</tr>
</tbody>
</table>

a Pearson chi-square=11.085, df=2, p=0.004
Source: Survey carried out in 2006 specifically for this study

The high association between students’ attitudes towards marriage and their stated preferred ages for marriage was proved by the results (chi-square = 11.08, df = 2, p = 0.004<0.01). It is characteristic that no student against marriage indicated the age group ‘up to 24 years old’ as appropriate for marriage (Table 5).

**4. Discussion and Conclusions**

Greek female university students were chosen as the target population for the present study. A sample of 220 students was investigated in order to explore their attitudes towards marriage and the factors associated with those attitudes.

The fewer and delayed marriages, the declining fertility rates, the new family patterns, including that of cohabitation and the single parent families, and the rising divorce rates, are a new global reality. Hence, studies related to the institution of family have not stopped being both interesting and useful. In Greece, relevant studies are not many and the statistics on the changes and the transformations observed in the Greek family are few. Therefore, the findings of the specific research may not only shed light on the issue, but can, also, contribute to the worldwide sociological research dealing with relevant issues.

Most of female students are in favour of marriage, but they believe that a woman is not anymore getting married for the same reasons with the past generations. The Greek woman, for example, used to view marriage as an obligation dictated by religion or as a mean for social recognition and economic security. As Mooney-Marini (1978) pointed out, marriage used to be the mean for obtaining status attainment. The students of this research characterised the above motives as unimportant and stated that
emotions are those that must lead to marriage and to family formation. They, also, stated that they believe in the institution of family. However, they pursue their social and economic independence through educational attainment and career, rather than through marriage.

As the above beliefs have been expressed by educated women, it is uncertain whether they can be generalized and described as representative of all young Greek women. The specific sample, which is open to new ideas, was selected in order to permit the exploration of new attitudes in a rather traditional society. To ensure, however, that these new attitudes are, also, valid for young women of other educational levels, a new survey should be conducted which will investigate their own beliefs, too. The World Value Survey of 1999 provides relevant information on a wide range of population, although the question: "is marriage an out-dated institution? (Disagree /Agree)" is not quite the same with the question of the present research: "Which are your attitudes towards marriage? (In favour of/against marriage). Having this in mind, as well as the fact that there was a time interval of six years between the two studies, it is important that the findings of both researches are quite similar. A differentiating point that can be identified, though, is that the present research results in slightly more increased rates of negative attitudes towards marriage than the previous one. Unfortunately, the World Value Survey provides no data concerning specifically female University students. However, one very important finding is that the percentage of university-degree holders who consider the institution of marriage outdated and old-fashioned is significantly higher than that of people with elementary educational level. It can be, thus, concluded that new attitudes towards marriage and family formation are likely to be developed at an earlier stage among highly educated people.

Most of the students stated that in the future may opt for cohabitation instead of marriage. More specifically, this statement was not elicited only by the students against marriage; almost half of those in favour of marriage did not reject the probability to cohabit in the future. Young educated women with positive attitudes towards marriage, view cohabitation with an open mind, as they feel that nowadays the decision to get married is becoming more and more difficult. Cohabitation may, thus, become in Greece-like in many western societies-a common alternative to marriage.

Nowadays in Greece, young educated women with looser religious influence than in the past, as stressed out above, do not exclude cohabitation from their future plans. Another important factor is that most Greek students have to move and live during their studies away from their homes due to the existing University Entry system. In that way, living independently encourages the idea of future cohabitation instead of
marriage, in comparison to those young people living at home with their parents. The impact of this factor was an important finding earlier enough in other societies as Netherlands, where changes in relative attitudes appeared years before (Liefbroer A., 1991). Preference in future cohabitation over marriage does not seem to change with age in the present study as revealed by the afore-mentioned study, where a decreased preference in cohabitation was noticed after the age of 21.

This study shows that attitudes in favor or against marriage are associated with a great number of factors. Even the frequencies of the students’ opinion or intentions revealed the importance assigned on factors, such as the willingness to undertake the commitments and the engagements arising from marriage, the non permanent forms of employment recently introduced in the Greek labor market, women’s professional aspirations and the loose policy action of the state on marriage and family issues. At a second stage, there was statistical evidence that attitudes towards marriage are associated with each of the two first of the above factors. Statistical significance also appeared for variables, such as the age and the year of University attendance, the mother’s educational level and their possible future preference in cohabitation instead of marriage. This last factor together with the intention not to undertake the commitments of marriage showed very strong association with the attitudes towards marriage. The rest of the factors examined for association showed independence or unclear association.

It could be possible that young students, as most of them are outside and maybe long away from the labor market, have not faced yet the difficulties of a dual or of a multi role and, for this reason, they do not evaluate career or State policy action as important for their marriage decision. On the contrary, they are anxious about the introduction of the non permanent work pattern in the Greek labor market, which is obvious to anyone in Greece. Most job posts in the private or public sector are offered in modern Greece for a temporary time, i.e. for six, twelve or mostly sixteen months and they usually offer no perspectives for permanent work in the near future. The prospect of a non permanent work of this kind, which also sometimes offers no insurance to employees, prevents young people from taking the decision to get married, as even if they find a job, they could be possibly unemployed a few months later.

The characteristics of the family of origin, such as the form of the family or the existence of brother or sisters, don’t seem to play an important role in the formation of the students’ attitudes towards marriage. On the contrary, significance appears in their mother’s educational level. The lower the mother’s educational level, the higher the percentage of students who were in favor of marriage. No relative association seems to exist with the father’s educational level. This finding has to do with the
typical pattern, concerning the sharing roles of the family members of the last generation, when the father was responsible for family earnings and the mother for household, especially for the growth of children. This is why mothers could pass on their attitudes to young daughters. It is obvious that these transferring attitudes are highly connected with the mother’s educational level. Well educated mothers usually think that their children (male and female) should attend higher school and follow a career, while mothers of lower educational level tended to have a preference in marriage.

Age and year of attendance are also associated with the attitudes towards marriage. The higher the age and the year of attendance, the higher the ratio against marriage, indicating a progressively growing skepticism on the part of the young woman about marriage, as they grow up and move towards the end of their studies, gaining at the same time more experience on the issues under consideration. Getting older also means facing the difficulties of a possible marriage, as well as the unstable working conditions and of the need to join the labor market. As Rand and Miller (1972:317) characteristically noticed in their similar study on junior high girls, senior high girls and young adult women, “the desire for marriage in early teenagers is substituted by the need for a live pattern involving career as by adulthood the biological surge for early marriage has been passed and/or fulfilled”. It should be kept in mind that attitudes are a complex mental state and that their relationship with future behavior is not clear as stated by Martin and Parashar (2006). Although they referred to the divorce attitude-behavior matter, these statements can be generalized for attitudes towards marriage. It is characteristic that even in liberal societies towards marriage, like the USA, where cohabitation has already been introduced as a serious alternative to marriage, the vast majority of people keep expressing a strong desire to marry (Manning and Smock 2005).

Factors traditionally associated with marriage attitudes as the urbanization level of the place of origin present no clear significance in the present study, indicating perhaps a tendency for common attitudes in current Greece, resulting from the expansion of the communication between several localities. It should be noticed that a bigger sample, which would give the opportunity of a larger area division (more than three, as in the present study), could possibly show significance. No statistical evidence for association with attitudes towards marriage result from the financial factor, tested with variables, such as the size and the source of income.

The construction of a well fitting logistic model to identify explanatory factors that simultaneously influence attitudes towards marriage indicates high statistical significance of three basic factors. The most important factor appears to be the students’ intention to undertake marital commitment and obligations, explaining the 67.8 percent of the
dependent’s variable variation. The next factor introduced into the model was the students’ preference for a possible future cohabitation instead of marriage, increasing the explanatory ability of the model to 70.8%. In the last step the variable expresses their belief that non permanent work would negatively influence their decision to get married, in addition to the explanatory ability of the model to 73.3 of the whole variation. Forward Stepwise procedure kept out the model variables which do not add to its explanatory ability and on the other hand solve multicollinearity problems that could possibly occur between independent variables, as in our case, between age and year of attendance. That is the reason why variables which had been separately associated with the attitudes towards marriage in the earlier analysis, were excluded from the model.

The model’s results verify that young female students who are against marriage are strongly concerned about the commitments, the obligations and the loss of independence entailed by marriage. It is obvious that they prefer their personal welfare and social prestige instead of the “sacrifice” for the sake of future society, by getting married, creating a family and bearing children. The model clearly shows that the probability for a student to be in favor of marriage is higher for those who are ready to undertake the above commitments and obligations and vice versa. Current parents in Greece seem to have overreacted with the comforts which they supply to their children, making them in this way keen on a higher standard of living for themselves, which they are not willing to jeopardize by getting married. This is a really important fact that accounts for the shift of attitudes towards marriage and family, recently recognized by research. Seltzer et al (2005) in a successful attempt to identify and explain the new trends and changes in family issues and the subsequent need for new research, tools and data, consider “individualization and secularization of Western societies as a commonly invoked explanation for changes in marriage”.

From the data results that the financial factor is of less importance when taking the decision to get married than the intention not to invest any economic recourses and time to family and children bearing. The 52.7% of the students gave a negative answer to the “hypothetical” question: “Could you ever get a loan in order to bring up your children, exactly the same way you would do it in order to buy a car or a house?” This answer has shed light to the real factors that determine attitudes towards marriage.

The fact that attitudes in favor of cohabitation have emerged among Greek young students has already been noticed and explained. It should be added, however, that the model results verify the realistic statement that cohabitation preference is associated with lower probability of a student to be in favor of marriage.

Combination of the significant factors, as suggested by the model, could give the exact probabilities certain student groups have to be in favor
or against to marriage. These estimations could be used for further research purposes or for policy action to support marriage and family formation. Students, as presented in the specific research, pursue further postgraduate studies, postponing, thus, marriage to an older age. They believe that the most suitable age for marriage should be, or even exceed, 28 years old. This belief is consistent with the actual mean age at marriage (29 years old), as recorded by national statistics. Negative attitudes towards marriage and the intention to postpone it are highly associated.

As a conclusion, most of the educated young people appear to have positive feelings about marriage, although a considerable part of them does not reject the probability to cohabit in the future. Generally speaking, the Greek society is still characterized as a rather traditional one. However, there is no doubt that a change in attitudes is gradually taking place and that new alternatives to traditional institutions are being adopted.

The institution of marriage is threatened by the desire for independence and the reluctance to undertake family commitments. This reluctance is, also, due to the uncertainty caused by unemployment, a problem quite serious in the Greek society. Marriage and family are threatened, as well, by the new role of women and their educational and career aspirations. The pursuit of these aspirations results in the postponement of marriage, a fact that has a negative effect on birth rates, intensifying, thus, the already existed demographic problem in Greece. Obviously, the modern Greek woman faces difficulties in combining her educational/professional aspirations and family creation. New family patterns, replacing marriage, seem to be expanded in the future society of Greece, following the evolution already exists in Western Societies.

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Social Systems Theory and Research Infrastructures

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Abstract:
Empirical social research defines certain procedures for the observation and analysis of social reality, which are based on document production. The produced documents have the form of either a text or a dataset. Datasets are the products of quantitative research methods, and texts are the products of qualitative research methods. Based on a specific research procedure empirical research produces written documents, which after their production exists as objects available to the research community independently from the persons and the involved in their production. Systematic, longitudinal and comparative social research presupposes not only of the production but of the accumulation of documents as well. To support document accumulation the development of research infrastructures is needed.

Social Research Infrastructures are not just mechanisms of technical support of document production and management. They are mechanisms that organize and support a communicative rationalism, based on the accumulation, management and dissemination of socioeconomic documents.

It is important to note that the production of socioeconomic data does not support social research exclusively. The development and functioning of modern social systems depends on their ability to produce and analyse socioeconomic data in order to monitor their behaviour. Thus, empirical research plays an important role in the business sector as well.

Social research infrastructures are important not only to the research community but to the business sector as well. Social research infrastructures support the production and accumulation of reliable socioeconomic data and at the same time they support the exchange of information and data between the research community, the business sector and the state.

Different research teams can analyse the data accumulated by research infrastructures in many different ways. The differences observed between these analyses, gives the best opportunities for the production of new knowledge.
Social systems theory provides the basic theoretical background for the development of research infrastructures for social sciences.

First of all it serves as the theoretical frame for the organisation of quantitative research. Second it allows the integration of every autonomous empirical study in a more general research frame which is constructed by the research action of the whole research community and not of a specific research team. Third the reference of the empirical studies to stable social systems supports the development of more stable knowledge schemas, which is a prerequisite for the systematic organization of comparative research.

**Keywords:** Social Systems Theory, Research Infrastructures

1. **INTRODUCTION**

According to Berger and Luckmann (1967), society is a human product. Society is an objective reality. Man is a social product. This means that society is neither a natural product not a product of human imagination but an objective reality, which changes through history. Thus social reality can be understood only through empirical investigation.

The concept of systems appears throughout the social and the natural sciences and has generated a body of literature of its own. A system is any structured or patterned relationship between any numbers of elements where this system forms a whole unity.

The concept of system, when applied in social theory, leads as to a social system theory. According to Parsons(1951), a social system is a mode of organization of action elements relative to the persistence or ordered processes of change of the interactive patterns of a plurality of individual actors. For Parsons the existence of social systems presupposes three other types of systems: a personality system (the actor himself or herself); a cultural system; and a physical environment to which the society must adjust. Luhmann(1995) focuses on social systems as systems of communication operating in environments in relation to which they undergo processes of social differentiation. According to Luhmann all other types of systems (systems of personality, of culture, other social systems and the physical environment) form the environment of a system.

Antony Giddens (1979) has stressed that the properties of social systems are reproduced by structured and routine social practices. The systematic properties of social systems thus have to be grounded in the nature of social action. But what Giddens didn’t say is that the structured and routine social practices exist in that for because a system organizes them, and otherwise they will not be structured and routine. This means that the systematic properties the structured social action have to be
grounded in the characteristics of social systems. We must also have in mind that social action is not always structured. This means that if we want to study human actions we must focus also on the actions outside of the social systems which are not structured. These actions belong to the environment of social systems.

Empirical social research defines specific procedures of observation and analysis of social reality, depending on the production management and processing of written documents which usually have the forms of texts or datasets. The documents after their production become independent from their producer and can be used by any researcher. For the production but mainly for the accumulation, archiving and dissemination of documents research infrastructure is needed.

2. SYSTEMS THEORY AND SOCIAL ANALYSIS

2.1 Social systems theory provides a theoretical frame for social analysis

The concept of social system is central for the understanding modern societies, but societies are not social systems. With the term society we define not only a number of social systems but a population as well. According to social systems theory the population belongs to the environment of the social system.

A society should be understood as a field of practices exercised by a population which belongs, according to Luhmann (1995), to the environment of the social systems organizing the society. We must have in mind that what are reproduced in a society are the structured and routine practices which are organized social systems. Non structural or semi structural action which emerge in the environment created by the social systems, play an important role because it is the main cause of social change, through social conflict, either by forcing the system to adapt in order to face the problems in its environment or by the rise of new social systems which replace the older ones.

Social system theory provides us with the theoretical frame for the scientific representation of structured and routine social action. Social systems share the following characteristics:

a) Meaning is important to the construction of a social system

Social organization is based on the ability of human beings to communicate through language. Meaning plays an important role in the construction of social systems.

b) Social systems are created according to their environment

Social systems emerge and develop in reference to an environment with which they interact. This environment changes partly due to the actions of the social systems.
In the environment of a social system, except the natural environment, belong a number of other social and cultural systems and all the persons (personality systems) that forms the population of the social system under consideration.

c) Social systems are created historically
Society is a human product and at the same time man is a social product (Berger and Luckmann 1967). This means that social systems are not natural or imaginary creations but social realities which can be understood through empirical investigation.

d) Social systems undergo structural differentiation
Social systems undergo structural differentiation in order to adapt to their environment.

2.2 Social systems are real entities

2.2.1 The Nation State
In general we understand society as a group of people who share a common culture, occupy a particular territorial area and feel themselves to constitute a unified and distinct entity. The nation state plays an important role in the definition of modern societies. It defines the borders of the particular territorial area, which the society occupies, it plays an important role in the construction of the national identity of the population (Gellner, 1983), but the most important is that it makes the rules which govern the society. As the nation state makes the rules it affects strongly social action. Foucault (1977) argued that surveillance is important for the existence of the state. Surveillance is an aspect of the disciplinary power through which societies control and regulate populations. Thus every nation state crates specific mechanisms for the organization of surveillance in his territory.

Although the nation state plays an important role for the organization of society we must differentiate society from the nation state. Inside the borders defined by a nation state a great number of social, cultural and personality systems exist and interact. All these social systems organize the population living inside the borders of the state in a number of different subpopulations and in a number of different social practices.

2.2.1 The economic system
Economy is another system that plays an important role in the organization of societies. The globalization of economy supported by the rise of the information society affect the functioning of the nation state which has to be adapted to the new environment created by the globalized economy.

In the Information society communication is supported by a new technological background, which integrates oral and written
communication and enables the automation of the headwork (see Kallas, 2006).

2.3 Empirical research supports the functioning of social systems

It is important to note that the production of socioeconomic data does not support scientific social research exclusively. The development and functioning of modern social systems depends on their ability to produce and analyse socioeconomic data in order to monitor their behaviour. Thus, empirical research plays an important role in the business and in the public sector of society as well.

In many social systems, decision making takes place within a tightly controlled and familiar normative framework in which: individual employees are responsible for well defined tasks; functions are precisely defined; control authority and communication are hierarchical; there is an insistence on loyalty to and obedience of superiors; and a greater importance is attached to internal than to general experience and skills. Surveillance plays an important role in the control and regulation of populations.

3. EMPIRICAL SOCIAL RESEARCH AND RESEARCH INFRASTRUCTURES

3.1. Empirical social research

Empirical social research defines certain procedures for the observation and analysis of social reality. There are two different methodological perspectives for research design. The first one is based on fixed research design and more quantitative methods of analysis and the second on more flexible research design and more qualitative methods of analysis. In both perspectives the general research procedure is organised under three processes: knowledge schema design, data production and data analysis.

According to the first perspective knowledge schema design is realised before data production and analysis while according to the second one schema design is realised as the result of data production an analysis.

There are two different ways to realise the general research procedure. The first is to realise every empirical study as a stand-alone project, organized by one research team. In that case data production (survey) and data analysis are very closely related and should be organised as steps of the same project. The other is to realise the general research procedure as a number of autonomous projects, some of them responsible for data production (surveys) and some of them responsible for data analysis. The differentiation leads two different methodologies, two different
methodological paradigms. The first one was named “the one phase methodological paradigm” and the second one “the two-phase methodological paradigm” (Kallas, 2008).

Empirical research is based on document production. The produced documents have the form of either a text or a dataset. Datasets are usually the products of quantitative research methods, and texts of qualitative research methods. Based on a specific research procedure empirical research produces written documents, which after their production exists as objects available to the research community independently from the persons and the involved in their production. Systematic, longitudinal and comparative social research presupposes not only of the production but of the accumulation of documents as well in research infrastructures.

Empirical social research organization, according to the one phase methodological paradigm, in a number of independent research projects leads to the production of a number of research documents distributed in many different research infrastructures. The integration of these documents into major collections, according to the organization strategy introduced to empirical research by the two phase methodological paradigm leads us to the construction of grids of research infrastructures.

3.2. Comparative research

The globalisation of the economy by changing the relationship between the market and the nation state changes the needs and the practices of empirical research as well. Systematic empirical research is organised in the frame provided by the nation state is not suitable for comparisons between the different states. A new type of empirical research, the comparative is needed.

3.2.1. The characteristics of comparative research

Because social phenomena are not stable and cannot be describe by scientific laws the empirical observation in social sciences is based on the accumulation of a great number of data. For the production of data empirical research is organised in a way which enables the decentralized production of data. But comparative research presupposes the comparison between data produced under independent empirical studies. This means that comparative research presupposes the accumulation of data as well and the secondary analysis.

Research data accumulation is an important precondition for the support of comparative research but it is not enough. In order to use the data available a standard frame for comparison is needed. This is the reason why comparative research is organised on the base of quantitative methodology.
The main problem of comparative research is the accumulation of a great number of information. This information as it is difficult to be produced by a single research project; it is usually produced by different research projects and then accumulated and archived in a research infrastructure. The variables defined for the production of data are used for the organization of these data in a collection of studies that enables comparisons. This means that variables must be defined not only as elements of a research study but as elements of a classification system at the same time.

According to Hantrais L. and Mangen S. (1996), comparative is a study when individuals or teams set out to examine particular issues or phenomena in two or more countries with the express intention of comparing their manifestations in different socio-cultural settings, using the same research instruments either to carry out secondary analysis of national data or to conduct new empirical work.

As it is not easy to compare two different societies, empirical research usually focuses on the comparisons between specific social systems.

The organisation of comparative research has to face the following problems:

- Problems of understanding the cultural and social differences between different nations
- Problems of harmonisation of the data produced for each nation in order to become comparable
- Problems of operational organization of the empirical study as it is realised through a number of different projects and a number of different research teams.
- Problems of data accumulation and data management
- Problems connecting the results of operational and scientific empirical studies

In order to face all these problems the development of an international grid of research infrastructure is needed.

**3.2.2. The change of methodological paradigm**

The development of research infrastructures, that enabled data sharing, created a new division of labor between the primary data producer, the data analyst and the data provider. This division of labor leads to the restructuring of the production procedure into two separate production procedures: the primary production procedure and the secondary production procedure. To support the restructuring the production of additional metadata is needed.

This new situation also influences research methodology. The old methodological paradigm (described before as the one phase methodological paradigm), is changed and a new methodological paradigm
arises. According to the new paradigm survey and analysis must be considered as two autonomous production procedures (phases) with different inputs and different outputs, even in the case of the simple survey. This is true because analysis uses as input the well-documented output of a survey procedure, which should be considered a separate research product and which can also be used for secondary analysis. Because the research procedure is divided into autonomous production procedures, two different phases, the new methodological paradigm was called “the two phase methodological paradigm” (Kallas, 2008).

The new paradigm supports the repurposing of data. A good example of this new situation is “the integrated study”. It is the result of a secondary data production procedure, the integration of which transforms already existing datasets into new ones. Although sometimes the differentiation between some of the old datasets and the new ones are not very important, the result is still a new product. It is important to note that the life cycle of the new products differs from the one of the simple dataset.

To support the coupling between primary and secondary production, additional metadata is needed. Thus under the two phase methodological paradigm metadata is produced in three main metadata production procedures:

a. During the primary data production (the survey).

b. During the secondary data production (analysis and dataset integration).

c. During the archiving in the database system.

3.3. Research Infrastructures

In order to support reanalysis and secondary analysis of existing data, Data Archives were established to provide the means for data accumulation, preservation, and dissemination. The Archives developed metadata management systems that first of all need to maintain collections of empirical studies and datasets. These are the first research infrastructures. Information technology changes the design, the function and the potentiality of research infrastructures (Kallas, 2006, 2008).

The potential created by new information technology, the need for more comparative research due to globalization and European integration, and the importance of secondary analysis due to the accumulation of data supported by the development of research infrastructures created the requirements for the development of a new generation of research infrastructures.

The new requirements for secondary analysis and comparative research had a great impact on empirical methodology which supports the development of research infrastructures. Thus a new methodological
paradigm for empirical research, the two phase methodological model, was established. According to the new paradigm empirical research is no longer organized in the frame of independent research projects but in the frame on vast research programs which integrate conceptually a number of research projects (Kallas, 2008).

Research infrastructures support the following:

- document and data accumulation
- not only scientific but operational research as well
- comparative research
- the organisation of research according to the two phase methodological paradigm

3.3.1. Document accumulation

The systematic, longitudinal comparative empirical research presupposes not only the production of documents but the accumulations of documents produced under different research projects. It requires research infrastructure capable to support the accumulation and management of a body of documents produced independently by different empirical studies which refer to the same social phenomena or to the same social systems. But research infrastructures are not just tools which provide technical support to the production and management of research documents. They are mainly mechanisms for the organisation of a new communicative rationalism based on the accumulation, the classification, the management and the dissemination of digital documents, which enables the interconnection of these documents.

3.3.2. Support of scientific and of operational research

Research infrastructures support data production not only for the needs of the scientific community, but also for the needs of economy and the state. The data that are archived in research infrastructures can be used for many different analyses from many different research teams. Through the use of research infrastructures the scientific community is able to exchange data with the business and the public sector of society. The differences that occur between the different analyses provide us with the best opportunities for the production of new knowledge (OECD, 2000). The accumulation of data in research infrastructures supports the exchange of data and information between the research community and the business sector and the public sector of the society.

3.3.3. Support comparative research

The change of the methodological paradigm from the one phase to the two-phase model is based on the development of empirical research
infrastructures. The development of the infrastructures is based on the theoretical design of classification systems. To support this theoretical design a stable representation of the social reality is needed, which will be shared by the different research projects. This approach gives new opportunities to comparative research because the classification system can be used as a background for comparisons.

The new research infrastructures support the following functions, additional to document searching (Kallas, 2005):

a. navigation through the documents of different empirical studies
b. ex post development of relationships between the documents documenting different empirical studies
c. Supplementary documentation of existing empirical studies

3.3.4. Research organisation according to the two phase methodological paradigm

An empirical study is always designed in reference to a specific social reality, which is represented by a knowledge schema. In quantitative research, this knowledge schema is considered as stable, at least for the period that the empirical research is conducted. The reference to stable social entities, like the social systems, supports the adoption of a new methodological paradigm, the two phase methodological paradigm (Kallas, 2008), which states that empirical research must not be organized in totally independent research projects but in larger research programs. These large research programs include a number of independent research projects, which share a common conceptual frame. According to the two-phase methodological paradigm empirical studies, in order to be comparable, must share some common characteristics, described by a knowledge schema, which are not determined at the level of a single research project but at the level of a more extended research program. These common characteristics may be used as metadata for the classification of research projects as well.

3.4. A theoretical frame for Infrastructure development

Social systems theory provides the basic theoretical background for the development of a new generation of research infrastructures in social sciences, based on the two phase methodological paradigm for the following reasons:

First of all it provides us with a theoretical frame for the description of structured and routine social practices as social systems.

Second it defines some social entities, the social systems, which can be empirically investigated, providing thus the scientific community with more stable descriptions of social reality.
Third it provides us with a classification system, which allows the integration of every autonomous empirical study in a more general research frame. This frame is constructed by the research action of the whole research community and not of a specific research team.

Fourth, not only structured and routine social practices are described as social systems but non structured practices are realized inside a social environment created by the social systems allowing thus any empirical study to be classified in reference to one or more social systems.

3.4.1. A theoretical frame for the description of structured and routine social practices

Social system theory provides us with a theoretical frame for the description of structured and routine social practices as social systems.

3.4.2. Social systems are real entities that can be used as objects of reference

As we have said already, social systems as real entities historically developed and not constructions of our imagination. This means that they exist independently from the studies that investigate them. But as any specific social system is the result of an evolutionary process, its theoretical description is based not only on social system theory but on also on a theoretical description built through a number of empirical studies.

3.4.3 A classification system for quantitative empirical research

Social systems based on structured and routine practices are rather stable social entities and any social phenomenon can be described in reference to one or more social system.

According to the description we gave above, the construction of a classification system for empirical studies independent from any specific study is possible by using the social system theory as a frame of reference. In this classification system each study will be classified in reference:

1. to social systems.
2. to social phenomena which are observed in the environment of social systems
3. to the observational terms that describe a social phenomenon
3.4.4. A classification scheme for any kind of empirical research

Social system theory is perhaps best understood as a vast classificatory scheme, enabling us to categorize any level of social life, at any level of analysis. This is possible because the empirical observation of a social formation can be based on a number of independent empirical studies, each one focussing on one or more specific social phenomena observed in reference to a social system. This means that social system theory provides us with a general frame for the description of social systems, but at the same time with a classificatory scheme which can be used for the classification of any kind of action.

The social systems define the boundaries of societies allowing at the same time the existence and development of not structured action in their environment. This means that social systems define the context for almost any kind of empirical research.

4. CONCLUSIONS

Systematic, longitudinal and comparative social research presupposes not only of the production but of the accumulation of documents as well. To support document accumulation the development of research infrastructures is needed.

Social Research Infrastructures are not used just for technical support of document production and management. They are used to organize and support another form of communicative rationalism, based on the accumulation, management and dissemination of socioeconomic documents.

The most important advantage of research infrastructures is that they enable different research teams to exchange and accumulate data and to analyse them in many different ways. The differences observed between these analyses, gives the best opportunities for the production of new knowledge.

Social research infrastructures are important not only to the scientific community but to the business and the public sector of society as well. Social research infrastructures support the production and accumulation of reliable socioeconomic data and at the same time they support the exchange of information and data between the research community, the business sector and the state.

Social systems theory provides the basic theoretical background for the development of a new generation of research infrastructures in social sciences by providing a theoretical scheme for the classification of the different empirical studies. The advantages of systems theory are the following:
First of all it provides us with a theoretical frame for the description of structured and routine social practices as social systems.

Second it defines some social entities, the social systems, which can be empirically investigated, providing thus the scientific community with more stable descriptions of social reality.

Third it provides us with a classification system, which allows the integration of every autonomous empirical study in a more general research frame. This frame is constructed by the research action of the whole research community and not of a specific research team.

Fourth, not only structured and routine social practices are described as social systems but non structured practices are realized inside a social environment created by the social systems allowing thus any empirical study to be classified in reference to one or more social systems.

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Developmental social policy and social research

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Abstract:
New European policies of employment and social protection are based on the strategy for the use of human resources and Social Capital taking into account the quantitative but mainly the qualitative factors that presuppose a developmental social policy. In addition, they activate and improve specific human capital, by providing it with the ability to make the most of an autonomous or cooperative productive participation, creating surplus itself and contributing with its own occupation to the redistribution policy. In this way, the function of social cohesion is enhanced in various fields of action implementation, while social policy, social protection and solidarity obtain a new dynamic character, contributing to a great extent to the increase of developmental capabilities in geographic areas through contribution of individuals that until today hadn’t had any involvement or participation in production.

Keywords:
Developmental Social Policy, Social Integration, Rationalization of Social Structures

1. Introduction
European strategies\(^1\) for social inclusion seem to intersect with the new active employment policies. In order to achieve the aim of social inclusion in accordance with the improvement of human resources and the real promotion of a developmental perspective, European and National Action Plans\(^2\) for Social Inclusion suggest the provision of motives, especially the

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1. At European level, the Luxemburg procedure, known as the emergency top meeting for employment which took place in 1997, set the terms for applying the European Strategy for Employment. More specifically, it determined the role of the European Committee, of the Member States Council, the application series of the NSE, as well as the guidelines and the structure of the National Action Plan for Employment (NAPE). The National Action Plan for Employment and the National Action Plan for Social Inclusion (NAPSI) are drafted at national level, whilst they aim at convergences at European level.

2. Greek National Action Plans for Social Inclusion (NAPSI)
rationalization of Public Administration, operation through creation of administrative structures and enhancement of Local Government involvement in welfare policies.

Through the development of high-quality social services, vulnerable individuals are assisted to get over the problems that their institutional exclusion brings about. Therefore, any efforts should aim at overcoming all obstacles met by vulnerable groups in accessing goods and services.

As pointed out above, these initiatives are aligned with reviewed Constitutions of E.U. member states, where the content of social rights and social protection are strengthened, through formal establishment in the European law and order. Towards this direction, the reviewed policies for Social Inclusion contribute to the improvement of social and financial situation, quality of life for vulnerable groups, as well as at national level aim at reducing the number of people who live in conditions of social and financial insecurity.

Particularly positive is the use of individualized actions of social policy having as focal point the activation of individuals’ potentials to whom actions are addressed, taking into account both structural changes and reforms.

2. Social integration and new social Services

At this point, these matters are extended in two pillars, which are gradually converged to compose a unified proposal. The first pillar stands critically on issues resulting from new policies and plans aiming at facilitating access to work and social inclusion, as well as issues regarding welfare and social care; the second pillar refers to the foundation and integration of social services for less-favoured population groups in relation to employment.

Social inclusion is a complex concept, which is difficult to be defined, let alone to be accurately estimated. Its relationship with economic sizes, like income distribution or even with low income, as poverty is conventionally defined, is neither simple nor logical. According to social inclusion policy, there are access difficulties that are not linked with low income and low income problems that do not entail access problems.

In any case, even if the relation itself between low income and employment is presented – according to social inclusion policy – up to a point as highly complex, only few can disagree with the self-evident fact that labour market upturn leads to significant decrease in poverty and social exclusion risk.\(^1\)

\(^1\) Ministry of Employment and Social Protection : National Action Plan for the certification of the Common Supportive Services’ Centers, 2002
Furthermore, in the reviewed Constitutions of E.U. Member States a clause was introduced which safeguards social state with clarity and at the highest legislative level. This constitutional report also formally establishes the principle of social protection in all Member States law and order. We should also clarify the subtle distinction between poverty and social inclusion and point out that social exclusion is not only connected with insufficient income but can also go beyond income issues and manifests itself in fields like employment, housing, education, health and access to services. Additionally, the concept of social exclusion is connected with lack of individual and social rights, which are considered to be fundamental, as well as lack of participation in the production process and lack of access to social and public goods, lack of participation in public affairs, as well as lack of access to exercise of power.

Furthermore, by ensuring better access to educational services, by combating direct and indirect forms of discrimination that non privileged groups encounter, but also by designing measures (e.g. networks which reinforce social cohesion or networks for social solidarity), even through legislative regulations for the solution of the problems, the basic aim, which is the accession of vulnerable groups to labour market, is facilitated.

Effectiveness of interventions is connected with the social and working environment in which the individual will be incorporated or re-incorporated, in order to experience the social terms of ratification relating to the results coming from the services offered by supportive mechanisms. Otherwise, there is a danger of creating a negative self-image, through lack of adaptation in working environments, where stress and performance deterioration is observed.

For instance, by attempting to do an evaluation of the Consulting and Supportive Services Centres’ Action Plans, one can identify the following services which either indirectly or directly support the procedures for facilitating vulnerable groups’ access to the labour market.

Horizontal services, whose content is defined according to the particular target groups’ needs

- Social – legal counseling support (individual or group)
- Counseling for social accession - or re-accession
- Professional counseling and professional orientation
- Information-sensitization
- Socio-educational and psychosocial support

Social and professional preparation is combined with removing discrimination and with empowering the individuals who are threatened

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with exclusion from the labour market. The completion of this circle of
actions can help individuals have access to active employment policies
(pre-training, training, acquisition of working experience with ulterior
motive occupying new job posts, or creating enterprises as new freelance
professionals).

At this point, we should mention the importance and the aim of social
skills, like self-confidence, cooperation, team working skills, as well as the
importance and aim of professional skills, which strengthen one’s
professional profile through complementary training, in order to move on
to a professional role.

Therefore, the contemporary concept of social care includes sets of
actions that go hand-in-hand with the reinforcement and empowerment of
the individual and with the mobilization and sensitization of the social
fabric, and contribute to both social and work inclusion. For example, we
believe that the realistic concept of empowerment as a procedure of self-
reliance and communicational appearance of the individual is completed
through active participation both in social events and at the workplace.

These services are included in an integrative plan of special education
 provision and of accession to labour market actions for all vulnerable
groups or socially excluded groups. At the same time, evaluating the
effectiveness of national policies on social care is related to safeguarding a
services network, ranging from social rights for less favoured groups,
rehabilitation of mental and social health and their implementation through
active employment policies.

This new type of social policy creates a new framework for
cooperation, which is defined through negotiations as a contract, in which
all these bodies playing some role in its implementation are involved.
Basic prerequisite for the effectiveness of this policy is its access to the
decentralization system that new local development policies provide. In
this way, the function of social cohesion is enhanced in various fields of
activities, while social policy and protection take on a new dynamic
character, considerably contributing to an increase in developed
capabilities\(^1\) in geographical areas with the contribution of individuals that
until today had never participated in production.

\(^1\) Fighting poverty and social exclusion constitutes a challenge for today’s social
policy. Against a background of continuously growing competition and
unemployment, the Greek society talks about, and also applies, with slow rates
and structures (often bureaucratic), new networks of social protection. These are
expected to become a powerful counterbalance to the consequences of the labour
market’s crisis, the restriction of public financing for social welfare, change in
family structures and social exclusion.
3. New system of Social Protection and Social Development

As we can see from the above, a relocation of the aim is observed: from access to labour market to prevention of exclusion from the labour market. For those issues and in the process of searching measures which can balance the adverse situations that people and groups experience, specific initiatives with the participation of specific NGOs have been undertaken, like the reinforcement of the social services sector, which is a special field for the activation of the social welfare system. ¹This relates to the group of organized activities of public, private and voluntary bodies, which aim at the improvement or the restoration of individuals’ or groups’ ability to meet the needs and their prospective life and social participation.

In recent years, a great number of various social structures and Organizations have been founded, which provide consulting services and support for joining labour market. These Organizations, through use of different methods, aim at supporting the unemployed or members of groups who are subject to discriminations, to organize an active individual strategy, so as to be able to join labour market.

These structures are different from each other as to the type, the legal form, the groups to which they refer to and the methodology they use. They also aim, in their majority, at supporting people in their orientation within a changeable labour market, by organizing an active individual policy, so as to be able to enter the labour market. ²


²The research examined also a wide range of matters. Specifically, it focused on matters which are related to the structures of the “intermediate sector”, meaning the structures supervised by Organizations of the Local Government, NGOs and by Civil Society Bodies. Conditions of foundation and evolution of these “structures”, staffing and viability, as they are laid down by the administrative and scientific are responsible for these structures. One of the central results had to do with the coupling of job offer and demand, which also presupposes the legislation of procedures of dialogue, understanding and networking with the social partners and the local bodies, in local and peripheral level. The research venture can be placed within the wider program of E-Quality: “Development of a quality system of consulting services supporting the occupation” focusing on the formation of a framework based on quality characteristics, preconditions, criteria and procedures, through development and pilot application of a quality system for the organizations, their services, and their executives that provide a consulting
Furthermore, the sectors of complex policy proposals aim at promoting through a systematic process, the institutional aspects that can take effective measures for the improvement of the beneficiary’s situation. Changes in organisation and function proposed by National Actions Plans for Employment ¹ and Social Protection ² are likely to offer an important provision in the response of the social state to society’s needs.

It is noted that the activation of One Stop Shops ³ between bodies in practice, exceeds the agreement networking and is not limited to technical possibilities offered for communication. Therefore, the opportunity is offered effectively face through integrated cooperative body systems the complex and various problems of vulnerable socially groups. At the same time, through common specialised project aims and thematic networking, successful applications fulfilling multiple criteria, like innovation, broader dissemination and application, and sustainability are revealed.

According to a group of criteria and with a specific methodology, the implementation of successful projects is selected, included in similar needs situations as good practices. Comprehensiveness and the subject’s content constitute the core of good practices and facilitate the successful practices transfer in complex policy proposals according to proved needs and priority policies in the afore-mentioned dimensions. According to this pattern, the basic structures of selected Action Plan practices have a common aim.

¹ Greek National Actions Plans for Employment, 2005/6
³ The institution of “one stop shop” has included a modern and effective medium for the social-financial inclusion of vulnerable groups in specific countries of the European Union (N. Nagopoulos: Concerted and Complementary Actions of integrated Intervention for the Reinforcement of Employment, E.C / Greek Ministry of Employment, 2005). “One stop shop” is the physical or other type (e.g. electronic) concentration services in a specific area, aiming at the total arsis of all the barriers that are limiting the inclusion of vulnerable groups members in labour market as employees/self-employees, or as business men. In this framework, ‘Unified Contact Points’ will have to be in position to provide, according to the needs of each member of vulnerable teams, consultation services, guidance, covering services (e.g. accommodation, caring of dependent members, e.t.c) and supportive services of employment or businesses.
4. Specifications of the Framework of Common Action for developmental social policy

The composition of thematic Social Networks by Developmental Partnerships consists in initiatives of wider partnerships aiming at disseminating tested and recognized results from the implementation of projects which specialize in national and European policy priorities for the citizens’ equal access to labour markets in a variety of domains and geographical regions. Moreover, the opportunity is given to categorize and distribute effective practices and new know-how, in order to promote equality in all sectors of social life. In this way, they will contribute and exchange transnational experiences on full-time employment, they will promote quality and productivity, as well as enhance cohesion in labour market at national and European level.

Henceforth, common actions aim at getting added value and disseminating project results, enlarging and supporting active participation of individuals from target groups; these actions primarily aim at connecting good practices resulting from specific projects with the core of an integrated programme of projects in co-operation with other collaborating sectors that have been implementing similar actions. The final goal is to support vertical mainstreaming and increase repercussions at the level of applied political practices. In this Framework the selected discussion

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1 The European and National Thematic Networks constitute dynamic Workgroups, which with the completion of their results and products, are extending partnerships with organisations that are developing relevant activities and fundamental bodies, in order to attempt the dissemination of information in horizontal level, and also the acknowledgement of innovative practices in decision – making that are contributing in the effect of systems and policies in fundamental level of policy making. Specially, they recommend initiatives for broader partnerships with the aim of dissemination of tested and recognisable results by applying plans that are specialised in sectoral and geographical environment, the national and European policy priorities for equal access of citizens in labour markets. In addition, they are carrying the effective practices and the new know–how for the promotion of equality and exchange of intergovernmental experience towards the direction of full employment, the advance of quality and production and the enhancement of cohesion in labour market at national and European level.

themes of the working groups of the European Thematic Networks ¹ concern:

- the modernisation of existing consulting structures on employment through development of new services with a good network and extensive co-operation, so that good practices can be better disseminated;
- the support, connection and collaboration of consulting support structures on employment with enterprises;
- the investigation of the institutional framework, as well as the drafting policy proposals for an integrative treatment of problems which most vulnerable groups encounter;
- the focus of employment consultants on new domains that strengthen the reasoning of integrated structural interventions;
- the development of supportive structures, qualitative level of services provided and mechanisms to detect needs for equal and full access to basic social goods and rights, which facilitate everyone’s smooth access to the labour market;
- the continuous consulting support for the development of social and professional skills related to the needs emerging from the new organisational forms of labour and the management of variety and diversity;
- the linkage of local development with the employment needs of socially vulnerable groups and the engagement of all local sectors, Non-Governmental Organisations (NGOs) and Social partners at all stages of support, starting from the designing stage up to the stage of action implementation, as well as of the wider implementation of successful practices;
- the management of cultural differences, the preparation of immigrants, refugees and national minorities on issues concerning their social and professional integration;
- the elaboration of individualised plans of education, social inclusion and comprehension of the strategy for labour market integration of individuals with multiple difficulties (i.e. comprehension of social exclusion and poverty with the help of comparative indicators), as well as the development of initiative factors that deal with social exclusion and poverty effectively and promote innovative methods;
- the adoption of enhanced methods for the right assessment of individuals’ learning and abilities, the organisation of exchanges in policies that are implemented and promote reciprocal learning, in

relation to the National Action Plans of the E.U Member States and the possibility to acquire lifelong education and training;

- the description of employers’ role, the organisation of employment support and trade-union associations, motives of participation and the aid to discuss on special themes (or thematic axes) oriented towards the enhancement of coupling, so that both the unemployed and enterprises are benefited. Within this framework, actions will be undertaken in order to strengthen the harmonisation of professional and family life.


The thematic priorities of Common Action Plans on developmental social policy are based on the previously selected thematic axes of discussion at European level, something that is related directly to the composition of National Thematic Networks. In this Framework, the Developmental Partnerships’ good practices for social development and their affinity with these thematic priorities have been taken into consideration. The treatment and composition of individual parts of practices that may be of interest attempts to supply the drafting of policy proposals based on needs and gaps identified within wider socio-economic developments. Furthermore, the treatment of these parts contributes to the efforts of working groups belonging to the Networks to get results from their work that can strengthen texts of work with their individual good practices; in these texts the integrated, coordinated and additional character of interventions is definitely impressive. Demonstrating good practices for developmental social policy is based on the criteria described below.

Innovation: Focuses on new approaches related to existing practices which deal with current needs and problems and points out gaps in or/and the lack of policy-making.

Coherence: Is related to the correct understanding of problems of target groups, as well as to response to specific demands and needs derived from their socioeconomic condition.

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2 N. Nagopoulos : Concerted and Complementary Actions of integrated Intervention for the Reinforcement of Employment, E.C / Greek Ministry of Employment, 2005
Effectiveness: Refers to direct quantitative and qualitative results from the implementation or testing of suggested practices and the degree of attainment of the initial and the expected results.

Consequences: Are related to the expected long-term results and their direct or indirect consequences, as well as to the utilization of quantitative and qualitative indices on the effects of implemented practices.

Ability to implement: This is a test of the ability to reproduce and re-implement practices under other circumstances and in other environments, as well as to inform and set human factor requirements (i.e. specialization and size) that are necessary for successful implementation in practice.

Ability to implement widely: Is related to the ability to adopt successful practices from all interested parties. It also focuses on actions that can contribute to the maximization of the results of these practices.

Empowerment: This concept and practice emphasizes specific ways of how potential beneficiaries can get involved in decision-making, designing and implementing. It also indicates to what extent beneficiaries strengthen their position in the labour market.

Accessibility: Refers to the utilization of the target groups’ accessibility to products and practices, as well as to the opportunity to use the products and practices according to target groups’ abilities and skills.

Utility: Is related to the other users’ ability to utilize practices and/or products so that other population groups can benefit. It is generally the ability to develop and utilize products / practices as tools of frequent and independent use.

Effectiveness: Compares the resources utilized in relevant and/or previous practices and considers how to maximize the effectiveness of products / practices in relation to a potential increase of resources.

6. Targets of Thematic Networks Interventions

The primary target of the actions undertaken by Thematic Networks on developmental social policy is the continuous enhancement of current integrated management systems for equal opportunities of specific vulnerable groups in the products and services provided, especially their facilitation during the integration (or re-integration) period in the labour market. This target to be achieved requires the promotion of co-operation between the Development Consortia on the basis of a framework common actions, which disseminates best practices to the thematic actions of the projects (horizontal mainstreaming) and relates innovative practices to produced products, which eventually can affect the labour systems, practices and policies and social integration at national and European level (vertical mainstreaming).

At this point, it is important to emphasize that the common target is, first, to facilitate co-operation of the related groups, so that they can
exchange experience and information on the thematic priorities highlighted in the study of the projects; second aim is to minimize the fragmentation and the lack of co-operation between those actors that undertake lots of different actions within the same thematic priority. This common aim can also highlight multifunctional areas of services that facilitate simultaneously and in many different ways the public.

Furthermore, when providing services, the related groups complement each other by offering support, making thus use to a great extent, of the infrastructure they have, as well as of the experience of the specialized workforce they employ. The central aim is that the coordinated and integrated approach can deal with beneficiaries’ problems, so that the latter can receive individualized support to overcome the difficulties that hinder social and professional integration.

The specific aims of the Common Action Plan determining the framework of thematic priorities in combination with the priorities at the European level are those presented hereafter.

Activation of those responsible for the projects which aim at strengthening wider aims and generating those requirements for co-operative processes, so that all partners deal together with the problems of social groups, as the partners may try to adapt to the content of the National and European employment policies for .

Upgrading implementation sectors, as they assume roles and undertake responsibilities that overcome a potentially restrictive and fragmented view of their involvement in the project assigned to them through wider and better communication by connecting the products of their actions with other similar actions heading towards the same direction.

Wherever the respective experience of Member States is taken into consideration, promotion of perceptions and practices of integrated and combined interventions aims at a horizontal and vertical mainstreaming, with a view to influencing as much as possible labour and social integration policy-makers.

Participation in drafting policy proposals - which deal with special topics brought up from specific products, conditions and best practices of the projects - as well as exploration of integrated action plans, coordination and Network, so that there will be a more effective approach to problems encountered by vulnerable groups.

Bringing up the competitive advantages that are connected with the target groups and the benefits derived for the economic reality, as well as the upgrading of those conditions that promote social integration.

Utilization of the project results in common actions which are promoted and widely disseminated. Furthermore, the dissemination, acceptance and implementation of specific effective practices at national and European
level and their deployment in benefited actors and groups (i.e. beneficiaries) that have not been active participants in the project.

7. Concluding remarks

The complexity and the importance of the problems that vulnerable groups are facing today demand the development of Supportive social Networks, which can include ‘new forms of aggregative action and intervention’, where individuals actively participate in procedures for their integration in the labour market, as well as in society.

In this Framework the Development of local productive systems and Local Councils (Bodies of Local Government, Communities, Development Companies, Trade Union Representatives, Union Centres, Bodies of the wider Civil Sector, Business Associations of Local Social Economy\(^1\), Bodies of collective Representation of susceptible groups) are based on:

- the elements and information collected, as well as on the analyses of the involved bodies concerning the socioeconomic situation and local labour markets,
- the diagnoses of local markets, needs and priorities,
- the developmental policy of the Regions and the focus placed by the Developmental Priorities, the way they are developed in the Regional Business Programs
- the priorities and guidelines of the NAPE and of the National Strategy for Employment.

Regarding local networking, the number and the kind of the participant bodies, their role, the cooperation form, the objectives and organization, as well as former experience at national and European level, are taken into account. Moreover, local peculiarities and the specific social, financial, legislation and historic-social framework of each region require different choices.

In every case, developing cooperation and dialogue among national, regional and local level, saving time and resources are basic prerequisites for the contribution of created networks (local, regional, or thematic networks) to the planning procedure. Recording and evaluating former experience for coherent participation of local communities in policy design with a view to promoting employment, can contribute to further thought on issues, such as:

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\(^1\) The Organizations of Social Economy try Economy able to adjust in changing conditions, and constitutes the alternative perspective in the big sized Economy
the concept of local level,
-the thematic width of the network,
-the number, kind and representation of participant bodies,
-the clarity of the role and the representation level of the bodies,
-the expected benefits to be gained from participation of each of the bodies in the network, as well as the way of contribution for each body,
-the possibility of participating in the network for the final services beneficiaries (users),
-the duration of the network function,
-the available resources for its utilization.\(^1\)

Finally, we underline The Participation of Thematic Social Networks, which homogenize and enforce the ways of dealing with problems in a common framework of criteria and strategies, exploring at the same time the requirements for the development of multi-force interventions, which will facilitate co-operation and synergy among involved actors and will specify the integrated character of these interventions.\(^2\)

The Utilization of transnational co-operations, which are of a mainstream character at a European level, whereas at the same time the participating actors (partners) of the projects are able to overcome the specific framework of their involvement and participate in disseminating best practices resulting from social policy projects.

The Activation of individuals of target groups, as well as the promotion of processes and techniques, so that group networking, organizations and individuals of socially vulnerable groups is facilitated.

The Processing of collective and combined texts, so that social discrimination of the afore-mentioned individuals and groups be reduced; promotion of equal opportunities and utilization of actions, so that successful cases in specific thematic domains have the maximum effect possible.

The Utilization of communication tools, so that publication activities are expanded within an integrated action plan for dissemination to all

\(^1\) Index for the expansion of regional approaches and local peculiarities in the framework of National Thematic Network of CIP Equal, 2005

interested parties. Furthermore, focus is on specific best practices that have been disseminated, promoted and implemented.

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Modeling the impact of social interactions on the decision making process: comprehensive framework

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Abstract:
This paper presents a theoretical framework on how sociality (the tendency to associate in or form social groups and networks) influences choice behavior of the individuals. A selected literature and a classification of the effects on human behavior of affiliations with social networks (e.g. families, co-workers, friends, political parties, etc) are presented. Based on the state-of-the-art, a comprehensive framework to model sociality effects on choice behavior is developed and analyzed. This framework suggests that social network effects influence choice behavior through both contextual and endogenous network factors (including constraints, perceptions, aptitudes and preferences of the decision makers) and their omission makes the quantitative analysis and especially the development of econometric choice models complex. The specification of such a choice model is thus proposed.

Keywords:
Social networks, choice behavior, endogenous factors, choice models

1. Introduction
This paper aims to give an insight to the individual choice behavior in the presence of social interactions. By social interactions are meant the interdependencies between individual decisions and the decisions and characteristics of others within a common social group, system or network.

From a modelling point of view, in the context of the development of econometric choice models of the individuals, the decisions of one decision maker seem to be influenced by the behaviors and characteristics of the other members within the same group; what distinguishes that these interdependences directly link individuals.

McFadden [1], the Nobel Prize laureate of 2000 in Economics, uses the term “sociality” in order to define: “the tendency to associate in or form social groups and networks” and suggests that sociality plays a critical role on the economic decision making process of the individuals.
The paper is organised as follows: section 2 following presents a detailed literature review regarding to the role of sociality for the decision making process of the individuals. The modeling efforts referring to the social network effects on choice behavior are also presented. In section 3 a theoretical framework for modeling network effects on choice is developed, based on the state-of-the-art. Finally, section 4 concludes the paper.

2. Literature review: The role of sociality to the decision making process

There is a large body of theoretical and empirical studies of social interactions. Becker [2], the Nobel Prize winner of 1992, has contributed vastly to the literature on social interactions. He was awarded to him "for having extended the domain of microeconomic analysis to a wide range of human behavior and interaction, including non-market behavior".

Additionally, McFadden [1], the Nobel Prize winner of 2000, examined the effect on human (economic) behavior of affiliations with social networks; e.g., families, co-workers, tribal and ethnic groups, political parties, religious sects, neighbors etc. He noted that people affiliate voluntarily with social networks in order to get efficiencies in information collection and sharing, to joint production and division of effort and to share risk in decision making. He suggested that “Opportunity-based homophile (OBH) requires reciprocity, while Preference-based homophile (PBH) requires trust, altruism”.

It is noted that, one strand of the social interactions literature has focused on the implications of social interactions in predetermined groups. Akerlof [3] and Brock and Durlauf [4-6], for example, considered the role of the interactions structure within a group on group-level outcomes. Models such as Loury [7] and Lundberg and Startz [8] focused on the effects of social interactions within ethnic groups with specific attention to how differences in initial conditions have long run effects.

In contrast, studies by Bénabou [9,10], Durlauf [11,12] and Hoff and Sen [13] have primarily focused on the implications of social interactions for group formation, specifically in the context of residential neighbourhoods. In such models, for instance, children were found to be influenced by the neighbourhoods in which they grew up through factors such as the local tax base, the types of role models that are present and via peer group influences. Another study by Head and Mayer [14] analyzed the extent of non-market interactions and investigated the social transmission of parental preferences regarding the naming of their children. The authors argued that the frequency of existing child names in the neighbourhood can influence parent's choice of what to name their child. In the same context, Glaeser et al. [15] presented a model where, after controlling for
economical and social conditions, social interactions explained the high variance of crime rates across cities, while they constructed an index of social interactions, using data from the FBI and the New York City Police Department.

One limitation of the existing theoretical models of social interactions is the relatively weak connections between these two approaches. See Becker and Murphy [16] for a synthesis of various theoretical strands of the social interactions literature as well as for a valuable analysis of links between the two strands described above. It is also noted that Manski [17] and Glaeser and Scheinkman [18] provide surveys of the literature and discuss different approaches to define and model social interactions.

2.1. Modeling Social Network Effects on Choice Behavior

A major weakness of the social interactions literature as it is currently constituted is the absence of strong connections between theory and empirics. While there has been paid considerable attention to such feedback effects in the context of linear regression models, there has been considerably less paid in the context of discrete choice models [4].

It is noted that Aoki [19], Brock and Durlauf [4] and Blume and Durlauf [20] introduced social interactions in binary discrete choice models by allowing a given agent’s choice for a particular alternative to be dependent on the overall share of decision-makers that choose that alternative.

Brock and Durlauf [4,5] modelled how the dynamics of a group can influence the decisions and actions of an individual. Based on the literature referring to discrete choice modelling, they investigated for self-consistent equilibriums which presented a hyperbolic tangent shape such as found in some specific models in physics (e.g. the Curie-Weiss model of magnetism).

Additionally Brock and Durlauf [6] extended that work to account for multinomial choice. This generalization leads to a number of new methodological insights as well as allows for the application of theoretical models of social interactions to a broader range of phenomena than was previously possible.

Furthermore, Dugundji [21] made Brock and Durlauf’s multinomial results precise for trinary multinomial choice and extended the results for the case of nested logit with global interactions. Also, while the behavior over time derived in early work assumed each decision-maker to be influenced by all other decision-makers (so-called global interactions).

In addition, Dugundji and Gulyas [22-24] derived more general behavior for the case where each decision-maker is influenced by only a subset of decision-makers (so-called non-global interactions). A key to all
of the above theoretical results, however, is the assumption that the only explanatory variable in the model is the feedback effect.

Dugundji and Gulyas [25] thus presented initial results using simulated data for a binary logit model with non-global interactions and other explanatory variables included in the utility function. In a companion paper Dugundji and Gulyas [26, 27] presented results for the behavior over time of a nested logit model with non-global interactions, using the same empirical data and the same treatments of which decision-makers influenced each other on the basis of socioeconomic group and spatial proximity of residential location.

Manski [28] related social interaction to the reflection phenomenon. He developed numerous models which took three main hypotheses: "(a) endogenous effects, wherein the propensity of an individual to behave in some way varies with the behavior of the group; (b) exogenous (contextual) effects, wherein the propensity of an individual to behave as in some way varies with the exogenous characteristics of the group, and (c) correlated effects, wherein individuals in the same group tend to behave similarly because they have similar individual characteristics or face similar institutional environments." The first hypothesis generated a social multiplier effect creating mimetic behavior in a group. The second hypothesis distinguished exogenous and independent determinants of behavior whilst the third related to correlated determinants of behavior.

Following Manski [28] one can think of a decision maker’s interaction with his /her social system or network as being composed of two factors: contextual and endogenous. Contextual are the group-specific factors and they are based on the common characteristics of the group members. Endogenous are the factors affected by the contemporaneous behavioral choices of group members.

The effect on modeling choice behavior of the individuals is found in the relevant literature as “the role model effect” (contextual effect, endogenous effect). It is noted that contextual effects are not reflexive, while endogenous effects are reflexive: one member’s efforts influence the other members’ choices, just as he /she is influenced.

Additionally, Dugundi and Walker [29] presented a framework for conceptualizing the interdependence of decision-makers’ choices, making a distinction between social versus spatial network interdependencies and between identifiable versus aggregate agent interdependencies. They discussed five strategies for introducing social and spatial network interdependencies into choice models, focusing on feedback effects and on correlated effects.
3. Comprehensive Behavioral Framework

The Discrete Choice Modelling system includes the following basic components:

- The decision maker;
- The set of the available to the decision maker discrete alternative choices;
- The decision rule: The available alternative which gives to the decision maker the maximum utility is selected.

Discrete choice models are based on the economic Random Utility Theory. These Random Utility Models (RUM) have traditionally presented an individual’s choice process as a black box, in which the inputs are the attributes of available alternatives and individual characteristics, and the output is the observed choice. Recent work in discrete choice models has emphasized the importance of the explicit treatment of psychological factors affecting decision-making (see, for example, [30-35]). A guiding philosophy in these developments is that the incorporation of psychological factors leads to a more behaviorally realistic representation of the choice process, and consequently, better explanatory power (Ben-Akiva et al [36]).

Attitudes, perceptions and preferences of individuals are hypothesized to be key factors that characterize the underlying behavior. Perceptions are the individuals’ beliefs or estimates of the levels of attributes of the alternatives. Attitudes are latent variables corresponding to the characteristics of the decision-maker. They are formed over time, are affected by experience and external factors and reflect individuals’ needs, values, tastes, and capabilities.

In this paper, based on the findings from the literature review, a comprehensive framework to model sociality effects on individual choice behavior is following presented. This framework considers both the contextual (exogenous) factors and the endogenous factors of the social groups, affecting the Utility functions of the alternative choices available to the decision maker.

In this diagram, ovals refer to unobservable (latent) variables, while rectangular boxes represent observable variables. These variables are linked to the individual’s utility and perceptions through a causal mapping, showed by solid arrows (structural equations of the model), while the unobservable variables are linked to their indicators (measurement equations of the model) by dashed arrows.
As shown in Fig. 1, the model system considers two types of unobservable variables and associated indicators. The first one is the utility of every alternative choice. Its indicators are the stated preference of the decision maker regarding his/her choice. The second type of unobservable variables includes perceptions, attitudes and preferences of the decision makers, indicating by other, observable, variables (indicators) which could be subjective answers of perceptual, attitudinal or preference questions (depend on the decision in question).

As discussed previously, it also contains two types of explanatory of the choice variables: variables related to contextual (exogenous) characteristics of the decision makers, additionally to endogenous network characteristics. The following endogenous network variables are considered:

1. Constraints (e.g. budget constraints, constraints from obligations to the social network, etc)

2. Perceptions / attitudes of the decision makers. Since attitudes and perceptions are unobservable to the analyst, they are represented by indicators. These latent attitudes and perceptions, as well as the observable explanatory variables, affect individuals’ choices toward different alternatives and their decision-making process.

**Figure 1.** Framework to model social interaction effects on individual choice behavior
It must be noted that, “while in the classical choice model is assumed that consumers form and act on realistic, rational expectations based on sound statistical analysis of all available information, the behavioral model has to assume that memory is imperfect, while personal probability calculus is inconsistent” [1].

3. Preferences of the decision makers, representing the desirability of alternative choices. These preferences are translated to decisions via a decision-making process.

It is noted that McFadden [1] has also suggested that: “In the classical choice model is assumed that consumers have utility based on their individualistic outcomes, and are indifferent to the welfare of others. The behavioral model has to consider that consumers have individualistic felicities, but also have personal welfare functions that may depend on:
(Indicators for) the felicities of others – altruism
Comparisons with outcomes of others – status, predation,
Approval by others
Accountability and sanctions”

4. Model system specification

The model presented in Figure 1 is the combination of a latent variable model and a discrete choice model, which constitutes to an Integrated Choice and Latent Variable (ICLV) model. For a detailed description of such models, see [40]). These types of integrated models can be estimated either sequentially or jointly (see Morikawa et al. [37] for a detailed presentation of both estimation techniques).

In this paper, the specification of the model system presented in the comprehensive framework of Figure 1 is going to be developed.

As mentioned previously, this model system constitutes of two (jointly or sequentially estimated) models:
1) A discrete choice model;
2) A latent variable model.

Both models are specified by:
A set of structural equations. These are represented in Figure 1 by solid arrows. In the case of the discrete choice model the structural equations are the Utility functions of the alternative choices (explained by both observed and latent variables), while in the case of the latent variable model, the structural equations are the latent variables functions (explained by socioeconomic and other observed variables of the decision makers).
A set of measurement equations. These equations link the unobserved (latent) variables to their observed indicators and are represented in Figure 1 by dashed arrows. In the case of the discrete choice model the indicator of the Utility of the available alternatives is the choice made by the decision maker. For the latent variable model, the indicators of each latent variable are subjective answers of perceptual, attitudinal or preference questions.

The following notation is used:

\( J \) is the number of available alternatives
\( U_{in} , i=1,2,...,J \) denote the utility of the alternative \( i \) for individual \( n \);
\( X_{in} , i=1,2,...,J \) are sets of observed exogenous variables of the network for individual \( n \) (e.g. socioeconomic characteristics);
\( Y_{in} , i=1,2,...,J \) are sets of observed endogenous variables of the network for individual \( n \) (e.g. constraints);
\( L \) is the number of latent (unobserved) variables, i.e. perceptions, attitudes, preferences.
\( Z_{ln}, l=1,2,...,L \) the set of the latent variables included in the model
\( I_{ln}, l=1,2,...,L \) are sets of the indicators of the latent variables
\( Z_{ln}, l=1,2,...,L \) respectively;
\( W_{ln}, l=1,2,...,L \) are sets of observed variables (characteristics of respondent \( n \));
\( \omega_{ln}, l=1,2,...,L \) and \( U_{ln}, l=1,2,...,L \) are sets of (i.i.d. normally distributed) errors;
\( b,c,d,l, \lambda l, \alpha l \) (\( l=1,2,...,L \)) are sets of unknown parameters;

The equations of the system to model sociality effects on individual choice behavior follow:

Discrete choice model
Structural equations

\[
U_{in} = bX_{in} + cY_{in} + \sum_{l=1}^{L} d_{l} Z_{ln} + \varepsilon_{in}, i = 1,2,...,n
\]
Measurement equations
\[ y_{in} = \begin{cases} 1, & if \ U_{in} = \max_j \{U_{jn}\}, i = 1, 2, \ldots, J \\ 0, & otherwise \end{cases} \]

Latent Variable model
Structural equations
\[ Z_{in} = \sum_j W_{in} + \omega_{in}, l = 1, 2, \ldots, L \]

Measurement equations
\[ I_{in} = a_i Z_{in} + v_{in}, l = 1, 2, \ldots, L \]

5. Concluding remarks
This paper develops a comprehensive behavioral framework to model the impact of sociality and social interactions to the decision making process of the individuals. Sociality is considered as “the tendency to associate in or form social groups and networks”, while by social interactions are meant “the interdependencies between individual decisions and the decisions and characteristics of others within a common social group, system or network”.

The review of the relevant literature suggests that there is a large body of theoretical and empirical studies, while a major weakness of this large body of literature, as it is currently constituted, is the absence of strong connections between theory and empirics.

Regarding to the development of econometric discrete choice models (based on the random utility theory), there is pure evidence. A significant finding is that modelling social network effects on individual choice behavior has mainly to consider two different types of explanatory characteristics: (a) endogenous characteristics, wherein the propensity of an individual to behave in some way varies with the behavior of the group; (b) exogenous (contextual) characteristics, wherein the propensity of an individual to behave as in some way varies with the exogenous characteristics of the group.

The modelling behavioral framework developed in this paper, based on the state-of-the-art, considers both the contextual (exogenous) factors and the endogenous factors of the social groups, affecting the decision making process. With regards to the endogenous factors, it includes constraints, perceptions, attitudes and preferences of the decision makers. Furthermore, due to the fact that the last variables are unobservable (latent) to the analyst, the model system developed indicates these variables by
other, observable, variables (indicators), which could be subjective answers of perceptual, attitudinal or preference questions (depend on the decision in question).

By concluding, it could be said that obviously sociality matters to the choice behavior of the individuals. Social network effects seem to influence choice behavior through constraints, perceptions, preferences, and the decision-making process, and their omission makes choice models incomplete and misleading. The rational choice model can be expanded to encompass field, Opportunity-based homophile (OBH) and Preference-based homophile (PBH) effects, trust and altruism.

References


The Phenomenon of Economic Responsibility

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Abstract:
The publication has arisen two aims: to describe the phenomenon of responsibility and to demonstrate, from where the weakness of the institution in Estonian economic relations comes today.
The representatives of different disciplines approach the problem in different and according to different criteria. We get an objective premise for the variety as for terminological, so for essential aspects, often even for the contradiction, if we’ll add the complexity and extremely difficult possibility to define, what gives the premises to approach the responsibility from very different levels of abstraction, to the faceted approach to the problem. The main amount of the publications are usages, which are far away to be scientific, and wherein the responsibility or usually some small part of it, which is out of the context, is treated according to personal or group interests or according to current political problems.
In this publication responsibility is considered as a specific regulation of human behaviour, wherein the activity of the subject of responsibility is influenced by self-assessment from one side and by the social assessment of the results of his activity through different sanctions from the other side.
Such a treatment of the essence of responsibility can demonstrate the conditions of its presence in every system i.e. it has got a heuristic methodological importance. The premises of the presence of the responsibility in every system are as follows: 1) the presence of the subject of responsibility (a person or smaller or bigger group of persons) in the observable system; 2) the subject of responsibility has to have a choice between different decisions; 3) different decisions of the subject have got different influences on the managed object (on the reflection of its activity); 4) the changes of the managed object can be determined; 5) the estimation (valuation) of the changes; 6) the presence of a real feedback on the subject of responsibility; 7) the understanding of the essence of the feedback by the subject; 8) the correction of the future activity of the subject according to the feedback.
The responsibility can exist only inside a system and only inside systems, which contain human activity. In human society the feedback appears through different social institutions. Therefore, the responsibility is an essential part of all the sciences studying the institutions of human society. The direct social character of responsibility appears in estimations of the results of activity given by the subject. As every subject dominantly proceeds from oneself and one’s own interests, so
these estimations don’t have to coincide with objective reality nor social estimations.
The presence of responsibility in a certain system premises some certain independence of the subject of responsibility. A person can’t have any level of independence in a one-to-one determined systems, therefore one can’t be responsible for anything.
It’s characteristic to the transitional states, so it’s characteristic to Estonia, that independence is identified with the lack of responsibility i.e. a situation, wherein the aggregated level of independence of society is limited. Only the Parliament of Estonia as the main legislative body can really change the situation. But it premises to overcome the diametrically controversial interests of very influential groups, wherein is the Parliament of Estonia itself and who are interested in preserving the current situation.

**Key words:**
Responsibility, economic responsibility, sanctions, efficiency.

1. **Introduction**

It has become a fashionable item to talk about the responsibility, in fact, about the lack of responsibility. At the same time it’s difficult to find two persons whose conceptions about the responsibility would have been coincidental. Obviously, it would be necessary to determine what’s the responsibility is, how it’s expressed, and how it would have to be expressed, before we will talk about the substantial lack of responsibility in many institutions (which is a false and true statement at the same time).

The publication has arisen two aims: to describe the phenomenon of responsibility and to demonstrate, from where the weakness of the institution comes today. The development of juridical, economical etc means in order to change the present situation isn’t even methodologically among the purposes of the publication.

2. **The essence of responsibility**

The representatives of different disciplines approach the problem in different and according to different criteria. We get an objective premise for the variety as for terminological, so for essential aspects, often even for the contradiction, if we’ll add the complexity and extremely difficult possibility to define, what gives the premises to approach the responsibility from very different levels of abstraction, to the faceted approach to the problem. The main amount of the publications are usages, which are far away to be scientific, and wherein the responsibility or usually some small part of it, which is out of the context, is treated according to personal or group interests or according to current political problems.
It’s instantly rational in order to avoid useless terminological discussion or even scholastic and conscious demagogoy to fix what the term responsibility means in this publication. So, responsibility is considered as a specific regulation of human behaviour, wherein the activity of the subject of responsibility is influenced by self-assessment from one side and by the social assessment of the results of his activity through different sanctions from the other side. Instantly, in order not to deal the essence of responsibility restrictedly it has to be mentioned that the sanctions aren’t considered only as a punishment. We originate from the Latin origin of the word sanctio i.e. we interpret the term as approval, acceptance, and the adoption of some act or as fixing it by a law. It’s especially controversial if the authorization is used in the meaning of punishment.

The author has proposed in his previous publications (Raju, 1985) a simplified model to explain the essence of responsibility, which is based on feedback (Figure 1). In order to understand the model it’s essential to stress that management has to be understand in it’s general meaning and the managed object can be whatever reflector of human activity. The dotted line on Figure 1 reflects the deviation of the managed object to desirable (+) or undesirable (-) direction.

Such a treatment of the essence of responsibility can demonstrate the conditions of its presence in every system i.e. it has got a heuristic methodological importance. The premises of the presence of the responsibility in every system are as follows: 1) the presence of the subject of responsibility (a person or smaller or bigger group of persons) in the observable system; 2) the subject of responsibility has to have a choice between different decisions; 3) different decisions of the subject have got different influences on the managed object (on the reflection of its activity); 4) the changes of the managed object can be determined; 5) the estimation (valuation) of the changes; 6) the presence of a real feedback on the subject of responsibility; 7) the understanding of the essence of the feedback by the subject; 8) the correction of the future activity of the subject according to the feedback.
The responsibility can exist only inside a system and only inside systems, which contain human activity. Unlike most of the researching objects of social sciences the responsibility can sometimes have a non-social character e.g. the responsibility existed in Robinson’s system people – nature. Certainly, the responsibility has dominantly got the social character in human society. In such a system the reflector of human activity isn’t a natural direct environment but the forms mediated by human activity and that’s different from Robinson. Also, the results of human activity don’t appear in direct biological changes of the living conditions of a concrete human individual but in the change of the social environment, especially in the change of total efficiency of economics. The feedback appears through different social institutions in such a situation. Therefore, the responsibility is an essential part of all the sciences studying the institutions of human community, however, it hasn’t been treated enough yet.

The direct social character of responsibility appears in estimations of the results of activity given by the subject. As every subject dominantly proceeds from oneself and one’s own interests, so these estimations don’t have to coincide with objective reality nor social estimations.
The presence of responsibility in a certain system premises some certain independence of the subject of responsibility. A person can’t have any level of independence in a one-to-one determined system, therefore one can’t be responsible for anything – one just doesn’t have any possibility to be the reason for a source of different conditions of the managed system. The responsibility is created by independence and the independence is directed by responsibility. Therefore, there isn’t any independence without responsibility or any responsibility without independence (Hegel, 1956).

The premise of the presence of responsibility in every system is the presence of a feedback, which reflects the changes taking place in currently managed object. Above all a direct perceptible feedback acts in the first stages of human society. But a feedback, which acts through different social institutions (bookkeeping, arbitration, judge, court), becomes dominant since the end of a traditional society. The latter fact isn’t a limited interpretation of ± treatment. A false feedback may originate from the false estimations of the changes of the managed object, an inadequate reaction or an inadequate perceiving of the reaction by the subject of the responsibility. The factual content is formed by the total effect of objective and subjective factors. The objective content of the responsibility of the subject (person, group, state etc) is in accordance with the real result of one’s activity only in the case of their coincident.

3. The lack of traditional treatment of responsibility
The traditional treatment of responsibility is based only on the negative results of the managed system and it deals only with the negative feedback. The restricted treatment, which widely identifies the responsibility with the punishment, can be used only for some juridical problems e.g. code of laws (Bunni, 2002). But it occurs to be limited for macro economical and especially social problems. For example, a worker has to make 25 details from one ton of steal but he copes with 30 details but he could make 100. The equivalent treatment says that there isn’t any responsibility, more over – there isn’t any responsibility and he is praised. But the changes of a managed object have to be valued negative by society (the efficiency is much less than it could be). Who’s really responsible for the negative changes? Probably they are inconspicuously divided inside a smaller or bigger group of people (as an extreme version – among all the humans), wherein these changes and especially the mechanism of their origin aren’t perceived at all or, if perceived, then in an inadequate way.

A bivalent approach to responsibility is necessary in order to avoid the aforesaid and other lacks. According to this treatment the subject of responsibility (person or collective) is responsible not only in the case of non-performance of a fixed demand but in the case of whatever change of
the managed object if these are the results of one’s free activity or inactivity. Certainly, a treatment of that kind assumes the feedback to be bivalent (±) being positive (+) or negative (-) according to the results of the activity.

The bivalent approach isn’t a new one in social sciences and in economics – it’s principally used in the observation of the principles of market forming mechanisms. All the treatment of automatic stabilisers is based on it.

The bivalent treatment is certainly more stimulating than the equivalent one. It describes the efficiency more. In the case of equivalent treatment it’s obligatory to fix the ideal condition of the managed system, then all the changes will be contemplated as deviations from it, and the subject of the responsibility will be punished for them. Even if the ideal condition of some system could be fixed, it will be very temporary in the dynamic world. Society is interested in Pareto-efficient division of the resources but it’s rapidly changing. We could at best insert the current Pareto-efficient division of resources if we’ll fix the ideal condition of some system. A system of equivalent response can’t be changeable at once; that’s why it inescapably impedes economics (and the whole society) in time. The equivalent treatment of responsibility is justifiably called retrospective. A retrospective treatment of that kind is based on the Medieval sense about the society - first of all the responsibility is a divine punishment for false behaviour. The God may be Jehovah, Allah, Buda or some fourth one.

Any phenomenon of efficiency can be estimated as a relation between the obtained result and the resources spent (or used) for it. The question – did the person i.e. the subject of responsibility reach the status given by the system – isn’t sufficient. It’s quite possible that one wasn’t able to reach the goal with the resources one possessed. The bivalent treatment contemplates the dynamics of the system and gives the estimation according it but the equivalent one gives the estimation according to an ideal (normative), which has been fixed by someone and somewhere. Certainly, the bivalent treatment of the responsibility assumes the presence of positive (+) and negative (-) feedback and the appropriate sanctions.

4. Responsibility contra independence

The problem of the relation between the responsibility and the independence has already been reported in the works of Ancient authors but the disputes haven’t ended even nowadays. It’s mostly the problem of free will. If the gods have destined the behaviour of a person, so how could a person be responsible for one’s activities? Is it allowed to punish a person for breaking a law? One hasn’t got discretion, as one is just a
puppet for the gods. Why should the puppet be punished if God stands behind all of it?!

The Medieval Ages added the stressing of the retrospective aspect as it has already been mentioned. As the Medieval Ages’ scholasticism receded, so human thoughts began to look for the answer to the essence of responsibility not in the divine will but in the reference system of a person as a social creature. It’s rather paradoxical that human kind hasn’t been able to add something principally new to Spinoza’s (1632 – 1677) rational gnoseological treatment. Spinoza told that the independence was obtained only in thoughts and that’s why independence was cognised inevitability, which is understandable only for a clever person who’s looking at the world from the position of eternity. It’s a fact that the position – independence is cognised inevitability – which has been ascribed to Hegel or even Engels, has de facto been written by Spinoza and both, Hegel and Marxism have just tried to press it in their system of ideal political categories.

The discussion about antonyms “independence – compulsion” and “independence –determination” hasn’t been finished yet. It can’t be finished until the solution to the problem is searched on the level of human psyche. Human being isn’t just a biological creature or just a thinking creature; it’s also a social creature. The problem of the essence of responsibility and independence can’t be solved without understanding it. Human person is never free from the biological nature and social environment. The less one knows, the less one understands – the fewer is the discretion. Human kind expands its discretions while understanding the general rules of the development on Universe, finding out the processes taking place in society, and perceiving general rules of regularity. Every step of progress enables to add new alternatives to human behaviour. It was just not long ago as human kind learned to fly and turned flying and air transport to be controllable objectives. Today we’re entering space and the probability to meet other civilizations in the nearest future of cosmic scales is great. The independence is increasing as the limits of the processes we can’t understand diminish.

The responsibility in human society grows as the determination made by natural laws diminishes, we can influence more and more objects and the results of human activity will be bigger, sometimes even fatal and catastrophic. The feedback of human society, especially on its higher levels of development, takes place through different social institutions. The systematic backwardness of them, for example juridical acts, from the rapidly changing reality compiles “empty places” in feedback i.e. the results of human activity can’t be understood or, as it’s common, they can’t be evaluated or the system of feedback can’t be created. But the results exist and they are divided between smaller or bigger groups. A paradox
arises – if there isn’t any feedback to subject of responsibility, which created concrete changes, then the results of its activity appear concerning other members of society as an inviolable power, which restricts the independence. The basis of independence for the members of society is the concrete feedback, which is based on responsibility.

The same may be said about the aggregated independence of society as a total unit. If subjects arise, who will stay away from responsibility, then the level of independence of very many people will decrease. The results of the subject, who didn’t take consequences, function as an inviolable power, which limits independence. The aggregated level of society decreases as a result of it.

The limitation of aggregated independence is especially high if the feedback doesn’t reach the persons, whose activity had the inviolable influence on the very many people (parliament, government, court, media etc). But these institutions are often eliminated, sometimes even consequently using their position, from the really working feedback. A situation of that kind decreases aggregated independence in the society.

It’s characteristic to the transitional states, so it’s characteristic to Estonia, that independence is identified with the lack of responsibility i.e. a situation, wherein the aggregated level of independence of society is limited. Only the Parliament of Estonia as the main legislative body can really change the situation. But it premises to overcome the diametrically controversial interests of very influential groups, wherein is the Parliament of Estonia itself and who are interested in preserving the current situation.

5. The essence of economical responsibility

It’s more difficult to find answers to questions – what are social, economical, material, political, moral etc responsibilities – than to understand the essence of responsibility.

The most common way to determine something is to define it as a part of something. But responsibility and its forms are so general terms that a determination of that kind doesn’t succeed. As the basis of the existence of responsibility in every system demands a simultaneous presence of abovementioned conditions, so the responsibility has tried to be classified according to them and on the basis of a simultaneous combined observation of some of them (Responsibility…, 2006).

The systematisation of the forms of responsibility is especially difficult whenever the responsibility and the sense of responsibility are mixed up. It’s obvious that if the subject of responsibility doesn’t perceive the feedback at all or perceives it in a false way, then there’s a lack of motivation in his/her intended behaviour. Certainly, an objective perceiving of the feedback is the obligatory assumption of responsibility. If there’s a lack of the objective perceiving, then the scheme, which depicts
the essence of the responsibility, isn’t closed and the system can’t function. But the perceiving of the responsibility or the adjustment of the behaviour for it can’t be identified with the whole essence of the responsibility.

The classifications of responsibility originate from the forms of feedback: material, criminal, disciplinary etc forms of feedback have been given just emanating from the essence of the feedback. But is it possible to give the essence of economical feedback on its basis? Through the extrapolation of the abovementioned logics the responsibility, which functions through the economical feedback, should have to be considered to be the responsibility. Essentially, any responsibility contains economical moments. That’s how the economical responsibility would dominantly be identified with the social responsibility.

It’s practical to originate from the abovementioned model of responsibility while limiting economical responsibility (Figure 1). The basis of responsibility are the changes, which take place in the guided system (in the reflector of human activity), which are positive or negative and which have been formed as a result of the voluntary behaviour i.e. behaviour, which contains a possibility of choice. As every human activity has often got some results in several different fields and/or it could be estimated according to several different aspects (economy, moral, politics etc), so different forms of responsibility – social, economical, moral etc – could be talked about. The moral responsibility means all results of human activity (with the changes in the reflection of human activity), which have some influence on moral (or which could be estimated from the position of moral); the economical responsibility means economical changes (results) originating from the activity of the subject of responsibility. The next problem would arise – practically all human activities will evoke some forms of economical results. According to the abovementioned criteria practically all human activities are “covered” with economical responsibility.

We can talk about the responsibility if the results of the activity of the subject have some real feedback on him. The lack of feedback automatically eliminates responsibility from the system. Therefore the question about the role of feedback in the identification of the economical responsibility arises.

The following versions are possible:

- A feedback of economical character from the economical changes of the guided object.

- A non-economical feedback from the economical changes of the guided object.
• An economical feedback from the non-economical changes of the guided object.

Undoubtedly, the first one is economical responsibility, whatever aspect you’ll consider. The second and the third versions are problematic. Logics about the second one would be the following. Probably it can’t be considered to be an economical responsibility, if there’s a punishment as deprivation of freedom, public humiliation etc for economical results. That’s certainly a case if there isn’t any economical changers of the situation e.g. decrease of earnings during the deprivation of freedom. The latter one i.e. the worsening of economical situation is already an economical feedback. The third version is more difficult. Let’s imagine a penalty fare for breaching the speed limit. Any measurable changes, particularly economical, didn’t occur in the guided object; but the feedback is certainly of economical character and it will elicit the worsening of the economical situation of the subject. The different treatments of the last version are the objects of the discussion around the boundaries of economical responsibility.

In order to avoid the scholastic discussion it’s perhaps practical to state that economical responsibility has got two different treatments: narrower one and wider one. Narrow treatment assumes a simultaneous presence of two possible characteristics – economical results and feedback of economical character. That’s strictly scientific treatment, wherein the borders of the observed category are exactly determined. The second treatment, wherein it isn’t obvious which part of the responsibility should be considered to be economical responsibility, is suitable for several philosophical and juridical problems, but it isn’t suitable for scientific economical questions.

6. Conclusion
The following conclusions could be made:

• As a general rule, the responsibility is treated as restrictive i.e. its definitions are suitable just for some part (or form) of the responsibility and even that’s dominantly within the frames of the categories of one scientific field. Thereat a retrospective treatment, which has been stressed by lawyers, is dominating and that’s rather unsuitable for the treatment of economical problems.

• The responsibility could be treated scientifically correctly and complexly only on the basis of the feedback of the systematic theory. (Figure 1). Responsibility should be understand as a specific regulation of human behaviour, wherein which the activity of the subject of the responsibility is influenced by self-estimation from
one side and by social estimations of the results of his/her activities through different sanctions from the other side. Thereat the sanctions can’t be observed as punishments and the feedback can’t be observed as a phenomenon, which strengthens or weakens the system. A treatment of that kind eliminates the inescapable dynamism of Pareto-efficient division.

- Responsibility can’t be treated outside the unity of “freedom-responsibility”. Unfortunately the stressing of their polarity is spread instead of giving their unity.

- The economical responsibility forms a part, especially a determining part, from the whole category of (social) responsibility. Suitable criteria of law have been used while determining it. The scholastic discussion about the economical definitions of economical responsibility could be avoided while observing the economical responsibility according to the above given scheme and by giving two definitions of economical responsibility – narrower and wider ones. The criteria of definition are the changes of economical situation of the subject as a result of the mechanism of feedback. It has to originate from the economical changes, which have taken place in the object of the responsibility, for narrower one. The influence of feedback on the economical situation of the subject of responsibility is sufficient for the wider one.

References
Topic: SEM

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Evanthia Tasopoulou

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Evaluation of the environmental sustainability performance of industrial facilities

Georgios Gaidajis, Chrisanthis Palasopoulou

Application of management cybernetics methods in a public hospital: case study the energy system of general hospital Xathi (ABSTRACT ONLY)

Charalambos Gevrekis, Dimitrios C. Panagiotakopoulos
Business process reengineering with use of workflow technologies

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Democritus University of Thrace

Abstract (only):
This paper presents a methodological approach of business process reengineering which incorporates the adoption of workflow technologies and the use of analytical hierarchical process. The benefits of this methodology’s use involve the improvement of the effectiveness, the efficiency and the adaptability of the procedures, the improvement of customers’ service and the decrease in cost and time of the procedures.
The theoretical background of the developed methodology is based on the bibliography concerning relative scientific fields such as: business process reengineering, workflow management systems, enterprise modeling and analytical hierarchical process.
The methodology proposed has been implemented on a factory producing electronic, communication and defensive systems (Sunlight systems Co). A case study was conducted that provided important facts in relevance with the basic theoretical framework.
For the application of the final evaluation of the alternative which resulted through the reengineering several factors were examined, such as laws, economical, social and environmental effects.

Keywords:
Business process, Business process reengineering, Workflow management systems, Analytic Hierarchy Process, ARIS, WITNESS, Simulation, Expert Choice, Political, economic, social and environmental repercussions
Technical and financial parameters of civil nuclear reactors

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Georgios Nikolaou

Abstract (only):
The object of this post-graduate thesis is to scrutinize the technical and financial parameters that characterize the production of energy from civil nuclear reactors. Firstly, after a description of the world’s vast increase in energy consumption, the problem is examined via the systemic approach, which compares the electricity production by nuclear technology with the conventional methods that are being used nowadays, such as the burning of fossil fuels and the use of renewable energy sources. This comparison introduces the technical, economical, environmental and social aspects of nuclear technology and clarifies that the latter is capable of playing a very important role in the global energy mix in the foreseeable future.

After a short historic flashback, this thesis analyzes the technical part of the problem. Matters such as nuclear fission, nuclear fuel cycle and existing kinds of nuclear reactors are discussed. Also, there is an economic analysis of all the above aspects and a highly detailed comparison with the economical data of power plants that produce electricity by burning fossil fuels. This comparison takes into account a great variety of combined economical parameters and eventually clarifies that the implementation of nuclear energy should be considered seriously when it comes to any country’s long-term energy planning.

Environmentally, this thesis focuses on the installation and operation of nuclear power plants in the best possible way, so as not to cause any harm to the natural environment or the human societies. Matters under consideration are seismicity, extreme meteorological phenomena, greenhouse gas emissions, nuclear waste management and necessary safety precautions.

The social impact of nuclear technology is also discussed, like the coupling of nuclear reactors with other beneficial applications to society, such as hydrogen production, seawater desalination, co-production of steam and heat for civil use as well as medical, industrial, naval and space implementations.

Moreover, the issue of implementing nuclear power plants is discussed through a specific point of view that concerns the case of Greece. The thesis carries out a primal study on the introduction of nuclear power plants in the greek electricity production grid, based on facts about domestic power production, seismicity and population density in many greek regions. The end of this feasibility study states that the greek electricity productive system could sustain and benefit from a civil nuclear reactor that could be settled in the region of Komotini, Thrace.
To sup up, a final SWOT analysis produces a rough estimation of the overall sustainability of the project and a summary of all topics of nuclear technology that have been discussed in the whole body of the thesis.

Keywords:
Nuclear energy, nuclear reactor, electricity production, electric power, uranium enrichment, nuclear fuel cycle, nuclear waste, reactor decommissioning
Using biogas for energy production: comparison between anaerobic digestion and landfilling

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Abstract:
This paper presents the comparison between anaerobic digestion of the organic fraction of municipal solid waste and landfilling for energy production, using biogas. The overall objective of this work is the evaluation and comparison of these two methods from technological, environmental and economic point of view. The initial quantity of municipal solid waste is assumed to be 200000 tons/year and the study is for a 20-year period. The electric power produced by the anaerobic digestion plant is 1,1 MW in 2008 and 2,3 MW in 2028. For the case of sanitary landfill, the electric power produced by the biogas plant is 0,7 MW in 2012 (biogas exploitation usually begins after 500000 tons of waste is disposed of in the landfill) and 2,9 MW in 2028. A sensitivity analysis is also conducted with respect to the quantity of the municipal solid waste produced (500000 and 1000000 tons/year). Taking into account the evaluation criteria, anaerobic digestion is selected over landfilling from environmental point of view, whereas landfilling is selected over anaerobic digestion from economic point of view.

Keywords:
Anaerobic digestion, biogas, energy production, Combined Heat and Power (CHP)

1. Introduction
Energy demands increase rapidly due to socio-economic development and technological progress. Limitation of fossil fuels and the environmental problems arising from their combustion leads to energy production using renewable resources. According to Greek legislation (Law 3468/06 for renewable recourses and combined heat and power) biogas can be used for
energy production (electrical or/and thermal). Biogas is produced in landfills or in digesters by the anaerobic digestion of the organic fraction of municipal solid waste (OFMSW). It consists of methane, carbon dioxide and a small amount of other compounds, some of which are dangerous to human health and responsible for greenhouse effect. Methane has a global warming potential that EPA estimates to be 21 times greater than that of the same volume of carbon dioxide (www.epa.gov/methane/). Thus, biogas combustion except from the energy production helps to reduce CO$_2$eq emissions.

The technology used for energy production at a biogas plant is mature and it is known worldwide. In Greece, there are two biogas plants, one at the landfill of Tagarades in the Prefecture of Thessaloniki and the other at the landfill of Ano Liosia in the Prefecture of Attiki. In Greece, there is no biogas plant using the OFMSW anaerobic digestion method. It is not known which one of the two methods (landfilling or anaerobic digestion) offers higher economic benefits, less environmental impact and higher energy production under the specific conditions of interest. The choice between landfilling and anaerobic digestion is a difficult decision, since it requires big capital investment for plant construction and operation.

The overall objective of this work is the evaluation and comparison of landfilling and anaerobic digestion for energy production from technological, environmental, economic and legal point of view. Three scenarios with respect to MSW production were studied and analyzed: 200000 tons/year, 500000 tons/year and 1000000 tons/year, respectively. The economic and environmental analysis begins with the disposal of MSW in the landfill or their placement at the anaerobic digestion plant and ends with the energy production at the gas-fired engine. Municipal solid waste (MSW) management is assumed to be for a 20 year period, and so is the economic analysis. There will be two points of view of analysis: one from the point of view of a company that sells energy and emphasizes at economic benefits and the other from the point of view of a Greek Region that emphasizes at the environmental benefits.

2. Municipal solid waste and biogas production

There are different scenarios predicting the increase of the municipal solid waste in the Greek Region (Skoulaxinou et al., 2004). One such scenario refers to increase of 35% for the period 2001-2020 and is adopted here. The average composition of the household waste in Greece for the year 2001 is presented in Table 1 (Decision 50910/2727, 2003).
Table 1: Composition of the household waste

<table>
<thead>
<tr>
<th>Component</th>
<th>% of the Municipal Solid Waste</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food</td>
<td>47%</td>
</tr>
<tr>
<td>Paper</td>
<td>20%</td>
</tr>
<tr>
<td>Plastic</td>
<td>8,5%</td>
</tr>
<tr>
<td>Metal</td>
<td>4,5%</td>
</tr>
<tr>
<td>Glass</td>
<td>4,5%</td>
</tr>
<tr>
<td>Others</td>
<td>15,5%</td>
</tr>
</tbody>
</table>

Taking into account the increase of the MSW and their composition, biogas production is computed. For the theoretical production of biogas, the following equation is used (Tchobanoglous et al., 1993):

\[
C_{4.5}H_{2.6}O_{1.3}N_{0.2}S_{0.1} + \left( \frac{4a - b - 2c + 3d + 2e}{4} \right) H_2O \rightarrow \left( \frac{4a + b - 2c - 3d - 2e}{8} \right) CH_4 + \\
\left( \frac{4a - b + 2c + 3d + 2e}{8} \right) CO_2 + dNH_3 + eH_2S
\]

The empirical formula of the organic waste is C_{32}H_{52}O_{19}N_{2}S. This was computed, according to the typical chemical analysis of the MSW components, which have been chosen for anaerobic digestion (Table 2) (Tchobanoglous et al., 1993).

Table 2: Chemical analysis of MSW components

<table>
<thead>
<tr>
<th>Component</th>
<th>(%) weight for dry base</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>C</td>
</tr>
<tr>
<td>Food waste</td>
<td>48,0</td>
</tr>
<tr>
<td>Paper</td>
<td>43,5</td>
</tr>
</tbody>
</table>

Assuming moisture content of OFMSW equal to 75% and total solids of 25%, biogas production was computed from:

\[
C_{12,5}H_{16,8}N_{2}S_{1,0} + 11,50 H_2O \rightarrow 16,75 CH_4 + 15,25 CO_2 + 2 NH_3 + H_2S
\]

For 100 kg organic solids reacting (destroyed), gas production will be:
- Methane: \((272,6/796)\times25\text{kg}=8,6\text{kg}\)
- Carbon dioxide: \((671,4/796)\times25\text{kg}=21,1\text{kg}\)

The density of methane and carbon dioxide at 0°C and 1 atm is 0,7167 g/l and 1,9768 g/l respectively (Tchobanoglous et al., 1993). Thus, 11,95 m³ of methane and 10,67 m³ of carbon dioxide from 100 kg organic waste
are produced. Biogas composition is 53% methane and 47% carbon dioxide.

Based on 100 kg wet organic waste which is destroyed, the theoretical biogas production is computed and is 0.23 m$^3$/kg or 0.90 m$^3$/kg on dry weight basis. Taking into account that 80% of TS is TVS and assuming 50% “destruction” of volatile solids during anaerobic digestion, the theoretical biogas production based on the incoming solids is $(0.5)\times(0.90\text{m}^3/\text{kgTS})/(0.8\text{kgTVS/kg TS})=0.56\text{m}^3/\text{kg incoming TVS}.$

3. Anaerobic digestion

The size of the digesters can be computed, given the incoming quantity of organic waste, the Organic Loading Rate (OLR) and the Hydraulic Residence Time (HRT). The operational parameters for one phase digester are given in Table 3 (Cecchi et al., 2003).

The incoming quantity of the OFMSW in the digester was computed based on the following assumptions:

- The organic household waste (food waste, paper, garden waste) is collected separately. Collection efficiency is influenced by public information and motivation and of course waste composition. In Copenhagen there was a pilot program for household waste separation and only 47% of the potential amount of food waste was actually source-separated in the households (Nilson, 1996). There is no respective information for Greece. Therefore, in this study the separation efficiency was assumed to be 40% in 2008 and increased to 60% in 2028.

- Most of the paper quantity is recycled. In the digester ends up paper that is difficult to be separated, such as food packing etc. Hypothetically, paper in the digester is 20% of the total amount of the MSW.

- Garden waste is 1.5% of the total amount of the MSW.

- Undesired contaminants are considered negligible.

Table 3: Operational parameters for one phase digester (Cecchi et al., 2003)

<table>
<thead>
<tr>
<th>Method (one phase)</th>
<th>Operational conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mesophilic Temperature- low solids</td>
<td>HRT: 14-30 d, OLR: 1-4 kg TVS/m$^3\times$d</td>
</tr>
<tr>
<td>Mesophilic Temperature- high solids</td>
<td>HRT: 17-25 d, OLR: 3-4 kg TVS/m$^3\times$d</td>
</tr>
<tr>
<td>Thermophilic Temperature- high solids</td>
<td>HRT: 12-16 d, OLR: 4-6 kg TVS/m3×d</td>
</tr>
</tbody>
</table>
Taking into account these assumptions, Table 1 and considering for the analysis that the total solids (TS) on dry weight basis are 25% and the total volatile solids (TVS) are 80% of TS (Cecchi et al., 2003) the daily quantity of TS and TVS for anaerobic digestion was computed (Table 4).

**Table 4: Daily quantity of TS and TVS for anaerobic digestion deriving from 200000 tons MSW/year**

<table>
<thead>
<tr>
<th>Year</th>
<th>2008</th>
<th>2028</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organic fraction of municipal solid waste (kg OFMSW/d)</td>
<td>115080</td>
<td>232471</td>
</tr>
<tr>
<td>TS 25% (kg TS/d)</td>
<td>28770</td>
<td>58118</td>
</tr>
<tr>
<td>TVS, 80% TS (kg TVS /d)</td>
<td>23014</td>
<td>46494</td>
</tr>
</tbody>
</table>

Biogas daily production can be calculated since the theoretical biogas production and the daily quantity of TVS is known (Table 4). The daily biogas production deriving from 200000 tons MSW/year, is approximately 13000 m³/d (or 0,15 m³/sec) in 2008 and increase to 26300 m³/d (or 0,30 m³/sec) in 2028. Biogas heating value is related to enthalpy of combustion of methane. Since methane is 53% v/v in biogas, low heat value (LHV) was computed at 17,40 MJ/m³ and high heat value (HHV) at 19,40 MJ/m³. Low heat value is used in this study, for more conservative results. Five different technologies were studied, for selecting the right one for energy production (combined heat and power). Fuel cells and microturbine systems are usually used for covering peak energy demands and as back-up systems. Among internal combustion engine, gas turbine and steam turbine, the internal combustion engine is chosen, due to the fact that less fuel input is needed for the same energy production (at this scale of energy production).

Thus, for the amount of biogas mentioned above, two internal combustion engines 1,416 MW each with electrical efficiency 42% and thermal efficiency 44%, are used at the biogas plant. In 2008 only one internal combustion engine is used at the biogas plant. The operation of the second engine begins in 2014, because of the increase of the biogas production. Biogas plant (mesophilic temperature, high solids) operates 8640 hours/year and in 2008 produces power 1,1 MW and in 2028 increases to 2,3 MW. The electric energy is given to the elecrical grid with power factor 0,85 so the electric energy that can be sold during 2008 is 8079 MWh.

The size of the digester is calculated for the three methods (Table 3) and for the three different scenarios. The results for initial quantity of 200000 tons MSW/year are given in Table 5. The digesters are cylindrical and constructed with concrete. For the biogas plant of this study
(mesophilic temperature, high solids) three digesters are needed, according to the operational parameters (Table 3). The first two digesters operate full time and the third digester is used part time until 2018. Thereafter, the three digesters work on full time basis.

**Table 5:** Size of the digesters for the three anaerobic digestion methods for MSW production of 200000 tons/year

<table>
<thead>
<tr>
<th>Method</th>
<th>Mesophilic Temperature-low solids</th>
<th>Mesophilic Temperature-high solids</th>
<th>Thermophilic Temperature-high solids</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year of operation</td>
<td>2008-2028</td>
<td>2008-2028</td>
<td>2008-2028</td>
</tr>
<tr>
<td>Volume of each digester (m³)</td>
<td>2 digesters 5753</td>
<td>2 digesters 3836</td>
<td>2 digesters 2847</td>
</tr>
<tr>
<td>height (m)</td>
<td>31,0</td>
<td>27,0</td>
<td>25,0</td>
</tr>
<tr>
<td>Diameter (m)</td>
<td>15,5</td>
<td>13,5</td>
<td>12,5</td>
</tr>
</tbody>
</table>

1 The operation of the third digester will be on part time basis from 2009 to 2018 and on full time basis thereafter.

2 The operation of the third digester will be on part time basis from 2009 to 2019 and on full time basis thereafter.

In Table 6, the operational results of the CHP engines are presented. About 20% - 30% of the thermal energy produced by the internal combustion engines, is used for heating the digesters and the OFMSW at 37 °C. Heat exchangers are used for heating the OFMSW. The rest of the thermal energy produced can be sold at near industries. For this study, the economic benefits deriving from the sale of thermal energy are not taken into account.

As for the economic analysis, the investment cost for the construction of a biogas plant include the buildings, shredders, digesters, biogas clean up system, pumps, CHP units, biogas storage, heat exchangers, flare, control system etc. For the investment cost is also taken into account the land cost, site preparation, water supply system, sewage system, start up cost and design cost. The operation and maintenance cost include CHP engines maintenance, labor salaries, biogas clean up system operation cost, compensations to the Municipality where the biogas plant is built and insurance. In Table 7, the economic and environmental parameters of the biogas plants are presented.
For the economic evaluation the annual rating is 6%. The price of the electric energy is 75.82 €/MWh (Law 3468/06, FEK 129A/27-6-2006). The compensations for the Municipality is 10% of the revenues from the sale of the electric energy. The net present value (NPV) is calculated for the economic evaluation of the biogas plants. For the first case (200000 tons MSW/year) the net present value is negative. So, the biogas plant is not economically viable.

**Table 6:** Energy production from the CHP engines using biogas from anaerobic digestion

<table>
<thead>
<tr>
<th>MSW initial quantity (×10³) tons/year</th>
<th>Organic fraction of MSW (×10³) tons/year</th>
<th>Electric power production (MW)</th>
<th>Power of internal combustion engines (MW)</th>
<th>Number of engines</th>
<th>Electric energy production for sale (MWh/yr)</th>
<th>Thermal energy production (MWh/yr)</th>
<th>Digester Thermal demands (MWh/yr)</th>
<th>% of thermal energy for sale</th>
</tr>
</thead>
<tbody>
<tr>
<td>200</td>
<td>42</td>
<td>85</td>
<td>1,1</td>
<td>2</td>
<td>8079</td>
<td>16367</td>
<td>2583</td>
<td>70</td>
</tr>
<tr>
<td>500</td>
<td>106</td>
<td>212</td>
<td>2,8</td>
<td>6</td>
<td>20247</td>
<td>40732</td>
<td>5780</td>
<td>73</td>
</tr>
<tr>
<td>1000</td>
<td>212</td>
<td>424</td>
<td>5,1</td>
<td>5</td>
<td>37697</td>
<td>75840</td>
<td>11569</td>
<td>73</td>
</tr>
</tbody>
</table>

For the other two cases, the NPV is positive and the biogas plants are economically viable. The cost per ton OFMSW decreases, as the quantity of MSW increases. Thus, positive economies of scale appear.

**Table 7:** Economic and environmental parameters of biogas plants (anaerobic digestion)

<table>
<thead>
<tr>
<th>MSW initial quantity (×10³) tons/yr</th>
<th>Biogas production (×10³ m³/yr)</th>
<th>Equipment cost 2008 (×10⁶ €)</th>
<th>Investment cost 2028 (×10⁶ €)</th>
<th>Net present value OFMSW (×10⁶ €)</th>
<th>Cost per tn OFMSW (€/tn)</th>
<th>Emissions tn CO₂eq/yr (×10³)</th>
<th>Emissions tn NOₓ/yr</th>
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<tr>
<td>200</td>
<td>4683</td>
<td>9465</td>
<td>3,4</td>
<td>6,7</td>
<td>-1,7</td>
<td>6,5</td>
<td>47,6</td>
</tr>
<tr>
<td>500</td>
<td>11709</td>
<td>23563</td>
<td>6,7</td>
<td>13,4</td>
<td>5,9</td>
<td>5,2</td>
<td>130,0</td>
</tr>
<tr>
<td>1000</td>
<td>23418</td>
<td>47113</td>
<td>10,7</td>
<td>20,5</td>
<td>20,2</td>
<td>4,0</td>
<td>270,0</td>
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<th>Net present value OFMSW (×10⁶ €)</th>
<th>Cost per tn OFMSW (€/tn)</th>
<th>Emissions tn CO₂eq/yr (×10³)</th>
<th>Emissions tn NOₓ/yr</th>
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<td>20,5</td>
<td>20,2</td>
<td>4,0</td>
<td>270,0</td>
</tr>
</tbody>
</table>
The CO\textsubscript{2eq} emissions derive from biogas combustion and from the MSW that are not used for anaerobic digestion and end up in the landfill. Nitrogen oxides are produced during biogas combustion.

4. Landfilling

Landfills operate for several years or decades and usually consist of smaller filling areas. When a filling area is filled with MSW, the filling of the next one begins. The basic element of the landfill is the cell, which consists of the MSW of one period, usually one day. The horizontal row of cells is named lift (Panagiotakopoulos, 2007). For this study, the landfill is designed to receive 200000 tons MSW/year for a twenty year period (2008-2028). The expected increase of the MSW for this period is 35% (Skoulaxinou et al. 2004) and the overall quantity of waste in the landfill is expected to be approximately 5 \times 10^6 tons. For this study, the lift is 3.5 m and the active base area at ground level is 65 \times 10^3 m^2. The landfill consists of four filling areas and the overall area is 260 \times 10^3 m^2. The MSW is compressed and the density is taken as 0.8 tons/m^3. In Table 8 the quantity of MSW for each sink is computed.

<table>
<thead>
<tr>
<th>SINK 1</th>
<th>Square lift side (m)</th>
<th>Heigh (m)</th>
<th>Volume (m\textsuperscript{3})</th>
<th>Density (tons/m\textsuperscript{3})</th>
<th>Tons of MSW</th>
<th>Sum (tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>150</td>
<td>3.5</td>
<td>78750</td>
<td>0.8</td>
<td>63000</td>
<td>63000</td>
<td></td>
</tr>
<tr>
<td>171</td>
<td>3.5</td>
<td>102344</td>
<td>0.8</td>
<td>81875</td>
<td>144875</td>
<td></td>
</tr>
<tr>
<td>192</td>
<td>3.5</td>
<td>129024</td>
<td>0.8</td>
<td>103219</td>
<td>248094</td>
<td></td>
</tr>
<tr>
<td>213</td>
<td>3.5</td>
<td>158792</td>
<td>0.8</td>
<td>127033</td>
<td>375127</td>
<td></td>
</tr>
<tr>
<td>234</td>
<td>3.5</td>
<td>191646</td>
<td>0.8</td>
<td>153317</td>
<td>528444</td>
<td></td>
</tr>
<tr>
<td>255</td>
<td>3.5</td>
<td>227588</td>
<td>0.8</td>
<td>182070</td>
<td>710514</td>
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</tr>
<tr>
<td>234</td>
<td>3.5</td>
<td>191646</td>
<td>0.8</td>
<td>153317</td>
<td>863831</td>
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<tr>
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<td>0.8</td>
<td>127033</td>
<td>990864</td>
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<tr>
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<td>0.8</td>
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<tr>
<td>150</td>
<td>3.5</td>
<td>78750</td>
<td>0.8</td>
<td>63000</td>
<td>1238958</td>
<td></td>
</tr>
</tbody>
</table>

Biogas combustion for energy production begins when 500000 – 1000000 tons of MSW are deposited in the landfill and the height of the MSW is at least 15 m (McBean et al. 1995). Therefore, the energy production begins the third year of landfill operation. Biogas production is calculated with LandGEM (Landfill Gas Emission) model. LandGEM model is based on the equation (US EPA, 2005):

\[
Q_{CH4} = \sum_{i=1}^{n} \sum_{j=1}^{m} kL_0 \left( \frac{M_j}{10} \right) e^{-\mu_j}
\]
Where:
\[ Q_{\text{CH}_4} = \text{annual methane generation in the year of the calculation (m}^3/\text{year)} \]
\[ i = 1 \text{ year time increment} \]
\[ n = \text{(year of the calculation)} - \text{(initial year of waste acceptance)} \]
\[ j = 0,1 \text{ year time increment} \]
\[ k = \text{methane generation rate (year}^{-1}) \]
\[ L_0 = \text{potential methane generation capacity (m}^3/\text{Mg)} \]
\[ M_i = \text{mass of waste accepted in the ith year (Mg)} \]
\[ t_{ij} = \text{age of the jth section of waste mass } M_i \text{ accepted in the ith year} \]

Since methane is 53% of biogas and the organic fraction of MSW is approximately 70% (Table 1) of the MSW, \[ L_0 = 0.23 \text{m}^3/\text{kg}_{\text{organic waste}} \times 0.7 \text{kg}_{\text{organic waste}}/\text{kg MSW} \times 0.53 \times 1000 \text{kg/tn} = 85 \text{m}^3/\text{tn MSW}. \] Methane generation rate (k) is assumed to be 0.05 year\(^{-1}\). The model is used for each filling area of the landfill and the biogas production for 2012 (third year of operation) is almost \(3 \times 10^6 \text{ m}^3\) and \(12 \times 10^6 \text{ m}^3\) in 2028. Internal combustion engines are used at the biogas plant and their operational results are presented at Table 9. Only the 50% of the biogas is assumed to be captured by the piping system and used for energy production.

The investment cost for the construction and operation of a biogas plant includes buildings, piping system in the landfill, biogas clean up system, booster, CHP units, flare, control system etc. For the investment cost is also taken into account the land cost, site preparation, water supply system, sewage system, start up cost and design cost. The operation and maintenance cost includes CHP engines maintenance, labor salaries, biogas clean up system operation cost, compensations to the Municipality where the biogas plant is built and equipment insurance. In Table 10, the economic and environmental results of the biogas plants are presented.
Table 9: Energy production from the CHP engines (landfill)

<table>
<thead>
<tr>
<th>MSW initial quantity (×10³ tons/year)</th>
<th>Organic fraction of MSW (×10³ tons/year)</th>
<th>Electric power production (MW)</th>
<th>Electric energy production for sale (MWh/yr)</th>
<th>Thermal energy production (MWh/yr)</th>
<th>Thermal demands (MWh/yr)</th>
<th>% of thermal energy for sale</th>
</tr>
</thead>
<tbody>
<tr>
<td>200</td>
<td>140</td>
<td>0,71</td>
<td>2,86</td>
<td>1,127</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5210</td>
<td>21022</td>
<td></td>
</tr>
<tr>
<td>500</td>
<td>350</td>
<td>1,32</td>
<td>6,71</td>
<td>1,416</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>9699</td>
<td>49301</td>
<td></td>
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<tr>
<td>1000</td>
<td>700</td>
<td>2,49</td>
<td>13,16</td>
<td>2,388</td>
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<td></td>
<td></td>
<td></td>
<td>18263</td>
<td>100424</td>
<td></td>
</tr>
</tbody>
</table>

For the economic evaluation the annual rating is 6%. The price of the electric energy is 75,82 €/MWh (Law 3468/06, FEK 129A/27-6-2006). The compensations for the Municipality is 10% of the revenues from the sale of the electric energy. The net present value (NPV) is calculated for the economic evaluation of the biogas plants. For the first case (200000 tons MSW/year) the net present value is negative. So the biogas plant is not economically viable. For the other two cases, the NPV is positive and the biogas plants are economically viable. The cost per ton OFMSW decreases, as the quantity of MSW increases. Thus, positive economies of scale appear.
Table 10: Economic and environmental parameters of biogas plants (landfill)

<table>
<thead>
<tr>
<th>MSW initial quantity (×10^3) tn/yr</th>
<th>Biogas production (×10^3 m^3/yr)</th>
<th>Equipment cost 2008 (×10^6 €)</th>
<th>Investment cost 2008 (×10^6 €)</th>
<th>Net present value (×10^6 €)</th>
<th>Cost/t CO_{2eq} (×10^3)</th>
<th>Emissions tn CO_{2eq}/yr</th>
<th>Emissions tn NOx/yr</th>
</tr>
</thead>
<tbody>
<tr>
<td>200</td>
<td>2012 2983 12037</td>
<td>2,1</td>
<td>6,0</td>
<td>-0,6</td>
<td>1,8</td>
<td>32,6</td>
<td>131,5</td>
</tr>
<tr>
<td>500</td>
<td>2012 5686 30093</td>
<td>3,6</td>
<td>12,1</td>
<td>7,4</td>
<td>1,4</td>
<td>62,1</td>
<td>328,6</td>
</tr>
<tr>
<td>1000</td>
<td>2012 11372 60187</td>
<td>4,8</td>
<td>18,9</td>
<td>18,2</td>
<td>2,8</td>
<td>124,1</td>
<td>657,3</td>
</tr>
</tbody>
</table>

The CO_{2eq} emissions derive from biogas combustion and from the biogas that is not captured by the piping system. Nitrogen oxides are produced during biogas combustion.

5. Comparison between anaerobic digestion and landfilling

The selection of the best method between anaerobic digestion and landfilling for energy production depends on the point of view from which the problem is examined. The point of view of a Greek Region emphasizes on the environmental impacts. The point of view of a company that produces and sales energy emphasizes on economic benefits. In Table 11 the criteria for selecting between the two methods for energy production are presented. Three stars symbolize “good” performance, two stars “medium” and one star “bad” performance.
Table 11: Evaluation of the two methods for energy production

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Anaerobic digestion</th>
<th>Landfilling</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Technological criteria</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy consumption for plant needs</td>
<td>*</td>
<td>***</td>
</tr>
<tr>
<td>Steady operation of biogas plant</td>
<td>**</td>
<td>***</td>
</tr>
<tr>
<td>Convenient to maintain</td>
<td>*</td>
<td>***</td>
</tr>
<tr>
<td>Simple operation</td>
<td>*</td>
<td>***</td>
</tr>
<tr>
<td>Tolerance to physical deterioration</td>
<td>**</td>
<td>***</td>
</tr>
<tr>
<td>Lifetime of the biogas plant</td>
<td>**</td>
<td>***</td>
</tr>
<tr>
<td>Suppleness to waste increase</td>
<td>*</td>
<td>***</td>
</tr>
<tr>
<td>Skillful staff</td>
<td>*</td>
<td>**</td>
</tr>
<tr>
<td>Experience – reliability</td>
<td>*</td>
<td>***</td>
</tr>
<tr>
<td>Sum of points</td>
<td>12</td>
<td>26</td>
</tr>
<tr>
<td><strong>Environmental criteria</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emissions to the environment (CO₂ and NOx)</td>
<td>***</td>
<td>*</td>
</tr>
<tr>
<td>Liquid waste production</td>
<td>**</td>
<td>*</td>
</tr>
<tr>
<td>Solid waste production</td>
<td>**</td>
<td>***</td>
</tr>
<tr>
<td>Visual annoyance</td>
<td>*</td>
<td>**</td>
</tr>
<tr>
<td>Sum of points</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td><strong>Economic criteria</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investment cost</td>
<td>**</td>
<td>***</td>
</tr>
<tr>
<td>Operation and maintenance cost</td>
<td>*</td>
<td>**</td>
</tr>
<tr>
<td>Profit from energy sale</td>
<td>***</td>
<td>**</td>
</tr>
<tr>
<td>Sum of points</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td><strong>Legal criteria</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Application of relevant legislation</td>
<td>***</td>
<td>*</td>
</tr>
<tr>
<td>Sum of points</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>

From the point of view of the Greek Region, the construction and operation of a biogas plant with anaerobic digestion is chosen. From the point of view of the energy company, energy production from landfilling is selected.
References


US Environmental Protection Agency URL: http://www.epa.gov/methane/
Consideration of a solution for the treatment and the safe environmental disposal of acidic mine waters with the employment of systemic approach

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Abstract:  
The issue of acidic waters in underground mining and consequently the acid mine drainage is one of the most important environmental issues related with mining activities. The main environmental consequences from the discharge of untreated acidic waters are the degradation of both surface and underground waters and of the ecological quality of natural receivers (rivers, lakes, etc.). The objective of this work is the consideration of the most holistically appropriate solution for the safe environmental management of the acidic waters emanating from the mining facilities, especially at time periods of intense rainfall during which the quantities of acidic waters may exceed to a significant extent the capacity of the existing treatment facilities. The potential solution should ensure that liquid wastes with qualitative characteristics outside the existing environmental limits would not be discharged to natural receivers. Following the application of an holistic and systemic approach, i.e. defining the potential alternative solutions, the criteria for the evaluation of the potential solutions and the restrictions and the specifications that the final should comply with, the most appropriate solution was emerged. Moreover, the advantages of the emerged solution that cover a wide range of aspects, i.e. environmental, safety, minimization of transport needs, economical, etc are discussed in detail.
1. Introduction

Mining has contributed significantly to the evolution of human civilization. The extractive industry and generally the mining sector ensure the supply of energy resources, provide raw materials to heavy industry and to infrastructure, and since 1950s a great increase in the production and consumption of raw materials has been observed (Horowitz, 2006).

According to the Hellenic Statitical Agency, the extractive and metallurgy sector contributes 2-4% of the GNP or 2,5 B€ (in steady 1995 prices). In Greece, approximately 90000 people are employed to the mining, metallurgy and metal sector an equivalent of 23% of the total industrial work force (Paspaliaris, 2007). It can be inferred therefore, that the extractive and mining industry in Greece has a steady contribution to the Greek economy the last 50 years and has obtained the tendency to expand itself to Europe and worldwide.

However, mining activities cause severe environmental impacts also, since large surface and underground areas are disrupted, the water regime, both surface and underground is differentiated, significant areas are needed for the disposal of mining wastes and the ecological balance is disturbed. The main environmental problems associated with mining activities (not in order of significance) are (MMSD report, 2002):

- Production of large volumes of waste with consequent problems
- High energy intensity
- Environmental degradation and negative impacts on ecosystems and biodiversity
- Production of acid mine drainage

Description of Acid Mine Drainage (AMD)

Acid mine drainage (AMD) is a term describing the natural mine drainage that occurs as a result of the natural oxidation of sulphide ores when they are exposed to the synergistic effect of water and atmospheric oxygen (Adam, 1997 and Kontopoulos, 1998). The phenomenon has been already recorded from medieval times (Agricola, 1556) (Figure 1).
AMD is the outcome of a complex series of reactions that include (Singer and Stumm, 1970):

- Production of sulfuric acid due to the synergistic effect of water, atmospheric oxygen and fero-oxidant bacteria
- Consumption of the produced acid from the acidity consuming ingredients, leading to the formation of gypsum and hydroxides of heavy metals

The AMD solutions may have a characteristic brown-red color due to trivalent ferric solutions and moreover if they contain suspended products their sediment may be colored red (trivalent ferrous hydroxide) or white.
(aluminum hydroxides) (Figure 2). For mixed sulphide mines acid mine drainage is the most important environmental problem (Singer and Stumm, 1970 and Steinhage, 1997).

AMD is finally reported to a natural receiver (a river, a lake, the sea, or the soil), increasing their acidity and their content in heavy metals. The toxic elements of AMD will be guided to animals and eventually human beings through skin contact, inhalation and/or ingestion. It is therefore of particular importance for modern mining to predict and control AMD.

**Description of the mining facilities under study**

The mining facilities under study exploit a mixed sulphide (PbS and ZnS) ore deposit and are comprised by:

- An active and an inactive mine
- Milling and floating installations for the production of PbS and ZnS concentrates
- A mine water treatment plant
- Mine waste disposal facilities
- Auxiliary installations (backfilling plant, maintenance shop, warehouses, offices, etc.)
- Ship loading facilities

whereas, the main activities of the mining facilities under study are summarized in the flow chart of Figure 3.

**Figure 3:** Flow sheet of the mining facilities under study.
2. Systemic analysis

The drainage and intrusion of surface and underground waters to mining projects results in the increased acidity and solubility of metals in the mine water stream, and their treatment is deemed necessary prior to their discharge to natural receivers. Moreover, the rapid increase of the incoming waters due to extreme precipitation events makes more demanding the disposal of mine waters with a quality that fulfills the environmental standards. In the under study mining facilities, the total mine water flow from the underground mines average 250 m$^3$/h on a yearly basis, however during periods of intense precipitation can increase up to 800 m$^3$/h, exceeding the capacity of the existing water treatment plant (450 m$^3$/h). Moreover, due to a scheduled extension of the existing mine, an extra quantity of 70 m$^3$/h of mine waters are anticipated.

Therefore, the problem that the facility faces is the selection of the most appropriate solution in order to ensure the treatment and the safe discharge of the acid mine waters emanating from underground mining facilities. More concretely, the maximum capacity for the treatment of mine waters should be upgraded to the level of 870 m$^3$/h, ensuring the effective treatment of mine waters even under extreme precipitation events.

The quantifiable goal resulting from the description of the problem is the selection of a solution that can ensure:

1. The treatment of mine waters quantities up to 870 m$^3$/h
2. The safe disposal of these quantities to a natural receiver
3. The future sustainability of the proposed solution

The evaluation criteria of the solutions were selected from the aspect of the mining facility manager and they are:

- The sufficient mine water treatment capacity $\geq$ 870 m$^3$/h
- The financial cost of the proposed solution ($\leq$ 1 M€), since the estimated ore reserves ensure a further 8-year mine life only
- The possibility of an alternative utilization for the treated mine waters (that are so far discharged to the sea)

The restrictions – specifications that the proposed solution should follow are:

- The acceptance of the solution from the local community
- The environmental impacts of the proposed solution to environmental media depending on the location, the construction and the operation of the solution
  - Direct impacts (i.e., dust, noise, impacts to flora and fauna, discharge of liquid effluents outside the legislative specifications, etc.)
• Indirect (i.e., increased consumption of water, electricity, reagents per unit of treated mine water, increased needs for piping and maintenance, etc.,)
• The visibility of the proposed solution to the neighboring settlements
• The proximity of the proposed solution to the active mine, due to:
  • Minimization of environmental impacts (less water transportation needs and thus less risk for environmental accident)
  • Minimization of the total intervention area in the proximity of the existing industrial area
  • Minimization of required infrastructure, intervention time and maintenance cost

Taking into consideration the described problem, the defined goal, the evaluation criteria and the restrictions-specifications mentioned above, the following alternative solutions were emerged:
• Zero solution, namely maintaining the existing situation regarding the capacity and the location of the water treatment plant
• Upgrading the nominal maximum capacity of the existing water treatment plant (WTP) in order to satisfy the treatment goal, expanding the existing WTP
• Construction of a new WTP satisfying the treatment goal and relocation to a different than the existing location
• Separation of the waters from the active and the inactive mines, construction of a new WTP close to the exit of the active mine for the treatment of waters of the active mine and discharge of treated waters to a polluted creek downstream of the mine. Maintenance of the existing WTP for the treatment of the waters of the inactive mine.

The characteristics of the alternative solutions are summarized in Table 1, whereas in Table 2 the advantages and the disadvantages of each solution are given.

Following a meticulous examination of the advantages and disadvantages listed in Table 2 it is clearly concluded that the following alternative solutions are rejected:
• The alternative solution No. 1 (zero solution) mainly due to its incompetence to treat increased quantities of mine waters following extreme precipitation and flood events and the consequent social reaction in case of discharge of untreated mine waters to the sea.
• The alternative solution No. 2 (upgrade of the existing WTP) due to technical intervention difficulties (restricted available area) and due to relatively increased financial cost.
### Table 1  Description of the alternative solutions.

<table>
<thead>
<tr>
<th>Characteristic of the solution</th>
<th>Solution</th>
<th>No. 1</th>
<th>No. 2</th>
<th>No. 3</th>
<th>No. 4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
<td>Zero solution</td>
<td>Upgrading of the existing WTP</td>
<td>Upgrading and relocation of the existing WTP</td>
<td>Separation of mine waters and separate treatment</td>
<td></td>
</tr>
<tr>
<td><strong>Location</strong></td>
<td>Existing location</td>
<td>Existing location</td>
<td>Another location</td>
<td>Another location (close to active mine)</td>
<td></td>
</tr>
<tr>
<td><strong>Maximum Capacity</strong></td>
<td>Existing capacity (450 m³/h)</td>
<td>Upgraded capacity (870 m³/h)</td>
<td>Upgraded capacity (870 m³/h)</td>
<td>Upgraded capacity (450+450 m³/h)</td>
<td></td>
</tr>
<tr>
<td><strong>Neutralization technique</strong></td>
<td>Addition of Ca(OH)₂</td>
<td>Addition of Ca(OH)₂</td>
<td>Addition of Ca(OH)₂</td>
<td>Addition of Ca(OH)₂</td>
<td></td>
</tr>
<tr>
<td><strong>Estimated cost</strong></td>
<td>Zero</td>
<td>700 k€</td>
<td>1500 k€</td>
<td>900 k€</td>
<td></td>
</tr>
<tr>
<td><strong>Fate of treated mine waters</strong></td>
<td>Discharge to the sea</td>
<td>Discharge to the sea</td>
<td>Discharge to the sea</td>
<td>Discharge to polluted creek and to the sea</td>
<td></td>
</tr>
<tr>
<td><strong>Future (&gt;8 years) sustainability of the solution</strong></td>
<td>Yes but with the existing problems</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>

WTP: Water treatment plant

### Table 2  Advantages and disadvantages of the alternative solutions.

<table>
<thead>
<tr>
<th>Solution description</th>
<th>Advantages (+) and Disadvantages (-)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>No. 1 Zero solution</strong></td>
<td>+ Visibility (is not affected, the WTP lies within the existing industrial area)</td>
</tr>
<tr>
<td></td>
<td>+ Zero extra intervention area</td>
</tr>
<tr>
<td></td>
<td>+ Zero extra cost</td>
</tr>
<tr>
<td></td>
<td>− Maximum treatment capacity &lt;&lt; 870 m³/h</td>
</tr>
<tr>
<td></td>
<td>− High risk of environmental illegality (discharge of untreated mine waters to the sea) and/or health and safety issues</td>
</tr>
<tr>
<td></td>
<td>− No alternative usage of treated “clean” waters</td>
</tr>
<tr>
<td></td>
<td>− Quality deterioration of relative clean mine waters as they pass through the mine and extra needs for treatment</td>
</tr>
</tbody>
</table>
Ground transportation through an open cement channel with high leakage risk in case of natural disasters (i.e., seismic event)
- Pumping of the emanating neutralization sludge to a 4,5 km distance through a forested area (high leakage risk in case of accident)
- Minimal social acceptance since the avoidance of discharge of untreated mine waters to the sea is not ensured

<table>
<thead>
<tr>
<th>No. 2</th>
<th>Upgrading of the existing WTP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Maximum treatment capacity = 870 m³/h</td>
</tr>
<tr>
<td></td>
<td>Mine water treatment even at periods of extremely intense precipitation events</td>
</tr>
<tr>
<td></td>
<td>Visibility (is not affected, the upgraded WTP lies within the existing industrial area)</td>
</tr>
<tr>
<td></td>
<td>Social acceptance, since the avoidance of discharge of untreated mine waters to the sea is ensured</td>
</tr>
<tr>
<td></td>
<td>Quality deterioration of relative clean mine waters as they pass through the mine and they need extra treatment</td>
</tr>
<tr>
<td></td>
<td>Ground transportation through an open cement channel with high leakage risk in case of natural disasters (i.e., seismic event)</td>
</tr>
<tr>
<td></td>
<td>Pumping of the emanating neutralization sludge to a 4,5 km distance through a forested area (high leakage risk in case of accident)</td>
</tr>
<tr>
<td></td>
<td>Significant intervention in terms of area to a densely structured industrial area</td>
</tr>
<tr>
<td></td>
<td>Financial cost approximately 700 k€</td>
</tr>
<tr>
<td></td>
<td>No alternative utilization of the treated “clean” waters</td>
</tr>
</tbody>
</table>

Financial cost approximately 1500 k€ due to significant infrastructure needs

<table>
<thead>
<tr>
<th>No. 3</th>
<th>Upgrading and relocation of the existing WTP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Maximum treatment capacity = 870 m³/h</td>
</tr>
<tr>
<td></td>
<td>Mine water treatment even at periods of extremely intense precipitation events</td>
</tr>
<tr>
<td></td>
<td>Visibility (the site selection for the new WTP would ensure the lack of visibility from settlements)</td>
</tr>
<tr>
<td></td>
<td>Social acceptance, since the avoidance of discharge of untreated mine waters to the sea is ensured</td>
</tr>
<tr>
<td></td>
<td>Intervention to a polluted industrial area</td>
</tr>
<tr>
<td></td>
<td>Construction close to the combined mine water flow</td>
</tr>
<tr>
<td></td>
<td>Pumping of the emanating neutralization sludge to a 4,5 km distance through a forested area (high leakage risk in case of accident)</td>
</tr>
<tr>
<td></td>
<td>Quality deterioration of relative clean mine waters as they pass through the mine and they need extra treatment</td>
</tr>
<tr>
<td></td>
<td>Financial cost approximately 1500 k€ due to significant infrastructure needs</td>
</tr>
<tr>
<td></td>
<td>No alternative utilization of the treated “clean” waters</td>
</tr>
<tr>
<td></td>
<td>Depreciation of the existing WTP</td>
</tr>
</tbody>
</table>
Separation of mine waters and separate treatment

+ Maximum treatment capacity = 900 m³/h
+ Mine water treatment even at periods of extremely intense precipitation events
+ Visibility (the site selection for the new WTP would ensure the lack of visibility from settlements)
+ Social acceptance, since the avoidance of discharge of untreated mine waters to the sea is ensured
+ Intervention to a polluted industrial area
+ Construction close to the combined water flow from the active mine
+ Avoidance of quality deterioration of the relative clean mine waters as they do not pass any more through the mine and they do not become more polluted
+ Avoidance of pumping the emanating neutralization sludge to a 4.5 km distance through a forested area, the sludge is dewatered and directly placed to the permanent disposal site
+ Alternative utilization of the treated “clean” waters (discharge to the polluted stream downstream of the mine with the enrichment of the underground water of a polluted area)
+ Utilization of the existing WTP

- Financial cost approximately 900 k€
- Need for infrastructure works for the completion of the new WTP

Therefore from the feasible alternative solutions acceptable are the alternative solutions No. 3 and No. 4. In Table 3 the evaluation of the acceptable solutions is listed according to the relevant significance level of each of the evaluation criteria (seen from the point of view of the management of the mining facilities).

Table 3 Multi criteria analysis for the alternative solutions No. 3 and No. 4.

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Relevant significance rating</th>
<th>Solution No. 3</th>
<th>Solution No. 4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Score</td>
<td>Weighted performance</td>
<td>Score</td>
</tr>
<tr>
<td>The sufficient neutralization of the maximum expected mine water quantity (870 m³/h.)</td>
<td>0,4</td>
<td>90</td>
<td>36</td>
</tr>
<tr>
<td>Solution cost</td>
<td>0,3</td>
<td>50</td>
<td>15</td>
</tr>
<tr>
<td>Utilization of the treated “clean” waters</td>
<td>0,3</td>
<td>20</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>57</td>
<td>93</td>
<td></td>
</tr>
</tbody>
</table>
Based on the multi criteria analysis the solution No. 4 is qualified, the detailed description of which is presented in the following section.

3. Description and application of the selected solution

The generic diagram of the water management scheme in the mining facilities under study is presented in Figure 4.

The mine waters from the active mine (approximately 155 m³/h) are transferred through the inactive mine and the combined stream with the mine waters of the inactive mine (approximately 100 m³/h) is guided to the water treatment plant (WTP) with a maximum nominal capacity of 450 m³/h.

According to the proposed solution, the mine waters of the active mine would not be transferred through the inactive mine and their combined stream (adit +216) will be guided to a new WTP to be constructed in the immediate vicinity of the adit entrance and with an estimated maximum nominal capacity of 450 m³/h. The remaining mine waters from the inactive mine will continue to form a combined flow to the existing WTP, which has a maximum nominal capacity of 450 m³/h as well. Therefore, the combined maximum nominal capacity of both WTPs will be in the level of 900 m³/h.

![Figure 4: Generic diagram of the water management scheme in the mining facilities.](image-url)
Regarding the quality of the mine waters from the active mines that will be treated to the new WTP, it is evident that the waters collected from the old exploitations (adits +410, +360, +216) are highly acidic with elevated concentrations of dissolved metals that are systematically higher than the environmental limits for untreated discharge (Table 4). Their degraded quality is attributed exclusively to the ore exploitation method employed in the past that favored the creation of acid mine drainage and the intrusion of surface waters in the mine through the subsidence zone appearing in the ground surface. On the contrary, the mine waters pumped from the new exploitations seem to satisfy the environmental limits which coincide with the water quality for irrigation purposes. The improved quality of those waters is attributed to the application of backfilling that prevents the appearance of the acid mine drainage since it minimizes the entrance of water and air in the underground mine.

Table 4  Summarized qualitative results of the mine waters flows from the active mine.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Units</th>
<th>+410</th>
<th>+360</th>
<th>+216</th>
<th>+216</th>
<th>+120</th>
<th>Combined mine water flow</th>
<th>Quality characteristics of the natural receiver downstream of the mining facilities</th>
<th>Environmental limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td></td>
<td>2.6</td>
<td>2.9</td>
<td>4.1</td>
<td>7.8</td>
<td>8.5</td>
<td>6.1</td>
<td>3.5-8.8</td>
<td>6.0 - 8.5</td>
</tr>
<tr>
<td>Cond</td>
<td>μS/cm</td>
<td>4654</td>
<td>3439</td>
<td>4292</td>
<td>700</td>
<td>1954</td>
<td>2197</td>
<td>1940 - 60</td>
<td></td>
</tr>
<tr>
<td>As</td>
<td>mg/L</td>
<td>18.8</td>
<td>2.8</td>
<td>7.4</td>
<td>0.1</td>
<td>0.1</td>
<td>3.7</td>
<td>0.2 - &lt; 0.01</td>
<td>0.5</td>
</tr>
<tr>
<td>Fe&lt;sub&gt;tot&lt;/sub&gt;</td>
<td>mg/L</td>
<td>1095.1</td>
<td>379.8</td>
<td>544.7</td>
<td>10.1</td>
<td>33.7</td>
<td>259.5</td>
<td>166</td>
<td>15.00</td>
</tr>
<tr>
<td>Fe&lt;sub&gt;diss&lt;/sub&gt;</td>
<td>mg/L</td>
<td>1186.0</td>
<td>372.3</td>
<td>549.4</td>
<td>0.6</td>
<td>0.0</td>
<td>260.3</td>
<td>166 - &lt; 0.2</td>
<td></td>
</tr>
<tr>
<td>Pb</td>
<td>mg/L</td>
<td>0.5</td>
<td>0.3</td>
<td>1.2</td>
<td>0.03</td>
<td>0.03</td>
<td>0.5</td>
<td>0.06 - &lt; 0.05</td>
<td>0.10</td>
</tr>
<tr>
<td>Zn</td>
<td>mg/L</td>
<td>420.7</td>
<td>223.0</td>
<td>39.0</td>
<td>1.3</td>
<td>0.1</td>
<td>45.7</td>
<td>205 - &lt; 0.05</td>
<td>2.00</td>
</tr>
<tr>
<td>Mn</td>
<td>mg/L</td>
<td>729.72</td>
<td>299.03</td>
<td>196.99</td>
<td>0.7</td>
<td>0.8</td>
<td>117.1</td>
<td>175 - &lt; 0.2</td>
<td>2.00</td>
</tr>
<tr>
<td>Cu</td>
<td>μg/L</td>
<td>1782.4</td>
<td>846.0</td>
<td>11718.7</td>
<td>6.8</td>
<td>5.7</td>
<td>3950.9</td>
<td>1030 - &lt; 2</td>
<td>0.50</td>
</tr>
<tr>
<td>Cd</td>
<td>μg/L</td>
<td>1740.1</td>
<td>789.9</td>
<td>859.4</td>
<td>1.6</td>
<td>1.6</td>
<td>408.9</td>
<td>220 - &lt; 2</td>
<td>0.02</td>
</tr>
<tr>
<td>Flow</td>
<td>m³/h</td>
<td>10</td>
<td>5</td>
<td>70</td>
<td>50</td>
<td>20</td>
<td>155</td>
<td>900 (max)</td>
<td></td>
</tr>
</tbody>
</table>
The treatment method in the new WTP will be similar to the neutralization methods applied to the existing WTP, namely the addition of a limestone solution [Ca(OH)2] for the neutralization of the acidity and the sedimentation of the metal cations in the form of hydroxides. The produced neutralization sludge will be filtered and in the form of cake will be guided for permanent disposal to the adjacent disposal sites.

The treated “clean” waters will be discharged to a stream located downstream of the mining facilities. The existing environmental quality of the stream does not satisfy the environmental limits for irrigation and the introduction of a significant amount of waters suitable for irrigation will improve its overall quality and enrich the underground water regime in the agricultural land further downstream.

Benefits from the application of the proposed solution

The anticipated benefits from the application of the proposed solution are listed below.

Environmental benefits
- Discharge of significant water amount (140-210 m³/h or 1.2-18 Mm³/year) appropriate for irrigation purposes to the basin downstream of the mining facilities.
- Enhancement of the water diet of the basin downstream of the mining facilities especially during the dry period. This is expected to be achieved through the increase of the quantities of surface running waters and though the partial infiltration of those waters.
- Improvement of the quality characteristics of the surface waters, since the discharged waters are expected to be of better quality compared with the existing surface waters.
- Avoidance of the underground transfer of mine waters of the active mine. Those waters will be treated at the new WTP located closely to their combined stream and thus the water transfer to the underground mine is expected to be minimal.
- The produced neutralization sludge in the existing WTP will be less than half the current amount and the consequent environmental risk for pumping the sludge 4.5 km upwards to the disposal sites will be also less.

Operational benefits
- Doubling of the nominal treatment capacity of the mine waters and effective treatment even in extreme weather conditions and flood events
Decrease in the transferred volume of neutralization sludge 4.5 km upwards to the disposal sites and therefore:
- less consumption of electric power for pumping
- independent operation of the existing WTP with the sludge network pumping capacity
- increase in the storage capacity of the disposal sites due to disposal of wastes with less water content (dewatered sludge)

Administrative benefits
- Elimination of sea pollution episodes from discharge of untreated waters to the sea and aesthetic upgrade of the wider area of the natural receivers (sea and stream)
- Observance of the existing environmental legislation

Social benefits
- Removal of industrial activities from sites close to settlement to more remote sites
- The irrigation needs of the agricultural land downstream of the mining facilities (150 Ha × 400 mm/m²/year = 0.6 Mm³/year) are theoretically satisfied from the quantities of treated waters discharged (1.2-18 Mm³/year)

4. Conclusions

The issue acid mine drainage emanating from past and on-going mining activities is one of the most important environmental issues related with the negative social acceptance of extensive mining. Taking into account the systemic approach in the confrontation of a multi-disciplined problem, this work focused on the selection of an appropriate solution for the treatment and the discharge of acidic waters emanating from underground mining facilities, in particular at extreme weather episodes (flood, intense rainfall and snowfall, etc.) during which the quantities of acidic waters exceed the maximum nominal capacity of the existing water treatment plant. Moreover, the proposed solution should incorporate an alternative utilization for the significant amount of treated water, which under the existing treatment regime is discharged to the sea.

Following the systemic approach and taking into consideration the environmental, operational, social and administrative dimensions of the specific existing problem of a mining facility in Greece, a potential solution was emerged from the four alternative solutions initially proposed.
The advantages and the benefits from the possible application of the emerged solution cover a wide range of aspects.

More concretely, the main environmental benefit is the enhancement of the water diet of the basin downstream of the mining facilities especially during the dry period, whereas the main operational benefit is the doubling of the nominal treatment capacity of the mine waters and their effective treatment even in extreme weather conditions and flood events. The avoidance of environmentally illegal water discharges is the key administrative benefit and the satisfaction of the irrigation needs of the agricultural land downstream of the mining facilities is the most important social benefit associated with the proposed solution.

References


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Evaluation of the environmental sustainability performance of industrial facilities

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Abstract:
In this work, the systemic analysis is applied in order to evaluate three methodological frameworks suitable for assessing the environmental sustainability performance of industrial facilities. Based on generic and specific criteria and limitations set by the principles of systemic approach, the methodological framework finally adopted gives qualitative and quantitative results and outlines the existing environmental status of the industrial facility. The application of the adopted framework would develop a reference comparison base for the temporal and spatial evolution of the environmental performance of the industrial facility. As a case study the proposed methodology is finally applied to a mining facility performing its environmental sustainability assessment, and identifying the areas of significant environmental concern.

Keywords:
Sustainability; environmental assessment; systemic analysis; mining.

1. Introduction

During the last two decades the development and the application of an Environmental Management System (EMS) to an industrial facility was the main vehicle expressing the environmental compliance, the corporate commitment to environmental protection and the incorporation of environmental consciousness to the organizational structure of an enterprise. Moreover, lately a shift of interest has been observed from the issue of the “environmental protection” to the issues of “sustainable
development” and “sustainability”, and from the issue of “economic performance for shareholders” to the issue of “sustainability performance for stakeholders”. Furthermore, due to the dynamic nature of the environment, the constant modifications of modern industrial systems, and the pressure from the society, the industrial organizations are forced to (Rondinelli and Vastag, 2000):

- redefine their environmental targets far beyond the levels of legitimacy,
- re-evaluate their potentialities,
- develop and apply more adequate tools for the follow-up of their environmental sustainability performance.

Therefore, an applicable and reliable environmental tool for industrial facilities should:

- be relevant with the issues of sustainability,
- address to issues across the range of time and space scales (examining for example the resources utilization rate and the potential hazard from their utilization, the relative importance of water and energy consumption, the impact on global environmental issues, etc.),
- be easily understood and applied from non environmental experts.

Frequently, the role of an EMS is supplemented from other tools that contribute to the recognition and assessment of environmental problems such as: Life-Cycle Assessment, Eco-efficiency Indicators, Evaluation of Environmental performance.

In this work, the systemic analysis is applied in order to evaluate those three methodological frameworks suitable for the assessment of environmental sustainability performance.

2. Systemic analysis

The problem and/or the necessity that an industrial facility should answer is related to the measurement of its environmental performance considering however issues from the broader sustainability point of view. Therefore, a clearer objective towards the solution of the problem stated above could be the deployment of an assisting managerial tool leading to qualitative and quantitative results for the environmental sustainability performance of an industrial facility. The evaluation criteria of the proposed alternative solutions are:

- the transparency and the efficiency of the assessment across the range of time and space scales
- the applicability among industrial facilities of similar or diverse field
The relevant simplicity of the methodology and its applicability from non environmental experts
the flexibility of the methodology in the (future) incorporation of additional parameters.

The alternative solutions examined were:
- the Eco-Efficiency Indicators (EEIs)
- the Life-Cycle Assessment (LCA) and
- the proposed methodology named Evaluation of Environmental Sustainability Performance (EoESP),

whereas the limitations selected for the preferred framework were:
- the holistic and not only the partial applicability of the methodological framework
- the reliability of the achieved environmental assessment

Description of alternative solutions

Life Cycle Assessment

Life-cycle analysis (LCA), is a sophisticated way of examining the total environmental impact of a product or service throughout its total lifespan, or “life cycle” (Figure 1) and consists of the following three steps, i.e., Life Cycle Inventory, Life Cycle Impact Analysis, and Life Cycle Improvement Analysis (Rebitzer G., 2005). It is considered by many as a complementary and more comprehensive tool with respect to other environmental management systems (EMS) for supporting an effective integration of environmental aspects in business and economy (Frankl, 2002). The Inventory is performed for the determination of the total impact of a product/service in the environment in terms of emissions, energy, etc., whereas the Impact Analysis is performed in order to establish the severity of the environmental degradation caused by each, and finally the Improvement Analysis focuses on the reduction of the environmental degradation following the application of certain changes to the product/service life cycle. Often, LCAs are comparative of several products so as to decide which one has the lower environmental impact. In that case, no Improvement Analysis is performed. However, even in that case, the selection of the most “environmentally friendly” product/service results eventually in an environmentally improved situation (Heijungs R., 1992).
The eco-efficiency concept was introduced from the World Business Council for Sustainable Development (WBCSD) in the Rio conference on 1992 as the contribution of industries in achieving sustainable development. The concept of eco-efficiency is a management strategy connecting the financial maximization with the betterment of the environmental performance of an enterprise. The meaning of eco-efficiency is to persuade enterprises in achieving higher value for their products combined with less energy and material absorbance and less emissions to the environment. In order to evaluate and quantify the performance of an enterprise the establishment and the application of relevant indicators is deemed necessary. Those indicators, the eco-efficiency indicators, are based on certain principles, i.e., scientific certainty, environmental relevance, as well as accuracy and usability worldwide.

According to eco-efficiency the improved performance of an enterprise is a result of improved conditions in the following seven sectors. Their implementation contributes not only to financial profitability but also to the reduction of consequent environmental impacts. Hence the eco-efficiency criteria are the following:

1. Minimization of material intensity of goods and services
2. Minimization of energy intensity of goods and services
3. Minimization of toxic dispersion
4. Enhancement of material recyclability
5. Maximization of renewable resources utilization
6. Extension of product durability
7. Increase of service intensity of goods and services
Not all kind of indicators are applicable to all enterprises, due to differentiations in processes and products, lack of specific measurement methods, different priorities in environmental issues, etc. Several indicators frameworks have been proposed for assessing the sustainability performance (Labuschagne et al, 2005), some of them especially for the mining industry (Jing Yu et al, 2005). In general, there are two kind of indicators, those applicable to all enterprises related with quantifiable and wide fields and those referring to specialized needs. For example the indicators for the air emissions of a smelter differ in terms of substances and magnitude from the respective air emissions from a power plant. As a conclusion, certain indicators, simply do not correspond to the needs of all enterprises.

**Evaluation of Environmental Sustainability Performance**

The generic industrial facility/process (Figure 2) involves the input of materials (raw materials, chemicals, etc.), energy and water and the output of materials (products and wastes) and energy (heat). The potential of a specific industrial system to have a negative environmental impact is influenced by the quantities of the materials used and produced, the hazard potential of the material involved and the utilization rate of energy and water employed in the facility/process.

![A generic diagram of an industrial process](image)

**Figure 2**: A generic diagram of an industrial process

Assuming that the utilization rate of each material and its environmental impact potential are both known, a simple matrix-type representation can be established (Figure 3) for assessing the relative combinational
environmental impact of material utilization and material hazard potential. Each component can be graded as high, medium or low.

![Diagram showing material utilization and material hazard]

**Figure 3**: The matrix–type representation. Here a combination of high rate material utilization with medium high rate material utilization with medium level hazard for NaOH is shown.

Extending that assessment to material utilization versus material scarcity, to energy performance versus energy concern and to water performance versus water concern an easily understood depiction of the existing environmental status of the facility is given where the presentation of the results communicates clearly the information and more importantly identify the areas of significant environmental concern. Moreover, the specific methodology can deliver quantifiable results through a grading system however this capability is not discussed further here.

The benefits and drawbacks of each methodological framework are summarized in Table 1.

The alternative solution No. 1 (Eco-Efficiency Indicators) is rejected, due to codification problems of the indicators, and due to differences that exist to the processes and the products of different industries, precluding therefore the generalization of eco-efficiency indicators.

For the selection of the most appropriate methodological framework, a multi-criteria analysis employing the evaluation criteria mentioned earlier is applied and the remaining two methodological frameworks are classified (Table 2).

The methodology No. 2 (EoESP-Evaluation of Environmental Sustainability Performance) is graded higher according with the evaluation criteria set and therefore it is the one chosen firstly to be analyzed and secondly to be applied to an industrial facility in order to perform an initial environmental sustainability assessment.
Table 1  Benefits and drawbacks of each methodological framework.

<table>
<thead>
<tr>
<th>Alternative solution</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eco-efficiency indicators</td>
<td>+ Address issues across the range of time and space scales</td>
</tr>
<tr>
<td></td>
<td>- Not all the indicators are applied to all industries due to the differences that exist to the processes and the products of different industries. Moreover, each industry sets different priorities to the environmental issues.</td>
</tr>
<tr>
<td></td>
<td>- Their codification especially for multi-national companies is difficult, in that the fluctuations from country to country are intense.</td>
</tr>
<tr>
<td></td>
<td>- Time-consuming method.</td>
</tr>
<tr>
<td>Evaluation of Environmental performance</td>
<td>+ Quick and reliable environmental assessment</td>
</tr>
<tr>
<td></td>
<td>+ Identification of areas of concern</td>
</tr>
<tr>
<td></td>
<td>+ Clear communication of the results</td>
</tr>
<tr>
<td></td>
<td>+ Application by non-experts</td>
</tr>
<tr>
<td></td>
<td>- Lack of similar examples that could be used as standard model</td>
</tr>
<tr>
<td>Life-Cycle-Assessment (LCA)</td>
<td>+ LCA inventory process helps to narrow in on the area where the biggest reductions in environmental emissions can be made</td>
</tr>
<tr>
<td></td>
<td>+ Examines the total environmental impact of a product through every step of its life and thus identifies the area of the most significant environmental concern, giving results for the environmental improvement</td>
</tr>
<tr>
<td></td>
<td>- Many details in order to be applied - Time-consuming method</td>
</tr>
<tr>
<td></td>
<td>- Complicated tool with a lot of details and assumptions - Interpretation is difficult – many results</td>
</tr>
<tr>
<td></td>
<td>- Companies can claim one product is better than another on the basis of LCA</td>
</tr>
</tbody>
</table>

Table 2  Multi-criteria analysis for the selection of the remaining alternative solutions.

<table>
<thead>
<tr>
<th>Evaluation criteria</th>
<th>Solution No. 2 (EoESP)</th>
<th>Solution No. 3 (LCA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>transparency and efficiency of the assessment across the range of time and space scales</td>
<td>Relevant significance rating Score Weighted performance</td>
<td>Score Weighted performance</td>
</tr>
<tr>
<td></td>
<td>0,4 90 36</td>
<td>80 32</td>
</tr>
</tbody>
</table>
applicability among industrial facilities of similar or diverse field relevant simplicity of the methodology and its applicability from non environmental experts the flexibility of the methodology in the (future) incorporation of additional parameters

<table>
<thead>
<tr>
<th></th>
<th>0.2</th>
<th>90</th>
<th>18</th>
<th>80</th>
<th>16</th>
</tr>
</thead>
</table>

Total 88 70

3. Description and application of the selected solution

The EoESP (Evaluation of Environmental Sustainability Performance) is described here and on the same time is applied to a mixed sulphide mining facility located in Northern Greece. The detailed flow sheet of the processes is presented in Figure 4.

![Figure 4: Detailed flow sheet for the mining industry under examination.](image)

As it was mentioned in the brief description of the methodology, four (4) matrix-type representations can be established for assessing the relative combinational environmental impact of:
1. Material utilization vs material hazard
2. Material utilization vs material scarcity
3. Energy performance vs energy concern
4. Water performance vs water concern

Projecting those matrices to a summary-matrix, it is possible to classify the issues in three (3) distinct areas (Figure 5), i.e. the areas of very high, moderate and low environmental concern, and to specify the most crucial issues from the environmental point of view.

Figure 5: A blank summary matrix plot

The reasoning behind the grading of each component/issue as high, medium or low is presented in detail in Table 3, where the examined issues and the employed criteria are explained analytically (Gaidajis, 2008).
Table 3  Explanation of the employed methodology (Graadel & Howard-Grenville, 2005).

<table>
<thead>
<tr>
<th>Issue No.</th>
<th>Issue examined</th>
<th>Sub-issue</th>
<th>Grade</th>
<th>Criterion</th>
<th>Explanation of criterion</th>
<th>Potential source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Material utilization</td>
<td>Main raw material to human health</td>
<td>Low</td>
<td>&lt;1%</td>
<td>Mass (%) of total incoming material mass (only virgin sources, not recycled material)</td>
<td>Mass balance of the industrial facility - process</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Secondary raw material to ecological health to environment</td>
<td>Medium</td>
<td>1-10%</td>
<td>Relevant evaluation from the selected source on a percentage basis</td>
<td>Material Safety Data Sheets, <a href="http://www.scorecard.org">www.scorecard.org</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>High</td>
<td>&gt;10%</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Low</td>
<td>&lt;0.1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Medium</td>
<td>0.1-1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>High</td>
<td>&gt;1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Material Hazard</td>
<td>Material utilization to ecological health to environment</td>
<td>Low</td>
<td>0 – 100%</td>
<td>Relevant evaluation from the selected source on a percentage basis</td>
<td>Material Safety Data Sheets, <a href="http://www.scorecard.org">www.scorecard.org</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Medium</td>
<td>100%</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>High</td>
<td>100%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Material Scarcity</td>
<td>Low DT&gt;100Y Medium DT: 50-100Y High DT&lt;50Y (&gt;5%)</td>
<td>Baseline comparison</td>
<td>in between</td>
<td>Depletion time &gt; 100 years Depletion time between 40-100 years Depletion time &lt; 40 years Increase in consumption &gt; 5%</td>
<td>Literature</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Low</td>
<td>in between</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Medium</td>
<td>in between</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>High</td>
<td>Reduction in consumption &gt; 5% Reduction in consumption &gt; 5% Reduction in consumption &gt; 5%</td>
<td>Consumption data of the facility-process</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Low</td>
<td>primary</td>
<td></td>
<td>Facility site visit, Facility environmental record</td>
</tr>
<tr>
<td>4</td>
<td>Water Performance (Medium)</td>
<td>Water re-use (Secondary)</td>
<td>Low</td>
<td>&lt;1%</td>
<td>Degree of waste-water treatment (decline one level for legislation violations)</td>
<td>Facility flow chart, etc.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>National concern</td>
<td>Medium</td>
<td>1 – 10%</td>
<td>Degree of the re-used water (&gt;10%)</td>
<td>Literature</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Regional concern</td>
<td>High</td>
<td>&gt;10% (&gt;90%)</td>
<td></td>
<td>National Meteorological Agency</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Low</td>
<td>Low</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Medium</td>
<td>&gt;1500 mm</td>
<td>Water resources vulnerability status</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>High</td>
<td>700-1500 mm</td>
<td>Annual precipitation</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Low</td>
<td>&lt; 700 mm (6763 mm)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Water concern (Medium)</td>
<td>Industrial sector water consumption (Tertiary)</td>
<td>Low</td>
<td></td>
<td>Literature</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Regional concern</td>
<td>Medium</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Low</td>
<td>High</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Energy Performance (Medium)</td>
<td>Baseline comparison</td>
<td>Low</td>
<td>&gt; (+) 5% Increase in consumption &gt; 5%</td>
<td>Consumption data of the facility-process</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Medium</td>
<td>in between</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Energy source</td>
<td>High</td>
<td>Reduction in consumption &gt; 5% Reduction in consumption &gt; 5% Reduction in consumption &gt; 5%</td>
<td>Country energy profile</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Medium</td>
<td>Low</td>
<td>Carbon and/or oil based</td>
<td>Facility site visit, Facility</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Renewable energy of all kinds</td>
<td>High</td>
<td>No energy conservation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Low</td>
<td>High</td>
<td>Pressure studies of all kinds</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


3.1 Material utilization – Material hazard matrix and Material scarcity matrixes

The mass balance of the facility for years 2006 and 2007 is summarized in Tables 4 and Table 5.

**Table 4** Input materials quantities.

<table>
<thead>
<tr>
<th>Material Description of raw material</th>
<th>Quantity (kg) 2006</th>
<th>w/w % 2006</th>
<th>Quantity (kg) 2007</th>
<th>w/w % 2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Run of mine (ROM)</td>
<td>179,951.000</td>
<td>96.985</td>
<td>209,565.000</td>
<td>98.124</td>
</tr>
<tr>
<td>C₄H₇NaO₂ secondary</td>
<td>29.580</td>
<td>0.016</td>
<td>26.340</td>
<td>0.012</td>
</tr>
<tr>
<td>Dow Froth 250 secondary</td>
<td>3.340</td>
<td>0.002</td>
<td>8.215</td>
<td>0.004</td>
</tr>
<tr>
<td>Aeropromoter 3477</td>
<td>1.760</td>
<td>0.001</td>
<td>2.200</td>
<td>0.001</td>
</tr>
<tr>
<td>CuSO₄ secondary</td>
<td>32.450</td>
<td>0.017</td>
<td>38.000</td>
<td>0.018</td>
</tr>
<tr>
<td>NaCN secondary</td>
<td>17.350</td>
<td>0.009</td>
<td>19.000</td>
<td>0.009</td>
</tr>
<tr>
<td>Grinding Rods secondary</td>
<td>39.640</td>
<td>0.021</td>
<td>43.435</td>
<td>0.020</td>
</tr>
<tr>
<td>Grinding Balls secondary</td>
<td>99.900</td>
<td>0.054</td>
<td>121.500</td>
<td>0.057</td>
</tr>
<tr>
<td>Ca(OH)₂ secondary</td>
<td>2,885.000</td>
<td>1.555</td>
<td>1,258.000</td>
<td>0.589</td>
</tr>
<tr>
<td>Acid mine water main</td>
<td>2,330.160</td>
<td>1.256</td>
<td>2,330.160</td>
<td>1.091</td>
</tr>
<tr>
<td>Flocculants secondary</td>
<td>9.125</td>
<td>0.005</td>
<td>5.875</td>
<td>0.003</td>
</tr>
<tr>
<td>Explosive secondary</td>
<td>145.000</td>
<td>0.078</td>
<td>153.000</td>
<td>0.072</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>185,544.305</td>
<td>100</td>
<td>213,570.725</td>
<td>100</td>
</tr>
</tbody>
</table>
Proceedings of the 5th HSSS Conference, Xanthi, Greece, 2009

Table 5  Output materials quantities & tailings.

<table>
<thead>
<tr>
<th>material</th>
<th>Description of final products &amp; tailings</th>
<th>Quantity (kg) 2006</th>
<th>w/w %</th>
<th>Quantity (kg) 2007</th>
<th>w/w %</th>
</tr>
</thead>
<tbody>
<tr>
<td>PbS</td>
<td>main</td>
<td>14.726.000</td>
<td>8,079</td>
<td>24.404.000</td>
<td>11,517</td>
</tr>
<tr>
<td>ZnS</td>
<td>main</td>
<td>32.294.000</td>
<td>17,717</td>
<td>39.712.000</td>
<td>18,741</td>
</tr>
<tr>
<td>tailings</td>
<td>main</td>
<td>132.931.000</td>
<td>72,926</td>
<td>145.449.000</td>
<td>68,642</td>
</tr>
<tr>
<td>Pure water</td>
<td>secondary</td>
<td>2.330.160</td>
<td>1,278</td>
<td>2.330.160</td>
<td>1,100</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>182.281.160</td>
<td>100</td>
<td>211.895.160</td>
<td>100</td>
</tr>
</tbody>
</table>

From literature data regarding the potential hazard of materials (www.scorecard.org) and the potential scarcity of materials (Kesler, 1994), the lower two matrixes of Figure 6 can be drawn. The classification of tailings in the zone of very high concern and the classification of acid mine water and concentrates in the zone of moderate concern are immediately drawn conclusions.

3.2 Energy and water performance – concern matrices

Based on the available data of the facility, the energy performance (i.e., the resultant of energy consumption trend, energy source, and technology) of the facility was graded as medium (M grade). Similarly, the energy concern of the facility (i.e., the outcome of national, regional and sectoral concern) was also graded as medium (M grade).

Based on the available data of the facility, the water performance (i.e., the resultant of water consumption trend, treatment and reuse) of the facility was graded as medium (M grade). Similarly, the water concern of the facility (i.e., the outcome of national, regional and sectoral concern) was also graded as medium (M grade).

The materials and issues from the 4 matrices are then projected in the final summary matrix shown in Figure 6.

The qualitative methodological approach described and applied above to a mining industrial facility, is a practical approach in order to perform an initial evaluation of the environmental performance of an industrial facility/process. More importantly, the graphical representation through matrixes identifies the issues of significant environmental concern and/or the issues that more attention should be paid during the production phases.
More specifically and for the examined case study, the issue of tailings was classified in the area of very high environmental concern; whereas the issues of energy, water, acid mine water from the mine and the produced concentrates (PbS and ZnS) were classified in the following area of moderate environmental concern. Indeed the issues of tailings management and acid mine water treatment are related with the major environmental problems deriving from the specific mining activity. On the other hand, the raw material and the chemical reagents used are not classify as environmental issues of high priority. Furthermore, the achieved classification points out the areas and/or issues that the management of the facility should focus in order to improve its overall environmental performance and operate in a more sustainable manner.

Figure 6: Summary matrix plot for a mining industrial facility
4. Conclusions

The broadest and most future-oriented environmental evaluation tools for industrial facilities/processes deal with aspects of sustainability. The objective of such evaluation tools is transparency, efficiency of the assessment, and addressing of issues across the range of time and space scales, as for example resources utilization, water and energy consumption, global environmental issues, hazards for humans and ecosystems, etc. In this paper, a semi-qualitative methodology is presented and then applied to a mining industrial facility in order to perform an initial environmental assessment.

In order for the method to be applied a minimal amount of information regarding the facility/process is required, namely, the amount of the input materials, process chemicals, energy, water, residues, and processed materials. The methodology uses a matrix-type combinational representation and addresses the issues of material (utilization, hazard, and scarcity), energy and water. The matrix approach is easily understandable and applied from non environmental experts, efficient to complete, and the presentation of the results communicates clearly the information. The results of the assessment enable an improved understanding of the environmental performance of the facility and more importantly identify the areas of significant environmental concern.

The employment of the method may not solve all the environmental problems of a facility, however conscientious use of the approach will enable improved understanding and remarkable betterment in the environmental performance of a facility/process.

References


http://www.iea.org/


Application of management cybernetics methods in a public hospital: case study the energy system of general hospital Xanthi

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Abstract (only):
In this work, General Hospital of Xanthi is considered to be a viable system using organizational cybernetics methods so that the problem of energy management in healthcare institution can be solved using the systemic approach. To this end, the existing energy situation (state), including production and management structures of the organization, has been analysed and represented using Beer’s Viable System Model (VSM). Furthermore, limits of the analysis as well as limits of the system in focus are defined. Simulation of hospital’s existing organizational structure using VSM has been done with a handy questionnaire-diagnosing tool which has been developed to fulfill this aim. In the next level, hospital’s goals (referred to as desired situation) are also defined and evaluation criteria for the alternative solutions and the limitations of the system were determined. For each criterion, in co-operation with hospital’s executive people, sustainability factors are defined in order to choose the best intervention. Delphi method is used to assess the sustainability factors. Moreover, for each one of the alternative solutions which focus in technical as well as organizational interventions, investment cost, economic and energy savings and environmental, working and social repercussions were determined. The alternative solutions are evaluated and classified in a priority order depending on the level of satisfaction of the sustainability factors. According to the above classification and keeping in mind the restrictions mentioned earlier, an action plan is proposed to management with the application of specific interventions in a short-term, mid-term and long-term basis. In fact, a new state of operations is designed for hospital’s energy system, which is expected to satisfy the initial goals.

Keywords:
Viable System Model, Organizational Cybernetics, Systemic approach, diagnosing tool, Viable system, Delphi method
Topic:

VARIous IN GREEK

Παράγοντες που επηρεάζουν το σύστημα αξιολόγησης των προτάσεων Ε&T της Ευρωπαϊκής Ένωσης (ABSTRACT ONLY)

Νικόλαος Γεωργιάδης, Βίκυ Μάνθου, Χριστίνα Μπέστα

Συστημικές σκέψεις επίλυσης νομικών διαφορών διαδικτύου

Μαίρη Κωνσταντοπούλου, Ελισάβετ Μπέσιλα-Μακρίδη, Νικήτας Ασημακόπουλος

Εξόρυξη γνώσης από αστρονομικά δεδομένα

Ευαγγελία Α. Μίτσικα

Ελληνικές επιχειρήσεις στα Βαλκάνια: εκτιμήσεις και προοπτικές

Ευαγγελία Α. Μίτσικα, Δημήτριος Ι. Πάκος

Σχεδιασμός και ανάπτυξη ενός κόμβου στο Διαδίκτυο για ηλεκτρονική διακυβέρνηση και μάντημα από τη γεωγραφική παραγωγή

Θωμάς Μπουρνάρης, Βασίλης Μάνος, Μάρω Βλαχοπούλου, Βασιλική Μάνθου

Τα ιστολόγια (e-blogs), ως συμπλήρωμα στην παραδοσιακή εκπαιδευτική διάδοση. Η δυνατότητα κριτικής προς τον καθηγητή. Συγκριτική έρευνα στο ΤΕΙ Λάρισας και το Πανεπιστήμιο Ιωαννίνων

Giannis Koulopitsis, Lia Pange, Jenni Pagge
Σχεδιασμός και υλοποίηση συλλογικού μαθησιακού πράκτορα: εικονικές κοινότητες συνεργασίας και μάθησης εκπαιδευτικών (ABSTRACT ONLY)

Νικήτας Α. Ασημακόπουλος, Ιωάννης Χ. Θεοχαρόπουλος

Εικονικές επιχειρήσεις και ηλεκτρονική διακυβέρνηση: μια προσέγγιση με χρήση Active Server Pages

Αναστάσιος Ν. Ρίγγας, Παναγιώτα Λ. Βουτσά, Σπύρος Π. Αγγελόπουλος

Συστημικά «εργαλεία» συζητήσεων για το Κυπριακό (ABSTRACT ONLY)

Κρίστης Χαράκης, Μιχάλης Μακάριος Χαράκης
Παράγοντες που Επηρεάζουν το Σύστημα Αξιολόγησης των Προτάσεων E&T της Ευρωπαϊκής Ένωσης

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Περίληψη (μόνο):
Η επιστημονική έρευνα και τα αποτελέσματα της, αποτελούν τον βασικό άξονα για την οικονομική ανάπτυξη, την ανταγωνιστικότητα και την απασχόληση. Η Ευρωπαϊκή Ένωση για να ενισχύσει την έρευνα δημιούργησε το νομικό πλαίσιο χρηματοδότησης ερευνητικών έργων, μέσω των Προγραμμάτων Πλαίσιο (ΠΠ). Τα ΠΠ με τις εκάστοτε επιστημονικές και τεχνολογικές τους προτεραιότητες εστιάζονται στην αειφόρο ανάπτυξη. Το 7ο ΠΠ έχει κεντρικό ρόλο την εφαρμογή της στρατηγικής για την υλοποίηση της οικονομίας της γνώσης που θα ανταποκρίνεται στις ανάγκες της κοινωνίας μέσω της χρηματοδότησης ανταγωνιστικών προγραμμάτων.

Η επιλογή των ερευνητικών και τεχνολογικών προτάσεων που παίρνουν μέρος για χρηματοδότηση στο 7οΠΠ βασίζεται σε ένα σύστημα αξιολόγησης που αξιοποιεί την εμπειρία που αποκτήθηκε από τα περαιτέρω ΠΠ μέσω ενός συνεχώς βελτιωμένου συστήματος αξιολόγησης, βασισμένο στην μέθοδο κριτικής αξιολόγησης με ομότιμους κριτές (peer review). Η ποιότητα, η επιστημονική αριστεία, η ορθή διαχείριση του έργου, η διάδοση των ερευνητικών αποτελεσμάτων και οι επιπτώσεις τους, είναι κριτήρια που οι κριτές πρέπει να λάβουν υπ’ όψη τους για την αξιολόγηση κάθε υποβληθείσας πρόταση προς χρηματοδότηση.

Οι προτάσεις που τελικά θα χρηματοδοτηθούν πρέπει βάσει των κριτηρίων να πληροί όλες τις τυπικές προϋποθέσεις και να πάρουν την υψηλότερη βαθμολογία από τους κριτές για αυτό που υπόσχονται να υλοποιήσουν.
Η παρούσα εργασία έχει ως αντικείμενο, τη μελέτη του συστήματος αξιολόγησης της ΕΕ, στο ειδικό πρόγραμμα «Συνεργασία» (Cooperation), με επίκεντρο τις διαδικασίες, τις διεργασίες, τα εργαλεία νέας τεχνολογίας που χρησιμοποιούνται στο στάδιο της αξιολόγησης και η αποτελεσματικότητα τους στην επιλογή των καλυτέρων ευρωπαϊκών προτάσεων ανά θεματική περιοχή.

Επίσης, εξετάζεται από επιχειρησιακής άποψης η καταλληλότητα, η ευκολία, η αποτελεσματικότητα, η διαχείριση, η διεξαγωγή και η εφαρμογή των κανόνων της αξιολόγησης. Κανόνων δεν υπεισέρχεται στο τρόπο της επιστημονικής προσέγγισης των κριτήρων για την αξιολόγηση της επιστημονικής και τεχνολογικής επάρκειας της πρότασης. Προσπάθεια γίνεται να εντοπισθούν τα δυνατά και αδύνατα σημεία του συστήματος αξιολόγησης μελετώντας από κοντά τις διάφορες φάσεις κατά την περίοδο της αξιολόγησης των προτάσεων.
Συστημικές σκέψεις επίλυσης νομικών διαφορών
diadiktóu

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Περίληψη:
Την τελευταία δεκαετεία και πλέον ο διαδικτυακός τόπος γνωρίζει ιδιαίτερη
άνθηση και πολλές δραστηριότητες της καθημερινής πρακτικής λαμβάνουν χώρα στο διαδίκτυο. Πρακτικές που άλλοτε θεωρούνταν εκ φύσεως πολύπλοκες για να
αναπτυχθούν και να επιτελέσουν τον επιδιωκόμενο στόχο τους, μέσα από
πολυεπίπεδες διαδικασίες, στη συναλλακτική καθημερινότητα, σήμερα
dιεκπεραιώνονται στο διαδίκτυο με λιγότερο ή/και περισσότερο πολύπλοκες
dιαδικασίες. Ως παράδειγμα αναφέρεται η διεκπεραίωση τραπεζικών
συναλλαγών, η οποία εξωδιαδικτυακά απαιτεί χρόνο και ταλαιπωρία για το
συναλλασσόμενο (χρονοβόρες ουρές αναμονής και πολιορκήσιμες τοπικές
dιαδικασίες ενώτε και άλλων υστέρων) ενώ διά της διαδικτυακής διεκπεραίωσης
eκμηδενίζεται η ταλαιπωρία και η απώλεια πολύτιμου χρόνου των
συναλλασσόμενων ταυτόχρονα όμως αυξάνεται η πολυπλοκότητα στις συναλλαγές
cαθώς μέσα από τις οδούς αυτές της καθημερινής πρακτικής αναφύσουν ουσιαστικά και σοβαρά θέματα που πρέπει να επιλυθούν σε κοινωνικό, σε νομικό και σε πολιτιστικό και πολιτικό επίπεδο. Απαιτείται σε αρχικό κυρίως στάδιο των
eφαρμογών διαδικτύου να ληφθεί σοβαρώς υπ’ άνευ η διαχείριση της
συγκεκριμένης πολυπλοκότητας με συστημικές προσεγγίσεις που θα βοηθήσουν στην πληρέστερη γνώση των σχετικών προβλημάτων και στη λήξη ομόφωνων
αποφάσεων. Χαρακτηριστική αναφορά γίνεται στα ζητήματα εμπιστοσύνης
ανάμεσα στους συναλλασσόμενους, προστασίας των συναλλαγών και των
cαταναλωτών, προστασίας των πνευματικών δικαιωμάτων, προστασίας της
ευρύθης λειτουργίας της διαδικτυακής κοινότητας σε βάση αξιών και κανόνων
dημόσιας τάξης και ηθικών αξιών και αρχών, καθώς το διαδίκτυο υπεροχελίζει τα
tοπικά όρια κάθε κράτους και απευθύνεται σε παγκόσμιο επίπεδο, ζητήματα
τα οποία αναφέρονται από την καθημερινή πρακτική στο διαδίκτυο. Στο πλέγμα αυτό ο σύγχρονος χρήστης του διαδικτύου διαπιστώνει τη συνεχή διάνοια νέων οριζόντων έρευνας, δραστηριοτήτων ή ακόμη και κερδοφορίας, νόμιμης αλλά και παράνομης. Βεβαίως δεν είναι δυνατόν να αγνοηθεί και η σύζευξη της πολυπλοκότητας και τα εξ αυτής ανακύπτοντα ζητήματα, όπως η ορθή διαχείριση της για την επέλευση του πλέον πρόσφορου δυνατού αποτελέσματος. Ο χώρος του διαδικτύου είναι χώρος πολλαπλών δυνατοτήτων αλλά και πολυποτών διενέξεων και συγκρούσεων. Είναι χώρος ο οποίος αδιαμφισβήτητα λειτουργεί ως μέσο πραγμογράφησης της επιστήμης, του εμπορίου, της έρευνας και του διαλόγου μέσα από τη συνεχή ροή της πληροφορίας και από την αμεσότητα. Χαρακτηριστικό παράδειγμα είναι η e-Bay πώλη διεξαγωγής διεθνών εμπορικών συναλλαγών. Το καινοφανές που παρατηρείται στην περίπτωση αυτή είναι η οικοδόμηση εσωτερικών κανόνων λειτουργίας της με σαφή προσανατολισμό στην προστασία του καταναλωτή και στη συμπεριφορά των δικαστικών διενέξεων για την επέλευση τυχόν διαφορών που θα ανακύπτουν από τη διεξαγωγή των εμπορικών συναλλαγών σε διεθνείς επίπεδο, δηλαδή ο ιδίος ο χώρος μέσα από την αναγκαία της πράξης δημιουργήσει δίκες του άμεσου και ανέπτυξε δικούς του μηχανισμούς προστασίας. Σαφώς και άλλοι οργανισμοί προσβλήθηκαν σε αυτορύθμιση θεσπίζοντας εσωτερικούς κανόνες προστασίας των ιδίων και των μετ’ αυτών συναλλασσόμενων, καθορίζοντας ακόμη και ποιοτικά κριτήρια προκειμένου να βελτιωθεί η ποιότητα των εμπορικών συναλλαγών και να διασφαλισθούν όσο το δυνατόν περισσότερα οι συναλλασσόμενοι, προσπαθώντας με τους εσωτερικούς μηχανισμούς που αναπτύσσουν να μειώσουν τον αριθμό των δικαστικών διενέξεων από τυχόν διαφορές. Η ίδια στιγμή όμως όπου στο διαδίκτυο εκτελόονται και μετατρέπονται κανονιστικά και προτοποποιητικά γεγονότα είναι δυνατόν το ίδιο να εξελιχθεί σε ισχυρό και επικίνδυνο όπλο στα χέρια αήθουν προσόντων που επιδιώκουν το άμεσο κέρδος μέσα από παραβατική και έκθεση συμπεριφορά και ενέργειες. Νεκροτολογικά αναφέρονται η συλλογή, η διάδοση και η διακίνηση πορνογραφικού και ειδικότερα παιδικού πορνογραφικού υλικού με σκοπό το κέρδος, η παράνομη εκμετάλλευση δικαιωμάτων δημοσίων (πνευματικών και συγγενικών δικαιωμάτων), η αποικία παράνομων ηλεκτρονικών μημετώπων (spams), η υποκλοπή σοφαρίων δεδομένων από τους ηλεκτρονικούς υπολογιστές χρηστών του διαδικτύου μέσα από την παράνομη κατασκευή ειδικού λογισμικού προορισμένου για την τέλεση τέτοιων εγκλημάτων. Κάνοντας αναφορά στις πολύμορφες και πολυπεπέδες δυνατότητες του διαδικτύου αλλά και στα προβλήματα που ανακύπτουν από την καθημερινή διαδικτυακή πρακτική εισερχόμεθα στο πεδίο της αναγκαίας της επίλυσης των προβλημάτων αυτών. Σε πρώτο στάδιο παρατηρείται ότι εξ αιτίας της αμεσότητας και της ταχύτητας στις συναλλαγές και στις δραστηριότητες που λαμβάνουν χώρα στο διαδίκτυο οι διενέξεις τέτοιων συνεχώς αρθηματικώ διογκούμενες. Οι οποίοι επιδημίζουν όμως αναταράξεις και διενέξεις στο διαδικτυακό ιστό έχουν άμεσο κοινωνικό αντίκτυπο, καθώς υποδηλώνεται με την έξαρση τέτοιων φαινομένων ότι η διεθνής κοινωνία δεν διαθέτει άμεσες και μηχανισμούς πάταξης έκνωμον δραστηριοτήτων. Λαμβάνοντας αυτή τη διαπίστωση ως αρετημα του προβληματισμού προς την ανεύρεση άμεσου και αποτελεσματικού τρόπους επίλυσης των παραπάνω διαφορών ως πρώτος και βασικός τρόπος φαίνεται να προβάλλει η θέσπιση εσωτερικών κατά περίπτωση κανόνων αυτορύθμισης και
Λέξεις Κλειδιά:
Νομικές Διαφορές Διαδικτύου, Συστημικές Προσεγγίσεις, Ηλεκτρονικό Επιχειρείν, Μηχανισμοί Προστασίας Διαδικτύου.

1. Εισαγωγή
Στο σύγχρονο κόσμο ένα σημαντικά μεγάλο τμήμα των συναλλαγών έχει μεταφερθεί προς διεκπεραίωση στο διαδικτυακό τόπο. Η πραγματικότητα αυτή δημιουργήθηκε από την ανάγκη της καθημερινής πρακτικής για αποποίηση κατά το δυνατό των καθημερινών συναλλαγών και εκμετάλλευση της άσκοπης σπατάλης χρόνου σε πολύ χρόνος ουρές αναμονής. Συναλλαγές οι οποίες μέχρι και στο πρόσφατο παρελθόν διεκπεραίωνταν κατά τις συνήθεις πρακτικές σήμερα έχει μεταφερθεί, έστω και ατύχως, στο μεγαλύτερο μέρος τους προς διεκπεραίωση στο διαδικτυακό τόπο. Χαρακτηριστικά παραδείγματα είναι οι τραπεζικές συναλλαγές, οι υπηρεσίες τουρισμού, οι εμπορικές συναλλαγές. Ο αριθμός των χρηστών του διαδικτύου βαίνει διαρκώς αυξανόμενος κατ’ ανάλογη δε και η εκτέλεση συναλλαγών της καθημερινής πρακτικής μέσω του διαδικτύου παρουσιάζει συνεχή αριθμητική αύξηση. Το αξιοπρόσκετο είναι ότι εμπορικές συναλλαγές (π.χ., παραγγελίες αγαθών) διενεργούν μέσω του διαδικτύου ακόμη και παιδιά κάτω του δώδεκα ετών. Βεβαίως
απέναντι στο δεδομένο αυτό εγείρονται πολύ σοβαρά ζητήματα νομικής κυρίας φύσεως, τα οποία αφορούν στην ευρύτερη προστασία των ανηλίκων χρηστών του διαδικτύου, στη φύση των ηλεκτρονικών συναλλαγών που επιχειρούν ανηλίκοι χρήστες του διαδικτύου, στις ασφαλιστικές δικλίδες που παρέχονται για την προστασία τους αλλά και για την προστασία τρίτων από δικές τους, λόγω άγνοιας τις περισσότερες φορές, λανθασμένες ενέργειες καθώς και στις ενέργειες επικοινωνίες τους.

Η αύξηση των ηλεκτρονικών συναλλαγών και η συνεχής μεταφορά καθημερινών πρακτικών συναλλαγών στο διαδίκτυο αυξάνει κατά συνεκκοπή την πολυπλοκότητα στις ηλεκτρονικές συναλλαγές, η οποία απαιτεί ορθή διαχείριση με μακροπρόθεσμο στόχο οφελιμότητας. Προς την κατεύθυνση αυτή αξιοποιήσιμα αποβαίνουν τα σύγχρονα επιστημονικά εργαλεία της επιστήμης της Συστημικής Ανάλυσης με την υποστήριξη συγκεκριμένων εργαλείων των Τεχνολογιών της Πληροφορικής και των Επικοινωνιών. Τα επιστημονικά αυτά εργαλεία δύνανται να χρησιμοποιηθούν για την αποτελεσματική διαχείριση της πολυπλοκότητας στις εφαρμογές διαδικτύων.

Οι συγκρούσεις από διαφορές που ανακύπτουν μεταξύ των συναλλαγμένων χρηστών του διαδικτύου και ειδικότερα από τις ηλεκτρονικές συναλλαγές που διεκπεραιώνονται ή βρίσκονται σε εξέλιξη ολοκλήρωσης τους μέσα από το διαδίκτυο είναι αναπόφευκτες. Τούτο καταδεικνύεται και από τα προβλήματα στις ηλεκτρονικές συναλλαγές που καταγράφονται σε καθημερινή βάση των οποίων ο αριθμός δεν είναι διάλογο ευκαταφρόντης.

Λαμβάνοντας ως αφετηρία αυτή την πλευρά της αλήθειας του προβλήματος προκύπτει η αναγκαιότητα χάραξης στρατηγικών κατευθύνσεων για την απρόσκοπτη και ασφαλή λειτουργία των ηλεκτρονικών συναλλαγών αλλά και για τη σύννομη λειτουργία των ιδιών των φορέων των ηλεκτρονικών συναλλαγών.

Ως μία πρώτη οδός εξωδικαστικής επίλυσης των διαδικτυακών συγκρούσεων και των προβλημάτων που ανακύπτουν στις ηλεκτρονικές συναλλαγές διαφαίνεται η γένεση και η δημιουργία θεσμοθετημένων οργάνων, των οποίων αρμοδιότητα θα είναι η επίλυση διαφορών του Χρήστη Διαδικτύου με το Φορέα των Ηλεκτρονικών Συναλλαγών. Εάν από την υπαγωγή μίας σχετικής διαφοράς ενώπιον των ανωτέρω οργάνων δεν επέλθει θετικό αποτέλεσμα, ως δεύτερη οδός εξωδικαστικής επίλυσης των συγκεκριμένων διαφορών προτείνονται οι Ανεξάρτητες Αρχές. Είναι χρήσιμο να εξεταστεί η αποτελεσματικότητα της παρέμβασης των Ανεξάρτητων Αρχών στην εξωδικαστική επίλυση διαφορών διαδικτύου εντός του υφιστάμενου νομοθετικού πλαίσιο και να προταθούν εκσυγχρονιστικές νομοθετικές τροποποιήσεις προς την κατεύθυνση της ενίσχυσης του ρόλου και ενδεχομένως και της διεύρυνσης του πεδίου
εφαρμογών των Ανεξάρτητων Αρχών για την αποτελεσματικότητά τους στην εξωδικαστική επίλυση τέτοιων φόσεως διαφορών.

Οι προσπάθειες εξωδικαστικής επίλυσης διαφορών που ανακύπτουν από τις εφαρμογές στο διαδίκτυο δεν ευδοκίμουν πάντοτε και ως εκ τούτου παρατηρείται ρηγαδία αύξησης των δικαστικών διενέξεων με όλα τα επιβαρυντικά για τα δικαστήρια επακόλουθα, όπως για παράδειγμα: αύξηση της εισφοράς των υποδοτών προς δικαστική επίλυση, βράδυτη στην έκδοση δικαστικών αποφάσεων, γεγονότα που έχουν ως απότομο την καλλιέργεια κλίματος αστάθειας στις συναλλαγές και την περαιτέρω διατάξη της κοινωνικής ειρήνης.

Υπέρ των ανεπαρκών διαπιστώσεων προβάλλει ως αδύνατη αναγκαίατά η συστημική προσέγγιση του πολυεπίπεδου προβλήματος της λειτουργίας της Δικαιοσύνης και των Ανεξάρτητων Αρχών και προτείνεται η τροποποίηση της σχετικής νομοθεσίας προς την κατεύθυνση της ψηφιακής λειτουργίας τόσο των Δικαστηρίων όσο και των Ανεξάρτητων Αρχών.

2. Συνοπτική καταγραφή προβλημάτων του διαδικτύου

Με την παραπομονούμενη αύξηση της πολυπλοκότητας στις συναλλαγές εν όψει της αδιάστατης αυξανόμενης συναλλακτικής δραστηριότητας στο διαδίκτυο γεννώνται ζητήματα που εκτείνονται σε κοινωνικό, νομικό, πολιτικό ακόμη και σε πολιτιστικό επίπεδο. Για τους λόγους αυτούς χρειάζεται να γίνει καταγραφή των προβλημάτων που αναφέρονται από τη διενέργεια των ηλεκτρονικών συναλλαγών στο διαδίκτυο και να υπάρχει ισχυρή βούληση προς αποτελεσματική αντιμετώπισή τους. Η διαχείριση της πολυπλοκότητας του συγκεκριμένου προβλήματος ως εκ της φύσεως της απαιτεί σύγχρονες και καινοτόμες λύσεις, με διεπιστημονική προσέγγιση και εμβάθυνση στον πυρήνα του προβλήματος. Η επιστήμη της Συστημικής Ανάλυσης και οι μεθοδολογίες που χρησιμοποιεί είναι ιδιαίτερα χρήσιμες για την επίλυση των προβλημάτων αυτών καθώς οδηγούν σε πληρέστερη γνώση των προβλημάτων και στοχεύουν στη λήψη ομόφωνων και σταθερών αποφάσεων.

Έχει υποστηριχθεί ότι από την κοινωνία της πληροφορίας ο σύγχρονος κόσμος, και κυρίως ο σύγχρονος ψηφιακός κόσμος, μετέβη στην κοινωνία της γνώσης. Ένας τέτοιος ορισθετιμένος διαχωρισμός όμως, δήος αμφιβολία είναι άστοχος ή τουλάχιστον ανώφελος διότι η πληροφορία και η ροή με την οποία αυτή διοργανώνεται στο σύγχρονο ψηφιακό γίγνεται τελεία σε σχέση αυτών – αιτιών ως προς το αποτέλεσμα της που είναι η γνώση. Δεν τίθεται σε αμφισβήτηση η διαλεκτική σχέση της πληροφορίας, από όπου και αν αυτή λαμβάνεται, με τη γνώση, γνώση η οποία αποκτάται μέσα από τη συνεχή και αποτελεσματικά κατανεμημένη πληροφόρηση για κάθε γνωστικό πεδίο και για κάθε ζήτημα. Η πληροφορία έτσι όπως λαμβάνεται και χρησιμοποιείται υποκειμενικά
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συναλλαγής. Η ίδια η επιχείρηση, ενταύθα ο φορέας των ηλεκτρονικών
συναλλαγών, οφείλει να εφαρμόζει πάντοτε και απαρέγκλιτα τον κώδικα
ηθικής και επιχειρηματικής διευθυντικής. Διευκρινίζεται βεβαίως ότι και το
ηλεκτρονικό επιχειρείν βασίζεται σε κώδικες, αρχές και αξίες που
συμπροέρχονται μεν με τη δυναμική εξέλιξη του εμπορίου και των
συναλλαγών, δεν διαφέρουν όμως στην ουσία τους από τους κανόνες του
συμβατικού επιχειρείν.

Σημαντικής ιδιαιτερότητας αναδεικνύεται και το ζήτημα της
προστασίας των πνευματικών και των συγγενικών αυτών δικαιωμάτων όπος
ανακύπτει κυρίως από την πρακτική των ηλεκτρονικών συναλλαγών. Από
το 18ο αιώνα αναγνωρίζεται και τελεί εν λειτουργία η αμφιμονόσήμαντη
σχέση του δημιουργού με το δημιούργημά του, αναγνώριση η οποία
εξασφαλίζει στο δημιουργό, εκτός από τα ηθικά δικαιώματα στο
dημιουργήμα του, και τα περιουσιακά δικαιώματα – οικονομικά οφέλη. Η
πολιτική αυτή ακολουθήθηκε με στόχο την αποδέσμευση του δημιουργού
από κάθε είδους δεσμεύσεις και εξαρτήσεις αφού με τον τρόπο αυτό θα
ήταν σε θέση να εξασφαλίσει ένα ισοζιακό βιοτικό επίπεδο και να έχει
tαυτόχρονα και τη δυνατότητα να εκφράζεται και να δημιουργεί ελεύθερα.
Η σχέση αυτή του δημιουργού με το δημιουργήμα του στη σύγχρονη
eποχή διαταραχάται καθώς με την ευρεία χρήση του διαδικτύου έχει
επικρατήσει σε μεγάλο αριθμό χρηστών του διαδικτύου την άποψη ότι η
σχέση αυτή του δημιουργού με το δημιουργήμα του και τα εξ αυτής
απορρέουν άπολυτα δικαιώματα, τα οποία σαφώς είναι νομοθετικώς
καταχωρισμένα, ορθώνουν κάποια εμπόδια στην ελευθερία της
πληροφόρησης και της επικοινωνίας και συνιστούν αδικαιολόγητη
περιχαράκηση των δικαιωμάτων των πολιτών στην πρόσβαση στην
πληροφόρηση και στη γνώση με περαιτέρω αποκλεισμούς από το
πολυγλωσσικό σύγχρονο κοινωνικό γίγνεσθαι. Ως εκ τούτου έμπροσθεν
του καταγγελμού επέκτασης του υπερθρησκού δημόσιας χρήσεως υπηρεσιακού
χώρου τα παραπάνω ιδιωτικά οικονομικά δικαιώματα του δημιουργού
tίθενται σε έντονη αμφιβολία.
Η πνευματική ιδιοκτησία διέρχεται σε
τροχιά σοβαρής νομιμοποιητικής κρίσης καθώς το δικαίωμα στην ελεύθερη
πληροφόρηση προτάσσεται αναφαντών ως θεμελιώδες. Στον αντίποδα όμως
της παραπάνω παγκόσμιας λογικής στη,τα αφορά στο συγκεκριμένο
ζήτημα βρίσκεται η παραχώρηση αποκλειστικών δικαιωμάτων
εκμετάλλευσης από τον ίδιο το δημιουργό στο συγκεκριμένους φορείς για
λόγους ενημερωτικούς, εκπαιδευτικούς, ερευνητικούς και λοιπούς
συναφείς, η οποία συνάδει με τις θεμελιώδεις έννοιες – δικαιώματα της
eλευθερίας στην πληροφόρηση και στην επικοινωνία. Η βασική νομοθεσία
που διέπει την προστασία της πνευματικής ιδιοκτησίας στην Ελλάδα είναι
ο νόμος 2121/1993, με τις τροποποιήσεις του μεταγενέστερα υπέστη
προκειμένου να εναρμονισθεί η εσωτερική νομοθεσία με τις σχετικές
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κύρωσε τη συμφωνία TRIPs (Agreement on Trade Related Aspects of Intellectual Property Rights), συμφωνία για τα δικαιώματα πνευματικής ιδιοκτησίας στον τομέα του εμπορίου, η οποία αποτελεί τμήμα των συμφωνιών του Παγκόσμιου Οργανισμού Εμπορίου (ΠΟΕ) και αφορά στην καθήρωση ενός ελαχίστου επιπέδου προστασίας της πνευματικής ιδιοκτησίας και των συναφών δικαιωμάτων στα κράτη μέλη του ΠΟΕ.

Η πνευματική ιδιοκτησία εξεταζόμενη ως νομικός κυρίως όρος εντός του περιβάλλοντος του σύγχρονου ψηφιακού γύρναθα δεν μπορεί να αποσπασθεί από την πρακτική της εμπορευματοποίησης, την ένταξή της στους κανόνες του διεθνούς εμπορίου, και από τη συνακόλουθη αναγκαιότητα της διεύρυνσης της έννοιας της προστασίας του πνευματικού δημιουργήματος, προκειμένου να καταχωριστεί αυτή υπέρ του δημιουργού στα πλαίσια δύσκολων προς τούτο συνθηκών εξ αιτίας της άμεσης πρόσβασης σε πνευματικά δημιουργήματα με τεχνικά μέσα και του ελλογενός κινδύνον συρρίκνωσης της προστασίας δημιουργίας.

Αξιοσημείωτη είναι η νέα τάση που δημιουργήθηκε στις ΗΠΑ από το δικηγόρο και Καθηγητή του Πανεπιστημίου του Standford, Lawrence Lessig, για την προστασία της πνευματικής ιδιοκτησίας. Ο Lawrence Lessig με σειρά άρθρων και βιβλίων του επέκρινε με σφοδρότητα το επικρατούν σύστημα προστασίας των πνευματικών δικαιωμάτων υποστηρίζοντας μάλιστα ότι «είναι ένας πολιτισμός στον οποίο οι δημιουργοί μπορούν να δημιουργήσουν μόνο με την άδεια του ισχυρού ή των δημιουργών του παρελθόντος». Προκειμένου να υποστηρίξει και στην πράξη τις απώγεις του αυτές ο Lawrence Lessig προχώρησε το 2001 στη δημιουργία της μια κερδοσκοπικής οργάνωσης Creative Commons (CC), με έδρα το San Francisco, για τη διεύρυνση της διαθεσιμότητας των πνευματικών έργων και της νόμιμης διανομής τους προκειμένου να παραχθούν νέα έργα με βάση ήδη υπάρχοντα. Η Creative Commons (CC) έχει ήδη εκδόσει σχετικές άδειες πνευματικών δικαιωμάτων, γνωστές ως άδειες Creative Commons, οι οποίες παρέχουν τη διακριτική ευχέρεια στους δημιουργούς να δηλώσουν ποια δικαιώματα επιθυμούν να διατηρήσουν επί του δημιουργήματος τους και ποια επιθυμούν να παραχωρήσουν υπέρ άλλων δημιουργών. Το εγχείρημα αυτό του Lawrence Lessig εκλαμβανόμενο ως εναλλακτική λύση στους περιορισμούς των παραδοσιακών μονοπωλίων επί των προϊόντων πνευματικής ιδιοκτησίας έτυχε της ένθερμης υποστήριξης των φοιτητών και άλλων μελών της Νομικής Σχολής του Πανεπιστημίου του Harvard και του “κέντρου για το διαδίκτυο και την κοινωνία” της Νομικής Σχολής του Πανεπιστημίου του Standford. Το πρώτο σύνολο των παραπάνω αδειών δημιουργήθηκε το Δεκέμβριο του έτους 2002. Η Ελλάδα εντάχθηκε στα μέλη των παραπάνω αδειών τον Οκτώβριο του έτους 2007 με την παρουσία του Καθηγητή Lawrence Lessig.
Η άποψη αυτή και οι συναφείς θέσεις της οργάνωσης Creative Commons (CC) και των υποστηρικτών της απέσπασε δριμύτατες αρνητικές κριτικές οι οποίες διακτύιστηκαν στο ρόλο που διαδραματίζει ως προς το εμπορικό τμήμα των αδειών αυτών η Creative Commons, στην εν γένει χρησιμοποίηση τους και στην κυοφορούμενη επικινδυνότητα από την παροχή μεγάλου αριθμού αδειών μη συμβατών με τη νομοθετική νούμενη προστασία της πνευματικής ιδιοκτησίας.

Εξετάζοντας περαιτέρω τα προβλήματα που ανακύπτουν από τη χρήση των ηλεκτρονικών συναλλαγών και στο εύρος που αυτή συντελείται, δεν πρέπει να παραβλέφθει το γεγονός ότι το διαδίκτυο είναι μία “παγκόσμια κοινωνία”, υπερσχεδιάζει τα γεωγραφικά όρια κάθε κράτους και απευθύνεται ταυτόχρονα στους λαούς της γης. Μέσα στην ευρύτατη αυτή γεωγραφική του έκταση και στις πολυάριθμες δραστηριότητες που αναπτύσσονται στο διαδίκτυο, διανύονται νέοι ορίζοντες για έρευνα, για δημιουργικό διάλογο, για προαγωγή της επιστήμης, για προώθηση του εγχώριου και του διεθνούς εμπορίου, για πολιτιστική προσέγγιση των λαών. Ο διαδικτυακός τόπος αδιαμφισβήτητα αποτελεί χώρο πολλαπλών δυνατοτήτων και μέσο κερδοφορίας, νόμιμης και παράνομης. Εντός αυτής της πραγματικότητας αναπτύσσονται ποικίλες διενέξεις και συγκρούσεις.

Μεγάλος αριθμός των παρατηρούμενων συγκρούσεων και των διενέξεων εστιάζεται στις εμπορικές ηλεκτρονικές συναλλαγές. Ως ένα χαρακτηριστικό παράδειγμα παράνομης κερδοφορίας και εξ αυτής δικαστικών διενέξεων αναφέρεται η περίπτωση με τίτλο “καταδίκη για κλοπή στο e-Bay”, όπως ανακοίνωθηκε στην ηλεκτρονική βάση δεδομένων Lawnet την 05η Μαίου του έτους 2009, στις 09:39 π.μ. Σύμφωνα με την ηλεκτρονική αυτή ειδήσει ένας πενήνταεπτάχρονος Αμερικανός από το Κολοράντο καταδικάστηκε σε 52 μήνες φυλάκιση και σε χρηματικό πρόστιμο ύψους 252.000 δολαρίων για κλοπές ύψους 259.000 δολλαρίων σε βάρος χρηστών του διαδικτυακού οίκου δημοπρασιών e-Bay χρησιμοποιώντας δύο μεθόδους απάτης. Στη μια περίπτωση εμπεριέευταν πολυτέλη αυτοκίνητα τόσο στην πύλη ηλεκτρονικών εμπορικών συναλλαγών e-Bay όσο και μέσω άλλης ιστοσελίδας. Αφού έπειθε τους μελλοντικούς αγοραστές να του αποστέλλουν τραπεζικές επιταγές ή να πραγματοποιήσουν μεταφορά χρηματικών ποσών μέσω τραπέζης για την υποτίθεμενη, όπως τελικά αποδείχθηκε, αγορά του πολυτελούς αυτοκινήτου όταν ολοκληρώθηκαν η συναλλαγή δεν παρέδεχε τα αυτοκίνητα. Στη δε άλλη περίπτωση ισχυρίστηκαν μέσω διαδικτύου ότι αγόραξε χρησιμοποιημένα φωτοαντιγραφικά σε χαμηλές τιμές, τα οποία τελικά μεταπωλήθηκαν σε πολύ υψηλότερες τιμές ζητώντας από τον υποψήφιο αγοραστή την καταβολή υψηλού χρηματικού ποσού.
3. Σκέψεις για την προσέγγιση των προβλημάτων του διαδικτύου

Κατόπιν των όσων παραπάνω αναφέρθηκαν σχετικά με τις συγκρούσεις και τις διενέξεις στο διαδίκτυο, το επόμενο στάδιο είναι οι προτάσεις για την προσέγγισή και την επίλυση των προβλημάτων αυτών.

Η στρατηγική αικονόμησης εσωτερικών κανόνων λειτουργίας των φορέων ηλεκτρονικών συναλλαγών φαίνεται να αποτελεί πρόταση αναγκαίτητη κυρίως σε ό,τι αφορά στον τομέα της πρόληψης σχετικών προβλημάτων στη διεξαγωγή και στην υλοποίηση ηλεκτρονικών συναλλαγών. Η πρόληψη σε στρατηγικό επίπεδο πρέπει να περιλαμβάνει:

- Αυστηρή εκτέλεση της πολιτικής ασφάλειας της εφαρμογής των ηλεκτρονικών συναλλαγών.

- Ξεκάθαρες και ακριβείς διαδικασίες ηλεκτρονικών συναλλαγών με παροχή πολύ καλής πληροφόρησης για το χρήστη του διαδικτύου, η οποία θα εμπεριέχει αναλυτικές πληροφορίες και εύχρηστη αλληλεπίδραση χρήστη και εφαρμογής.

- Δημιουργία διαδικασιών επίλυσης νομικών διαφορών διαδικτύου από ηλεκτρονικές συναλλαγές εντός της ίδιας εφαρμογής με κύριο στόχο την άμεση επίλυση της νομικής διαφοράς. Στις διαδικασίες αυτές θα ενταχθούν νομικές διαδικασίες συμβολικής επίλυσης της διαφοράς και διατεταγμένες ώστε η νομική διένεξη που θα ανακύψει να μην απολήξει σε δικαστική διαμάχη.

- Η προστασία του καταναλωτή στη στρατηγικό επίπεδο είναι ζήτημα ιδιαίτερης σημασίας και η αντίστοιχη πολιτική πρόληψης οφείλει
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να κινηθεί σε αρχές και σε αξίες του εμπορίου και των συναλλαγών που προσανατολίζονται στην ομαλή διεξαγωγή και εκτέλεση των συναλλαγών με την ταυτόχρονη προστασία του καταναλοτή. Ειδικότερα, ο καταναλωτής για πρώτη φορά/και υπηρεσίες δεν πρέπει να τελεί υπό πίεση για τη λήψη της τελικής του απόφασης σχετικά με το συγκεκριμένο προϊόν ή/και τη συγκεκριμένη υπηρεσία, πρέπει να αποφασίζει ελεύθερα και η σχετική βούληση του να είναι σαφής και χωρίς περιθώρια παρεμπορημένας της από το φορέα της ηλεκτρονικής συναλλαγής, οι όροι και οι διαπραγματεύσεις της συναλλαγής από το φορέα προς τον καταναλωτή πρέπει να είναι αληθείς, ο καταναλωτής δεν πρέπει να παραπλανάται σχετικά με το προς επιλογή προϊόν ή/και την προς επιλογή υπηρεσία εις ὅτι αφορά στα αναφερόμενα χαρακτηριστικά που πρέπει να φέρει προκειμένου η συναλλαγή να μην αποβεί παραπλανητική και ζημιωτική για τον καταναλωτή. Επίσης είναι επιβεβλημένη σήμερα παρά ποτέ η θέσπιση αυστηρών κανόνων πολιτικής της ασφάλειας των προϊόντων και των υπηρεσιών τόσο για τις εξωδιαδικτυακές εμπορικές συναλλαγές όσο και για τις ηλεκτρονικές συναλλαγές που συντελούνται στο διαδίκτυο, με στόχο την αποτελεσματική μείωση του καταναλωτικού κινδύνου, δημιουργώντας ταυτόχρονα σαφή και καθορισμένα ελάχιστα αποδεκτά όρια καταναλωτικού κινδύνου.

Η επίλυση των διαφορών που ανακύπτουν στο διαδίκτυο από τις ηλεκτρονικές εμπορικές συναλλαγές που λαμβάνουν χώρα σε αυτό θα πρέπει να είναι στρατηγικώς σχεδιασμένη και προσανατολισμένη ώστε να στοχεύει τόσο σε εθνικό όσο και σε διεθνές επίπεδο καθώς τα στοιχεία αλλοδαπότητας που τυχόν εμφανίζονται σε αυτής της φύσεως νομικού ενδιαφέροντος συναλλαγής είναι ποικίλα και είναι δυνατό να ανακύψουν σε κάθε στάδιο εκτέλεσης των διαδικασιών και των συμβάσεων. Στρατηγικός στόχος, για την ομαλή και απρόσκοπτη λειτουργία των ηλεκτρονικών και ιδιαίτερως των εμπορικών ηλεκτρονικών συναλλαγών, οφείλει να είναι η αυτορύθμιση του φορέα των ηλεκτρονικών συναλλαγών, δηλαδή η ανάπτυξη ιδίων εσωτερικών νομικών μηχανισμών προστασίας, ιδίων αμοιβικών μηχανισμών, ώστε να είναι το ίδιο το σύστημα ικανό να αντιδρά και να ανταπεξέρχεται, με εσωτερικές αυστηρές διαδικασίες διασφάλισης ποιότητας, στο όποιο τυχόν πρόβλημα νομικής φύσεως ανακύψει από τη διεξαγωγή και από την εκτέλεση συγκεκριμένης ηλεκτρονικής συναλλαγής.

Όλα τα παραπάνω στρατηγικά επίπεδα πρόληψης πρέπει να αποσκοπούν στη μείωση του αριθμού των δικαστικών διενέξεων από τυχόν διαφορές και διαφοριών από την εκτέλεση των ηλεκτρονικών συναλλαγών.

Το διαδίκτυο ως εκ της φύσεως του αναμφίβολα βοηθεί και συμβάλλει στη γέννηση και στην εξέλιξη καινοτομίας και πρωτοποριακός γεγονότος που αφορούν σε όλα τα επίπεδα της καθημερινής ζωής. Από σύγχρονη ευλογία προδούμε όμως πολλές φορές το διαδίκτυο μετατρέπεται.
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ελάχιστες μόνο από τις παράνομες δραστηριότητες που έχουν ευρέως αναπτυχθεί στο διαδίκτυο.

Η θέσπιση και η τήρηση ποιοτικών κριτηρίων για τη βελτίωση της ποιότητας των εμπορικών, και ειδικότερα των ηλεκτρονικών εμπορικών, συναλλαγών εντός των πλαισίων της πραγματικότητας όπως αυτή εκτυλίσσεται στις διαδικτυακές συναλλαγές, πρέπει να αποτελέσουν βασικό μέλημα πολιτικής διασφάλισης τους σε στρατηγικό επίπεδο καθώς και σε επίπεδο εφαρμογής στα πλαίσια της πρόληψης προβλημάτων νομικής φύσης.

Η κατάρτιση συμβάσεων για κάθε εμπορική ηλεκτρική συναλλαγή με βάση διεθνείς κανόνες και πρότυπα κατάρτισης συμβάσεων δύναται να αποβεί καρποφόρο μέτρο πρόληψης των προβλημάτων αυτών και συγχρηματοδότηση των καταναλωτών - χρηστών του διαδικτύου. Στις σχετικές συμβάσεις πρέπει να υπάρχουν με ακρίβεια ζητήματα ουσιώδη για την ομαλή πορεία και εκτέλεση της αναπτυσσόμενης ηλεκτρονικής νομικού ενδιαφέροντος σχέσης καθώς και για το στάδιο ολοκλήρωσης της αλλαγής και μετέπειτα αυτών, εφ’ όσον τούτο επιβάλλεται από τις επί μέρους ιδιομορφίες της συγκεκριμένης σχέσης. Χαρακτηριστικά αναφέρεται ότι η σύμβαση πρέπει να ρυθμίζεται με σαφήνεια την περιγραφή της συγκεκριμένης συναλλαγής, τα συμβαλλόμενα μέρη και την ιδιότητα τους υπό την οποία μετέχουν στη σχέση αυτή, το γλώσσα της σύμβασης και εν γένει της συναλλαγής (για την ανταλλαγή ηλεκτρονικών εγγράφων και επικοινωνιών), τις υποχρεώσεις και τα δικαιώματα των συμβαλλόμενων μερών, τις εξασφαλιστικές προϋποθέσεις ανά περίπτωση ειδικότερα, τις εκπτώσεις της πορείας της συγκεκριμένης σχέσης και της εκτέλεσης των όρων της σύμβασης ως προς τους τρίτους που εμπλέκονται στη συγκεκριμένη ψηφιακή συναλλαγή, τα οργάνα εξωδικαστικής επίλυσης της οποίας τυχόν διαφοράς ανακύψει, τη δικαιοδοσία των δικαστηρίων στα οποία θα υπάγονταν τα συμβαλλόμενα μέρη την επίλυση των τυχόν διαφορών τους σε περίπτωση εμπλοκής της συναλλαγής, ρητά δε θα εκφράζεται η σύμπτωση της βούλησης των συμβαλλόμενων μερών για την συμμετοχή τους στη συγκεκριμένη έννομη σχέση [Λ1Α03].

Μία ηλεκτρονική σύμβαση, η οποία καταρτίζεται με υπερθένδα χαρακτηριστικά, διακρίνεται από μία εγχώρια σύμβαση, με ίδιο ή παρεμπορικός, αντικείμενο διαπραγμάτευσης, τόσο ως προς την αναπάραστη παρουσιαζόμενη σε αυτή πολυπλοκότητα, για τους λόγους που μόλις αναφέρθηκαν για τις ρυθμίσεις που πρέπει να προβλέπεται μία τέτοιας φύσεως σύμβαση, όσο και ως προς τη μεταχείριση της από τις νομοθεσίες άλλων κρατών, δηλαδή από την ύπαρξη ή από την αναπαρίστα φυλετική νομοθεσία πνευμόνων στις συναλλαγές, και ειδικότερα στις ψηφιακές συναλλαγές, της εκάστοτε εθνικής έννομης τάξης.
Αξίζει εντάθα να επισημανθεί ότι η εμπιστοσύνη ανάμεσα στα συμβαλλόμενα μέρη και η κατάρτιση σχετικής σύμβασης δεν είναι αντικρούμενες έννοιες και πρακτικές στις συναλλαγές διότι η αμοιβαία εμπιστοσύνη οικοδομείται με τη θέσπιση και με την κοινοποίηση των εκτελέσιμων προτύπων και με την αποτελεσματική χρήση τους στην πράξη.

Εντός της πραγματικότητας, όπως και ανωτέρω στην παρούσα εργασία αναφέρθηκε, οι συγκρούσεις και οι διενέξεις στο διαδικτυακό τόπο τείνουν αριθμητικά διογκώμενες. Οι αναταράξεις και οι διενέξεις που καταγράφονται στο διαδικτυακό ιστό έχουν άμεσο κοινωνικό αντίκτυπο, ο οποίος εκτείνεται σε όλα τα πεδία και στις δραστηριότητες της καθημερινής πρακτικής.

Σε επίπεδο εφαρμογής πλέον, μετά από το στρατηγικό επίπεδο χάραξης πολιτικής αντιμετώπισης των συγκεκριμένων προβλημάτων, ως πρώτος τρόπος προσέγγισης επίλυσης των διαφορών που θα ανακύπτουν από τις ηλεκτρονικές συναλλαγές στο διαδίκτυο προβάλλει αναγκαία η αυτούπατρική, δηλαδή η ανάπτυξη ισχυρών μηχανισμών αυτοπροστασίας και αυτοάμυνας αφ’ ενός μεν του ιδίου του κοινωνικού ιστού, εδώ κυρίως από την πλευρά των χρηστών του διαδικτύου, και αφ’ ετέρου από τον ιδίο το φορέα των ηλεκτρονικών συναλλαγών. Βεβαιώς η ύπαρξη μηχανισμών αυτοπροστασίας και αυτοάμυνας για να επιφέρει στοχευμένα ευδόκημα σχετικά με την εξωδικαστική επίλυση νομικών διαφορών διαδίκτυου αποτελέσματα πρέπει να συνυπάρχει με την ισχυρή βούληση των εμπλεκομένων – συμβαλλόμενων μερών προς την κατεύθυνση αυτή.

Στα πλαίσια της Ευρωπαϊκής Ένωσης έχουν αναπτυχθεί δίκτυα και μηχανισμοί εξωδικαστικής επίλυσης διαφορών που ανακύπτουν από τις διαδικτυακές ηλεκτρονικές εμπορικές συναλλαγές. Τα σπουδαίτερα από τα δίκτυα αυτά είναι αφ’ ενός μεν το Ευρωπαϊκό Εξωδικαστικό Δίκτυο (European Extra Judicial Network– EEJ-NET) και αφ’ ετέρου το Δίκτυο Εθνικών Εναλλακτικών Επιλύσεων Διαφορών (Εναλλακτική Επίλυση Διαφορών – EED, Alternative Dispute Resolution). Διασφαλίζεται δε, ότι η υπαγωγή προς επίλυση μίας διαφοράς προκύπτουσας από τις ηλεκτρονικές συναλλαγές στο διαδίκτυο, ενώπιον των παραπάνω αναφερόμενων δικτύων εξωδικαστικής επίλυσης δεν είναι αποτρεπτική για την υπαγωγή της ιδιαίτερα ενώπιον των αμοιβών δικαστηρίων στην περίπτωση που καταστρατηγούνται κανόνες αναγκαστικού δικαίου για την προστασία των καταναλωτών τόσο σε περιπτώσεις εγχώριων όσο και σε περιπτώσεις υπερεθνικών διαφορών διαδικτύου, δηλαδή όταν οι περιπτώσεις αντικείνται στο δημόσιο έννομο συμφέρον του καταναλωτή. Επίσης πρέπει να αναφερθεί και το δίκτυο εξωδικαστικής επίλυσης διαφορών ανακυπτούσων από υπηρεσιακές συναλλαγές, Financial Services Complaints Network (FIN-NET), το οποίο αφορά στην επίλυση διαφορών που προκύπτουν από χρηματοπιστωτικές υπηρεσίες. Σημειώνεται ότι το
δίκτυο FIN-NET εξαρτείται από το πεδίο εφαρμογής της Κοινοτικής Οδηγίας 2000/31.

Εν κατακλιδεί παρατηρείται ότι οι καταγραφικές εξελίξεις στο διαδίκτυο επιφέρουν σαρωτικές αλλαγές στα συναλλακτικά ήθη και στις συναλλακτικές πρακτικές, και επιβάλλουν νέα συναλλακτική τακτική, με κύρια χαρακτηριστικά την ταχύτητα, την αμεσότητα και ενιότερα την ευέλιξια. Λαμβάνοντας σοβαρά τις δεδομένα αυτά, η ανάγκη για τη δημιουργία και τηθεμελίωση νέων, καινοτόμοι διαδικασιών προπαρατήσεων των καταναλωτών – χρηστών του διαδικτύου, των συμβαλλομένων μερών σε μία ηλεκτρονική σύμβαση και των συμμετεχόντων φυσικών ή και νομικών προσώπων σε μία ψηφιακή συναλλαγή θεωρείται άμεσα επιβεβλημένη.

3.1 Νομική εξωδικαστική αντιμετώπιση των προβλημάτων και των διαφορών του διαδικτύου: διαίτησις

Εάν οι προσπάθειες εξωδικαστικής επίλυσης διαφοράς νομικής φύσεως, που ανέκυψε από ηλεκτρονικές συναλλαγές στο διαδίκτυο, αποτύχουν στο πρώτο στάδιο προσέγγισης, όπως αυτό αναπτύχθηκε μόλις ανατέθηκε, τότε η προσέγγιση της επίλυσης της διαφοράς αυτής σε δεύτερο στάδιο θα πρέπει να είναι αυστηρά νομική εμμενούσα ακόμη και στο στάδιο αυτό στην εξωδικαστική επίλυση της, μέσω της Διαίτησις. Το κεφάλαιο που αφορά σε θέματα Διαιτησίας απτείται σημαντικής έκτασης της νομικής επιστήμης και βεβαιώς η όπως εκτενής αναφορά στη διαίτησις της Διαιτησίας υπερβάλλει τους ορίους και τον στόχο της παρούσας εργασίας. Ακριβότερα, εν προκείμενω θα αναφερθούν κάποιοι σημαντικοί εννοιολογικοί και πρακτικοί άξονες της Διαιτησίας υπό τη νομική θεώρηση για να καταδειχθεί η σοβαρότητα και η υστερική συμβολή της εις ὅ,τι αφορά στις ανάγκες της παρούσης έρευνας. Η Διαιτησία αποτελεί εξωδικαστική υδό επίλυσης διαφορών νομικής φύσεως. Είναι νομική διαίτησις η οποία αποσκοπεί στην ταχεία άποψη δικαιοσύνης και στην άμεση άρση της διατάραξης της κοινοτικής εφίμης με γρήγορες διαδικασίες και με την παροχή της δυνατότητας στα εμπλέκομαι μέρη να επιλύσουν εξ ιδίας πρωτοβουλία την ανακύψα αδιαφορία. Οι νομικές κατευθύνσεις της επίλυσης των διαφορών με διαιτησία είναι δυνατόν να αποτελέσουν τελεσφόρο πεδίο εξωδικαστικής επίλυσης διαδικασικών διαφορών στην εποχή των ηλεκτρονικών συναλλαγών. Μολονότι η άξονα της επίλυσης διαφορών, η διαιτησία ηλεκτρονικών εμπορικών διαφορών, είναι αδιαμφισβήτητη για την ομαλή ροή του εμπορίου και για την αποφάσιση πρόσληξη των ηλεκτρονικών συναλλαγών, είναι άξονα επισήμανσης το γεγονός ότι η Σύμβαση των Βρυξελλών του έτους 1968, που αφορά στη διεθνή δικαιοδοσία και στην εκτέλεση αποφάσεων επί αστικών και εμπορικών διαφορών, εξαίρετα ρητά από το πεδίο εφαρμογής της τη διαιτησία ως τρόπο επίλυσης των διαφορών. Η Οδηγία 2000/31 του
Ευρωπαϊκό Κοινοβουλίο εστιάζει στην αναγκαιότητα εξωδικαστικών λύσεων των εμπορικών διαφορών, η οποία όμως προϋποθέτει αναγκαστική αναθεώρηση της Σύμβασης των Βρυξελλών. Η απόφαση της 25ης Ιουλίου του έτους 1991 του Δικαστηρίου των Ευρωπαϊκών Κοινοτήτων αποσαφήνισε για πρώτη φορά τα όρια της εξαίρεσης της Διαιτησίας από τη Σύμβαση των Βρυξελλών. Σύμφωνα με την απόφαση αυτή εξαρτώνται από το πεδίο εφαρμογής της Σύμβασης των Βρυξελλών τα θέματα που σχετίζονται με την υπαγωγή από τα συμβαλλόμενα μέρη της επίλυσης της διαφοράς τους ενώπιον ιδιωτών, με τη διεξαγόμενη σχετική διαδικασία και με τη συγκεκριμένη διαιτητική απόφαση. Δεν εξαρτώνται όμως από το πεδίο εφαρμογής της Σύμβασης των Βρυξελλών οι δίκες που διεξάγονται ενώπιον των Εθνικών Δικαστηρίων κατά τα προβλεπόμενα από τη σχετική νομοθεσία για τη Διαιτησία καθώς και οι αποφάσεις των Δικαστηρίων αυτών. Παρατηρείται δε ότι ο Κανονισμός 44/2001 της Συνόδου της Χάγης εξαρτά ρητά τη Διαιτησία από το πεδίο εφαρμογής του ενώ αναθεωρεί τη Σύμβαση των Βρυξελλών κυρίως σε θέματα αφορούντα σε διαφορές μεταξύ επιχειρήσεων και καταναλωτών και παρέχει σημαντικό ρόλο στην πρωτοβουλία των μερών να υπαγάγουν τα ιδια με δίκη τους βούληση τη διαιτησία τους στη δικαιοσύνη, αναζητήτως από τη lex contractus, καθώς και μία ρύθμιση αναγκαστικού δικαίου περί της εφαρμογής της διαιτητικής αποφάσεων.

Η έκφραση της βούλησης των μερών για την υπαγωγή της επίλυσης της διαφοράς τους με διαιτησία πρέπει να είναι ρητή, σαφής και ανεπιφύλακτη. Η διαιτητική συμφωνία πρέπει να περιβάλλεται έγγραφο τύπου, συστατικός αυτής. Διευκρινίζεται δε ότι ο έγγραφος αυτός τύπου δεν αποτελεί απόδειξη αλλά σύσταση της διαιτητικής συμφωνίας. Ο έγγραφος τύπου δύναται να είναι και σε ηλεκτρονική μορφή, η οποία ουδόλος προσβάλλει την εγκυρότητα και το κύρος του, αρκεί και στην περίπτωση αυτή να πληρούνται οι ανωτέρω αναφερόμενες προϋποθέσεις για την έκφραση της βούλησης των μερών. Ενα επιπλέον στοιχείο στο οποίο οφείλει να αποδοθεί η δέοςα σημασία είναι το αναγνωρισμό της ταυτότητας των συμμετέχοντων μερών. Η βασική αυτή αναγκαιότητα συνάδει με τη ρύθμιση της Οδηγίας 2000/31 του Ευρωπαϊκού Κοινοβουλίου, η οποία απαιτεί αναγνωρισμό εμπορικής επικοινωνίας με τη δήλωση της επομένως του φορέα παροχής υπηρεσίας καθώς και με τη δήλωση άλλων στοιχείων του ποιον του ταυτοποιούν και τον προσδιορίζουν χωρίς αμφιβολία. Πάραν των όσων ήδη αναφέρθηκαν για τη δήλωση της βούλησης των μερών, επισημαίνεται ότι η τυχόν ελλείψη εγγράφου τύπου της διαιτητικής συμφωνίας θεραπεύεται με την ανεπιφύλακτη συμμετοχή των μερών στη διαιτητική διαδικασία, όπως δύναται να συναχθεί από την εν γένει συμπεριφορά των μερών για την υπαγωγή της διαφοράς τους προς επίλυση σε εξωδικαστικές διαδικασίες και εν προκειμένω στη διαιτησία. Σχετική νομοθετική πρόβλεψη παρέχεται και δία του άρθρου 869 του
ημεδαποῦ Κώδικα Πολιτικής Δικαιομορίας (ΚΠολΔ), στο οποίο αναφέρεται ότι: “...Αν αυτοί που συνομολόγησαν τη συμφωνία εμφανίσθησαν στους διαπρέποντες και λάβουν ανεπιφυλακτικά μέρος στη διατηρητική διαδικασία, η έλλειψη εγγράφου θεραπεύεται”.

Στο Ελληνικό δικαίωμα σύστημα ενώ υπάρχει νομοθετική πρόβλεψη και ικανές νομοθετικές ρυθμίσεις για το θεσμό της διατηρητικής, κατά βάση στον Κώδικα Πολιτικής Δικαιομορίας (άρθρα 867-903) αλλά και σε ειδικές ρυθμίσεις σε ειδικούς νόμους, όπως για παράδειγμα στο άρθρο 17 του Νόμου 2331/1995, δεν υπάρχει ρητή νομοθετική πρόβλεψη για τη διεθνή διατηρητική. Σχετικές ρυθμίσεις εμπεριέχονται στα άρθρα 903-906 του ΚΠολΔ και αφορούν στις αλλοδαπές διατηρητικές αποφάσεις ορίζοντας τις προϋποθέσεις για την εφαρμογή τους στην ημεδαπή. Εν γένει παρατηρείται ότι ο ΚΠολΔ και τα άλλα νομοθετήματα διακρίνουν ανάμεσα σε ημεδαπές και σε αλλοδαπές διατηρητικές αποφάσεις. Η διεθνής διατηρητική και η διεξαγωγή της στο ημεδαπό νομικό σύστημα οριοθετείται από τις παραπάνω διατάξεις του ΚπολΔ αλλά και από διεθνείς συμβάσεις, κυρίως δε από τη Σύμβαση της Νέας Υόρκης του 1958, η οποία κυρώθηκε από την Ελλάδα με το Νόμο 4220/1961 και ως εκ τούτου αποτελεί και εσωτερικό δίκαιο. Ο δε ημεδαπός Νόμος 2735/1999 για τη Διεθνή Εμπορική Διατηρητική επικύρωσε τον πρότυπο Νόμο UNCITRAL για τη Διεθνή Εμπορική Διατηρητική [ΚΟΥ96].

Στο πλαίσιο των παραπάνω τρόπων αντιμετώπισης διά της διατηρητικής, των διαφορών που ανακύπτουν από τις ηγημονικές συναλλαγές στο διαδίκτυο, προτείνεται η Ηλεκτρονική Διατηρητική, η οποία θα διεξάγεται ακραιφνώς ηλεκτρονικά. Όλα τα δεδομένα για τη διεξαγωγή αυτής της μορφής διατηρητικής θα είναι υποβάθμιστα και τα έγγραφα που απατούνται κατά περίπτωση θα είναι ηλεκτρονικά φέροντας όλα τα αναγκαία στοιχεία που θα ταυτοποιούν τα συμμετέχοντα στη διαδικασία αυτή πρόσοψα, όπως για παράδειγμα: η ύπαρξη προηγούμενων ηλεκτρονικών υπογραφών και γενικότερα η κρυπτογράφηση, και πρότυπα επαλήθευσης ταυτότητας. Σημειώνεται ότι στην παρούσα εργασία δεν αναπτύσσονται ηγημονικές διαδικασίες διατηρητικά διότι αποτελούν ειδικές μελέτες μορφών διατηρητικάς αναλόγως με το εκάστοτε προς επίλυση αντικείμενο διαφοράς.

3.2 Νομική δικαστική αντιμετώπιση διαφορών διαδικτύου: ζητήματα εφαρμοστέον δικαίου

Όταν οι προσπάθειες εξωδικαστικής επίλυσης διαφορών, που ανακύπτουν από τις ηγημονικές συναλλαγές στο διαδίκτυο, αποβλέπουν άκαρπες σε πρώτο και σε δεύτερο επίπεδο, όπως ανοιχτώς αναλυτικά αναφέρθηκαν, τότε είναι πλέον μονόδρομος η απευθύνηση ενώπιον της δικαιοσύνης για την επίλυση των διαφορών αυτών. Ενταύθα διευκρινίζεται ότι θα πρέπει να είναι νομοθετικός πλέον θεσμοθετημένη η υποχρεωτική προσπάθεια
εξωδικαστικής επίλυσης των διαφορών που δημιουργούνται από τις διαδικτυακές ψηφιακές συναλλαγές και μόνον εφ’ όσον εξαντλήθησαν οι προσπάθειες αυτές και αποβούν άκαρπες, και σε πρώτο και σε δεύτερο στάδιο, θα έχει τη δυνατότητα ο ζημιωθείς χρήστης του διαδικτύου να προσφέρει στη δικαιοσύνη για την επίλυση της συγκεκριμένης διαφοράς του. Σε περιπτώσεις όμως καταστρατηγήσης κανόνων δημοσίας τάξεως και προσβολής του δημοσίου εννοίμου συμφέροντος του καταναλωτή – χρήστη του διαδικτύου θα πρέπει ο χρήστης του διαδικτύου να έχει το δικαίωμα, εφ’ όσον το επιθυμεί, να προσφέρει και ενώπιον των αρμοδίων Αρχών ή Οργανισμών για εξωδικαστική επίλυση της διαφοράς του και ενώπιον των αρμοδίων δικαστηρίων εκ παραλλήλου. Η αναδυόμενη εξωδικαστικής επίλυσης συγκεκριμένης διαφοράς τέτοιας φύσεως δεν θα πρέπει να αποτελεί πρόκριμα για την περαιτέρω διαμόρφωση της κρίσης του δικαστή και για την έκβαση της δίκης. Είναι όμως επιβεβλημένη η αξιολόγηση όλων των στοιχείων του σχετικού κάθε φορά φακέλλου.

Με την υπογεγραμμένη διαφορά ή διαφορές, που ανακύπτουν από σχέσεις νομικού ενδιαφέροντος αναπτυσσόμενες και εξελισσόμενες στο διαδίκτυο, ενώπιον των αρμοδίων δικαστηρίων προς επίλυση και άρση, αναφύνονται ταυτόχρονα προβλήματα εφαρμογής του κατάλληλου κάθε φορά δικαίου όστο να επιτυχεί το ζητούμενο αποτέλεσμα, η άρση δηλαδή της διατάξεως των σχέσεων στον κοινωνικό ιστό. Τα προβλήματα του εφαρμοστέου δικαίου διακρίνονται από πολλομοιά και συνεκδοχικό και από πολιτικός. Ως και ανωτέρω επισημάνθηκε, η πλειοψηφία των σχέσεων που αναπτύσσονται και διεξάγονται ψηφιακά στο διαδίκτυο διακρίνονται από στοιχεία αλλοδαπότητας, γεγονός που εξ ιδίας ιδιαιτερότητας παραπέμπει σε εμπλοκή πολλών δικαίων, κατάλληλων εκ πρώτης ύψους να επιλύσουν τη συγκεκριμένη διαφορά. Εάν η διαφορά ανακύπτει ανάμεσα σε πρόσωπα της ίδιας ιθαγένειας ή σε πρόσωπα που έχουν την ίδια κατοικία τους στην ίδια χώρα τότε εάν δεν έχουν ορίσει τα ίδια τα συμμετέχοντα στη συγκεκριμένη σχέση μέρη διαφορετικά, κατάλληλους κανόνες δικαίου να επιλύσουν τη συγκεκριμένη διαφορά τους είναι οι νόμοι της χώρας με την οποία τα πρόσωπα αυτά συνδέονται με νομικούς και πραγματικούς δεσμούς. Εάν και η ψηφιακή συναλλακτική τους δραστηριότητα λαμβάνει χώρα εντός των ορίων του κράτους με το οποίο συνδέονται κατά τον ανωτέρω αναφερόμενο τρόπο τότε οι προτάσεις που αφορούν στο εφαρμοστέο δίκαιο απλουστεύονται, καθώς, εάν στη μεταξύ τους καταρτισθείσα συμβάσεις τα συμβαλλόμενα μέρη δεν έχουν ορίσει διαφορετικά, εφαρμοστέο είναι το δίκαιο του κράτους αυτού. Τα ζητήματα στην εφαρμογή του δικαίου διαφορετικής επίλυσης διαφορών που ανακύπτουν από τις ψηφιακές συναλλαγές στο διαδίκτυο περιπλέκονται με την εμφάνιση στοιχείων αλλοδαπότητας στη συγκεκριμένη σχέση. Στο σημείο αυτό, για τις ανάγκες της παρούσης εργασίας διευκρινίζεται συνοπτικά ότι με τον όρο "αλλοδαπότητα"
εννοούμε την ύπαρξη στις βιοτικές με νομικό ενδιαφέρον σχέσεων στοιχείων, τα οποία τις συνδέουν με το δίκαιο και άλλου κράτους από εκείνο στο οποίο οι σχέσεις αυτές συντελούνται, δηλαδή οι συγκεκριμένες βιοτικές σχέσεις είναι διεθνείς έναντι του κράτους όπου λαμβάνονται χώρα.

Σύμφωνα με το άρθρο 25 του ημεδαπού Αστικού Κώδικα (AK), «οι ενοχές από σύμβαση ρυθμίζονται από το δίκαιο στο οποίο έχουν υποβληθεί τα μέρη. Αν δεν υπάρχει τέτοιο εφαρμόζεται το δίκαιο που αρμόζει στη σύμβαση από το σύνολο των ειδικών συνθηκών», ενώ σύμφωνα με το άρθρο 26 του ίδιου ως άνω νομοθετήματος: «Οι ενοχές από αδίκημα διέπονται από το δίκαιο της πολιτείας όπου διαπράχθηκε το αδίκημα».

Στο σημείο αυτό παρατηρείται ότι το άρθρο 25 ΑΚ παρέχει τη δυνατότητα στον εφαρμοστή του δικαίου να διαμορφώσει την κρίση του με γνώμονα και τις ειδικές συνθήκες που διέπουν κάθε συγκεκριμένη δικαιοπρακτική ενοχή. Είναι προφανές ότι το άρθρο 25 του ημεδαπού ΑΚ παρέχει την ευκαιρία στον εφαρμοστή του δικαίου να προβεί σε ποιοτική και όχι σε ποσοτική εκτίμηση των ειδικών συνθηκών που διέπουν τη συγκεκριμένη δικαιοπρακτική ενοχή.

Σε κάθε βιοτική υπερθυνική ενοχική σχέση, όπως είναι οι ψηφιακές συναλλαγές στο διαδίκτυο, που παρουσιάζουν νομικό ενδιαφέρον, οφείλουμε να αναζητήσουμε τα στοιχεία που τις συνδέουν αρχικά με το forum, δηλαδή με το κράτος υπό τη νομική σκοπιά του οποίου εξετάζεται η συγκεκριμένη σχέση ώστε να διερευνηθεί εάν και σε ποιο βαθμό τυχάνει εφαρμογής σε αυτή η lex fori, δηλαδή το δίκαιο του κράτους του forum. Εάν στη σχέση διαπιστώθηκαν στοιχεία αλλοδαπότητας, δηλαδή στοιχεία που την καθοδηγούν διεθνή έναντι του κράτους του forum τότε η lex fori δεν είναι η προσήκουσα προς επίλυση των ανακυπτούσων διαφορών και ρύθμιση της συγκεκριμένης σχέσης και αναζητούνται τα στοιχεία που τη συνδέουν με άλλα κράτη ώστε να υπαγέθη προς ρύθμιση στο δίκαιο άλλου, πέραν του forum κράτους [BPE01]. Ενίοτε φαίνεται ότι οι κανόνες δικαίου περισσότεροι του ενός κράτους με τα οποία συνδέεται μία συγκεκριμένη σχέση είναι προσήκοντες για τη ρύθμιση της. Στις περιπτώσεις αυτές γίνεται λόγος για σύγκρουση κανόνων δικαίου. Το ιδιωτικό διεθνές δίκαιο, που αφορά σε διεθνείς σχέσεις ιδιωτικού δικαίου επιμένει προς την κατεύθυνση της άρσης της συγκρούσεως αυτής και την υπόδειξη εφαρμοστέου δικαίου κατα περίπτωση, καθώς οι κανόνες συγκρούσεως ασκούν προκριματική λειτουργία αφού δεν ρυθμίζουν άμεσα τη συγκεκριμένη έννομη σχέση αλλά καθοδηγούν το δίκαιο που πρέπει κατά περίπτωση να εφαρμοσθεί [BPE01]. Η θεωρία που έχει αναπτυχθεί μέσα από την πραγματικότητα και τις σχετικές εμπειρίες και αφορά σε ζητήματα εφαρμοστέου δικαίου στις συμβατικές ενοχές είναι σημαντική και ογκώδης και εν προκειμένω δεν εντάσσεται στο ερευνητικό πεδίο της παρούσης εργασίας. Για τις ανάγκες όμως της εργασίας αυτής και για την καλύτερη κατανόηση των ζητημάτων εφαρμοστέου δικαίου στις ψηφιακές

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συναλλαγές στο διαδίκτυο αναφέρονται στην παρούσα μελέτη εν συντομία οι κρατούσες στη νομική θεωρία σχετικές απόψεις για τις συμβατικές ενοχές. Παρατηρείται ότι η πολυπλοκότητα σε όλα τα στάδια των ενοχών συμβάσεων και η επί μέρους είδικτοτήτως τους προσόντων βαρύτητα σε ποικίλα στοιχεία που αποτελούν τα συνδετικά στοιχεία συγκεκριμένης σχέσης με το δίκαιο ενός κράτους. Ως εκ τούτου επικρατεί γενικότερα η άποψη ότι δεν μπορεί να γίνει δεκτή ενιαία η lex contractus, δηλαδή το δίκαιο της σύμβασης, ως εφαρμοστέο δίκαιο στις συμβατικές ενοχές αλλά αναπτύχθηκαν διαφορετικές νομικές θεωρίες αναλόγως με ποιό στοιχείο συνδέεται κατ’ ουσίαν και σε μεγαλύτερο βαθμό η σχέση. Οι σχετικές θεωρίες που αναπτύχθηκαν κατά καιρούς υποστηρίζουν ότι εφαρμοστέο πρέπει να είναι το δίκαιο της lex loci contractus, δηλαδή το δίκαιο του τόπου κατάρτισης της σύμβασης, θεωρία η οποία δεν βρίσκει πρόσφορα έδαφος καθός αντιτάχθηκε έναντι αυτής η εξέλιξη των διεθνών εμπορικών συναλλαγών και η διεθνικότητα που τις χαρακτηρίζει και ως εκ τούτου ο τόπος κατάρτισης της συγκεκριμένης σύμβασης μπορεί να είναι τυχαίος αλλά και τα συμβαλλόμενα μέρη να μην γνωρίζουν το δίκαιο του συγκεκριμένου τόπου. Άλλη θεωρία υποστηρίζει ως εφαρμοστέο δίκαιο στις συμβατικές ενοχές τη lex loci solutionis, δηλαδή το δίκαιο του τόπου εκτέλεσης της σύμβασης, ενώ άλλη θεωρία υποστηρίζει ως εφαρμοστέο δίκαιο τη lex voluntatis, το δίκαιο δηλαδή που επέλεξαν τα συμβαλλόμενα μέρη να υπαγόνται τη σχέση τους, σύμφωνα με την αρχή της αυτονομίας της βούλησης των συμβαλλόμενων μερών. Η θεωρία αυτή και μάλλον κατέστησε και σε συνδυασμό με τη lex contractus, υιοθετήθηκε από αρκετά σύγχρονα δίκαια, ανάμεσα σε αυτά και από το ελληνικό δίκαιο (άρθρο 25 ΑΚ) και από τη Σύμβαση της Ρώμης του 1980 ως primo loco εφαρμοστέο δίκαιο στις περιπτώσεις των ενοχών εκ συμβάσεων. Στο ελληνικό ιδιωτικό διεθνές δίκαιο έχει υιοθετηθεί για τις σχέσεις αυτές το διαδικτυακό σύστημα, δηλαδή εφαρμόζονται από τα ημεδαπά δικαστήρια τα προβλήματα από τη Σύμβαση της Ρώμης της 1991 Ιουνίου του 1980 και από το άρθρο 25 του ΑΚ. Στις ψηφιακές συναλλαγές που λαμβάνουν χώρα στο διαδίκτυο ενίοτε για την υπαγωγή της επίλυσης ανακύψας τυχόν διαφορά σε συγκεκριμένο δίκαιο λαμβάνεται υπ’ όψιν και ο τόπος όπου ο καταναλωτής – χρήστης του διαδικτύου έχει τη μόνη κατοικία του ή τη συνήθη διαμονή του εφ’ όσον δεν έχουν τα ίδια τα μέρη υπαγάγει τη ρύθμιση της σχέσης τους σε συγκεκριμένο δίκαιο. 
Η Σύμβαση της Ρώμης του 1980 προβλέπει βασικές ρυθμίσεις για τις ενοχές συμβάσεις, οι οποίες τυχόναν ισχύσει σε θέματα προστασίας του καταναλωτή ως αποδέκτη συγκεκριμένου προϊόντος ή υπηρεσίας, ακόμη και εάν όλα ή κάποιο από τα εμπλεκόμενα μέρη ευρίσκονται εκτός των γεωγραφικών και διοικητικών ορίων της Ευρωπαϊκής Ένωσης. Χαρακτηριστική είναι η πρόβλεψη της Σύμβασης της Ρώμης του 1980 σχετικά με τις εμπορικές συμβάσεις, η οποία στο άρθρο 3, παρέχει στα
συμβαλλόμενα μέρη το δίκαιομα της ελεύθερης επιλογής του εφαρμοστού δικαίου και ως εκ τούτου η σχέση ρυθμίζεται από το δίκαιο της χώρας της επιλογής. Στο δέδομενο 4 προβλέπεται η ίδια ως άνω Σύμβαση ότι αν τα συμβαλλόμενα μέρη δεν έχουν ορίσει ρητά ή σωστά το εφαρμοστέο στη σύμβαση τους δίκαιο, η σύμβαση διέπεται από το δίκαιο της χώρας με την οποία συνδέεται στενότερα. Γίνεται δεκτό ότι μία σύμβαση, εφ’ όσον από τα μέρη δεν έχει ορισθεί διαφορετικά, συνδέεται στενότερα με τη χώρα στην οποία το συμβαλλόμενο μέρος που οφείλει να εκπληρώσει τη χαρακτηριστική παροχή έχει τη μόνην κατοικία του ή τη συνήθη διαμονή του κατά το χρόνο σύναψης της σύμβασης. Στην περίπτωση που η σύμβαση καταρτίσθηκε εν όψει της επιχειρησιακής δραστηριότητας του προσώπου, υποστηρίζεται ότι στενότερος δεσμός της υφίσταται ως προς τη χώρα της κύριας εγκατάστασης του προσώπου ακόμη και εκτός των ορίων της Ευρωπαϊκής Ένωσης.

Στο σημείο αυτό σημαντικό είναι να υπογραμμισθεί η διαφορετική αντιμετώπιση της Σύμβασης των Βρυξελλών και της Σύμβασης της Ρώμης ως προς την πιθανή διακατακτική διένεξη των συμβαλλόμενων ή των εμπλεκομένων μερών για τη ρύθμιση της σχέσης τους. Ειδικότερα, ενώ στη Σύμβαση των Βρυξελλών προβλέπεται σε περίπτωση διακατακτικής διένεξης τα συμβαλλόμενα μέρη να είναι εγκατεστημένα εντός των ορίων της Ευρωπαϊκής Ένωσης, στη Σύμβαση της Ρώμης προβλέπεται ότι για τη διακατακτική επίλυση διαφοράς, που εμπίπτει στο πεδίο εφαρμογής της συγκεκριμένης Σύμβασης, αρκεί το έχον τη σχετική δικαιοδοσία δικαστήριο να εδρεύει εντός της Ευρωπαϊκής Ένωσης χωρίς να ενδιαφέρει νομικά εάν τα συμβαλλόμενα μέρη ευρίσκονται εντός ή εκτός των ορίων της Ευρωπαϊκής Ένωσης ή συνδέονται ή όχι με την Ευρωπαϊκή Ένωση με κάποιο συνδετικό στοιχείο. Ως εκ τούτου η προστασία του καταναλωτή — χρήση του διαδικτύου διαφοροποιείται με κριτήριο την ένταξη της χώρας του εντός ή εκτός των ορίων της Ευρωπαϊκής Ένωσης. Ο πάροχος — προμηθευτής αγαθού ή υπηρεσίας που έχει την έδρα ή τη διαμονή ή την κατοικία το εκτός της Ευρωπαϊκής Ένωσης και από εκεί παρέχει τις υπηρεσίες του εμπίπτει στο πεδίο εφαρμογής του άρθρου 4 της Σύμβασης της Ρώμης του 1980. Αξίζει να σημειωθεί ότι στον τομέα των ψηφιακών εμπορικών συναλλαγών ευρείας εφαρμογής τυχάν η Σύμβαση της Ρώμης καθότι είναι το μόνο νομοθετικό κείμενο που αναφέρεται ταυτόχρονα σε αγαθά και σε υπηρεσίες.

Η Οδηγία 2000/31 του Ευρωπαϊκού Κοινοβουλίου για το ηλεκτρονικό εμπόριο στο άρθρο 3§1 καθορίζει την αρχή της χώρας προέλευσης “country of origin principle”. Σύμφωνα με την αρχή αυτή, το δίκαιο της χώρας του φορέα της παροχής υπηρεσιών θα διέπει κάθε υπηρεσία της κοινοπραξίας των πληρωφοριών εντός των ορίων της Ευρωπαϊκής Ένωσης. Επισημαίνεται δε ότι τόσο τα υπό του άρθρου 3§1 της Οδηγίας 2000/31 του Ευρωπαϊκού Κοινοβουλίου όσο και τα υπό του άρθρου 4 της
Σύμβασης της Ρώμης του 1980 προβλεπόμενα, κατ’ ουσίαν θέτουν κοινό κανόνα εφαρμογής δικαίου με νομικό έρεισμα τη χώρα εγκατάστασης του
φορέα παροχής υπηρεσιών. Ως εκ τούτου τυγχάνει εφαρμογής το δίκαιο της της χώρας εγκατάστασης του φορέα παροχής υπηρεσιών, με κριτήριο εάν η χώρα αυτή ανήκει στην Ευρωπαϊκή Ένωση.

Σε ό,τι αφορά στην ημεδαπή νομολογία αξίζει να αναφερθεί η υπ’ αριθμόν 591/2002 απόφαση του Αρείου Πάγου, η οποία δεν αφορά μεν στις ηλεκτρονικές συμβάσεις αλλά οριοθέτησε το πεδίο εφαρμογής της Σύμβασης της Ρώμης και παρέχει το νομικό έρεισμα για να κηρύσσονται αποτυχίες ως στερούμενες αντικειμένου, ενστάσεις που αφορούν σε καταστροφή του νόμου εξ αιτίας της επιλογής αλλοδαπού δικαίου διά της καταρτισθείσας σύμβασης.

Ειδικότερα για συμβάσεις που συνάπτονται μεταξύ του παρόχου και του καταναλωτή και αφορούν σε ενσώματα κινητά πράγματα ή σε παροχή υπηρεσιών το άρθρο 5§2 της Σύμβασης της Ρώμης δίδει ιδιαίτερη βαρύτητη στην προστασία του καταναλωτή καθώς προβλέπει ότι οι κανόνες αναγκαστικού δικαίου που αφορούν στην προστασία του καταναλωτή τυχόν άμεσης εφαρμογής ακόμη και αν τα συμβαλλόμενα μέρη έχουν επιλέξει τα ίδια το δίκαιο υπογνωσιάς της συμβατικής τους σχέσης. Παρέχεται δηλαδή προβλέψιμα στους κανόνες αναγκαστικού δικαίου προκειμένου να προστατευθεί με νομική θεμελίωση ο καταναλωτής ακόμη και αν το δίκαιο της χώρας όπου είναι εγκατεστημένος ο φορέας παροχής του συγκεκριμένου αγαθού ή της συγκεκριμένης υπηρεσίας έχει εκ διαμέτρου αντίθετες νομοθετικές προβλέψεις. Εν προκειμένω βεβαιώνεται συγκρούση δικαίου αλλά προτείνεται να γίνει δεκτό να έχει προβλέψιμα εφαρμογής το δίκαιο που εξασφαλίζει τη μεγαλύτερη δυνατή σταθερότητα και ασφάλεια στις συναλλαγές και προστατεύει τους συναλλασσόμενους. Εντάθη όμως πρέπει να υπογραμμισθεί η ανάγκη αποσφαλίσης και συγκεκριμενοποίησης της νομικής προστασίας που θα καλύπτει τον καταναλωτή – χρήστη του διαδικτύου. Προτείνεται για την επίλυση του προβλήματος αυτού η θέσπιση υπερθερμικών κανόνων αναγκαστικού δικαίου από διεθνής νομοθετικό οργανό, το οποίο θα είναι επαφορτισμένο με τη μελέτη των καθημερινών ηθικών συναλλακτικών πρακτικών στο διαδίκτυο, με την καταγραφή των προβλημάτων που δημιουργούνται και με τη χάραξη στρατηγικής για την επίλυση των προβλημάτων αυτών. Οι κανόνες αυτοί δεν θα λειτουργούν σε βάρος των εθνικών νομοθετικών τάξεων αλλά θα οφείλουν να επιλύουν προβλήματα και να αμβλύνουν τις διαφορές. Το διεθνής αυτό νομοθετικό οργανό που προτείνεται εν προκειμένω, δεν να αποτελείται από διεθνούς εμβέλειας και υπηκοού επιστημονικού διεθνούς κύρους επιστήμονες νομικούς και τεχνικούς αλλά και από συστημικούς αναλυτές ώστε να προσεγγισθεί το πρόβλημα σφαιρικά και σε βάθος, να προταθούν εξειδικευμένες πλέον λύσεις και να
συγκερασθούν οι απόψεις προς την κατεύθυνση ολοκληρωμένης και επιστημονικά τεκμηριωμένης αντιμετώπισης του και εν γένει πολιτικής ασφάλειας στις ψηφιακές συναλλαγές λαμβάνοντας όμως σε κάθε περίπτωση σοβαρώς υπ’ όψη τον ανθρώπινο παράγωνα, διότι κυριαρχο θεωρεί στις εμπορικές συναλλαγές γενικότερα και ειδικότερα στις ηλεκτρονικές εμπορικές συναλλαγές είναι ο άνθρωπος με όλες τις αδυναμίες και τα προτερήματά του, με την κουλτούρα του, με την εν γένει υποδομή του, με τα επί μέρους στοιχεία της ιδιοσυγκρασίας του, τα οποία όμως σε κάθε περίπτωση λειτουργούν καταλληλά στην οικοδόμηση και στην περαιτέρω πορεία, εκτέλεση και ολοκλήρωση κάθε συμβατικής έννοιας σχέσης.

Λαμβάνοντας υπ’ όψη τα όσα αναφέρθηκαν ανωτέρω και αφορούν στην κατάρτιση συμβάσεων, στη με σαφήνεια και χωρίς περιθώρια αμφισβήτησεων αναφορά στο περιεχόμενο των συμβάσεων, στην από τα συμβαλλόμενα μέρη επιλογή του δικαίου υπαγωγής και ρύθμισης της σχέσης τους, σε τρόπους και μορφολογικούς αμφιθετικώς εξωδικαστικής επίλυσης των συγκεκριμένων διαφορών, στη διαταγή, σε ζητήματα εφαρμοστέου δικαίου σε περίπτωση υπαγωγής προς επίλυση διαφορών ανακύπτουσών από ενοχική σχέση ως χαρακτηριστικό παράδειγμα εφαρμογής των όσων ήδη εξετάθηκαν είναι οι Εικονικές Επιχειρήσεις, οι οποίες είναι ακραίως ηλεκτρονικές και ασκούν εθνικές και διεθνείς εμπορικές δραστηριότητες.

3.3 Ο ρόλος του νομοθέτη και του εφαρμοστή του δικαίου

Είναι αδύνατη η αλήθεια ότι το δίκαιο δημιουργείται μέσα από την εμπειρία και μέσα από τα προβλήματα που καταγράφονται στο κοινονικό οικοδομήμα, κατά τη λειτουργία των θεσμών και τις συνήθεις πράξεις του καθημερινού βίου των πολιτών, τόσο σε παγκόσμιο όσο και σε εθνικό επίπεδο, με όμηρα μεν τη λογική όχι όμως με μήτρα γενέσεως τη λογική. Ο δικαιικός συλλογισμός είναι η αποτύπωση της αριστοτελείας λογικής, η λογική όμως, ως ανθυπόστατη λειτουργική διαδικασία δεν είναι η γενεσιονικός ατία του δικαίου. Η παρατηρούμενη έλλειψη αποτελεσματικών νομικών οργάνων και διαδικασιών που να επιλύουν επιτυχώς σύγχρονης μορφής διαφορές και ειδικότερα διαφορές που ανακύπτουν αναπόφευκτα από τη χρήση των νέων τεχνολογιών, καταδεικνύει την ένδεια του νομικού οικοδομήματος εν όψει των συντελεύσιμων διεθνών ηλεκτρονικών και ψηφιακών μεταβολών που σχετίζονται άμεσα με τους ταχύτατους ρυθμούς ανάπτυξης των νέων τεχνολογιών. Ισχυρό, λειτουργικό και επιλεκτικό, όχι όμως άναρχο, νομικό οικοδόμημα σε διεθνή πλαίσια που να αποσκοπεί στην εδράγωση της εμπιστοσύνης στις ψηφιακές συναλλαγές, στην προστασία των δικαιωμάτων και στην ελαχιστοποίηση του κινδύνου, τίθεται σε βασική προτεραιότητα υλοποίησης εν όψει των πραγματοποιούμενων συνεχών
4. Παράγοντες υποστήριξης ψηφιακής αναδόμησης για την απονομή της δικαιοσύνης

Οι σκέψεις που αναπτύχθηκαν παραπάνω και οι προτάσεις στρατηγικής, οι οποίες αναφέρθηκαν για επίλυση των προβλημάτων που καταγράφηκαν σχετικά με την άρση των διαφόρων που ανακύπτουν από τη χρήση των νέων τεχνολογιών και του διαδικτύου ειδικότερα, προκειμένου να βρούν πρόσφορο έδαφος υλοποίησης είναι ανανεώσιμη η ανάγκη τροποποίησης και εκσυγχρονισμού της απονομής της δικαιοσύνης ώστε η δικαιοσύνη, και ευνύτερα το δίκαιο, να συμβαδίζουν με τις τρέχουσες τεχνολογικές εξελίξεις και με την ταχύτητα κίνησης των πληροφοριών στο διαδίκτυο.

Ως θεμελιώδες παράγοντας υποστήριξης της ψηφιακής αναδόμησης για την απονομή της δικαιοσύνης προτείνεται η εγκαθίσταση, η ανάπτυξη, και η υποστήριξη πληροφοριακού συστήματος δικαστηρίων. Το πληροφορικό σύστημα αυτό όταν αναπτυχθεί, υποχρεωτικά θα οδηγήσει στην ανάπτυξη των σχετικών δικαιοσύνης ψηφιακής δικαστικής επίλυσης των ανωτέρω αναπτυγμένων διαφόρων. Στο σημείο αυτό πρέπει να
δεν κρίνεται ότι το πληροφοριακό σύστημα δικαστηρίων που προτείνεται
tυγχάνει εφαρμογής σε κάθε υπόθεση εισερχόμενη προς επίλυση ενόποιν
της δικαιοσύνης. Επίσης, η στρατηγική προσέγγιση του παραπάνω
αναφερομένου πληροφοριακού συστήματος δύναται να εφαρμοσθεί και ως
πληροφοριακό σύστημα Ανεξάρτητου Αρχών για υποθέσεις οι οποίες
εισέρχονται προς επίλυση ενόποιν των αρμοδίων κάθε φορά Ανεξάρτητου
Αρχών.

Ως δεύτερος παράγοντας υποστήριξης της ψηφιακής αναδόμησης για
την απονομή της δικαιοσύνης προτείνεται η ατομική μαγνητική κάρτα
επικοινωνίας του κάθε δικηγόρου με το Πληροφοριακό Σύστημα
Δικαστηρίων (ΠΣΔ). Η κάρτα αυτή θα πρέπει να εκδίδεται από το
Υπουργείο Δικαιοσύνης ατομικά για τον κάθε δικηγόρο και να διανέμεται
από τους δικηγορικούς συλλόγους, θα είναι δε αυστηρά προσωπική και
μοναδική. Η λειτουργία της κάρτας αυτής θα επιτυγχάνεται μέσω
ηλεκτρονικού υπολογιστή έτσι ώστε να εξασφαλίζονται δύο επίπεδα
ηλεκτρονικής ασφάλειας: το πρώτο επίπεδο εξασφαλίζεται με την ατομική
μαγνητική κάρτα επικοινωνίας του κάθε δικηγόρου με το Πληροφοριακό
Σύστημα Δικαστηρίων και το δεύτερο επίπεδο εξασφαλίζεται με τους
ατομικούς κωδικούς εισόδου στο ΠΣΔ, οι οποίοι θα είναι μυστικοί και
μοναδικοί για κάθε Δικηγόρο. Σε παράλιο περίπτωση απόλειας της κάρτας
ή/και των κωδικών θα λειτουργήσει η πολιτική ασφάλειας που θα έχει
καθοριστεί και θα εφαρμοστεί στις περιπτώσεις αυτές ο κάθε δικηγορικός
σύλλογος.

Ως τρίτος παράγοντας υποστήριξης της ψηφιακής αναδόμησης για την
απονομή της δικαιοσύνης προτείνεται η θεσμοθέτηση θέσεως Εισαγγελέως
ΠΣΔ ανά δικαστήριο και ανά περιφέρεια λειτουργίας του. Ο Εισαγγελέας
ΠΣΔ θα πρέπει να έχει θεσμοθετημένες αυξημένες ευθύνες και
αρμοδιότητες και να είναι γνώστης της σύγχρονης τεχνολογίας.

Ως τέταρτος παράγοντας προτείνεται η δημιουργία Ηλεκτρονικού
Φακέλλου Υποθέσεως (ΗΦΥ) αμέσως μόλις κατατεθεί το εισαγωγικό της
υπόθεσης δικόγραφο κατά περίπτωση από το Δικηγόρο ή από τον αρμόδιο
Εισαγγελέα ή από την αστυνομική αρχή, στις περιπτώσεις που
προβλέπεται αυστηρά και περιοριστικά από το Νόμο η δυνατότητα
εισαγωγής της υπόθεσης από τον Εισαγγελέα ή από άλλη αρχή, όπως p.χ.
σε περιπτώσεις αυτοεπαγγελτής διοίξεις ποινικών αδικημάτων.
Εξυπηρετείται ότι στην περίπτωση που εισάγεται την υπόθεση ενόποιν της
dικαιοσύνης δικηγόρου, πρόκειται για το δικηγόρο που θα καταδίδει
πρώτος, κατόπιν έγγραφης εντολής του εντόλα του προς αυτόν,
eισαγωγικό της υπόθεσης δικόγραφο και θα δρομολογήσει την επίλυση της
διαφοράς διά της δικαστικής οδού. Στην περίπτωση αποχώρησης
συνηγόρου ή πρόσθεσης και άλλου συνηγόρου στην υπόθεση θα πρέπει ο
συνήγορος που αποχωρεί να ενημερώνει άμεσα και χωρίς καμία
καθυστέρηση το ΠΣΔ. Ο συνήγορος που παραμένει στην υπόθεση στην
οποία προστίθεται και άλλος δικηγόρος να ενημερώνει άμεσα το ΠΣΔ για την υπάρξη και νέο δικηγόρο στην υπόθεση και το ίδιο βεβαίως να υποχρεούται να πραξεί και ο νέος δικηγόρος στην υπόθεση γνωστοποιώντας τα πλήρη στοιχεία του στο ΠΣΔ. Η δημιουργία ΗΦΥ διασφαλίζει την ακεραιότητα των στοιχείων του φακέλλου της κάθε δικογραφίας και την τήρηση των προθεσμιών ενώ εκμεταλλεύεται τους κινδύνους απόλυσης στοιχείων από τους φακέλλους δικογραφίας, ενίοτε απόλυσης ολόκληρου του φακέλλου δικογραφίας, εκπρόθεσμης εισαγωγής στοιχείων στους φακέλλους δικογραφίας από κάποιον από τους δικηγόρους των αντιδικών πλευρών, και εν γένει μειώνει στο ελάχιστο τα σχετικά προβλήματα που αντιμετωπίζονται στην καθημερινή πρακτική της μαχαιρίμης δικηγορίας.

Ως πέμπτος παράγοντας προτείνεται η πλήρης ηλεκτρονική ενταξή ενημέρωσης και παρακολούθησης των στοιχείων του ΗΦΥ από τα εμπλεκόμενα μέρη, δηλαδή από τους Δικαστές, από τους Δικηγόρους και από τη Γραμματεία του Δικαστηρίου, στις προβλεπόμενες από το νόμο σχετικά κατά περίπτωση προθεσμίες. Εις ό,τι αφορά στην τήρηση των απαρέγκλιτων προθεσμιών για τη συμπλήρωση του φακέλλου της δικογραφίας με τα απαιτούμενα από το νόμο κατά περίπτωση στοιχεία, όπως π.χ. τήρηση της ηθικής προθεσμίας για την εισαγωγή του δικογράφου προσθήκης-αντίκρουσης επί των προτάσεων του αντιδικού, πρέπει να προβλέπεται νομοθετικά ηττώς και με σαφήνεια ότι για την αυτόνομη τήρηση του νόμου ο χρόνος εισαγωγής στοιχείων και δικογράφων, ως τούτα ορίζονται, θα αποδεικνύεται από το ίδιο το σύστημα και θα καταγράφεται αυτομάτως σε αυτό με την επιμέλεια του δικηγόρου που το εισάγει. Αυτής της στοιχείων ΗΦΥ πρόσβαση θα έχουν μόνο οι λειτουργοί της Δικαιοσύνης (Δικαστικοί Λειτουργοί, Δικηγόροι και Γραμματεία του Δικαστηρίου και όταν απαιτείται, τεχνικοί σύμβουλοι, και πραγματογράφοι). Οι διάδικοι για λόγους ορθής απρόσκοπτης και χωρίς παρεμβάσεις στη λειτουργία του ηλεκτρονικού φακέλου υποθέσεως δεν θα έχουν πρόσβαση σε αυτόν, θα έχουν όμως τη δυνατότητα, εφ’ όσον το επιθυμούν, να λαμβάνουν από τον πληρεξόσιο δικηγόρο τους τα στοιχεία που τους αφορούν και των οποίων επιτρέπεται να λάβουν γνώση. Για τις κλάσεις θα ενημερώνονται ηλεκτρονικώς μόνοι οι πληρεξόσιοι δικηγόροι, οι οποίοι όμως θα υποχρεούνται σε αποδεδειγμένη, με κεκλεισμένη την υπόθεση προβλεπόμενο τον τρόπο απόδειξης, άμεση σχετική ενημέρωση των εντολών τους. Σε περίπτωση αναβολής της ακροαματικής διαδικασίας για οποιονδήποτε λόγο η Γραμματεία του αρμοδίου Δικαστηρίου οφείλει χωρίς καμία καθυστέρηση να εγγράφει ηλεκτρονικά την πληροφορία για την αναβολή και για το λόγο για τον οποίο δόθηκε και να εγγράψει ταυτόχρονα ηλεκτρονικώς την πληροφορία για τη νέα δικάσιμο, εάν αυτή ορίζει τη ηττώς. Σε διαφορετική περίπτωση θα αναφέρει την εκκρεμότητα ορισμού νέας.
δικασίμου κατά τα ρητώς προβλεπόμενα από τη σχετική νομοθεσία. Με τον τρόπο αυτό διασφαλίζεται η αυστηρή τήρηση των δικονομικών κανόνων και των υπό ειδικόν νόμων προβλεπομένων σχετικά με την τήρηση των προθεσμιών και με τη δόμηση των φακέλλων δικογραφίας.

Ως έκτος παράγοντας προτείνεται οι Ένορκες Βεβαιώσεις, κατόπιν τροποποίησης της υφιστάμενης σχετικής νομοθεσίας, να λαμβάνονται μόνο από Συμβολαιογράφους προκειμένου να αποσυμπορηθούν τα Ευρηνοδικεία τουλάχιστον ως προς αυτή τη διαδικασία, η οποία στην καθημερινή δικαστηριακή πρακτική προκαλεί συμφόρηση των διαδικασιών και των άλλων ουσιαστικών λειτουργιών του Ευρηνοδικείου. Τις Ένορκες Βεβαιώσεις θα τις παραλαμβάνει ο δικηγόρος, ο οποίος θα τις σαρώνει και θα τις εισαγάγει στον ΗΦΥ. Προτείνεται για την ομαλή ψηφιακή λειτουργία του ΗΦΥ να μην επερχόνται οι Συμβολαιογράφοι στο στάδιο αυτό στον ΗΦΥ. Οι περιπτώσεις που θα επερχόνται οι Συμβολαιογράφοι στον ΗΦΥ θα πρέπει να καθορισθούν περιοριστικά με αντίστοιχες νομοθετικές ρυθμίσεις.

Ως εβδομος παράγοντας προτείνεται όλα τα έγγραφα να σαρώνονται (scanning), να αποστέλλονται στον ΗΦΥ και να κρατούνται σε έντυπη μορφή από το δικηγόρο προς επίδειξη σε κάθε αναζήτηση κατά την ακροαματική διαδικασία. Στα έγγραφα συμπεριλαμβάνονται και όλες οι εκθέσεις επιδόσεως εξωδικόν προσκλήσεων, κλήσεων, το πρακτικό απόπειρας εξώδικης επίλυσης της διαφοράς, όταν υπάρχει τα έγγραφα πληρεξοστώσης προς τους δικηγόρους, οι νομιμοποιήσεις των δικηγόρων σε περιπτώσεις παραστάσεως τους σε δικαστήρια εκτός της περιφέρειας του δικηγορικού συλλόγου στον οποίο ανήκουν. Όταν στην υπόθεση εμπλέκονται πραγματογνώμονες ή τεχνικοί σύμβουλοι θα πρέπει να εμπνεύσονται και να ορίζονται ενώπιον του αρμόδιου Δικαστή και μετά από την ορκοδοσία να παραλαμβάνουν και αυτοί κωδικός πρόσβασης για το συγκεκριμένο ΗΦΥ ώστε να καταθέτουν ηλεκτρονικά και εντός των προβλεπόμενων κατά περίπτωση προθεσμιών τις γνωμοδοτήσεις τους και τις εκθέσεις τους. Δυνατή θα είναι η εκτύπωση από το δικηγόρο φωτοαντιγράφων εκ του ηλεκτρονικού προτύπου, εφ’ όσον αυτό είναι απαραίτητο για την ομαλή έκβαση της διαδικασίας, τα οποία ο δικηγόρος θα έχει τη δυνατότητα να επικυρώνει και να τα φέρει μαζί του στην ακροαματική διαδικασία προς επίδειξη εφ’ όσον αναζητηθούν. Ο δικηγόρος θα πρέπει επίσης κατά την ακροαματική διαδικασία να φέρει μαζί του τα προτύπα του έγγραφου έγγραφα, τα οποία έχει εισάγει με σάρωσή στον ΗΦΥ για να τα επείδειξε εφ’ όσον αναζητηθούν. Επίσης και η απόφαση του δικαστηρίου θα εισέρχεται στο συγκεκριμένο ΗΦΥ και θα φέρει την προηγμένη ψηφιακή υπογραφή του Δικαστή ή των Δικαστών που συμμετείχαν στην έκδοσή της. Θα υπάρχει η δυνατότητα να εκτυπώνεται από τους δικηγόρους των αντίδικων αντίγραφο της
ηλεκτρονικής μορφής της απόφασης και να επικυρώνεται από τη Γραμματεία του Δικαστηρίου που την εξέδωσε.

Ως όγδοος παράγοντας υποστήριξης της ψηφιακής αναδόμησης για την απονομή της δίκαιης ισότητας προτείνεται η θεσμοθέτηση θέσεων Ελεγκτή και Μετα-Ελεγκτή Προσωπικών Διευθυνόμενων. Τις θέσεις αυτές θα καταλαμβάνουν Δικαστικοί Λειτουργοί οι οποίοι θα έχουν εξειδικευμένες γνώσεις της σύγχρονης τεχνολογίας και της εφαρμογής της στο χώρο των δικαστηρίων. Στο σημείο αυτό αναφέρεται η βαρύνσα σημασία του ελέγχου και του μετα-ελέγχου ως ισχυρά επίπεδα διασφάλισης και επιστημονικά εργαλεία ελέγχου σε όλο το φάσμα της ψηφιακής λειτουργίας των δικαστηρίων.

Στη συνέχεια ως ένατος παράγοντας προτείνεται η ενδεικτική μελέτη και υποστήριξη της εφαρμογής των ηλεκτρονικών διαδικασιών για το ΠΣΔ ανά περίπτωση.

Ως δέκατος παράγοντας προτείνεται η ισχυρότερη νομοθετική καταχώριση της απόσπασης εξωδικασησ}
πλεονέκτημα τις σχεδιαστικές της δυνατότητες, με βάση τις οποίες ακόμη και το πλέον πολύπλοκο πρόβλημα δύναται να χαρτογραφηθεί και να παρουσιασθεί σε μία σελίδα, έντυπη ή/και ψηφιακή, διαστάσεων A4. Ενα επιπλέον πλεονέκτημα της εν λόγω συστημικής μεθοδολογίας είναι ότι εμπεριέχει και σχεδιαστικές δυνατότητες ελέγχου του προβλήματος. Επισημαίνεται ότι για την επιστήμη της Συστημικής Ανάλυσης ο έλεγχος και ο μετα-έλεγχος συνιστούν πολύ σοβαρά στοιχεία διασφάλισης της αποτελεσματικότητας της διαχείρισης του προβλήματος. Με βάση τα ανωτέρω εισερχόμεθα πλέον στην εφαρμογή της μεθοδολογίας DCSYM στη Δικαιοσύνη (Δ) και στις Ανεξάρτητες Αρχές (ΑΑ) για το Χρήση Διαδικτύου (ΧΔ) παραθέτοντας τα αντίστοιχα σχήματα:

Στο Σχήμα 01 που ακολουθεί σχεδιάζονται σε πρώτο επίπεδο τα βασικά υποσυστήματα της DCSYM για το πρόβλημα που αντιμετωπίζομε σχετικά με τη Δικαιοσύνη και με τις Ανεξάρτητες Αρχές (Δ & ΑΑ).

Τα βασικά υποσυστήματα του ανωτέρου προβλήματος είναι: από τη μια πλευρά η Δικαιοσύνη και από την άλλη πλευρά οι Ανεξάρτητες Αρχές. Εις άλλα αφορά στη Δικαιοσύνη αναφέρονται τα Πολιτικά Δικαστήρια, Αστικά και Ποινικά, (Α&ΠΔ) και τα Διοικητικά Δικαστήρια κατά βαθμούς δικαιοδοσίας, δηλαδή: Διοικητικό Πρωτοδικείο (Δ.Π), Διοικητικό Ερετείο (Δ.Ε), Συμβούλιο της Επικρατείας (Σ.Ε.), Ελεγκτικό Συνέδριο (ΕΛ.Σ). Σχετικά δε με τις Ανεξάρτητες Αρχές, δειγματοληπτικά για τις ανάγκες της παρούσας εργασίας και επειδή τα πεδία εφαρμογής τους βρίσκονται πλησιέστερα προς τα υπό εξέταση στην παρούσα εργασία ζητήματα, από τις δεσμοδημιουργείς σήμερα Ανεξάρτητες Αρχές στην Ελλάδα εντάσσεται αναφορά στο Συνήγορο του Καταναλωτή (Σ.Κ.), στην Ανεξάρτητη Αρχή Προστασίας Δεδομένων Προσωπικού Χαρακτήρα (Α.Α.Π.Δ.Π.Χ) και στην Αρχή Διασφάλισης Απορρήτου των Επικοινωνιών (Α.Δ.Α.Ε). Στη βάση του σχήματος καταδεικνύεται η αμφιδρομία κατά πρώτον σχέση του ΧΔ με το Φορέα, Δημόσιο ή Ιδιωτικό (Δ ή Ι), των Ηλεκτρονικών Συναλλαγών, η οποία υποδεικνύεται με έντονο αμφιδρομό βέλος. Με το σχεδιασμό αυτό επισημαίνεται η επικοινωνία μεταξύ του Χρήση του Διαδικτύου (ΧΔ) και του Φορέα των Ηλεκτρονικών Συναλλαγών και ιδιαίτερα από τη στιγμή που θα ανακύψει πρόβλημα στη μεταξύ τους συναλλακτική σχέση. Στη φάση αυτή ο ΧΔ, που υφίσταται ως βάρος του το πρόβλημα, απευθύνεται στο Φορέα των Ηλεκτρονικών Συναλλαγών αναζητώντας απαντήσεις σε πιθανά ερωτήματά του και προσπαθώντας να επιλύσει το πρόβλημα. Ο Φορέας των Ηλεκτρονικών Συναλλαγών υποχρεούται να απαντήσει, και με τον πρότο αυτό αρχίζει η επικοινωνιακή ένταση μεταξύ τους. Αποδημητικά η χρηματοδότηση του προβλήματος, άμεση, εξ αποτελεσμάτων της παραβίασης άμεσης, είναι ο τόπος δημιουργίας του προβλήματος. Ως συνεπεία του προβλήματος αναφερθεί η πολύ ηλεκτρονικών
συναλλαγών e-Bay, προβλήματα στις ηλεκτρονικές εμπορικές συναλλαγές της οποίας αναφέρθηκαν ήδη ανωτέρω στην παρούσα εργασία.

**Σχήμα 01**: Τα βασικά υποσυστήματα της DCSYM για Δ & ΑΑ

Στο Σχήμα 02, που ακολουθεί, σχεδιαστικά με συστημικό τρόπο και σκέψη προοπτικής, καταδεικνύονται οι μετέπειτα ενέργειες του ΧΔ αφού αποφεύγει άκαρπη η συστοιχιακή προσπάθεια επίλυσης της διαφοράς του με το Φορέα των ηλεκτρονικών συναλλαγών σε πρώτο επίπεδο. Σε δεύτερο επίπεδο ο ΧΔ εμμένει προς την κατεύθυνση εξοδικαστικής επίλυσης της ανακύψας διαφοράς του με το Φορέα των ηλεκτρονικών συναλλαγών και απευθύνεται στις Ανεξάρτητες Αρχές αρμοδίως, σύμφωνα δηλαδή με τα πεδία εφαρμογής τους, όπως προβλέπονται κάθε φορά εξειδικευμένα από τους οικείους νόμους. Η απευθύνθη του ΧΔ ενώπιον της αρμόδιας ή/και των αρμοδίων κάθε φορά Ανεξάρτητον Αρχών στο Σχήμα 02 παρουσιάζεται σχεδιαστικά με τα βέλη που ξεκινούν από το ΧΔ και απευθύνονται προς τις αρμόδιες Ανεξάρτητες Αρχές ενώ παραμένει το αμφισβητήμαντο έντονο βέλος που υπογραμμίζει την ηλεκτρονική συναλλακτική σχέση του ΧΔ με το Φορέα των ηλεκτρονικών συναλλαγών από την οποία ανέκυψε η διαφορά. Διευκρινίζεται ότι ο Χρήστης Διαδικτύου έχει το δικαίωμα να απευθυνθεί ταυτόχρονα σε περισσότερες τις μίας Ανεξάρτητες Αρχές για την επίλυση της συγκεκριμένης διαφοράς του εάν η διαφορά που έχει ανακύψει εμφανίζει πολυπλοκότητα η οποία εκτείνεται στα πεδία εφαρμογής περισσότερων της μίας Ανεξάρτητην Αρχών. Στην περίπτωση αυτή οφείλει να
απευθυνθεί σε κάθε μία αρμόδια για την επίλυση της διαφοράς του 
Ανεξάρτητη Αρχή σύμφωνα με το πεδίο εφαρμογής της στο οποίο εμπίπτει 
η συγκεκριμένη διαφορά, ενημερώνοντας ταυτόχρονα την κάθε 
Ανεξάρτητη Αρχή προς την οποία θα απευθυνθεί και για την απευθυνθή 
του ενώπιον άλλης Ανεξάρτητης Αρχής κατά το πεδίο εφαρμογής της στο 
οποίο εμπίπτει μέρος της διαφοράς του.

Ως παράδειγμα συγκεκριμού των ανωτέρω αναφερομένων, δηλαδή 
αφ’ ενός μετά διαδικτυακής διαφοράς ΧΔ με το Δημόσιο και αφ’ ετέρου 
anακύψασα διαφορά η οποία εμπίπτει στα πεδία εφαρμογής περισσότερον 
tης μίας Ανεξάρτητης Αρχών, αναφέρεται η υποβολή φορολογικής 
δήλωσης ηλεκτρονικώς. Οι πιθανές εμπλοκές που είναι δυνατόν να 
δημιουργηθούν από την εν λόγω ηλεκτρονική συναλλαγή του πολίτη με τη 
Δημόσια Διοίκηση, όπως για παράδειγμα ισχυρισμός από την πλευρά της 
Δημόσιας Διοίκησης περί μη ηλεκτρονικής παραλαβής της φορολογικής 
δήλωσης, διάδοση περιουσιακών στοιχείων και άλλων προσωπικών 
δεδομένων του πολίτη σε τρίτους, πράξεις από τις οποίες προκύπτουν 
σοβαρές νομικές φόρεσις διαφορές, δίνονται να εμπίπτουν σε πεδία 
eφαρμογής διαφορετικών Ανεξάρτητων Αρχών. Στην περίπτωση αυτή ο 
πολίτης, Χρήστης του Διαδικτύου, οφείλει να απευθυνθεί αρμόδιας 
ts στις Ανεξάρτητες Αρχές κατά το μέρος που κάθε μία καλύπτει την ανακύψα 
διαφορά. Για το συγκεκριμένο παράδειγμα αρμοδίες φαίνεται να είναι η 
Αρχή Προστασίας Δεδομένων Προσωπικού Χαρακτήρα και η Αρχή 
Διασφάλισης Απορρήτου των Επικοινωνιών.

Σχήμα 02: Επικοινωνία ΧΔ με Φορέας και ΑΑ
Στο Σχήμα 03, που έπεται, παρουσιάζεται σχεδιαστικά με ομφάδρομα βέλη η επικοινωνία των Ανεξάρτητων Αρχών με το ΧΔ αλλά και με το Φορέα ηλεκτρονικών συναλλαγών. Ειδικότερα: οι Ανεξάρτητες Αρχές οφείλουν άμεσα και χωρίς υπαίτια καθυστέρηση να διερευνήσουν την εισαγωγή προς επίλυση διαφορά ενώπιον τους και να ενημερώσουν σχετικώς το ΧΔ και το Φορέα των Ηλεκτρονικών Συναλλαγών διότι σε κάθε περίπτωση ελλογεύει ο κίνδυνος της παράγραφης.

Προς την κατεύθυνση αποσυμφόρησης των δικαστηρίων και την ενίσχυση των εξωδικαστικών διαδικασιών επίλυσης των διαφορών, προτείνεται οι αποφάσεις των Ανεξάρτητων Αρχών να διαγωρισθούν σε κυρωτικές – οριστικές, σε αμιγώς παραπεμπτικές και σε παραπεμπτικές – συμβουλευτικές. Οι κυρωτικές – οριστικές αποφάσεις των Ανεξάρτητων Αρχών προτείνεται να είναι εκτελεστές.

Σχήμα 03: Επικοινωνίες ΧΔ με Φορείς και ΑΑ

Στο Σχήμα 04, που αναπτύσσεται κατωτέρω, παρουσιάζεται η περαιτέρω πορεία των αποφάσεων των Ανεξάρτητων Αρχών. Οι μεν κυρωτικές – οριστικές αποφάσεις είναι εκτελεστές και γνωστοποιούνται τόσο στο Χρήστη του Διαδικτύου όσο και στο φορέα των ηλεκτρονικών συναλλαγών ενώ οι παραπεμπτικές αποφάσεις ανάλογα με τον επιμέρους χαρακτηρισμό τους ακολουθούν άλλη πορεία: Οι αμιγώς παραπεμπτικές αποφάσεις των Ανεξάρτητων Αρχών παραπέμπουν άμεσα τη διαφορά προς επίλυση ενώπιον του αρμοδίου δικαστηρίου. Διευκρινίζεται ότι οι Ανεξάρτητες Αρχές θα παραπέμπουν απ’ ευθείας την υπόθεση στα
αρμόδια δικαστήρια μόνον όταν διαπιστώσουν την τέλεση κακουγρηματικών πράξεων, διότι στην περίπτωση αυτή δημιουργείται ζήτημα σύγκρουσης εννόμων αγαθών. Συγκεκριμένα, το έννομο αγαθό της αυτοδιάθεσης του προσώπου και κατ’ επέκταση και της ιδίας διαχείρισης των υποθέσεων του συγκρούεται με το έννομο αγαθό του προσώπου, το οποίο προσβάλλεται από την τελεσθείσα κακουγρηματική πράξη του δράστη. Όταν προβλέψει πρόβλημα σύγκρουσης εννόμων αγαθών θεραπεύεται με την προσβολή του εννόμου αγαθού που κρίνεται συγκριτικά ως πιο θετικής έντασης. Στην υπό εξέταση, δειγματοληπτικός αναφερόμενη περίπτωση, το έννομο αγαθό του προσώπου που προσβλήθηκε με την κακουγρηματική πράξη είναι εισαρχικά ανάτετερο και ισχυρότερο από το δικαίωμα του προσώπου να διαχειρισθεί ιδίες υποθέσεις. Ως εκ τούτου και ενεργόντας ταυτόχρονα οι Ανεξάρτητες Αρχές και εντός του πνεύματος της προστασίας των πολιτών δύναται να εισαγάγουν τη συγκεκριμένη διαφορά, όπως ανοτέρο αναπτύχθηκε, ενώπιον των αρμοδίων δικαστηρίων με επισυναπτόμενη τη σχετική έκθεσή τους, ενώ παράλληλα υποχρεούνται για την ενέργειά τους αυτή να ενημερώσουν άμεσα το Χρήστη του Διαδικτύου που απευθύνθηκε ενώπιον τους αλλά και το συγκεκριμένο Φορέα των ηλεκτρονικών συναλλαγών.

Διά των παραπεριφερειών – συμβουλευτικών αποφάσεων οι Ανεξάρτητες Αρχές ενημερώνουν αιτιολογημένα και τεκμηριωμένα τον απευθυνόμενο ενώπιον τους πολίτη, εν προκειμένω το ΧΔ, ότι δεν δύναται να επιλύσουν τη συγκεκριμένη διαφορά του και τον συμβουλεύουν για τα περαιτέρω στάδια που πρέπει να ακολουθήσει, οικεία βουλήσει, προκειμένου να επιλύσει την ανακύψασα διαφορά του με το Φορέα των ηλεκτρονικών συναλλαγών. Εάν αποτύχει η εξωδικαστική επίλυση της διαφοράς τότε η αντιμετώπιση της υπόθεσης θα πρέπει να είναι αυστηρά νομική. Στο Σχήμα 04 προστίθεται σχεδιαστικά, επιπλέον από τα περιγραφόμενα στο υπ’ αριθμόν 03 Σχήμα, η πορεία των αποφάσεων των Ανεξάρτητων Αρχών, η οποία περιγράφεται με βέλη χρώματος πράσινου, όπως ακριβώς ανωτέρω αναλύθηκε. Διευκρινίζεται ότι η υπό εξέταση διαφορά αφορά σε ηλεκτρονική συναλλαγή του Χρήστη του Διαδικτύου με Ιδιωτικό Φορέα των ηλεκτρονικών συναλλαγών και ως εκ τούτου εισάγεται ενώπιον των αρμοδίων πολιτικών, αστικών και ποινικών, κατά περίπτωση δικαστηρίων. Επισημαίνεται στο σημείο αυτό ότι με την εισαγωγή της διαφοράς ενώπιον των αρμοδίων δικαστηρίων οικοδομείται και ο αντίστοιχος ΗΦΥ (Ηλεκτρονικός Φάκελλος Υπόθεσης), ο οποίος πρέπει να ενημερώνεται επαρκώς, όπως και ανωτέρω στην παρούσα εργασία αναπτύχθηκε, αλλά και να φέρει όλα τα στοιχεία και την πορεία της υπόθεσης από το στάδιο προσπάθειας επίλυσής της μέσω των Ανεξάρτητων Αρχών.
Σχήμα 04: Επικοινωνίες ΧΔ με Φορέας, Αστικά & Ποινικά Δ και ΑΑ

Στο Σχήμα 05, που ακολουθεί, εμφανίζεται σχεδιαστικά η παραπομπή της διαφοράς ενώπιον των αρμοδίων κατά περίπτωση διοικητικών δικαστηρίων από τον ιδιο το ΧΔ στην περίπτωση που ο Φορέας των ηλεκτρονικών συναλλαγών είναι το Δημόσιο ή ο ευρύτερος Δημόσιος Τομέας και η διαφορά απορρέει από σχετική ηλεκτρονική συναλλαγή. Η εισαγωγή της συγκεκριμένης διαφοράς από το ΧΔ, ύστερα από σχετική παραπομπική – συμβουλευτική απόφαση των Ανεξάρτητων Αρχών ενώπιον των οποίων απευθύνθηκε σε πρώτο στάδιο, στο Σχήμα 05 παρουσιάζεται με βέλη χρώματος πράσινου, τα οποία εκπερεύονται από το Χρήστη του Διαδικτύου, δηλαδή από το πρόσωπο εις βάρος του οποίου έχει ανακύψει η διαφορά.
Σχήμα 05: Επικοινωνίες ΧΔ με Φορέας, Αστικά, Ποινικά & Διοικητικά Δ και ΑΔ

Το Σχήμα 06, που αναπτύσσεται σχεδιαστικά κατωτέρω, εμφανίζει πολυπλοκότητα καθώς προστίθενται σε αυτό οι εκδοθησόμενες αποφάσεις των αρμοδίων πολιτικών (αστικών και ποινικών) δικαστηρίων, οι οποίες στο συγκεκριμένο σχήμα παρουσιάζονται με διακεκομμένο βέλος χρώματος κόκκινου και με κατεύθυνση από τα αρμόδια δικαστήρια προς το ΧΔ και προς το Φορέα των ηλεκτρονικών συναλλαγών. Επισημαίνεται δε ότι ενημερώνεται πλήρως σε κάθε στάδιο ο Ηλεκτρονικός Φάκελλος Υπόθεσης (ΗΦΥ).
Σχήμα 06: Επικοινωνίες ΧΔ με Φορείς, Αστικά, Ποινικά & Διοικητικά Δ και ΑΑ συμπεριλαμβανομένων των αποφάσεων των Πολιτικών Δ

Στο Σχήμα 07, που έπεται, παρουσιάζεται σχεδιαστικά όλο το φάσμα της πορείας μίας συγκεκριμένης διαφοράς που ανέκυψε από ηλεκτρονικές συναλλαγές στο διαδίκτυο εις βάρος του Χρήση του Διαδικτύου – Καταναλωτή. Με διακεκομμένα βέλη χρώματος κόκκινου παρουσιάζονται οι αποφάσεις των αρμοδίων δικαστηρίων, οι οποίες αφορούν στα συμβαλλόμενα μέρη και κατευθύνονται από τη δικαιοσύνη προς το ΧΔ και μέσω της υποχρεωτικής ενημέρωσης του ΗΦΥ γνωστοποιούνται και στο Φορέα των ηλεκτρονικών συναλλαγών.
Σχήμα 07: Επικοινωνίες ΧΔ με Φορέας, Αστικά, Ποινικά & Διοικητικά Δ και ΑΑ συμπερλαμβανομένων των αποφάσεων των Πολιτικών και Διοικητικών Δ

6. Εκσυγχρονισμός των Δικαστηρίων και των Ανεξάρτητων Αρχών σε μηχανογραφικό επίπεδο

Σαφής στόχος της παρούσης εργασίας είναι η δρομολόγηση και η θεσμοθέτηση νόμιμων τρόπων εξωδικαστικής επιλύσης διαφορών που ανακύπτουν από τη χρήση του διαδικτύου και από τις εμπορικές κυρίως ηλεκτρονικές συναλλαγές που λαμβάνουν καθημερινά χώρα στο διαδίκτυο αλλά και η επισήμανση της αναγκαιότητας και η καταγραφή τρόπων εκσυγχρονισμού της απονομής της δικαιοσύνης, καθώς δεν αποβιάνουν καρποφόρες όλες οι προσπάθειες εξωδικαστικής επίλυσης των ανακυπτουσών διαφορών και ένας μεγάλος αριθμός τους εισάγεται προς επίλυση ενότονων των δικαστηρίων. Για τον εκσυγχρονισμό της λειτουργίας της δικαιοσύνης στην Ελλάδα πρέπει να συμβάλλουν ουσιαστικά και δραστικά οι νέες τεχνολογίες, αφού βεβαιώς λήφθηκαν πρώτα αποφασιστικές καινοτόμες νομοθετικές ρυθμίσεις προς την κατεύθυνσή αυτή. Στα πλαίσια προς την κατεύθυνση της υλοποίησης των παραπάνω σκέψεων και στόχων προτείνεται να μηχανογραφικό επίπεδο η οικοδομή και η συνεχής συντήρηση Πληροφοριακού Συστήματος Δικαστηρίων και Ανεξάρτητων Αρχών (ΠΣΔΑ), Intranet, δηλαδή εσωτερικό πληροφοριακό σύστημα της δικαιοσύνης. Το πληροφοριακό αυτό σύστημα θα έχει υποδομή πληροφοριακού συστήματος Intranet και προτείνεται να
είναι εσωτερικό πληροφοριακό δίκτυο του Υπουργείου Δικαιοσύνης. Επιρροθέτεται να είναι εγκατεστημένο στο Υπουργείο Δικαιοσύνης, να ελέγχεται και να υποστηρίζεται από το Υπουργείο Δικαιοσύνης διότι με τον τρόπο αυτό αυξάνεται η ασφάλεια στο σύστημα, μειώνονται οι κίνδυνοι πιθανόν επεμβάσεων και περιορίζεται ο αριθμός των προσώπων που θα ευθύνονται για την ομαλή, απρόσκοπτή και ασφαλή λειτουργία του. Στα σχήματα που ακολουθούν παρουσιάζεται το μηχανογραφικό περιβάλλον στο οποίο αναπτύσσονται οι συντελεστές της λειτουργίας του πληροφοριακού αυτού συστήματος.

Στο Σχήμα 08, που αναπτύσσεται αμέσως παρακάτω, παρουσιάζεται η υποδομή του πληροφοριακού συστήματος Intranet. Κεντρικός πυρήνας του είναι ο server, ο οποίος δύναται να είναι εγκατεστημένος οπουδήποτε. Εν προκειμένω όμως προτάθηκε να είναι εγκατεστημένος στο Υπουργείο Δικαιοσύνης για λόγους υψηλότερης ασφάλειας. Εμφανής σχεδιαστικά είναι η ύπαρξη τοπικού σκληρού δίσκου (local storage) και απομακρυσμένου σκληρού δίσκου (remote storage). Ο διαχειριστής (administrator) του πληροφοριακού συστήματος μπορεί να βρίσκεται είτε στον τόπο όπου είναι εγκατεστημένος ο server είτε σε απόσταση από το συγκεκριμένο χώρο. Από την άλλη πλευρά υπάρχουν οι χρήστες, οι οποίοι είναι δυνατόν να είναι διασκορπισμένοι σε διαφορετικά γεωγραφικά σημεία. Επισημαίνεται ότι ο administrator και οι χρήστες βρίσκονται σε απ’ ευθείας σύνδεση και επικοινωνία με το server ενώ ο server επικοινωνεί με το local storage και με το remote storage.
Σχήμα 08: Υποδομή ΠΣ Δ & ΑΑ - Intranet

Στο Σχήμα 09, που ακολουθεί, παρουσιάζεται σχεδιαστικά η υποδομή του πληροφοριακού συστήματος δικαστηρίων με τη μορφή πληροφοριακού συστήματος Intranet και οι δυνατότητες υπηρεσιών του server προς τους χρήστες.
Σχήμα 09: Υποδομή ΠΣ Δ & ΑΑ – Υπηρεσίες του Server

Στο Σχήμα 10, το οποίο έχει επέλαση, αναπτύσσεται περαιτέρω η υποδομή του πρωταθέντος πληροφοριακού συστήματος δικαστηρίων. Απεικονίζεται ως βασικός πυρήνας ο server και σχεδιάζονται βασικά στοιχεία από τα οποία αποτελείται. Ειδικότερα, περιέχει τον λογαριασμό του χρήστη (user accounts) και κατατάσσει τους λογαριασμούς ως περιλαμβάνουν ειδικότερα: το λογαριασμό του διαχειριστή του δικτύου (account administrator), όλη την ηλεκτρονική αλληλογραφία (mail messaging) των προσώπων που έχουν δικαίωμα πρόσβαση στο πληροφοριακό σύστημα δικαστηρίων, σύμφωνα με όσα ανατέθηκε αναλύθηκαν, καθώς και την αποστολή μαζικών και βαρέων ψηφιακών δεδομένων (FTP Services, FTP: File Transfer Process). Επιπροσθέτως, ο server περιέχει βάσει νομικών δεδομένων (Law Database), ψηφιακή βιβλιοθήκη (Digital Library) και αποθηκευτικούς χώρους.
Σχήμα 10: Υποδομή ΠΣ Δ & ΑΑ – Αντικείμενα του Server

Στη συνέχεια αναπτύσσεται σχεδιαστικά και εξετάζεται το Πληροφοριακό Σύστημα Δικαστηρίων και Ανεξάρτητων Αρχών, που ανωτέρω προτάθηκε, εις ὅτι αφορά σχεδιαστικά στον Ηλεκτρονικό Φάκελλο Υποθέσεως (ΗΦΥ). Ταύτα απεικονίζονται στο Σχήμα 11, το οποίο αναπτύσσεται κατωτέρω. Ειδικότερα παρουσιάζεται η δομή του ΗΦΥ, ο οποίος θα φέρει τη μορφή: "Υπόθεση01.lawx file". Ο ΗΦΥ θα είναι αρχείο XML, ο οποίος θα αποτελείται από φακέλους και υποφακέλους εγγράφων (folders & subfolders). Ο τελευταίος στη συγκεκριμένη ιεραρχία υποφακέλλος θα περιέχει διάφορα, σχετικά με την υπόθεση ψηφιακά αρχεία (documents). Το επίπεδο της ασφάλειας των αρχείων αυτών θα έχει άμεση συνάφεια με τη συμμετοχή του συγκεκριμένου αρχείου σε συγκεκριμένη δικαστική διαδικασία. Ως παράδειγμα εν προκειμένω αναφέρεται η παροχή δυνατότητας ψηφιακού κλειδώματος του αρχείου με ή χωρίς τη δυνατότητα εκτύπωσής του.
Σχήμα 11: Υποδομή XML File της Υπόθεσης

7. Προστασία των δεδομένων σε συνάρτηση με τις εκσυγχρονιστικές δράσεις

Όπως γίνεται αντιληπτό από τις προτάσεις που αναπτύχθηκαν ανωτέρω και αφορούν στον εκσυγχρονισμό της λειτουργίας της δικαιοσύνης και στην εν γένει εύρυθμη και δέοσα απόδοση της, απορρέουν έντονοι προβληματισμοί σχετικά με την προστασία και τη διασφάλιση των δεδομένων που θα διακινούνται ψηφιακώς και ειδικότερα των προσωπικών δεδομένων. Οι εν λόγω προβληματισμοί είναι ορθολογικής φυσικής απόρροια των παραπάνω προτεινόμενων εκσυγχρονιστικών δράσεων καθώς στις προτεινόμενες εκσυγχρονιστικές λύσεις που αναλύθηκαν, πρωταρχικό έως και κυριάρχο ρόλο διαδραματίζουν οι νέες τεχνολογίες των οποίων η εκτέλεση και η λειτουργία συντελούνται ακριβώς ηλεκτρονικά. Ως εκ τούτου ανάγεται σε μείζονος σημασίας ζήτημα η προστασία των δεδομένων εν γένει και των προσωπικών δεδομένων ειδικότερα. Με την εξέλιξη των νέων τεχνολογιών διαφάνηκε κάποια απειλή ίσως σε βάρος της διασφάλισης και της προστασίας του
απορρήτου των προσωπικών δεδομένων, γεγονός το οποίο οδήγησε τους νομοθέτες κρατών της Ευρωπαϊκής Ένωσης κυρίως αλλά και κρατών εκτός αυτής, να τροποποιήσουν τις σχετικές νομοθεσίες και να λάβουν σειρά μέτρων προστατευτικών των δεδομένων που διακινούνται ηθικάς αλλά και των προσωπικών δεδομένων πιο εξειδικευμένα. Εντός του επιβεβλημένου αυτού πλαισίου μετατροπής της νομοθεσίας και συγχρονισμού της με τις νέες ανάγκες που δημιουργήθηκαν, η Ευρωπαϊκή Ένωση έθεσε νομοθετικές βάσεις και εξέδωσε σχετικές οδηγίες τις οποίες οφείλουν να ακολουθήσουν τα κράτη μέλη της για την αντιμετώπιση των σχετικών προβλημάτων. Εντάθα όμως επισημαίνεται ότι για να τύχει εσωτερικής εφαρμογής σε ένα κράτος κοινωνικός νόμος ή διμερής ή πολυμερής σύμβαση μεταξύ κρατών, πρέπει να κυρωθεί από το συγκεκριμένο κράτος με ειδικό νόμο και ύπατα αποτελεί εσωτερικό νόμο του κράτους αυτού και τυχόν αρμόδιες εσωτερικούς δικαίους. Βεβαίως του κανόνα αυτού δεν εξαρτάται η Ελλάδα. Προ της εφαρμογής των αντίστοιχων κοινωνικών οδηγιών και της θεμελίωσης της σχετικής νομοθεσίας στο ελληνικό δικαίο σύστημα υπήρχε ρητή νομοθετική πρόβλεψη διά της οποίας δεσμεύονται με το καθήκον εξειδίκευσης, δικηγορικό απόρρητο, οι δικηγόροι για τις υποθέσεις τις οποίες χειρίζονται, (κώδικας δεοντολογίας δικηγόρων, Νομοθετικό Διάταγμα 3026/1954 “Περί Κώδικος Δικηγόρων”). Οι νομοθετικές μηχανές αυτές ισχύουν απαρέγκλητα μέχρι σήμερα για την ευδοκία της χρηστής και δίκαιης δίκης, εν ονόματι των απαραβίαστων αρχών της ισονομίας και της ισοπολιτείας σε δημοκρατικό καθεστώς. Αξίζει να σημειωθεί ότι έχουν παρατηρηθεί αναπαράξεις στην Ευρωπαϊκή Ένωση σε μία προσπάθεια νομοθετικής τρόπης της αρχής του δικηγορικού απορρήτου με την έκδοση της Οδηγίας 308/1991 του Ευρωπαϊκού Συμβουλίου. Με την Οδηγία αυτή καθερώνεται νομοθετικά η υποχρέωση του δικηγόρου να αναφέρει στις αρμόδιες αρχές οποιηδήποτε ύποπτη κίνηση και ενέργεια του πελάτη του. Η ρύθμιση αυτή ορίζει μάλλον σαν μία νομοθετική ενέργεια πανικού και αντιπερισσομένη στην προσπάθεια ευρύτερης καταστολής των διαρκώς εξαπλώμενων οικονομικών εγκλημάτων με κυρίως έκφραση τους το “ξέπλυμα βρομικού χρήματος”, παρά σαν μία εσφαλμένη νομοθετική ρύθμιση καταστρατήγησης του βασικότερου δικαιώματος του πελάτη απέναντι στο δικηγόρο του σε ευνομούμενες πολιτείες. Οι αντιδράσεις που προκάλεσε από νομικούς κύκλους διεθνής η παραπάνω Κοινοτική Οδηγία ήταν οξύτατες διότι θεωρήθηκε ως προσπάθεια καταστρατήγησης συνταγματικώς βεβαιωμένου δικαιώματος στα πλαίσια της απρόσκοπτης λειτουργίας της ίδιας της δημοκρατίας. Διευκρινίζεται εντάθα ότι η έν λόγω Οδηγία ουδέν προσθέτει στην πάταξη των οικονομικών εγκληματικών ενεργειών, μάλλον πολλαπλά ξεπλύματα λειτουργίας των θεσμών δημιουργεί, διότι οι νομοθεσίες των κρατών, μεταξύ αυτών και της Ελλάδας, προβλέπουν ειδικώς ότι θα
διώκεται και θα τιμωρείται ποινικά όποιος συμμετέχει σε παράνομες ενέργειες ή παράσχει αρωγή σε όποιον τελεί αξιόποινες πράξεις, οι οποίες λαμβάνουν κακογρηγματικό χαρακτήρα εάν τελέσθηκαν με σκοπό προσπορισμού ιδίων οφέλους. Από τις ρυθμίσεις αυτές δεν εξαιρούνται οι δικηγόροι, οι οποίοι παρέχουν αρωγή στους πελάτες τους για την τέλεση τέτοιων αξιόποινων πράξεων. Κατόπιν των ανωτέρω αναπτυχθέντων καθίσταται σαφές ότι τα δικαίωμα συστήματα των κρατών ως προς τα ζητήματα αυτά αυτορυθμίζονται. Επιπροσθέτως, αναφέρεται ότι η Οδηγία 308/1991 του Ευρωπαϊκού Συμβουλίου αντικαίνει και στη βασική αρχή του άρθρου 6 της Ευρωπαϊκής Σύμβασης των Δικαιωμάτων του Ανθρώπου (ΕΣΔΑ), διά του οποίου προστείται το δικαίωμα των πολιτών σε δίκη δίκη. Σε ποινικής φύσεως υποθέσεις ισχύει το τεκμήριο αδιότητας υπέρ του κατηγορούμενου, η κατοχώρωση του "ευλογούχου" απονομής της δικαιοσύνης καθώς και το δικαίωμα πρόσβασης σε νομική εκπροσώπηση. Δηλαδή το άρθρο 6 της ΕΣΔΑ καθερέωνε και καταχρύσωνε με νομοθετική ισχύ ουσιώδεις αρχές λειτουργίας του ιδίου του δημοκρατικού πολιτεύματος, σημαντικό τμήμα του οποίου αποτελεί η ορθή και σύννυμη λειτουργία της δικαιοσύνης, και βεβαιώς οι αρχές αυτές είναι αποφασιστικές. Η ΕΣΔΑ τυγχάνει άμεσης και προσφανούς εφαρμογής και στην ημεδαπή ως υπερθηκικού χαρακτήρα νομοθετικό κείμενο, σύμφωνα και με τα υπό το άρθρο 28§1 του Ελληνικού Συντάγματος προβλέποντα, ήτοι: «Οι γενικά παραδεδεγμένοι κανόνες του διεθνούς δικαίου, καθώς και οι διεθνείς συμβάσεις, από την επικύρωσή τους με νόμο και τη θέση τους σε ισχύ σύμφωνα με τους όρους καθεμίας, αποτελούν αναπόσπαστο μέρος του εσωτερικού ελληνικού δικαίου και υπερισχύουν από κάθε άλλη αντίθετη διάταξη νόμου». Επίσης, στο καθήκον εκμετάλλευσης υποχρεούνται ρητώς και οι δικαστικοί λειτουργοί. Οι λειτουργοί των Ανεξάρτητων Αρχών δεσμεύονται με το καθήκον εκμετάλλευσης ακόμη και μετά από την με οποιοδήποτε τρόπο αποχώρησή τους από το σώμα που υπηρετούν. Εις ὅτι αφορά ειδικότερα στα προσωπικά δεδομένα και στα ευαίσθητα προσωπικά δεδομένα, όπως στοιχειοθετούνται και διακρίνονται από την οικεία νομοθεσία, Ν.2472/1997, με τις τροποποιήσεις που μεταγενέστερα υπέστη, παρατηρείται ότι ο ανωτέρω νόμος αποτελεί εναρμόνιση του εσωτερικού μας δικαίου με την Οδηγία 95/46/ΕΚ. Εν προκειμένω, και για τις ανάγκες της παρούσης εργασίας, ακροθηγούσας αναφέρεται ότι σύμφωνα με την οικεία νομοθεσία την έννοια των προσωπικών δεδομένων συγκροτεί κάθε πληροφορία που αναφέρεται στο υποκείμενο των δεδομένων, ενώ την έννοια των ευαίσθητων προσωπικών δεδομένων συνθέτεται κάθε πληροφορία που αναφέρεται στο υποκείμενο των δεδομένων και αφορά σε επιμέρους ιδιαίτερα στοιχεία του προσώπου, όποια για παράδειγμα στη φυλετική ή στην εθνική του προέλευση, στα πολιτικά του φρονήματα, στις θρησκευτικές ή στις φιλοσοφικές πεποιθήσεις του.
στην υγεία του, στην ερωτική του ζωή, σε πιθανές ποινικές διώξεις ή καταδίκες. Ως προς τις πιθανές ποινικές διώξεις ή καταδίκες παρατηρείται ότι είναι δυνατή η δημοσιοποίηση τους μόνο από την εισαγγελική αρχή και μόνο για τα αδικήματα που αναφέρονται στο εδάφιο β’ της παραγράφου 2 του άρθρου 3 του Ν.2472/1997 και μόνον ύστερα από σχετική διάταξη του αρμόδιου Εισαγγελέα Πρωτοδικών ή του Εισαγγέλα Εφετών, εάν η υπόθεση εκκρεμεί στο Εφετείο. Η σχετική νομοθεσία αναδεικνύει ως λόγο και θεμέλιο λίθο ύπαρξης αυτής της διάταξης την προστασία του δημοσίου συμφέροντος και του κοινωνικού συνόλου από τη διάρροια ποινικών αδικημάτων που στοχοποιούν την ίδια την κοινωνία και τη λειτουργία των θεσμών. Την έννοια του αρχείου των προσωπικών δεδομένων στοχεύονται το σύνολο των πληροφοριών που αφορούν στο υποκείμενο, δημιουργούν με κριτήρια που οδηγούν είτε απ’ ευθείας στο υποκείμενο είτε δύνανται να οδηγήσουν στην αντιποίηση του υποκειμένου και να παρέχουν πρόσβαση στις πληροφορίες που αφορούν στο συγκεκριμένο υποκείμενο. Εν προκείμενω διευκρινίζεται ότι για να δημοσιοποιηθούν προσωπικά δεδομένα απαιτείται μία σειρά προϋποθέσεων μεταξύ αυτών και η ύπαρξη αιτιολογημένης εισαγγελικής εντολής. Σε κάθε άλλη περίπτωση που ο χειριστής ή ο επεξεργαστής αρχείου προσωπικών δεδομένων διαπρέπει και γνωστοποιείται σε τρίτους στοιχεία προσωπικού χαρακτήρα οποιουδήποτε προσώπου, τα οποία έχουν περιέλθει σε γνώση του εξ αιτίας της θέσεως του, φέρει ακέραια την ευθύνη και διώκεται ποινικά.


Εις ό,τι αφορά στα όσα ανωτέρω εξετάθηκαν για την καθεστωτική κατάσταση της προστασίας των προσωπικών δεδομένων στην Ελλάδα και σε άλλα κράτη, κυρίως της Ευρωπαϊκής Ένωσης και στις προτεινόμενες ανωτέρω στην παρούσα εργασία εκσυγχρονιστικές ψηφιακές δράσεις στην απομονή της δικαιούχης προτείνεται αφ’ ενός μεν η θέση σε λειτουργία των ήδη υφιστάμενων σχετικών νομοθετικών διατάξεων και για την περίπτωση της αναδιάρθρωσης της λειτουργίας και της απομονής της δικαιούχης με ακραίφνη χρήση των νέων τεχνολογιών και αρ’ ετέρου ο εκσυγχρονισμός της νομοθεσίας σε επιμέρους ζητήματα που ανακύπτουν με τη χρήση των νέων τεχνολογιών. Στα πλαίσια αυτά προτείνεται η νομοθετική τροποποίηση της ισχύοντας κείμενης σχετικής νομοθεσίας και η θεσσαλίδευση και νομοθετική καταχώριση των θέσεων Ελεγκτή και Μετα-ελεγκτή προσωπικών δεδομένων στη Δικαιοσύνη και στις Ανεξάρτητες Αρχές. Στις θέσεις αυτές προτείνεται να τοποθετούνται δικαστικοί λειτουργοί οι οποίοι εκτός των νομικών γνώσεων θα πρέπει να έχουν και
8. Συμπεράσματα

Στην παρούσα εργασία αναπτύχθηκε η αναπτυξιακή αύξηση των ηλεκτρονικών συναλλαγών και ιδιαίτερα των εμπορικών ηλεκτρονικών συναλλαγών. Ακολούθησε συνοπτική καταγραφή των προβλημάτων που ανακύπτουν από τις ηλεκτρονικές συναλλαγές στο διαδίκτυο καθώς και οι νομικές φύσεως διαφορές.

Παρουσιάσθηκαν στρατηγικές σκέψεις για την προσέγγιση των προβλημάτων που αναφέρονται από τη χρήση του διαδικτύου με βασικό άξονα αναφοράς την ενίσχυση της στρατηγικής στον τομέα της πρόληψης για τα αναφορώμενα σε όλα τα επίπεδα από τη χρήση του διαδικτύου προβλήματα με στόχο τη μείωση του αριθμού των δικαιούχων διενέξεων.

Τονίσθηκε η αναγκαιότητα κατάρτισης συμβάσεων, ενώ έγινε αναφορά στην υπεροχή των ηλεκτρονικών συμβάσεων, για κάθε εμπορική ψηφιακή συναλλαγή με βάση διεθνείς κανόνες και πρότυπα, με διίκτη στόχο αφ’ ενός μεν την πρόληψη διαφορών και διενέξεων από την εκτέλεση των ηλεκτρονικών συναλλαγών και αφ’ ετέρου την ανοικοδόμηση της εμπιστοσύνης τόσο προς τις νέες τεχνολογίες όσο και προς τη λειτουργία θεσμών και κανόνων, διεθνών και κρατικών, και κατ’ επέκταση αμφιδρόμα μεταξύ των συμβαλλόμενων μερών.

Καταδείχθηκε η αναπόδραση ανάγκη εξωδικαστικής επίλυσης των διαφορών αυτών σε πρώτο στάδιο με εσωδικαστικές διαδικασίες ανάμεσα στα συμβαλλόμενα μέρη. Σε περίπτωση μη ευνοίας των προσπαθειών αυτών η προσπάθεια εξωδικαστικής επίλυσης των ανακυψάντων διαφορών από τις ηλεκτρονικές συναλλαγές στο διαδίκτυο θα εισέρχεται στο στάδιο της διαιτησίας. Εν προκειμένω, εντός του πλέγματος της συνοπτικής αναφοράς στο θεσμό της διαιτησίας για τις ανάγκες της παρούσας εργασίας, προτάθηκε και η θεσμοθέτηση της ηλεκτρονικής διαιτησίας σε όλα τα στάδια της.

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Εξόρυξη Γνώσης από Αστρονομικά Δεδομένα

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Περίληψη:
Η κατηγοριοποίηση είναι ίσως η πιο γνωστή και πιο δημοφιλής τεχνική εξόρυξης γνώσης. Η οποία θεωρείται ως μια απεικόνιση από τη βάση δεδομένων στο σύνολο των κατηγοριών. Μια απλή μέθοδος κατηγοριοποίησης είναι και η κατηγοριοποίηση κατά Bayes που χρησιμοποιείται στην εργασία και περιγράφεται θεωρητικά και πракτικά αρκεί έχουμε και υλοποίηση του σχετικού αλγόριθμου. Επιπλέον στα προβλήματα κατηγοριοποίησης είναι πολύ χρήσιμη η προσέγγιση των δεδόμενων απόφασης, όπου με αυτήν την τεχνική, κατασκευάζεται ένα δέντρο για να μοντελοποιήσει τη διαδικασία της κατηγοριοποίησης, και σε αυτήν την εργασία θα δούμε τον αλγόριθμο id3, και j48 που ανήκουν στους αλγόριθμους που βασίζονται σε δέντρα απόφασης.

Ο id3 είναι ένας αλγόριθμος που χρησιμοποιείται για να δημιουργήσει ένα δέντρο απόφασης με χρήση στοιχείων από τη θεωρία πληροφοριών (εντροπία) και επιλέγει για διάσπαση το χαρακτηριστικό με το μεγαλύτερο κέρδος πληροφορίας (information gain). Η id3 τεχνική για το χτίσμα δένδρου απόφασης βασίζεται στη θεωρία της πληροφορίας και προσπαθεί να ελαχιστοποιήσει τον αναμενόμενο αριθμό των συγκρίσεων. Η βασική στρατηγική που εκτελείται από το id3 είναι η επιλογή γνωρισμάτων διάσπασης με το υψηλότερο κέρδος πληροφορίας πρώτα. Το ποσό της πληροφορίας, το οποίο συνδέεται με την τιμή ενός γνωρίσματος, σχετίζεται με την πιθανότητα εμφάνισης του. Ως μειονόκτημα αυτού του αλγόριθμου αναφέρεται η μεροληψία του υπέρ των χαρακτηριστικών με μεγάλο αριθμό διαφάνειών.

Στην εργασία επεξεργάζονται αστρονομικά δεδομένα με την υλοποίηση τριών αλγόριθμων στο WEKA. To Weka έχει τη δική του εκδοχή των C4.5 γνωστή ως J48, ο αλγόριθμος αυτός εφαρμόζει μια απλή κατά-βάθος μέθοδο για την κατασκευή του δέντρου. Τα γνωρίσματα κάθε κόμβου του δέντρου μπορούν να έχουν συνεχείς τιμές. Ωστόσο για να λειτουργήσει σωστά χρειάζεται ολοκληρωμένα δεδομένα. Ο J48 κρίνεται ακατάλληλος για μεγάλα σύνολα δεδομένων, αρκεί η ακρίβεια (accuracy) που παρουσιάζει είναι πολύ μικρή. Ο αλγόριθμος δένδρο απόφασης J48 αποτελεί μια βελτιωμένη έκδοση του αλγόριθμου id3, ο οποίος όπως ήδη
έχουμε προαναφέρει, έχει ως μειονέκτημα ότι μεροληπτεί υπέρ των χαρακτηριστικών με μεγάλο αριθμό διαφέροντων.

Η Bayesian κατηγοριοποίηση (classification) βασίζεται στη στατιστική θεωρία κατηγοριοποίησης του Bayes. Ο απλούστερος Bayesian κατηγοριοποιητής είναι ο γνωστός Naïve Bayesian κατηγοριοποιητής. Αυτός υποθέτει ότι η επίδραση ενός γνωρίσματος (attribute) σε μια δεδομένη κατηγορία είναι ανεξάρτητη από τις τιμές των άλλων γνωρισμάτων. Αυτή η υπόθεση γίνεται για να απλοποιήσει τους υπολογισμούς που εμπλέκονται και καλείται υπό συνθήκη ανεξαρτησία (conditional independence) κατηγοριών.

Ο Naïve Bayesian κατηγοριοποιητής υπολογίζει τις υπό συνθήκη πιθανότητες της κατηγορίας υποθέτοντας υπό συνθήκη ανεξαρτησία (conditional independence), και αποτελεί μια πολύ αποδοτική τεχνική. Θεωρητικά οι Bayesian κατηγοριοποιητές έχουν το ελάχιστο ποσοστό σφάλματος σε σύγκριση με όλους τους άλλους κατηγοριοποιητές. Στην πράξη, όμως, αυτό δεν συμβαίνει πάντα λόγω των υποθέσεων που απαιτούνται να γίνουν κατά τη χρήση τους, όπως η υπό συνθήκη ανεξαρτησία, και η έλλειψη διαθέσιμων δεδομένων για τον ακριβή υπολογισμό των υπό συνθήκη πιθανοτήτων. Ωστόσο, έχει βρεθεί ότι είναι συγκρίσιμο με τα δέντρα απόφασης και τους κατηγοριοποιητές που βασίζονται σε νευρωνικά δίκτυα σε μερικές εφαρμογές. Η κατηγοριοποίηση Naïve Bayes περιέχει δυνατότητα καλά ακόμη και αν καταστρατηγικτεί φανερά η παραδοχή περί ανεξαρτησίας χαρακτηριστικών. Και αυτό έγκειται στο ότι η κατηγοριοποίηση δεν απαιτεί ακριβείς εκτιμήσεις πιθανοτήτων αρκεί η μέγιστη πιθανότητα να αντιστοιχεί στη σωστή κλάση.

Όμως η προσθήκη επιπλέον χαρακτηριστικών μπορεί να δημιουργήσει προβλήματα, π.χ. ταυτόσημα χαρακτηριστικά. Ειδικότερα σε ότι αφορά τα δεδομένα, οι πρώτες 5 στήλες είναι παράμετροι είναι γνωστοί στους αστρονόμους και οι υπόλοιπες είναι τιμές φάσματος που αντιστοιχούν στις παραμέτρους αυτές. Στην εργασία χρησιμοποιούμε μόνο μία παράμετρο τον μορφολογικό τύπο, και όλες τις στήλες που αντιστοιχούν σε τιμές του φάσματος έτσι ώστε μετά από την υλοποίηση των αλγοριθμίων για όλες τις τιμές του φάσματος να απορρέει ο μορφολογικός τύπος που όπως προαναφέραμε μιας αφορά και θα είναι η μόνη παράμετρος που θα χρησιμοποιηθεί σε αυτή την εργασία. Και στους τρεις αλγόριθμους τα αποτελέσματα κατά κύριο λόγο είναι ίδια, αφού οι αριθμητικές εμφάνισες των μορφολογικών τύπων είναι ίδιες, όμως η απεικόνιση των αποτελεσμάτων είναι αυτή που ίσως κάνει τη διαφορά.
Λέξεις Κλειδιά:
Εξόρυξη γνώσης, Αποθήκες δεδομένων, WEKA, Κατηγοριοποίηση, Αλγόριθμοι, Bayes, id3, j48, Δένδρα απόφασης, Φάσμα, Μορφολογικός τύπος.

1. Εισαγωγή
Η κατηγοριοποίηση είναι ίσως η πιο γνωστή και πιο δημοφιλής τεχνική εξόρυξης γνώσης, η οποία θεωρείται ως μια απεικόνιση από τη βάση δεδομένων στο σύνολο των κατηγοριών. Μια απλή μέθοδος κατηγοριοποίησης είναι και κατηγοριοποίηση κατά Bayes που χρησιμοποιείται στην εργασία και περιγράφεται θεωρητικά και πρακτικά αρού έχουμε και υλοποίηση του αλγόριθμου. Επιπλέον στα προβλήματα κατηγοριοποίησης είναι πολύ χρήσιμη η προσέγγιση των δένδρων απόφασης, όπου με αυτήν την τεχνική, κατασκευάζεται ένα δένδρο για να μοντελοποιήσει τη διαδικασία της κατηγοριοποίησης, και σε αυτήν την εργασία θα δώσει τον αλγόριθμο id3, και j48 που αντικατοπτρίζουν στους αλγόριθμους που βασίζονται σε δένδρα απόφασης. Σε αυτήν την εργασία επεξεργάζονται αστρονομικά δεδομένα με την υλοποίηση τριών αλγόριθμων στο WEKA. Ειδικότερα σε ότι αφορά τα δεδομένα, οι πρώτες 5 στήλες είναι παράμετροι είναι γνωστοί στους αστρονόμους και οι υπόλοιπες είναι τιμές φάσματος που αντιστοιχούν στις παραμέτρους αυτές. Στην εργασία θα χρησιμοποιόσουμε μόνο μία παράμετρο τον μορφολογικό τύπο, και όλες τις στήλες που αντιστοιχούν σε τιμές του φάσματος έτσι ώστε μετά από την υλοποίηση των αλγόριθμων για όλες τις τιμές του φάσματος να αποφεύγει ο μορφολογικός τύπος που όπως προαναφέραμε μας αφορά και θα είναι η μόνη παράμετρος που θα χρησιμοποιηθεί σε αυτήν την εργασία.

2. Αλγόριθμος ID3
O id3 είναι ένας αλγόριθμος που χρησιμοποιείται για να δημιουργήσει ένα δένδρο απόφασεων με χρήση στοιχείων από τη θεωρία πληροφορίας (εντροπία) και επιλέγει για διάσπαση το χαρακτηριστικό με το μεγαλύτερο κέρδος πληροφορίας (information gain). Η id3 τεχνική για το χτίσμα δένδρου απόφασης βασίζεται στη θεωρία της πληροφορίας και προσπαθεί να ελαχιστοποιήσει τον αναμενόμενο αριθμό των συγκρίσεων. Η βασική στρατηγική που εκτελείται από το id3 είναι η επιλογή γνωρισμάτων διάσπασης με το υψηλότερο κέρδος πληροφορίας πρώτη. Το ποσό της πληροφορίας, το οποίο συνδέεται με την τιμή ενός γνωρισμάτος, σχετίζεται με την πιθανότητα εμφάνισής του. Ως μειονέκτημα αυτού του αλγόριθμου αναφέρεται η μεροληψία του υπέρ των χαρακτηριστικών με μεγάλο αριθμό διαφέροντων. Ακολουθεί μια προγραμματιστική περιγραφή του αλγόριθμου.
Δημιουργήσεις ένα αρχικό κόμβο για το δέντρο
Εάν όλα τα παραδείγματα είναι θετικά, Επέστρεψε την Ρίζα ως δέντρο με ένα κόμβο, με ετικέτα+.
Εάν όλα τα παραδείγματα είναι αρνητικά, Επέστρεψε την Ρίζα ως δέντρο με ένα κόμβο, με ετικέτα-.
Εάν ο αριθμός των προβλεπόμενων ιδιοτήτων είναι κενός, τότε Επέστρεψε την Ρίζα ως δέντρο με ένα κόμβο, με ετικέτα = την πιο κοινή τιμή της ιδιότητας-στόχου των παραδειγμάτων.
* Αλλιώς Ξεκίνα
** Α = Η ιδιότητα που κατηγοριοποιεί καλύτερα τα παραδείγματα.
** Ιδιότητα Δέντρου απόφασης για τη ρίζα = Α.
** Για κάθε πίθανη τιμή, <math>v_i</math>, του Α,
*** Πρόσθεσε ένα νέο κλάδο κάτω από τη Ρίζα, που να αντιστοιχεί στη
dοκιμή Α = <math>v_i</math>.
*** Θέσε Παραδείγματα(<math>v_i</math>), ως το υποσύνολο των
παραδειγμάτων που έχουν την τιμή <math>v_i</math> για το Α.
*** Αν Παραδείγματα(<math>v_i</math>) είναι κενό
**** Τότε κάτω από αυτό τον νέο κλάδο πρόσθεσε έναν κόμβο-φύλλο με
etικέτα = την πιο κοινή τιμή στόχο στα παραδείγματα.
*** Αλλιώς κάτω από αυτό τον νέο κλάδο πρόσθεσε το υποδέντρο ID3
(Παραδείγματα(<math>v_i</math>), Ιδιότητα_Στόχος_Ιδιότητας – {Α})
* Τέλος
* Επέστρεψε Ρίζα

2.1 Επέξεργασία αστρονομικών δεδομένων με τον αλγόριθμο id3
Ανοίγοντας το αρχείο με τα αστρονομικά δεδομένα στο περιβάλλον του
WEKA, εμφανίζονται όλες οι στήλες με τις παραμέτρους και τις τιμές του
φάσματος και κατόπιν επιλέγουμε όλες τις παραμέτρους εκτός του
μορφολογικού τύπου και μετά πατάμε remove ώστε να λάβουμε υπόψη
μόνο τον μορφολογικό τύπο στην επεξεργασία που πρόκειται να γίνει, και
eπιπλέον μετατρέπουμε τις τιμές από Numeric σε Nominal αφού στο
WEKA μόνο σε αυτή την μορφή επεξεργάζονται σωστά τα δεδομένα.
Μετά τις προαναφερόμενες ενέργειες προκύπτει το ακόλουθο παράθυρο.
Στη συνέχεια πατάμε classify και επιλέγουμε από το μενού του choose τον αλγόριθμο id3 που θα υλοποιήσουμε σε αυτό το στάδιο της εργασίας, και κατόπιν πατάμε start προκειμένου να ξεκινήσει ο αλγόριθμος, και έτσι τελικά προκύπτει το παρακάτω παράθυρο.

2.2 Απεικόνιση και σχολιασμός αποτελεσμάτων

Μετά την υλοποίηση του αλγόριθμου απορρέουν τα ακόλουθα αποτελέσματα τα οποία στην συνέχεια θα αξιολογηθούν.

Scheme: weka.classifiers.trees.Id3
Relation: 2 - parametroi - BP xwris teleies to weka ta vgazei numeric-
weka.filters.unsupervised.attribute.NumericToNominal-R1,2,3,4-
weka.filters.unsupervised.attribute.Discretize-B10-M-1.0-R6-53-
weka.filters.unsupervised.attribute.Remove-R54-
weka.filters.unsupervised.attribute.Remove-R1-4-
weka.filters.unsupervised.attribute.NumericToNominal-Rfirst-last
Instances: 881
Attributes: 49
Morphological Type
Column 0
Column 1
Column 2
............
Column 46
Column 47
Test mode: 10-fold cross-validation

=== Classifier model (full training set) ===
Id3
Column 18 = '(-inf-1123869750]': E
Column 18 = '[1123869750-1183009500]':
Column 0 = '(-inf-40102044.8]': Sa
Column 0 = '[40102044.8-40713462.6]': Sb
Column 0 = '[40713462.6-41324880.4]': null
Column 0 = '[41324880.4-41936298.2]': null
Column 0 = '[41936298.2-42547716]': null
Column 0 = '[42547716-43159133.8]': null
Column 0 = '[43159133.8-43770551.6]': null
Column 0 = '[43770551.6-44381969.4]': null
Column 0 = '[44381969.4-44993387.2]': null
Column 0 = '[44993387.2-inf]': null
Column 18 = '[1183009500-1242149250]': Sbc
Column 18 = '[1242149250-1301289000]': Sbc
Column 18 = '[1301289000-1360428750]': Sc
Column 18 = '[1360428750-1419568500]': Sd
Column 18 = '[1419568500-1478708250]': null
Column 18 = '[1478708250-1537848000]': Im
Column 18 = '[1537848000-1596987750]': Im
Column 18 = '[1596987750-inf]': Im
Time taken to build model: 0.05 seconds

=== Stratified cross-validation ===

=== Summary ===
Correctly Classified Instances 881 100 %
Incorrectly Classified Instances 0 0 %
Kappa statistic 1
Mean absolute error 0
Root mean squared error 0
Relative absolute error 0 %
Root relative squared error 0 %
Total Number of Instances 881
<table>
<thead>
<tr>
<th>Class</th>
<th>TP Rate</th>
<th>FP Rate</th>
<th>Precision</th>
<th>Recall</th>
<th>F-Measure</th>
<th>ROC Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Im</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Sa</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Sbc</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Sb</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Sc</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Sd</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

== Confusion Matrix ==

<table>
<thead>
<tr>
<th></th>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
<th>e</th>
<th>f</th>
<th>g</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>327</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Im</td>
<td>0</td>
<td>245</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Sa</td>
<td>0</td>
<td>0</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Sbc</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>148</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Sb</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>25</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Sc</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>68</td>
<td>0</td>
</tr>
<tr>
<td>Sd</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>58</td>
</tr>
</tbody>
</table>

To the δένδρα που απορρέουν από τη υλοποίηση του αλγόριθμου είναι τα ακόλουθα:

```
Column 18

1123869750

E

Column 0

1123861750 - 1183009500

1123861750 - 1183009500

40102044.8

40102044.8 - 40713462.6

40102044.8 - 40713462.6

40102044.8 - 40713462.6

Sb

Sb

Sa

Sa
```
Οι τιμές που αντιστοιχούν σε null μορφολογικό τύπο δεν συμπεριλαμβάνονται στα δέντρα διότι δεν έχουν καμία πληροφορία που να μας αφορά και βάση αυτών να καταλήξουμε σε κάποιο συμπέρασμα, για αυτό και αγνοούνται.

Τα παραπάνω δέντρα απεικονίζουν τις αριθμητικές τιμές του φάσματος που αντιστοιχούν σε έναν μορφολογικό τύπο και υπάρχουν σε κάθε στήλη. Για την καλύτερη απεικόνιση των αποτελεσμάτων δημιουργήθηκαν πολλά δέντρα, ενώ θα ήταν εφικτό τα αποτελέσματα να βρισκόταν σε ένα ενιαίο δέντρο, όμως η απεικόνιση δεν θα ήταν η αντίστοιχη.

3. Αλγόριθμος J48

Το Weka έχει τη δυκή του εκδοχή των C4.5 γνωστή ως J48, ο αλγόριθμος αυτός εφαρμόζει μια απλή κατά-βάθος μέθοδο για την κατασκευή του δέντρου. Τα γνωρίσματα κάθε κόμβου του δέντρου μπορούν να έχουν συνεχείς τιμές. Ωστόσο για να λειτουργήσει σωστά χρειάζεται ολοκληρωμένα δεδομένα. Ο J48 κρίνεται ακατάλληλος για μεγάλα σύνολα δεδομένων, αφού η ακρίβεια (accuracy) που παρουσιάζει είναι πολύ μικρή. Ο αλγόριθμος δέντρου απόφασης J48 αποτελεί μια βελτιωμένη έκδοση του αλγόριθμου id3, ο οποίος όπως ήδη έχουμε προαναφέρθηκε, έχει ως μειονέκτημα ότι μεροληπτεί υπέρ των χαρακτηριστικών με μεγάλο αριθμό
διαφέρουν. Στη συνέχεια απεικονίζονται οι τρόποι με τους οποίους ο αλγόριθμος j48 βελτιώνει τον αλγόριθμο id3.

**Ελλιπή δεδομένα:** Όταν το δενδρό απόφασης χτίζεται, τα ελλιπή δεδομένα απλά αγγούνται. Το οποίο σημαίνει ότι τα κλάσματα του κέρδους υπολογίζονται κοινότατα μόνο σε εκείνες τις εγγραφές που έχουν κάποια τιμή για εκείνο το γνώρισμα. Για να κατηγοριοποιήσουμε μία εγγραφή με ελλιπή τιμή για ένα γνώρισμα, η τιμή για αυτό το στοιχείο μπορεί να προβλεφθεί με βάση το τι είναι γνωστό για τις τιμές του γνωρίσματος από τις άλλες εγγραφές.

**Συνεχή δεδομένα:** Η βασική ιδέα είναι να χορήγουμε τα δεδομένα σε διάστημα με βάση τις τιμές των γνωρισμάτων για εκείνα τα στοιχεία τα οποία αντίκουν στο δείγμα εκπαίδευσης.

**Κλάδοιμα:** Υπάρχουν δύο σημαντικές στρατηγικές κλαδέματος οι οποίες προτείνονται στο j48: Με την αντικατάσταση υποδένδρου (subtree replacement), ένα υποδένδρο αντικαθίσταται από ένα φύλλο εάν αυτή η αντικατάσταση έχει σαν αποτέλεσμα ένα σφάλμα κοντά σε αυτό του αρχικού δενδρού. Η αντικατάσταση ενός υποδένδρου δουλεύει ξεκινώντας από το κάτω μέρος του δενδρού και ανεβαίνοντας προς τη ρίζα. Μια άλλη στρατηγική κλαδέματος καλείται ανύψωση υποδένδρου( subtree raising), αντικαθίστα ένα υποδένδρο με το πιο χρησιμοποιημένο υποδένδρο του. Σε αυτήν την περίπτωση ένα υποδένδρο ανυψώνεται από την τρέχουσα θέση του σε ένα κόμβο που βρίσκεται υψηλότερα στο δενδρό. Και πάλι, πρέπει να καθορίσουμε την αύξηση στη συχνότητα εμφάνισης λαθών για αυτήν την αντικατάσταση.

**Κανόνες:** Αυτός ο αλγόριθμος επιτρέπει την κατηγοριοποίηση είτε μέσω δενδρόν αποφάσεων είτε μέσω κανόνων οι οποίοι δημιουργούνται από αυτά. Επιπλέον προτείνονται μερικές τεχνικές για την απλούστευση πολλών κανόνων. Μια προσέγγιση είναι η αντικατάσταση της αριστερής πλευράς ενός κανόνα από μια απλούστευση έκδοση εάν όλες οι εγγραφές του συνόλου εκπαίδευσης αντιμετωπίζονται με τον ίδιο τρόπο. Ένας εναλλακτικός τύπος κανόνας μπορεί να χρησιμοποιηθεί για να δείξει τι πρέπει να γίνει εάν κανένας άλλος κανόνας δεν μπορεί να εφαρμοστεί.

**Διάσπαση:** Η προσέγγιση που χρησιμοποιεί ο id3 προτιμά γνωρισμάτα με πολλές διαρρέες και έτσι μπορεί να οδηγήσει σε περιπορισμογή. Στην πιο ακραία περίπτωση, ένα γνώρισμα, το οποίο έχει μία μοναδική τιμή για κάθε πλευρά στο σύνολο εκπαίδευσης, θα έπαιξε το καλύτερό επειδή θα υπήρχε μόνο μια πλευρά (και έτσι μόνο μια κατηγορία) για κάθε διάρθρωση. Μια βελτίωση θα μπορούσε να γίνει εάν λάβουμε υπόψη την πληθυσμό της κάθε διάρθρωσης.

3.1 Επεξεργασία αστρονομικών δεδομένων με τον αλγόριθμο J48

Ανοίγοντας το αρχείο με τα αστρονομικά δεδομένα στο περιβάλλον του WEKA, εμφανίζονται όλες οι στήλες με τις παραμέτρους και τες τιμές του
φάσματος και κατόπιν επιλέγουμε όλες τις παραμέτρους εκτός του μορφολογικού τύπου και μετά πατάμε remove ώστε να λάβουμε υπόψη μόνο τον μορφολογικό τύπο στην επεξεργασία που πρόκειται να γίνει, και επιπλέον μετατρέπουμε τις τιμές από Numeric σε Nominal αφού στο WEKA μόνο σε αυτή την μορφή επεξεργάζονται σωστά τα δεδομένα. Μετά τις προαναφερόμενες ενέργειες προκύπτει το ακόλουθο παράθυρο.

Στη συνέχεια πατάμε classify και επιλέγουμε από το μενού του choose τον αλγόριθμο J48 που θα υλοποιήσουμε σε αυτό το στάδιο της εργασίας, και κατόπιν πατάμε start προκειμένου να ξεκινήσει ο αλγόριθμος, και έτσι τελικά προκύπτει το παρακάτω παράθυρο.
3.2 Απεικόνιση και σχολιασμός αποτελεσμάτων

Μετά την υλοποίηση του αλγόριθμου απορρέουν τα ακόλουθα αποτελέσματα τα οποία στην συνέχεια θα αξιολογηθούν.

=== Run information ===
Scheme: weka.classifiers.trees.J48 -C 0.25 -M 2
Relation: 2 -parametrosi - BP xwris teleies to weka ta vgazei numeric-
weka.filters.unsupervised.attribute.NumericToNominal-R1,2,3,4-
weka.filters.unsupervised.attribute.Discretize-B10-M-1.0-R6-53-
weka.filters.unsupervised.attribute.Remove-R54-
weka.filters.unsupervised.attribute.NumericToNominal-Rfirst-last-
weka.filters.unsupervised.attribute.Remove-R1-4
Instances: 881
Attributes: 49
Morphological Type
Column 0
Column 1

.......... 

Column 47
Test mode: 10-fold cross-validation

=== Classifier model (full training set) ===

J48 pruned tree

------------------
Column 39 = '(-inf-37903978.5]': E (327.0)
Column 39 = '(37903978.5-43985278]': Sa (10.0)
Column 39 = '(43985278-50066577.5]'
Column 14 = '(-inf-1593004520]': Sb (0.0)
Column 14 = '(1593004520-1637510940]': Sb (25.0)
Column 14 = '(1637510940-1682017360]': Sbc (8.0)
Column 14 = '(1682017360-1726523780]': Sb (0.0)
Column 14 = '(1726523780-1771030200]': Sb (0.0)
Column 14 = '(1771030200-1815536620]': Sb (0.0)
Column 14 = '(1815536620-1860043040]': Sb (0.0)
Column 14 = '(1860043040-1904549460]': Sb (0.0)
Column 14 = '(1904549460-1949055880]': Sb (0.0)
Column 14 = '(1949055880-inf]': Sb (0.0)
Column 39 = '(50066577.5-56147877]': Sbc (140.0)
**Column 39** = \([56147877-62229176.5]\): Sc (64.0)
Column 39 = \([62229176.5-68310476]\]

**Column 18** = \([\text{inf}-1123869750]\): Sd (0.0)
Column 18 = \([1123869750-1183009500]\): Sd (0.0)
Column 18 = \([1183009500-1242149250]\): Sd (0.0)
Column 18 = \([1242149250-1301289000]\): Sd (0.0)
Column 18 = \([1301289000-1360428750]\): Sc (4.0)
Column 18 = \([1360428750-1419568500]\): Sd (58.0) Column 18 = \([1419568500-1478708250]\): Sd (0.0)
Column 18 = \([1478708250-1537848000]\): Sd (0.0)
Column 18 = \([1537848000-1596987750]\): Sd (0.0)
Column 18 = \([1596987750-\text{inf}]\): Sc (4.0)

**Column 39** = \([68310476-74391775.5]\): E (0.0)
Column 39 = \([74391775.5-80473075]\): Im (28.0)
Column 39 = \([80473075-86554374.5]\): Im (122.0)
Column 39 = \([86554374.5-\text{inf}]\): Im (95.0)

**Number of Leaves**: 28
**Size of the tree**: 31

Time taken to build model: 0.03 seconds

--- Stratified cross-validation ---

--- Summary ---
Correctly Classified Instances 881 100 %
Incorrectly Classified Instances 0 0 %
Kappa statistic 1
Mean absolute error 0
Root mean squared error 0
Relative absolute error 0 %
Root relative squared error 0 %

**Total Number of Instances** 881

--- Detailed Accuracy By Class ---

<table>
<thead>
<tr>
<th>TP Rate</th>
<th>FP Rate</th>
<th>Precision</th>
<th>Recall</th>
<th>F-Measure</th>
<th>ROC Area</th>
<th>Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>E</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>Im</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>Sa</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>Sbc</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>Sb</td>
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<tr>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>Sc</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>Sd</td>
</tr>
</tbody>
</table>

--- Confusion Matrix ---

```
a b c d e f g <-- classified as
327 0 0 0 0 0 0 | a = E
0 245 0 0 0 0 0 | b = Im
```
J48 Το παρακάτω δέντρο απεικονίζει τους μορφολογικούς τύπους από την τιμή που έκδιδε η αντιστοίχισή τους, και φυσικά αποδίδει και την αριθμητική τους παρουσία στη στήλη που συμμετέχουν. Αξιοσημείωτο ότι η αριθμητική παρουσία που αντιστοιχεί σε κάθε μορφολογικό τύπο παραμένει η ίδια.

![Diagram](attachment:image.png)

Το παραπάνω δέντρο είναι ημιτελές αφού τα κλαδιά και τα φύλλα που αντιστοιχούν στη ρίζα Column 14 είναι και άλλα εκτός από αυτά που ήδη απεικονίζονται παραπάνω, όμως η συγκέντρωση τους στο προηγούμενο δέντρο δεν είναι εφικτή και αυτό έγινε στην χωρητικότητα της σελίδας. Πάντως το δέντρο συνεχίζει όπως και σε προηγούμενες αναπαραστάσεις, ειδικότερα μετά τη ρίζα 14, ακολουθεί η ρίζα 39, κατόπιν η 18, και ξανά η 39, όπου και καταλήγουν τα τελικά κλαδιά και φύλλα του δέντρου. Επίσης στα παραπάνω δέντρα απεικονίζονται τις αριθμητικές τιμές που αντιστοιχούν σε κάθε μορφολογικό τύπο, και δεν απεικονίζονται null τιμές στους μορφολογικούς τύπους όπως στην υλοποίηση του προηγούμενου αλγόριθμου. Παραμένοντας στον αλγόριθμο J48 θα προβούμε στην τροποποίηση των κανόνων όπως θα δούμε στη συνέχεια, διότι έχουμε αυτή τη δυνατότητα αυτή μόνο σε αυτούς τον αλγόριθμο.
Πραγματοποιώντας αυτές τις αλλαγές συγχρόνως θα αξιολογούμε και τα 
αποτελέσματα που θα απορρέουν από αυτές. Ειδικότερα θα υλοποιήσουμε 
τον αλγόριθμο επαναλαμβάνοντας τα προηγούμενα βήματα με τη μόνη 
διαφορά ότι θα γίνουν κάποιες αλλαγές στους κανόνες. Αρχικά θα δούμε 
tους κανόνες βάση των οποίων υλοποιήθηκαν τα προηγούμενα 
αποτελέσματα, έτσι ώστε να κατανοήσουμε ευκολότερα τις αλλαγές που 
πρόκειται να γίνουν.

Στη συνέχεια πραγματοποιούμε τις αλλαγές και πριν πατήσουμε οκ τις 
βλέπουμε να απεικονίζονται στο επόμενο παράθυρο.

Πατάμε οκ και στη συνέχεια υλοποιούμε τον αλγόριθμο πατώντας start και 
με αυτόν τον τρόπο προκύπτει το επόμενο παράθυρο.
Σε αυτό το στάδιο βλέπουμε τα αποτελέσματα τα οποία δεν διαφοροποιούνται σε σχέση με τα προηγούμενα, παρόλα αυτά απεικονίζονται ακόλουθα προκειμένου να γίνει καλύτερα αντίληπτο ότι δεν υπάρχουν αλλαγές στα αποτελέσματα μετά την τροποποίηση στους κανόνες.

--- Run information ---

Scheme: weka.classifiers.trees.J48 -C 1.0 -M 4
Relation: 2 -parametroi - BP xwris teleies to weka ta vgazei numeric-
weka.filters.unsupervised.attribute.NumericToNominal-R1,2,3,4-
weka.filters.unsupervised.attribute.Discretize-B10-M-1.0-R6-53-
weka.filters.unsupervised.attribute.Remove-R54-
weka.filters.unsupervised.attribute.NumericToNominal-Rfirst-last-
weka.filters.unsupervised.attribute.Remove-R1-4
Instances: 881
Attributes: 49
Morphological Type
Column 0
Column 1
Column 2
............
Column 46
Column 47
Test mode: 10-fold cross-validation
--- Classifier model (full training set) ---
J48 pruned tree

---------------
Column 39 = '(-inf-37903978.5]': E (327.0)
Column 39 = '[37903978.5-43985278]': Sa (10.0)
Column 39 = '[43985278-50066577.5]'
Column 14 = '(-inf-1593004520]': Sb (0.0)
Column 14 = '[1593004520-1637510940]': Sb (25.0)
Column 14 = '[1637510940-1682017360]': Sbc (8.0)
Column 14 = '[1682017360-1726523780]': Sb (0.0)
Column 14 = '[1726523780-1771030200]': Sb (0.0)
Column 14 = '[1771030200-1815536620]': Sb (0.0)
Column 14 = '[1815536620-1860043040]': Sb (0.0)
Column 14 = '[1860043040-1904549460]': Sb (0.0)
Column 14 = '[1904549460-1949055880]': Sb (0.0)
Column 14 = '[1949055880-inf]': Sb (0.0)
Column 39 = '[50066577.5-56147877]': Sbc (140.0)
Column 39 = '[56147877-62229176.5]': Sc (64.0)
Column 39 = '[62229176.5-68310476]'
Column 18 = '(-inf-1123869750]': Sd (0.0)
Column 18 = '[1123869750-1183009500]': Sd (0.0)
Column 18 = '[1183009500-1242149250]': Sd (0.0)
Column 18 = '[1242149250-1301289000]': Sd (0.0)
Column 18 = '[1301289000-1360428750]': Sc (4.0)
Column 18 = '[1360428750-1419568500]': Sd (58.0)
Column 18 = '[1419568500-1478708250]': Sd (0.0)
Column 18 = '[1478708250-1537848000]': Sd (0.0)
Column 18 = '[1537848000-1596987750]': Sd (0.0)
Column 39 = '[68310476-74391775.5]': E (0.0)
Column 39 = '[74391775.5-80473075]': Im (28.0)
Column 39 = '[80473075-86554374.5]': Im (122.0)
Column 39 = '[86554374.5-inf]': Im (95.0)
Number of Leaves : 28

Size of the tree : 31
Time taken to build model: 0.05 seconds

--- Stratified cross-validation ---
Correctly Classified Instances 881 100 %
Incorrectly Classified Instances 0 0 %
Kappa statistic 1
Mean absolute error 0.0003
Root mean squared error 0.009
Relative absolute error 0.1521 %
Root relative squared error 2.7591 %
Total Number of Instances 881

--- Detailed Accuracy By Class ---

<table>
<thead>
<tr>
<th>TP Rate</th>
<th>FP Rate</th>
<th>Precision</th>
<th>Recall</th>
<th>F-Measure</th>
<th>ROC Area</th>
<th>Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>E</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>Im</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>Sa</td>
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<tr>
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<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>Sbc</td>
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<tr>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>Sb</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>Sc</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>Sd</td>
</tr>
</tbody>
</table>

--- Confusion Matrix ---

<table>
<thead>
<tr>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
<th>e</th>
<th>f</th>
<th>g</th>
</tr>
</thead>
<tbody>
<tr>
<td>327</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>245</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>148</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>25</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>68</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>58</td>
<td>0</td>
</tr>
</tbody>
</table>

Παρότι δεν υπήρξαν αλλαγές σα αποτελέσματα, θα προβούμε σε εκ νέου τροποποιήσεις στους κανόνες προκειμένου να εντοπίσουμε τυχόν αλλαγές στα αποτελέσματα, έτσι το επόμενο παράθυρο απεικονίζει τους νέους κανόνες βάση των οποίων θα τρέξει για άλλη μια φορά ο αλγόριθμος j48.
Πατάμε οκ για να επικυρώσουμε τους κανόνες και στη συνέχεια υλοποιούμε τον αλγόριθμο και έτσι προκύπτει το επόμενο αποτέλεσμα.

Τα αποτελέσματα που απορρέουν τώρα είναι διαφορετικά όπως θα δούμε αμέσως μετά.

Run information ===

Scheme: weka.classifiers.trees.J48 -C 0.8 -M 10
Relation: 2 -parametroi - BP xwris teleies to weka ta vgazei numeric- 
weka.filters.unsupervised.attribute.NumericToNominal-R1,2,3,4-
weka.filters.unsupervised.attribute.Discretize-B10-M-1.0-R6-53-
weka.filters.unsupervised.attribute.Remove-R54-
weka.filters.unsupervised.attribute.NumericToNominal-Rfirst-last-
weka.filters.unsupervised.attribute.Remove-R1-4
Instances: 881
Attributes: 49
Morphological Type
Column 0
Column 1
Column 2
………………
Column 46
Column 47

Test mode: 10-fold cross-validation

===== Classifier model (full training set) =====

J48 pruned tree

Column 39 = '(-inf-37903978.5]': E (327.0)
| Column 39 = [37903978.5-43985278]| Sa (10.0) |
| Column 39 = (43985278-50066577.5] | |
| Column 15 = (-inf-1415072800] : Sb (0.0) |
| Column 15 = (1415072800-1479495400] : Sb (20.0) |
| Column 15 = (1479495400-1543918000] : Sbc (13.0/5.0) |
| Column 15 = (1543918000-1608340600] : Sb (0.0) |
| Column 15 = (1608340600-1672763200] : Sb (0.0) |
| Column 15 = (1672763200-1737185800] : Sb (0.0) |
| Column 15 = (1737185800-1801608400] : Sb (0.0) |
| Column 15 = (1801608400-1866031000] : Sb (0.0) |
| Column 15 = (1866031000-1930453600] : Sb (0.0) |
| Column 15 = (1930453600-inf] : Sb (0.0) |
| Column 39 = (50066577.5-56147877] : Sbc (140.0) |
| Column 39 = (56147877-62229176.5] : Sc (64.0) |
| Column 39 = (62229176.5-68310476] : Sd (62.0/4.0) |
| Column 39 = (68310476-74391775.5] : E (0.0) |
| Column 39 = (74391775.5-80473075] : Im (28.0) |
| Column 39 = (80473075-86554374.5] : Im (122.0) |
| Column 39 = (86554374.5-inf] : Im (95.0) |

Number of Leaves : 19
Size of the tree : 21
Time taken to build model: 0.05 second

--- Stratified cross-validation ---

Correctly Classified Instances 873 99.0919 %
Incorrectly Classified Instances 8 0.9081 %
Kappa statistic 0.9878
Mean absolute error 0.004
Root mean squared error 0.047
Relative absolute error 1.8859 %
Root relative squared error 14.3951 %
Total Number of Instances 881

--- Detailed Accuracy By Class ---

<table>
<thead>
<tr>
<th>TP Rate</th>
<th>FP Rate</th>
<th>Precision</th>
<th>Recall</th>
<th>F-Measure</th>
<th>ROC Area</th>
<th>Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>E</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>Im</td>
</tr>
<tr>
<td>1</td>
<td>0.005</td>
<td>0.974</td>
<td>1</td>
<td>0.987</td>
<td>1</td>
<td>Sbc</td>
</tr>
<tr>
<td>0.84</td>
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<td>0.84</td>
<td>0.913</td>
<td>0.999</td>
<td>Sb</td>
<td></td>
</tr>
<tr>
<td>0.941</td>
<td>0.1</td>
<td>0.941</td>
<td>0.97</td>
<td>0.997</td>
<td>Sc</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>0.005</td>
<td>0.935</td>
<td>1</td>
<td>0.967</td>
<td>0.997</td>
<td>Sd</td>
</tr>
</tbody>
</table>

--- Confusion Matrix ---

a b c d e f g "-- classified as
327 0 0 0 0 0 | a = E
0 245 0 0 0 0 | b = Im
0 0 10 0 0 0 | c = Sa
0 0 0 148 0 0 | d = Sbc
0 0 0 4 21 0 | e = Sb
0 0 0 0 64 4 | f = Sc
0 0 0 0 58 | g = Sd

Όπως παρατηρούμε τα αποτελέσματα αφορούν τις στήλες 39 και 15, ενώ στις προηγούμενες υλοποιήσεις τα αποτελέσματα που προέκυπταν βρισκόταν στις στήλες 14, 18, και 39.

4. Αλγόριθμος NaïveBayes

Η Bayesian κατηγοριοποίηση (classification) βασίζεται στη στατιστική θεωρία κατηγοριοποίησης του Bayes. Ο απλούστερος Bayesian κατηγοριοποιητής είναι ο γνωστός Naïve Bayesian κατηγοριοποιητής. Αυτός υποθέτει ότι η επίδραση ενός γνωρισμάτος (attribute) σε μια δεδομένη κατηγορία είναι ανεξάρτητη από τις τιμές των άλλων γνωρισμάτων. Αυτή η υπόθεση γίνεται για να απλοποιήσει τους υπολογισμούς που εμπλέκονται και καλείται υπό συνθήκη ανεξαρτησία (conditional independence) κατηγοριών.

Ο Naïve Bayesian κατηγοριοποιητής υπολογίζει τις υπό συνθήκη πιθανότητες της κατηγορίας υποθέτοντας υπό συνθήκη ανεξαρτησία (conditional independence), και αποτελεί μια πολύ αποδοτική τεχνική. Θεωρητικά οι Bayesian κατηγοριοποιητές έχουν το ελάχιστο ποσοστό σφάλματος σε σύγκριση με όλους τους άλλους κατηγοριοποιητές. Στην πράξη, όμως, αυτό δεν σημαίνει πάντα λόγω των υποθέσεων που απαιτούνται να γίνουν κατά τη χρήση τους, όπως η υπό συνθήκη ανεξαρτησία, και η έλλειψη διαδεδομένων δεδομένων για τον ακριβή υπολογισμό των υπό συνθήκη πιθανοτήτων. Ωστόσο, έχει βρεθεί ότι είναι συγκρίσιμο με τα δενδρά απόφασης και τους κατηγοριοποιητές που βασίζονται σε νευρωνικά δίκτυα σε μερικές εφαρμογές.

Η κατηγοριοποίηση Naïve Bayes περιέχει καλά ακόμη και αν καταστρατηγείται φανερά η παράδοξη περί ανεξαρτησίας χαρακτηριστικών. Και αυτό έγκειται στο ότι η κατηγοριοποίηση δεν απαιτεί ακριβείς εκτιμήσεις πιθανοτήτων αρκεί η μέγιστη πιθανότητα να αντιστοιχεί στη σωστή κλάση. Όμως η προσθήκη επιπλέον χαρακτηριστικών μπορεί να δημιουργήσει προβλήματα, π.χ. τουτόσημα χαρακτηριστικά.
4.1 Επεξεργασία αστρονομικών δεδομένων με τον αλγόριθμο Naïve Bayes

Ανοίγοντας το αρχείο με τα αστρονομικά δεδομένα στο περιβάλλον του WEKA, εμφανίζονται όλες οι στήλες με τις παραμέτρους και τις τιμές του φάσματος και κατόπιν επιλέγουμε όλες τις παραμέτρους εκτός του μορφολογικού τύπου και μετά πατάμε remove ώστε να λάβουμε υπόψη μόνο τον μορφολογικό τύπο στην επεξεργασία που πρόκειται να γίνει, και επιπλέον μετατρέπουμε τις τιμές από Numeric σε Nominal αφού στο WEKA μόνο σε αυτή την μορφή επεξεργάζονται σωστά τα δεδομένα. Μετά τις προαναφερόμενες ενέργειες προκύπτει το ακόλουθο παράθυρο.

![WEKA Interface](https://example.com/fig1.png)

Στη συνέχεια πατάμε classify και επιλέγουμε από το μενού του choose τον αλγόριθμο που Naïve Bayes θα υλοποιήσουμε σε αυτό το στάδιο της εργασίας, και κατόπιν πατάμε start προκειμένου να ξεκινήσει ο αλγόριθμος, και έτσι τελικά προκύπτει το παρακάτω παράθυρο.
4.2 Απεικόνιση και σχολιασμός αποτελεσμάτων

Μετά την υλοποίηση του αλγόριθμου απορρέουν τα ακόλουθα αποτελέσματα τα οποία στην συνέχεια θα αξιολογηθούν.

==== Run information ====
Scheme: weka.classifiers.bayes.NaiveBayes
Relation: 2 -parametroi - BP xwris teleies to weka ta vgazei numeric-
weka.filters.unsupervised.attribute.NumericToNominal-R1,2,3,4-
weka.filters.unsupervised.attribute.Discretize-B10-M-1.0-R6-53-
weka.filters.unsupervised.attribute.Remove-R54-
weka.filters.unsupervised.attribute.Remove-R1-4
Instances: 881
Attributes: 49 Morphological Type
  Column 0
  Column 1
  Column 2
  ..........
  Column 46
  Column 47
Test mode: 10-fold cross-validation
==== Classifier model (full training set) ====
Naive Bayes Classifier

Class E: Prior probability = 0.37

| Column 0: Discrete Estimator. Counts = 326 3 1 1 1 1 1 1 1 1 1 (Total = 337) |
| Column 1: Discrete Estimator. Counts = 326 3 1 1 1 1 1 1 1 1 1 (Total = 337) |
| Column 2: Discrete Estimator. Counts = 310 19 1 1 1 1 1 1 1 1 (Total = 337) |
| Column 46: Discrete Estimator. Counts = 328 1 1 1 1 1 1 1 1 (Total = 337) |
| Column 47: Discrete Estimator. Counts = 328 1 1 1 1 1 1 1 1 (Total = 337) |
| **Class Im: Prior probability = 0.28** |
| Column 0: Discrete Estimator. Counts = 1 1 1 1 1 1 1 25 114 121 (Total = 255) |
| Column 1: Discrete Estimator. Counts = 1 1 1 1 1 1 1 19 115 115 (Total = 255) |
| Column 2: Discrete Estimator. Counts = 1 1 1 1 1 1 1 29 104 104 (Total = 255) |
| …… |
| Column 46: Discrete Estimator. Counts = 1 1 1 1 1 1 1 25 119 104 (Total = 255) |
| Column 47: Discrete Estimator. Counts = 1 1 1 1 1 1 1 118 105 105 (Total = 255) |
| **Class Sa: Prior probability = 0.01** |
| Column 0: Discrete Estimator. Counts = 11 1 1 1 1 1 1 1 1 1 (Total = 20) |
| Column 1: Discrete Estimator. Counts = 11 1 1 1 1 1 1 1 1 1 (Total = 20) |
| Column 2: Discrete Estimator. Counts = 11 1 1 1 1 1 1 1 1 1 (Total = 20) |
| …… |
| Column 46: Discrete Estimator. Counts = 1 1 1 1 1 1 1 1 1 1 (Total = 20) |
| Column 47: Discrete Estimator. Counts = 1 1 1 1 1 1 1 1 1 1 (Total = 20) |
| **Class Sbc: Prior probability = 0.17** |
| Column 0: Discrete Estimator. Counts = 1 7 124 20 1 1 1 1 1 1 (Total = 158) |
| Column 1: Discrete Estimator. Counts = 1 7 119 25 1 1 1 1 1 1 (Total = 158) |
| Column 2: Discrete Estimator. Counts = 1 30 88 33 1 1 1 1 1 1 (Total = 158) |
| …… |
| Column 46: Discrete Estimator. Counts = 1 1 41 109 1 1 1 1 1 1 (Total = 158) |
| Column 47: Discrete Estimator. Counts = 1 1 41 109 1 1 1 1 1 1 (Total = 158) |
| **Class Sb: Prior probability = 0.03** |
| Column 0: Discrete Estimator. Counts = 1 26 1 1 1 1 1 1 1 1 1 (Total = 35) |
| Column 1: Discrete Estimator. Counts = 1 26 1 1 1 1 1 1 1 1 1 (Total = 35) |
| Column 2: Discrete Estimator. Counts = 13 14 1 1 1 1 1 1 1 1 1 (Total = 35) |
| Column 46: Discrete Estimator. Counts = 1 5 22 1 1 1 1 1 1 1 1 (Total = 35) |
| Column 47: Discrete Estimator. Counts = 1 5 22 1 1 1 1 1 1 1 1 (Total = 35) |

| Class Sc: Prior probability = 0.08 |
| Column 0: Discrete Estimator. Counts = 1 1 1 1 57 13 1 1 1 1 1 (Total = 78) |
| Column 1: Discrete Estimator. Counts = 1 1 1 1 53 17 1 1 1 1 1 (Total = 78) |
| Column 2: Discrete Estimator. Counts = 1 1 1 1 40 30 1 1 1 1 1 (Total = 78) |
| Column 46: Discrete Estimator. Counts = 1 1 1 1 64 6 1 1 1 1 1 (Total = 78) |
| Column 47: Discrete Estimator. Counts = 1 1 1 1 62 8 1 1 1 1 1 (Total = 78) |

| Class Sd: Prior probability = 0.07 |
| Column 0: Discrete Estimator. Counts = 1 1 1 1 41 19 1 1 1 1 1 (Total = 68) |
| Column 1: Discrete Estimator. Counts = 1 1 1 1 40 20 1 1 1 1 1 (Total = 68) |
| Column 2: Discrete Estimator. Counts = 1 1 1 1 28 32 1 1 1 1 1 (Total = 68) |
| Column 46: Discrete Estimator. Counts = 1 1 1 1 59 1 1 1 1 1 1 (Total = 68) |
| Column 47: Discrete Estimator. Counts = 1 1 1 1 59 1 1 1 1 1 1 (Total = 68) |

Time taken to build model: 0.02 second
Morfologikos typos

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<th></th>
<th>E</th>
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<td>0.08</td>
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<td>148</td>
<td>25</td>
<td>68</td>
<td>58</td>
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</tbody>
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Ο προηγούμενος πίνακας περιέχει όλους τους μορφολογικούς τύπους που απεικονίζονται κατά μήκος της πρώτης γραμμής του πίνακα και η δεύτερη γραμμή περιέχει την Prior probability που αντιστοιχεί σε κάθε μορφολογικό τύπο, και τέλος η τρίτη γραμμή μας ενημερώνει για την άριθμητική παρουσία των μορφολογικών τύπων.

4. Συμπεράσματα

Και στους τρεις αλγόριθμους τα αποτελέσματα κατά κύριο λόγο είναι ίδια, αφού οι αριθμητικές εμφανίσεις των μορφολογικών τύπων είναι ίδιες, όμως η απεικόνιση των αποτελεσμάτων είναι αυτή που ίσως κάνει τη διαφορά. Ειδικότερα αν παρατηρήσουμε τα παραπάνω δέντρα θα εντοπίσουμε ότι στα δέντρα που αντιστοιχούν στον id3 αλγόριθμο απορρέουν οι τιμές που αντιστοιχούν σε κάποιον μορφολογικό τύπο, και σε αυτούν τον αλγόριθμο επιβεβαιώνεται το μειονέκτημα του αφού στα
αποτελέσματα που απορρέουν βλέπουμε μόνο δύο στήλες την 0 και την 18, ενώ στο δέντρο (του j48) που έπεται έχουμε επιπλέον πληροφορία η οποία έγκειται στην απεικόνιση της τιμής που ξεκινά και καταλήγει η αντιστοίχιση της με τον μορφολογικό τύπο στον οποίο ανήκει, σε περισσότερες στήλες από ότι απορρέουν από τον id3, και αυτό επιβεβαιώνει και τη θεωρία που ακολουθεί αυτούς τους δύο αλγόριθμους, ειδικότερα ο j48 σύμφωνα με τη θεωρία αποτελεί μια πιο βελτιωμένη έκδοση του id3, και αυτό επιβεβαιώνεται στην πράξη αφού τα αποτελέσματα που απορρέουν εντοπίζονται σε περισσότερες στήλες, από ότι στον j48. Επίσης στα δέντρα που υπάρχουν στον αλγόριθμο NaiveBayes απεικονίζεται η Prior probability που αντιστοιχεί σε κάθε μορφολογικό τύπο που αντιστοιχεί σε τιμή φάσματος. Επίσης στον αλγόριθμο NaiveBayes η λεπτομέρεια στα αποτελέσματα είναι μεγαλύτερη αφού έχουμε περισσότερη πληροφορία να απορρέει μετά από την επεξεργασία του αλγόριθμου. Ειδικότερα στο θεωρητικό υπόβαθρο των αλγόριθμων απεικονίζεται το βασικό μειονέκτημα του αλγόριθμου id3, αναφέροντας ότι αυτός ο αλγόριθμος μεροληφτεί υπέρ των γνωρισμάτων με μεγάλο αριθμό διαφάνειες, και ακολουθεί ο αλγόριθμος j48, ο οποίος αποτελεί μια πιο βελτιωμένη έκδοση του αλγόριθμου id3, τέλος ο αλγόριθμος NaiveBayes δημιουργεί μια κατηγοριοποίηση που δουλεύει άψογα και στην προκειμένη περίπτωση το μειονέκτημα του αλγόριθμου δεν γίνεται αισθητό αφού χρησιμοποιούμε μία παράμετρο (ένα γνώρισμα), σε αντίθετη περίπτωση δηλαδή αν προσθέταμε και άλλες παραμέτρους τότε ίσως να εμφανίζονταν κάποια προβλήματα, στην προκειμένη περίπτωση ο αλγόριθμος λειτουργεί άψογα και επιπλέον μας δίνει σωστή και εμπεριστατωμένη πληροφορία. Επιπλέον αλλάζοντας τους κανόνες στον αλγόριθμο j48 παρατηρήσαμε ότι στην περίπτωση που τα αποτελέσματα είχαν διαφοροποιηθεί είχαμε διαφορετικές εμφάνισεις στηλών στις οποίες η αριθμητική υπεροχή των μορφολογικών τύπων παραμένει ίδια, όπως είχε συμβεί στην υλοποίηση και των τριών αλγόριθμων.

**Βιβλιογραφία**

Ελληνικές Επιχειρήσεις στα Βαλκάνια: Εκτιμήσεις και Προοπτικές

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Περίληψη:
Οι βαλκανικές χώρες έχουν σημειώσει σημαντική πρόοδο στην προσπάθεια τους να γίνουν μια λειτουργική οικονομία της αγοράς, αν και θα λέγαμε ότι δεν είναι ακόμα ικανές να αντιμετωπίσουν τις ανταγωνιστικές πιέσεις και τις δυνάμεις αγοράς εντός της Ευρωπαϊκής Ένωσης. Ο όγκος των επενδυμένων κεφαλαίων σε αυτές τις χώρες είναι πολύ περιορισμένος και υπάρχει έλλειψη δυτικού επενδυτικού ενδιαφέροντος. Με δεδομένη αυτή την κατάσταση, οι Έλληνες επιχειρηματίες έχουν βρει έδαφος για να πραγματοποιήσουν αρκετά μεγάλες επενδύσεις σε σχέση με τα οικονομικά μεγέθη της Ελλάδας. Οι ελληνικές επενδύσεις είναι σημαντικές όχι μόνο σε όγκο αλλά και σε αριθμό και ανέρχονται σε 6 δισ. δολάρια, συνυπολογίζονται την ειδική περίπτωση του ΟΤΕ στη Ρουμανία και τη χρήση των υπεράκτιων κέντρων της Κύπρου και του Λουξεμβούργου από Έλληνες1. Περίπου 4.000 ενεργείς Ελληνικές Επιχειρήσεις προσέφεραν και προσφέρουν υπηρεσίες προστίθεμενης αξίας στις βαλκανικές οικονομίες, όπως τοποθετήσεις εργαζομένων, καλύτερης ποιότητας προϊόντα, ευρύτερη ποιότητα προϊόντων, αυξανόμενη παραγωγή2. Επίσης 25 περίπου ελληνικές πολυεθνικές έχουν επενδύσει το 80% των συνολικών ελληνικών εκροών σε ολόκληρη τη βαλκανική περιοχή3. Συγχρόνως, περίπου 3.000 - 3.500 ενεργείς ελληνικές επιχειρήσεις από τις 8.000 - 10.000 εγγεγραμμένες πρόσφεραν και προσφέρουν δραστηριότητες

1 Μπιζήνης, Α. (2003a). «Η Δυναμική των Βαλκανικών Αγορών & Η Μετάβαση των Χωρών της Ανατολικής Ευρώπης στην Οικονομία της Αγοράς».
2 Μπιζήνης, Α. (2003b). «Η Δυναμική των Βαλκανικών Αγορών & Η Μετάβαση των Χωρών της Ανατολικής Ευρώπης στην Οικονομία της Αγοράς».
προστιθέμενης αξίας στις βαλκανικές οικονομίες, όπως νέες θέσεις εργασίας, προϊόντα καλύτερης ποιότητας, ευρύτερη ποικιλία των προϊόντων και αύξηση της παραγωγής. Με δεδομένο ότι οι εταιρείες από τις ανεπτυγμένες δυτικές χώρες έχουν αναπτύξει υψηλό επιδεικτικό ενδιαφέρον για τις χώρες της Κεντρικής Ευρώπης, οι ελληνικές επιχειρήσεις πρέπει να στραφούν στις βαλκανικές χώρες αφού αναλύουν με προσοχή τα οικονομικά και επιχειρησιακά δεδομένα των βαλκανικών χωρών και λάβουν υπόψη κυρίως τη γεωγραφική και πολιτισμική εγγύτητα καθώς και τη γνώση του επιχειρηματικού περιβάλλοντός των Βαλκανίων.

1. Εισαγωγή

Η εργασία αφορά τις Ελληνικές επενδύσεις στα Βαλκάνια, και απεικονίζει τους λόγους στους οποίους οφείλεται αυτή η δραστηριότητα. Επιπλέον αναφέρονται κάποιες από τις Ελληνικές εταιρίες αλλά και οι Βαλκανικές χώρες στις οποίες αυτές δραστηριοποιούνται. Ακολουθούν οι λόγοι στους οποίους οφείλεται η Ελληνική επιχειρηματική επέκταση στα Βαλκάνια αλλά και τα κίνητρα που υπάρχουν στο Βαλκανικό χώρο για επιτυγχάνοντο επιχειρηματικές δραστηριότητες. Στη συνέχεια πραγματοποιείται αναφορά στις αποτυχημένες επενδυτικές προσπάθειες στο χώρο των Βαλκανίων και ειδικότερα στους λόγους στους οποίους οφείλεται αυτή η αποτυχία.

Κατόπιν παρουσιάζονται τα συμπεράσματα που απορρέουν από την αξιολόγηση των στοιχείων που συλλέχθηκαν με την παρουσίαση προτάσεων διά την αποφυγή αποτυχημένων επιχειρηματικών εγχειρημάτων.

2. Μαγνήτης για τους Έλληνες επιχειρηματίες οι χώρες των Βαλκανίων

1Μεσομένα κατά 50% κόστη λειτουργίας της επιχείρησής και από 70% έως 70% εργατικού δυναμικού είναι τα χαρακτηριστικά των χωρών της Νοτιοανατολικής Ευρώπης, η οποία συνεχίζει να αποτελεί Ελληνοπροέλαυντα για τις ελληνικές επιχειρήσεις. Παρά τον παγκόσμιο "ιό" που έχει προβάλει αισθητά τις οικονομίες των γειτονικών μας χωρών, μεγάλες ελληνικές εμπορικές επιχειρήσεις συνεχίζουν την επενδυτική τους δράση, έστω και με πιο συνθετικούς ρυθμούς, στοχεύοντας στην ενίσχυση της παρουσίας τους και δημιουργώντας τις προϋποθέσεις ανάπτυξης για την επόμενη μέρα μετά την κρίση. Κίνητρο, όπως καταδεικνύουν τα στατιστικά στοιχεία, για τους Έλληνες επενδυτές είναι ο έντονος ρυθμός ανάπτυξης που καταγράφεται τα τελευταία χρόνια στη NA Ευρώπη αλλά και η σταδιακή εδραίωση ενός σταθερού μακροοικονομικού περιβάλλοντος. Να σημειωθεί ότι ο μεγαλύτερος ρυθμός ανάπτυξης

1 Πηγή: makthes.gr 27-09-2009
παρατηρήθηκε την προηγούμενη χρονιά στο Μαυροβούνιο (8,1%) και ακόλουθος στην Αλβανία και τη Σερβία με 6,1%. Είναι χαρακτηριστικό ότι οι ελληνικές επιχειρήσεις έχουν υλοποιήσει επενδύσεις άνω των 15 δισ. ευρώ στη Νότιοανατολική Ευρώπη, δημιουργώντας περισσότερες από 200.000 θέσεις εργασίας.

Ειδικά στη Βουλγαρία, τη Ρουμανία και τη Σερβία οι ελληνικές επιχειρήσεις συγκαταλέγονται μεταξύ των τριών μεγαλύτερων ξένων επενδυτών. Οι αγορές της Ρουμανίας, της Τουρκίας, της Βουλγαρίας, της Σερβίας και της Αλβανίας, στις οποίες οι εγχώριες τράπεζες έχουν παρουσία, αποτελούν μια πρόκληση για τους έλληνες τραπεζίτες λόγω των υψηλών ρυθμών ανάπτυξης που παρουσιάζουν.

ΑΛΒΑΝΙΑ

1 Η Ελλάδα κατέχει περίπου το 27% επί του συνόλου των ξένων επενδύσεων στην Αλβανία και την πρώτη θέση σε επενδυμένο κεφάλαιο, το οποίο υπερβαίνει τα 800 εκατ. δολάρια (545 εκατ. ευρώ). Οι περίπου 270 ελληνικές και ελληνικών συμφερόντων επιχειρήσεις δραστηριοποιούνται κυρίως στους τομείς: τηλεπικοινωνιών, εμπορικών τραπεζών, εργοληψίας και κατασκευών, εμπορίας καπνού, εμπορίας και διακίνησης πετρελαίου και πετρελαιοειδών, κλωστοφαντουργίας, τροφίμων και ειδών ενδύσεως - υπόδησης. Μεταξύ των ελληνικών επιχειρήσεων στην Αλβανία αναφέρονται τέσσερις τράπεζες -Εθνική, Εμπορική, η θυγατρική της Πειραιώς Tirana Bank και η Alpha- που συνεχώς επεκτείνονται. Οι ελληνικές τράπεζες, όπως η Alpha Bank, η Εθνική και η Εμπορική Τράπεζα κατέχουν υψηλά ποσοστά στην τραπεζική αγορά στους τομείς των χορηγούμενων δανείων, των καταθέσεων και των κερδών.

ΒΟΥΛΓΑΡΙΑ

Όι ελληνικές επενδύσεις στη Βουλγαρία για το διάστημα 1992 ως 2007 υπερέβαλαν κατά πολύ το 1,5 δισ. ευρώ, καταλαμβάνοντας ποσοστό 10% στις συνολικές άμεσες έξεσες επενδύσεις στη χώρα αυτή και την τρίτη θέση μετά την Αυστρία και την Ολλανδία. Ειδικότερα, οι ελληνικές τράπεζες κατέχουν το 23,6% των συνολικών τραπεζικών κεφαλαίων. Οι ενεργές ελληνικές επιχειρήσεις ανέρχονται σε περίπου 1.500 (με εγχειρημένες επιχειρήσεις στη Βουλγαρία πάνω από 3.000) και έχουν δημιουργήσει πολλές δεκάδες χιλιάδες θέσεις εργασίας, ιδιαίτερα στη Νότια Βουλγαρία, όπου λειτουργούν εργοστάσια και βιοτεχνίες παραγωγής ενδυμάτων και υποδημάτων.

ΣΚΟΠΙΑ

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Η Ελλάδα κατέχει την πρώτη θέση μεταξύ των ξένων επενδυτών στα Σκόπια την τελευταία δεκαετία. Το ύψος των συνολικών ελληνικών επενδύσεων που έχουν υλοποιηθεί ή βρίσκονται στο στάδιο της υλοποίησης ανέρχεται σε περίπου 950 εκατ. ευρώ. Οι ελληνικές επενδύσεις αφορούν κυρίως τους ακόλουθους τομείς: τρόφιμα - αναψυκτικά (ειδή αρτοποιίας, παγωτά, μπίρα, μη οινοπνευματώδη ποτά), ενέργεια - πετρέλαιο, βιομηχανία σιμέντου, ορυχεία, μάρμαρα, τράπεζες, κατανομημηχανές, έτοιμο ενδομα και αξεσουάρ (παραγωγή φασών) και σύσταση εμπορικών εταιρειών και αντιπροσωπειών.

ΡΟΥΜΑΝΙΑ
Σύμφωνα με τα επίσημα ρουμανικά στοιχεία, η Ελλάδα κατέχει την ένατη θέση μεταξύ των ξένων επενδυτών στη Ρουμανία, με συνολικό επενδυμένο κεφάλαιο ύψους 505,5 εκατ. ευρώ. Σύμφωνα όμως με ορθότερες εκτιμήσεις, η Ελλάδα κατατάσσεται μεταξύ των τριών πρώτων ξένων επενδυτών (οι μεγαλύτερες ελληνικές επενδύσεις στα Βαλκάνια έχουν γίνει στη Ρουμανία), με 800 περίπου ενεργές επιχειρήσεις και με το συνολικό ελληνικό κεφάλαιο που επενδύθηκε να υπολογίζεται σε άνω του 3 δισ. ευρώ, λαμβάνοντας υπόψη και την αύξηση κεφαλαίων από τον OTE-Romtelecom το 2002, την εξαγορά μετοχών από τη Eurobank της Bank Post το έτος 2002 και το 2003 και την εξαγορά πλειοψηφίας μετοχών από την Εθνική Τράπεζα της Banka Romaneska το 20032.

ΣΕΡΒΙΑ
Τα σκήπτρα στις επενδύσεις στη Σερβία κρατά η χώρα μας. Σύμφωνα με τα επίσημα στοιχεία της Σερβικής Υπηρεσίας Προώθησης Επενδύσεων για τις άμεσες επενδύσεις, κατά το διάστημα 2001 - 2004 οι ελληνικές επενδύσεις καταλαμβάνουν την τέταρτη θέση, με το ύψος του κεφαλαίου που επενδύθηκε να φθάνει τα 122,12 εκατ. δολ. Ωστόσο, τα στοιχεία αυτά δεν περιλαμβάνουν επενδύσεις που έγιναν πριν από το 2001, επενδύσεις μέσω υπερμικτών εταιρειών, επενδύσεις στο Μαυροβούνιο, καθώς και επενδύσεις σε είδος, παραχωρήσεις δικαιωμάτων κ.ά. Οι ελληνικές άμεσες επενδύσεις -από το 1996 έως σήμερα- ανέρχονται σε 1,8 δισ. ευρώ. Το συνολικό ελληνικό επενδυμένο κεφάλαιο (συνυπολογιζόμενο αμέσως και άλλων επενδύσεων) ανέρχεται σε 2,1 δισ. ευρώ. Σημειώνεται η παρουσία 150 μεικτών ελληνογιουγκοσλαβικών εταιρειών, καθώς και 120 περίπου αμιγώς ελληνικών3.

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3. Λόγοι που δικαιολογούν τις επενδύσεις

Υπάρχουν πολλοί λόγοι για τους οποίους η Ελλάδα και πιο συγκεκριμένα οι ελληνικές εταιρείες επενδύουν στα Βαλκάνια. Πιο συγκεκριμένα, επειδή:

- Τα Βαλκάνια προσφέρουν στην Ελλάδα μία εντελώς νέα αγορά (Petrochilos και Salavrakos 2003).
- Η νέα αγορά των Βαλκανίων βρίσκεται πολύ κοντά στην Ελλάδα (Petrakos, 1997).
- Στην αγορά των Βαλκανίων υπάρχει έλλειψη εγχώριου ανταγωνισμού.
- Τα Βαλκάνια προσφέρουν φτηνό εργατικό κόστος, έτσι οι μεταφερόμενες επιχειρήσεις «συμβάλλουν» στην αύξηση της ανεργίας στην Ελλάδα και ιδιαίτερα στη Βόρεια Ελλάδα.
- Η Ελλάδα ειδικεύεται στη φασόν παραγωγή (ειδικά η Βόρεια Ελλάδα), η οποία στηρίζεται επίσης στο χαμηλό κόστος της ανειδικευτής εργασίας. Οι γειτονικές Βουλγαρία, Αλβανία και ΠΓΔΜ προσφέρουν εξαιρετικά καλούς όρους από αυτή την άποψη. Είναι σημαντικό να σημειώσουμε ότι η ανάλογα των αμοιβών μεταξύ Ελλάδας και Βαλκανίων ήταν 1:8 στην αρχή της μετάβασης και είναι τώρα 1:4 ή και ακόμη 1:5. Εντούτοις η παραγωγικότητα της εργασίας στα Βαλκάνια στα πρώτα χρόνια ήταν 1:3, αλλά με την αυξανόμενη εμπειρία σε ορισμένες περιοχές πλησίαζε εκείνη των Ελλήνων εργαζομένων. Η τελευταία ανάπτυξη οφείλεται στη συγκέντρωση ενός μεγάλου αριθμού ελληνικών υφαντουργικών επιχειρήσεων (ιδιαίτερα στη Νότια Βουλγαρία), οι οποίες δημιουργούσαν υψηλότερη ζήτηση για εργασία και αύξησαν στη συνέχεια τους μισθούς.
- Η ύπαρξη πολύ ευνοϊκών εμπορικών συμφωνιών (φορολογικές απαλλαγές, έλλειψη ποσοστώσεων και δασμολογίων κ.λπ.) μεταξύ της Βουλγαρίας και άλλων κοινών χωρών, καθώς και η χαμηλή φορολογία (15% φόρος επί των εταιρικών κερδών στη Βουλγαρία από 1/1/2005).
- Η γεωργική, ο υψηλός κίνδυνος, η διαφθορά που χαρακτηρίζουν την οικονομία των Βαλκανίων αποτελούν αποθεωρητικά παράγοντες για τους δυτικούς επενδυτές, ενώ οι Έλληνες ένιωσαν εξοικειωμένοι με αυτή την πραγματικότητα που την είχαν ξέσει και στην Ελλάδα κατά τη διάρκεια της δεκαετίας του 1980 (και τη «ξόνω» εν μέρει μέχρι και σήμερα) (Iammarino και Pitelis, 2000).
- Υπήρξε μια γενική ευφορία που προκύπτει από την κατάρρευση των κομμουνιστικών καθεστώτων και την ανάλογη ανάγκη για αγαθά και υπηρεσίες στις χώρες που υποδεικνύουν το γρήγορο και εύκολο
κέρδος. Αυτή η ευφορία ενθαρρύνει τους Έλληνες επιχειρηματίες να ενεργήσουν βιαστικά και χωρίς προηγούμενη και λεπτομερή έρευνα της αγοράς.

- Η παρουσία χιλιάδων σπουδαστών στα πανεπιστήμια κυρίως της Σερβίας, της Βουλγαρίας και της Ρουμανίας προσέλκυσε τους Έλληνες επιχειρηματίες για να επενδύσουν -ειδικά- στους κλάδους της ψυχαγωγίας, των εστιατορίων και της βιομηχανίας τροφίμων.

- Τέλος, η πώληση κρατικών επιχειρήσεων μέσω της ιδιωτικοποίησης ή της δημιουργίας κοινών (κοινοπραξών) επιχειρήσεων (joint ventures) έβαλε σε «σειριακό» μεγάλες ελληνικές επιχειρήσεις, όπως η Ελληνική Εταιρεία Εμφαίλωση Coca-Cola, το Τιτάν, το Intracom, η Δέλτα, το Goody's, η Nika, η Χαρτοποιία Θράκης και άλλες, να μπουν στην αγορά και απεκτήσαν ένα μεγάλο μέρος αυτής. Αυτή η συμμετοχή των ελληνικών επιχειρήσεων στη βαλκανική αγορά θα δώσει άθικτη στην ισχύ τους και στη θέση τους στην παγκόσμια αγορά και θα αξιώσει το παγκόσμιο μερίδιο αγοράς [π.χ. η Ελληνική Εταιρεία Εμφαίλωσης έγινε ο δεύτερος μεγαλύτερος εμφαίλωτης στον κόσμο (πέσες από τον ανταγωνισμό)] (Bitzenis, 2002).

4. Ελληστικά κίνητρα στο χώρο των Βαλκανίων

Χαμηλοί φορολογικοί συντελεστές και φθηνό εργατικό δυναμικό είναι τα ισχυρότερα και ελκυστικότερα κίνητρα για επενδύσεις στις βαλκανικές χώρες. Σε δυσχερή θέση η Ελλάδα, καθώς υποχωρούν οι εγχώριες επενδύσεις και οι βιομηχανίες μετακομίζουν σε γειτονικές χώρες. Όπως σημειώνει η εφημεριδά Το Βήμα την Κυριακή, την ώρα που η ελληνική κυβέρνηση μειώνει δεκά τη φορολογία των κερδών (από 35% σε 32%) και σταδιακά στο τέλος της τετραετίας στο 25%) οι γειτονικές χώρες είναι φορολογικοί παράδεισοι για τις επιχειρήσεις. Οι συντελεστές φορολογίας κερδών κυμαίνονται γύρω στο 15%, με πλήθος φορολογικών κινήτρων, τα οποία αν συνδυάστουν με το επίπεδο του μισθού εξήγον γιατί εκατοντάδες ελληνικές επιχειρήσεις μετακομίζουν προς Βορρά.

Το ελληνικό φορολογικό σύστημα, όπως εξελίσσεται, μένει έξω από τον ανταγωνισμό, με αποτέλεσμα το μόνο που επιτυγχάνει είναι να χαρίζει δισ. ευρώ στους μεγάλους Έλληνες επιχειρηματίες χωρίς αυτοί να μπαίνουν στον κόστος να επενδύσουν. Το αντίθετο μάλλον. Κλείνουν τα εργοστάσια και μεταφέρουν τον μηχανολογικό εξοπλισμό στη Βουλγαρία, στην ΠΓΔΜ, στη Ρουμανία, στην Αλβανία. Δεν είναι τυχαίο ότι στη Βουλγαρία οι ελληνικές επενδύσεις καταλαμβάνουν το 10,2% του συνόλου των άμεσων ξένων επενδύσεων. Το 2004 η Βουλγαρία προσέλκυσε το 30% του συνόλου των ξένων επενδύσεων που έγιναν σε όλα τα Βαλκάνια. Η

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Η Ελλάδα μάλιστα καταλαμβάνει τη δεύτερη θέση μετά την Αυστρία στους ξένους επενδύτες. Το σύνολο των ελληνικών κεφαλαίων που έχουν επενδύθει από το 1992 ως και το Σεπτέμβριο του 2004 στη Βουλγαρία ανέρχεται σε 1,2 δισ. δολάρια.

Το ίδιο ισχύει και στα Σκόπια. Είναι χαρακτηριστικό, όπως λέει στέλεχος της ελληνικής πρεσβείας στην πΓΔΜ, ότι τα ελληνικά κεφάλαια που είναι επενδυμένα στη χώρα ανέρχονται σε 820 εκατ. ευρώ από περισσότερες από 200 ελληνικών συμφερόντων επιχειρήσεις και αυτό όχι τυχαία, καθώς πέραν του χαμηλότατου φορολογικού συντελεστή 15% που επιβάλλεται στα καθαρά κέρδη για τα πρώτα τρία χρόνια της επένδυσης οι κατά 100% θυγατρικές των ξένων επιχειρήσεων δεν καταβάλλουν κανέναν φόρο.

Παράσημα κίνητρα παρέχονται και στη Βουλγαρία, καθώς από το 2005 το ποσοστό φορολογίας ανέρχεται σε μόλις 15%, ενώ οι βιομηχανικές επιχειρήσεις απολαμβάνουν 100% απαλλαγή από τον φόρο εισοδήματος νομικών προσώπων στην περίπτωση που συντρέχουν σωφρονικά οι παρακάτω προϋποθέσεις:

Τα πάγια της επιχείρησης, τα οποία δηλώνονται υποχρεωτικά, πρέπει να είναι εγκατεστημένα εντός των διοικητικών ορίων των δήμων και κοινοτήτων, όπου το ποσοστό ανεργίας είναι 50% υψηλότερο από τον μέσο όρο ανεργίας της χώρας τον προηγούμενο χρόνο. Το 80% του ετήσιου μέσου αριθμού απασχολουμένων που εργάζονται με συμβόλαιο εργασίας έχει μόνιμη διεύθυνση εντός των ορίων που περιγράφονται στην προηγούμενη περίπτωση και κατά το ημερολογιακό έτος της απαλλαγής η επιχείρηση δεν πρέπει να έχει φορολογικές ή ασφαλιστικές οφειλές.

Η φορολογική απαλλαγή χορηγείται εφόσον το ποσόν του φόρου επενδύεται για αύξηση της παραγωγικής δυναμικότητας ή διανέμεται στους εργαζόμενους με συμβόλαιο στο τέλος του ημερολογιακού έτους που ακολουθεί το έτος της απαλλαγής. Μια εταιρεία που δικαιούται φορολογική απαλλαγή μπορεί να τη χρησιμοποιήσει μέσα στα επόμενα πέντε χρόνια ακόμη και αν λόγω της αυξημένης απασχόλησης ο δήμος ή η κοινότητα εξαιρείται της κατάστασης που επικυρώνεται από το υπουργείο οικονομικών.

Πιο βαριά φορολογία στις επιχειρήσεις έχει μόνο η Τουρκία, η οποία ωστόσο εξεισορροπεί τη φορολογία με το φθηνό εργατικό δυναμικό. Ένας ακόμη σημαντικός λόγος για τον όποιο οι Έλληνες επιχειρηματίες επέλεγαν τα Βαλκάνια είναι ότι εκεί τώρα αναπτύσσεται η αγορά και υπάρχει ένα αγοραστικό δυναμικό το οποίο διαρκώς ενισχύεται. Το γεγονός αυτό προσελκύει τις τράπεζες, τους τηλεπικοινωνιακούς οργανισμούς, καθώς και τις εργοληπτικές επιχειρήσεις. Όπως και να έχει πάντως, το σκηνικό αυτό υπονομεύει ουσιαστικά τον παραγωγικό ιστό της ελληνικής οικονομίας.
5. Αποτυχημένες Επενδύσεις στα Βαλκάνια (Λόγοι αποτυχίας) ¹

Οι αποτελέσματα των προαναφερθέντων λόγων 10.000 ελληνικές επιχειρήσεις εγγράφηκαν στη βαλκανική αγορά, ενώ ενεργές είναι λιγότερες από 3.500. Επομένως, ο αριθμός των αναγγελθέντων ελληνικών επενδυτικών προγραμμάτων στα Βαλκάνια δεν αντιστοιχεί στον πραγματικό αριθμό εταιρειών υπό λειτουργία. Φαίνεται ότι διάφορες ελληνικές επιχειρήσεις υπήρξαν μόνο κατά όνομα στη βαλκανική αγορά περιμένοντας καλύτερες ημέρες να έρθουν και να γίνουν ενεργές. Μπορούμε όμως να αναφέρουμε και το γεγονός ότι η διαφορά μεταξύ του αναγγελθέντος αριθμού των ελληνικών επιχειρήσεων που λειτουργούν στη βαλκανική αγορά και του πραγματικού αριθμού των εταιρειών που υπάρχουν σε αυτήν οφείλεται και στην αποχώρηση ενός σημαντικού αριθμού μικρών και μεσαίων εταιρειών από τη βαλκανική αγορά. Οι λόγοι για την αποχώρησή τους σχετίζονται και με την ενδυνάμωση του ανταγωνισμού. Μόνο το ένα τρίτο των εγγεγραμμένων ελληνικών επιχειρήσεων είναι ενεργές στα Βαλκάνια και αυτό οφείλεται στο γεγονός ότι οι Έλληνες επιχειρηματίες θέλουν το εύκολο και γρήγορο κέρδος χρησιμοποιώντας περιορισμένο κεφάλαιο και χωρίς να έχουν προηγούμενη εμπειρία στις οικονομικές δραστηριότητες στα Βαλκάνια.

- Πολλοί Έλληνες, οι οποίοι στα πρώτα χρόνια της μετάβασης έσπευσαν χωρίς οποιοδήποτε σχέδιο επένδυσης και χωρίς έρευνα αγοράς- να δημιουργήσουν εταιρείες στα Βαλκάνια και να τις καταχωρίσουν, γρήγορα κατάλαβαν ότι δεν έχουν πιθανότητα να δημιουργήσουν μια επιχείρηση ελπίζοντας σε εύκολα κέρδη.

- Η γραφειοκρατία, η διαφορετικότητα, ο υψηλός επιχειρηματικός κίνδυνος και η διαφορά από τους παράγοντες που οδήγησαν πολλούς Έλληνες να κλείσουν τις επιχειρήσεις τους και να επιστρέψουν (παρά την εξουσιοδότησή τους με αυτά τα εμπόδια-αντικινητήρα).

- Μερικές κοινωνικές λόγω της ανικανότητας για συνεργασία με τους τοπικούς επενδυτές οδηγήθηκαν σε αποτυχία.

- Μερικές από τις περιπτώσεις «ακολουθώντας τον πελάτη» απέτυχαν επειδή τα κέρδη που οι επιχειρηματίες περίμεναν μετά από μερικά χρόνια δεν έφθασαν. Πολλοί από αυτούς σταμάτησαν τις προσπάθειές τους, είτε επειδή οι απώλειες ήταν σημαντικές στα πρώτα χρόνια επένδυσης είτε γιατί η εδραίωσή τους στην αγορά δεν φάνηκε να δίνει πιθανότητες για κάτι καλύτερο στο μέλλον.

¹ Bitzenis, A. (2003c). «Universal Model of Theories Determining FDI; Is there any dominant theory? Are the FDI inflows in CEE countries and especially in Bulgaria a myth?». 
Το χαμηλό κατά κεφαλήν εισόδημα που οδήγησε στη χαμηλή κατά κεφαλήν κατανάλωση, και επιδείνωσε τα εισοδήματα και τα κέρδη των επιχειρήσεων. Αυτό είχε μεγαλύτερες επιπτώσεις στις μικρές επιχειρήσεις, δεδομένου ότι «αγορά-στόχος» είναι τα νοικοκυριά, τα οποία στις περισσότερες περιπτώσεις «δοκιμάστηκαν» από οικονομικές κρίσεις.

Οι οικονομικές κρίσεις ανάγκασαν πολλές ελληνικές επιχειρήσεις να επιστρέψουν στην Ελλάδα.

Μερικές ελληνικές επιχειρήσεις στον τομέα κλωστοϋφαντουργίας και έτοιμο ενδιαφέρον έκτισαν στην Ελλάδα λόγω της ανεπάρκειας των ικανοτήτων των Βαλκανίων εργαζόμενων, η οποία είχε ως αποτέλεσμα την παραγωγή χαμηλής ποιότητας προϊόντων. Το χαμηλό κόστος εργασίας δεν ήταν αρκετό να κρατήσει αυτούς τους επιδείσεις στα Βαλκάνια.

Διάφορες μικρές ελληνικές επιχειρήσεις, που καθιερώθηκαν στα πρώτα χρόνια της μετάβασης, επιβίωσαν για μικρό χρονικό διάστημα, καθώς πολύ σύντομα οι δυτικές πολυεθνικές ήρθαν προσφέροντας τα ίδια προϊόντα με καλύτερη ποιότητα και με πιο προσιτές τιμές. Στην πραγματικότητα δεν είναι εύκολο να είναι κανείς ακριβής με τον αριθμό εκείνων των επιχειρήσεων που είναι ακόμα ενεργές ή έχουν φύγει από μία βαλκανική χώρα. Αυτό οφείλεται στο πρόβλημα με τα στατιστικά στοιχεία, τα οποία δεν αφαιρούν από το σύνολο του αριθμού επενδύσεων εκείνες τις επιχειρήσεις που δεν δραστηριοποιήθηκαν ποτέ ή δεν είναι ενεργές ακόμα (Bitzenis, 2003b).

Οι ελληνικές εταιρείες στην προσπάθεια να αποφύγουν την υψηλή φορολόγηση, η οποία υπάρχει στην Ελλάδα, μπορεί να στραφούν σε μία βαλκανική χώρα όπου θα δημιουργήσουν μία εταιρεία με έδρα τη βαλκανική χώρα με αποτέλεσμα να λειτουργούν με τους κανόνες και τους νόμους της χώρας που υποδέχεται την επένδυση, διατηρώντας το δικαίωμα να επιστρέψουν, όποτε αυτές τις επιθυμούν, τα καταγεγραμμένα ποσά του επενδυτικού κεφαλαίου στην Ελλάδα υπό τη μορφή κερδών (επαναπατρισμός κερδών). Επίσης, οι ελληνικές εταιρείες μπορεί να επανεπενδύσουν τα κέρδη και έτσι να αποφύγουν ακόμη και τη φορολογία του κράτους στο οποίο επένδυσαν. Πολλές φορές εταιρείες, κυρίως εντάσσοντας εργασίας, προτιμούν να επενδύσουν σε περιοχές με υψηλή ανεργία, όπου θα απασχολούν πάνω από ένα συγκεκριμένο αριθμό εργαζομένων, ή να πραγματοποιήσουν μια επένδυση πάνω από ένα συγκεκριμένο ύψος με αποτέλεσμα να απαλλάσσονται από φορολόγηση ενός μεγάλου μέρους των κερδών τους.

Επιπλέον, πολλές φορές και σε αρκετές βαλκανικές χώρες οι εταιρείες απαλλάσσονται από τη φορολόγηση των κερδών (εξ ολοκλήρου) για τα πρώτα χρόνια λειτουργίας τους, και κάποιο ποσοστό των κερδών για τα
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επόμενα χρόνια αν επενδύσουν αυτές οι εταιρείες μέσα από το κρατικό πρόγραμμα των ιδιωτικοποιήσεων με πλευρηφικό πακέτο. Είναι, επίσης, δυνατό βάσει της νομοθεσίας οι εταιρείες, είτε να μεταφέρουν τις ζημιές στα επόμενα έτη (ισχύει για όλες τις επιχειρήσεις -έως 5 χρόνια- και για τις τράπεζες -έως 10 χρόνια-) είτε να απαλλάσσονται από την πληρωμή κάποιου ποσοστού ΦΠΑ και να έχουν πλήρη απαλλαγή ΦΠΑ όταν πρόκειται για εισαγωγή μηχανολογικού εξοπλισμού. Επιπρόσθετα, οι ξένες επιχειρήσεις στη Βαλκανία μπορούν να εγγραφούν ως εγχώριες επιχειρήσεις (και όχι ως ξένες πολυεθνικές) με αποτέλεσμα τη χαμηλή φορολογία (για παράδειγμα στη Βουλγαρία το ποσοστό φόρου εταιρικών είναι 15% από 1/1/2005).

Τέλος, είναι σύνηθες σε μία χώρα υπό μετάβαση να είναι δεδομένη η αναπαρίξια ενός ανεπτυγμένου κρατικού ελέγχου για αποφυγή φοροδιαφυγής, με αποτέλεσμα την ύπαρξη διορθωτών-καταστάσεων διαφθοράς, αλλά και αναπαρίξια ελεγκτικών μηχανισμών, νόμων, αστυνομικών κυρώσεων κτλ.

Αποτέλεσμα αυτόν η δήλωση ελάχιστων κερδών από την πλευρά των επιχειρήσεων. Όπως αναφέρθηκε και παραπάνω, δύναται κάθε επιχείρηση που επιθυμεί να επενδύσει στη Βαλκανία να δημιουργήσει ταυτόχρονα μια παράκτια εταιρεία (offshore) (εταιρεία που απολαμβάνει προνομιακή φορολογική μεταχείριση σε περιοχές που αποκαλούνται φορολογικούς παράδεσσους) με αποτέλεσμα να εμφανίζεται αυτή η εταιρεία στους πίνακες των χωρών της Βαλκανικής ως επενδύτρια εταιρεία προερχόμενη από χώρα διαφορετική (π.χ. από Κύπρο, Λουξεμβούργο, Virgin Islands κτλ.) από αυτή (home country) που πραγματικά ανήκουν τα συμφέροντα των επιχειρηματιών που την κατέχουν (Bitzenis, 2003b).

6. Συμπεράσματα

Οι επενδυτικές Ελληνικές δραστηριότητες στο χώρο των Βαλκανίων (Αλβανία, Βουλγαρία, Σκόπια, Σερβία, Ρουμανία) είναι γεγονός. Ευκαιρίες υπάρχουν, είτε μέσα από την πραγματοποίηση έργων υποδομής είτε μέσα από την ευρύτερη ικανοποίηση των ανεκπλήρωτων καταναλωτικών αναγκών ενός πληθυσμού που είναι πολλαπλάσιος από αυτόν της Ελλάδας, συνεπάγονται οι επενδυτικές Ελληνικές δραστηριότητες στο χώρο των Βαλκανίων έχουν λόγους να υφίστανται. Ομοίως κάθε Ελληνική επιχείρηση η οποία αποφασίζει να επενδύσει σε χώρες του εξωτερικού θα πρέπει να λάβει υπόψη της κάποιες απαραίτητες παραμέτρους δια την βιωσιμότητα αλλά και την κερδοφορία των δραστηριοτήτων της, ειδικότερα θα πρέπει:

- Να μελετήσει προσεκτικά τα κίνητρα και αντικίνητρα μιας επένδυσης σε μια χώρα της Βαλκανικής.
Η Δυναμική των Βαλκανικών Αγορών & Η Μετάβαση των Χωρών της Ανατολικής Ευρώπης στην Οικονομία της Αγοράς, Αθήνα: Εκδόσεις Σταμούλης.

Μπιτζένης, Α. (2003b). «Η Δυναμική των Βαλκανικών Αγορών & Η Μετάβαση των Χωρών της Ανατολικής Ευρώπης στην Οικονομία της Αγοράς», Τόμος 2, Αθήνα, Εκδόσεις Σταμούλης.

ΒΙΒΛΙΟΓΡΑΦΙΑ

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Περίληψη:
Η χρήση του διαδίκτυου στον αγροτικό τομέα τα τελευταία χρόνια είναι συνεχώς αυξανόμενη, παραμένει όμως σαφώς χαμηλότερη σε σχέση με άλλους τομείς της οικονομίας μας. Ο μεγάλος όγκος, μη ταξινομημένων πληροφοριών, που διακινούνται στο διαδίκτυο και αφορούν τον αγροτικό τομέα καθιστά άμεση την ανάγκη για την δημιουργία δικτυακών τόπων, όπως άλλοι όσοι ασχολούνται με τα προϊόντα, τις υπηρεσίες, την εκπαίδευση, την έρευνα, το μάνατζμεντ της γεωργικής παραγωγής, αλλά και την οργάνωση παραγωγής γεωργικών περιοχών θα μπορούν να βρίσκουν εύκολα και γρήγορα πρόσβαση στις πληροφορίες αυτές. Οι διαδικτυακές πύλες παίζουν επίσης καθοριστικό ρόλο στα συστήματα ηλεκτρονικής διακυβέρνησης, καθώς αποτελούν τα σημεία πρόσβασης των πολιτών στην ηλεκτρονική τοπική, περιφερειακή ή εθνική διοίκηση. Οι πύλες αποτελούν το Front office της δημόσιας διοίκησης και παρέχουν εργαλεία για τη σύνθεση και υποβολή ερωτημάτων, ενώ συνθέτουν και παρουσιάζουν τα αποτελέσματα.

Η εκλειψη μιας μεγάλης και οργανωμένης πύλης ηλεκτρονικής διακυβέρνησης και μάνατζμεντ της γεωργικής παραγωγής στον ελληνικό χώρο, μας οδήγησε στο να ερευνήσουμε τις δυνατότητες σχεδιασμού και ανάπτυξης ενός κόμβου στο διαδίκτυο, για αγροτικά προϊόντα και υπηρεσίες με τελική πρακτική εφαρμογή την λειτουργία του στο Παγκόσμιο Διαδίκτυο. Στην εργασία αυτή, παρουσιάζονται τα εργαλεία ανάπτυξης μια πύλης στο διαδίκτυο με την χρήση Συστημάτων Διαχείρισης Περιεχομένου αναχώρου κώδικα.
Αξίωση: Ηλεκτρονική διακυβέρνηση, μάνατζμεντ γεωργικής παραγωγής, συστήματα διαχείρισης περιεχομένου

1. Εισαγωγή

Οι τεχνολογίες πληροφορικής και επικοινωνιών (ΤΠΕ) έχουν αλλάξει δραματικά το πρόσωπο της γεωργίας στις αναπτυγμένες χώρες. Πολλές δραστηριότητες των αγροτικών εκμεταλλεύσεων έχουν συνδεθεί με βάσεις δεδομένων, ηλεκτρονική επικοινωνία και διαδικτυακούς τόπους, που δίνουν τη δυνατότητα στους παραγωγούς να έχουν πρόσβαση σε κυβερνητικά προγράμματα, πιστωτικά ιδρύματα, αγορές, τεχνική και επιστημονική βοήθεια. Σε πολλές περιπτώσεις η πρόσβαση στη γνώση και στην πληροφορία έχει γίνει ένα βασικό στοιχείο της ανταγωνιστικότητας σε τοπικό, περιφερειακό και διεθνές επίπεδο. Με οικονομικούς όρους η πληροφόρηση έχει γίνει τόσο σημαντική ώστε να θεωρείτε ως ο τέταρτος συντελεστής παραγωγής. Με λίγα λόγια, το πρόσωπο της γεωργίας στον αναπτυγμένο κόσμο έχει αλλάξει, καθώς οι ΤΠΕ έχουν γίνει ολόδενα και περισσότερο κρίσιμης σημασίας για τους αγρότες και τους φορείς λήψης αποφάσεων (ΑΕΔ, 2003).

Η συμβολή του management στο σημείο αυτό είναι ουσιαστική, έστω και σαν διαδικασία ανάπτυξης της γνώσης και αξιοποίησης της πληροφορίας, με τελικό σκοπό την υποβοήθηση του αγρότη-μανέντερ στην διαδικασία λήψης αποφάσεων. Ιδιαίτερα, η συμβολή του management στον αγροτικό τομέα, δίνει τη δυνατότητα στον αγρότη να λαμβάνει την πληροφόρηση, να την ταξινομεί και να υιοθετεί ότι τον βοηθάει στην επιτυχία των στόχων του, απορρίπτοντας ότι του είναι περιπτώτυ (Μαρτίκα - Βακιτζή, 2008).

Από την άλλη πλευρά, οι αγροτικές περιοχές είναι εξ ορισμού απομακρυσμένες, αραιοκατοικημένες και σχετικά εξαρτώμενες από τους φυσικούς πόρους (Kilkenny, 1998). Οι πολιτικές που κατοικούν στις αγροτικές περιοχές είναι μακριά από τα κέντρα λήψης αποφάσεων και χάραξης πολιτικής και δεν είναι πάντα εφικτό (εξαιτίας της έλλειψης μεταφορικών μέσων, χρόνου, χρημάτων ή κακοκαιρίας) να ταξινομήσουν για τη λήψη των απαραίτητων πληροφοριών ή για τη χρηματοποίηση των διαθέσιμων υπηρεσιών. Αυτό το γεγονός κάνει περισσότερο ουσιαστική την ανάγκη για εγκαίρες και επικουρικές πληροφορίες με έναν εναλλακτικό τρόπο, ο οποίος είναι εύλογος μέσω των υπηρεσιών Ηλεκτρονικής Διακυβέρνησης (Mahaman, Ntaliani, & Costopoulou, 2005).
Καθοριστικό ρόλο στην πρόσβαση στα συστήματα γνώσης και πληροφόρησης, καθώς και στη διάδοση της πληροφορίας στο διαδίκτυο έχουν οι πύλες (portals). Ιδιαίτερα στα συστήματα Ηλεκτρονικής Διακυβέρνησης παίζουν ουσιαστικό ρόλο, καθώς αποτελούν τα σημεία πρόσβασης των πολιτών με την Ηλεκτρονική Δημόσια Διοίκηση. Η έλλειψη μιας μεγάλης και οργανωμένης πύλης Ηλεκτρονικής Διακυβέρνησης στον ελληνικό χώρο για τον αγροτικό τομέα, μας οδήγησε στο να ερευνήσουμε, τις δυνατότητες σχεδιασμού και ανάπτυξης ενός κομβού στο διαδίκτυο, για την ηλεκτρονική διακυβέρνηση και το management της γεωργικής παραγωγής. Βασικός στόχος η ανάπτυξη ενός αξιόπιστου, δυναμικού, ευέλικτου και φιλικού πρότυπου συστήματος ηλεκτρονικής διακυβέρνησης, το οποίο θα ανταποκρίνεται τόσο στις ανάγκες των αρχών όσο και σε αυτές των πολιτών τους. Ένας ακόμη στόχος ήταν και η ανάπτυξη δύο εφαρμογών για το μάνατζμεντ της γεωργικής παραγωγής, μα για την οργάνωση και διοίκηση γεωργικών εκμεταλλεύσεων και μία για την οργάνωση παραγωγής γεωργικών περιοχών με απάτερο σκοπό, ο γεωργός-χρήστης των εφαρμογών να αποκτήσει καλύτερο έλεγχο του εξωτερικού περιβάλλοντος με την εύκολη πρόσβαση στην γνώση και αξιοποίηση της πληροφόρησης.

2. Ηλεκτρονική Διακυβέρνηση

Οι κυβερνήσεις έχοντας διευκολύνθεί από τη χρήση ΤΠΕ και του διαδικτύου, προωθούν και υποστηρίζουν την ηλεκτρονική διακυβέρνηση σκοπεύοντας σε πιο γρήγορη και αποτελεσματική εξυπηρέτηση των πολιτών από τις δημόσιες αρχές. Η προσπάθεια αυτή δεν είναι εύκολη, αρκού απαιτεί σωστό και προσεκτικό σχεδιασμό, διαθεσιμότητα υποδομών σε μεγάλη κλίμακα και αλλαγή του τρόπου σκέψης των πολιτών. Για την ηλεκτρονική διακυβέρνηση έχουν διατυπωθεί πολλοί ορισμοί, άλλοι πολύπλοκοι και άλλοι πιο απλοί. Ο πρώτος ορισμός δίνεται από τον Οργανισμό Ηνωμένων Εθνών (ΟΗΕ), ο οποίος ορίζει την Ηλεκτρονική Διακυβέρνηση ως «την αξιοποίηση του Διαδικτύου από την κυβέρνηση για την παροχή πληροφοριών και υπηρεσιών στους πολίτες». Ένας ακόμη ορισμός δίνεται από τον Οργανισμό Οικονομικής Συνεργασίας και Ασφάλειας (Ο.Ο.Σ.Α) σύμφωνα με τον οποίο «η Ηλεκτρονική Διακυβέρνηση σημαίνει τη χρήση των ΤΠΕ και ειδικότερα του Διαδικτύου, ως εργαλεία που οδηγούν σε μια καλύτερη κυβέρνηση» (ΟΕΕΔ, 2003). Παράλληλα, η Ευρωπαϊκή Ένωση (Commission Of The European Communities, 2003) ορίζει την Ηλεκτρονική Διακυβέρνηση ως «τη χρήση των ΤΠΕ στη Δημόσια Διοίκηση, η οποία σε συνδυασμό με οργανωτικές αλλαγές και νέες δεξιότητες οδηγούν σε βελτίωση των δημοσίων υπηρεσιών και των δημοκρατικών διαδικασιών, ενώ ενισχύουν τις δημόσιες πολιτικές». Σε ένα πιο απλό ορισμό μπορούμε να ορίσουμε την Ηλεκτρονική
Διακυβέρνηση ως «την παραγωγή δημόσιων υπηρεσιών και πληροφοριών ηλεκτρονικά, 24 ώρες το 24ωρο και 7 μέρες την εβδομάδα». Ως κύριοι στόχοι της ηλεκτρονικής διακυβέρνησης αναφέρονται, από πολλούς συγγραφείς, η βελτίωση της αποτελεσματικότητας της Δημόσιας Διοίκησης και η μείωση των διοικητικών επιβαρύνσεων των επιχειρήσεων και πολιτών. Οι τύποι της ηλεκτρονικής διακυβέρνησης έχουν καθοριστεί ανάλογα με το είδος των συναλλασσόμενων που έρχονται σε επαφή με την δημόσια διοίκηση και κατ’ επέκταση, με τις δημόσιες υπηρεσίες. Οι τύποι ηλεκτρονικής διακυβέρνησης διακρίνονται σε τρεις κύριες κατηγορίες (Montagna, 2005):

α) μεταξύ Πολιτή – Δημόσιας Διοίκησης (Government-to-Citizen, G2C),
β) μεταξύ Επιχείρησης – Δημόσιας Διοίκησης (Government-to-Business, G2B) και
γ) μεταξύ διαφορετικών Δημοσίων Αρχών (Government-to-Government, G2G)

Πρόσφατα προστέθηκαν και οι τύποι:

δ) Κυβέρνηση προς Μη Κυβερνητικές Οργανώσεις (MKΟ) (G2NGO) (Government to Non-Governmental Organizations)
ε) Κυβέρνηση προς Μη Κερδοσκοπικές Οργανώσεις (G2NPO) (Government to Non-Profit Organizations).

3. Πύλες (portals)

Οι πύλες (portals) αποτελούν την είσοδο των χρηστών του internet στο απέραντο ωκεανό πληροφοριών που κυκλοφορούν στο διαδίκτυο. H IBM θέλοντας να αποδώσει έναν ορισμό των πυλών αναφέρει ότι είναι «ένα απλό, μοναδικό, αυτόνομο σημείο πρόσβασης σε εφαρμογές, ανθρώπους και πληροφορία». Οι Looney και Lyman (2000) περιήγησαν σύντομα τις πύλες ως εξής: «οι πύλες συγκεντρώνουν μια ποικιλία από χρήσιμες πηγές πληροφορίας σε μια απλή, ένιοτες προσέλαση σελίδα του παγκόσμιου ιστού, βοηθώντας τους χρήστες με αυτό τον τρόπο να μην είναι υπερφορτωμένοι από τον τεράστιο όγκο πληροφορίας ή να αισθάνονται χαμένοι στο δίκτυο». Ετσι λοιπόν καταλήγουμε στον ορισμό που αφορά τον όρο πύλη στο διαδίκτυο. «Οι πύλες (portals) αποτελούν μια σελίδα ή υπηρεσία του διαδικτύου που προσφέρει μια βασική δομή από πηγές και υπηρεσίες».

Οι πύλες παίζουν καθοριστικό ρόλο στα συστήματα Ηλεκτρονικής Διακυβέρνησης, καθώς αποτελούν τα σημεία πρόσβασης (front-office) των πολιτών στην Ηλεκτρονική Δημόσια Διοίκηση. Οι πύλες παρέχουν εργαλεία για τη σύνθεση και υποβολή ερωτημάτων προς το back-office, ενώ συνδέουν και παρουσιάζουν τα αποτελέσματα.
4. Συστήματα Διαχείρισης Περιεχομένου

Τα τελευταία χρόνια δεν έχει γίνει γιατί οι διαφορούν στις δυνάμεις των πυλών του παγκοσμίου ιστού αλλά και το μέγεθος αυτών. Πλέον ένας μεγάλος αριθμός κόμβων μπορεί να φιλοξενεί το τέρας άριθμοι υποστηρικτών, είτε αυτές κατασκευάζονται δυναμικά, είτε στατικά. Είναι λοιπόν πιθανό να έχεις κόμβος στον οποίο δεν γίνεται κατάλληλη διαχείριση περιεχομένου να περιέλθει σε χαοτική κατάσταση και η προσθήκη ή επεξεργασία περιεχομένου σε αυτόν να γίνει εξαιρετικά επίπονη διαδικασία. Για αυτό τον λόγο είναι πολλές φορές αναγκαία η χρησιμοποίηση ενός Συστήματος Διαχείρισης Περιεχομένου (ΣΔΠ) (Content Management Systems - CMS), ώστε η διαχείριση της πύλης να γίνει αποτελεσματικότερη.

Τα ΣΔΠ είναι συνδυασμός μιας βάσης δεδομένων, ενός συστήματος αρχείων και διαφόρων σχετικών μονάδων λογισμικού που χρησιμοποιούνται για τη δημιουργία, αποθήκευση και αρχότερα για την ανάκτηση δεδομένων (Μπαζάνος & Αλεξάνδροπουλόου, 2005). Οι χρήστες αυτών των συστημάτων μπορούν να τοποθετούν περιεχόμενο στη βάση δεδομένων και να ψάχνουν για περιεχόμενο με διάφορα κριτήρια χρησιμοποιώντας απλό παραγράμμα περιβάλλον ιστολογίας και διαφάνειας. Τα συστήματα αυτά επιτρέπουν τη δημιουργία, διαχείριση, διανομή και δημιουργία της πληροφορίας (Λαζαρίνης, Κανελλόπουλος & Αλάλοχος, 1999). Ένα ΣΔΠ είναι ένα interface που μπορεί να χρησιμοποιηθεί για την διαχείριση και ενημέρωση του περιεχομένου ενός δικτυακού τόπου χωρίς εξειδικευμένες γνώσεις υπολογιστών. Υπάρχουν διάφορες μορφές ΣΔΠ, έτοιμα εμπορικά πακέτα και συστήματα ΣΔΠ ανοιχτού κώδικα (open source).

5. Συστήματα Διαχείρισης Περιεχομένου Ανοιχτού Κώδικα

Στης μέρες μας έχει πλέον ευρέος καθιερωθεί το λογισμικό ανοιχτού κώδικα. Η εξάλλου αυτόν σημείεται κυρίως στη γιγαντία ανάπτυξη του παγκόσμιου ιστού παγκόσμιο κάθε και στην καθημερινή του Apache server και του Linux. Πλέον υπάρχουν πολλά ΣΔΠ ανοιχτού κώδικα τα οποία συναγωνίζονται σε ποιότητα και δυνατότητες συστήματα τα οποία διατίθενται στο επίπεδο και κατά σενάρια ακριβώς.

Υπάρχει ένα σημαντικός αριθμός από πλεονεκτήματα και μειονεκτήματα των ΣΔΠ ανοιχτού κώδικα, τα οποία και αναλύουμε παρακάτω. Ως πλεονεκτήματα των ΣΔΠ αναφέρονται: το πολύ χαμηλό κόστος, η ευκολία προσαρμογής, οι ανοιχτές πλατφόρμες, η ισχυρισματοποίηση των διαδικτυακών, η ευκολία ενσωμάτωσης, η υποστήριξη από την κοινότητα, η δυνατότητα δοκιμής πριν την κατασκευή του κόμβου, η γρήγορη επίλυση προβλημάτων και η διάρκεια στο μέλλον. Ως μειονεκτήματα έχουν αναφερθεί: το ότι είναι διορθεί δεν σημαίνει ότι δεν θα κατασκευάσουν τίποτα, το ότι είναι πιθανό να μην τοποθετούν και ανοιχτό κώδικα με ακριβής λειτουργία.
δημιουργία μεγάλων κόμβων, η έλλειψη εμπορικής υποστήριξης, η μικρότερη ορισμότητα, η ελλιπής χρηστικότητα, η ελλιπής τεκμηρίωση και ο κίνδυνος υπέρ-επένδυσης.

6. Τεχνολογίες Συστημάτων Διαχείρισης Περιεχομένου Ανοιχτού Κώδικα

Τα ΣΔΠ ανοιχτού κώδικα αναπτύσσονται και με αντίστοιχες τεχνολογίες ανοιχτού κώδικα. Συνήθως λοιπόν χρησιμοποιούνται ο Apache σαν webserver, η MySQL για τη βάση δεδομένων και η PHP για γλώσσα προγραμματισμού. Ο Apache είναι ένας δωρεάν HTTP ανοιχτού κώδικα web server για UNIX συστήματα, για Windows καθώς και για άλλες πλατφόρμες. Ο Apache server έχει παίξει καθοριστικό ρόλο στην ανάπτυξη του παγκόσμιου ιστού και συνεχίζει να είναι ο πιο δημοφιλής web server στις μέρες μας. Χρησιμοποιείται κυρίως για να εξυπηρετεί στατικό και δυναμικό περιεχόμενο στο web. Η MySQL είναι ένα πολυνηματικό (multithreaded), πολυχρηστικό (multiuser) σύστημα διαχείρισης βάσεων δεδομένων. Η MySQL είναι ιδιαίτερα δημοφιλής για τις εφαρμογές ιστού και λειτουργεί και ως συστατικό των πλατφόρμων LAMP και WAMP (Linux-Windows-Apache-MySQL-PHP-Perl-Python). Η δημιουργία της για τις web εφαρμογές οφείλεται κυρίως στην PHP με την οποία συνεργάζονται άψογα. Η PHP είναι μια ανοιχτού κώδικα, γλώσσα προγραμματισμού που χρησιμοποιείται κυρίως για να παράγει δυναμικό περιεχόμενο στο web και στις εφαρμογές που τρέχουν στον server. Το σημαντικότερο χαρακτηριστικό της PHP είναι ότι αυτή εκτελείται στον server και όχι στον browser όπως ας πούμε το Javascript. Η PHP είναι ιδιαίτερα δημοφιλής και χρησιμοποιείται ευρέως.

7. Επιλεγμένα Συστήματα Διαχείρισης Περιεχομένου Ανοιχτού Κώδικα


7.1 Το Σύστημα Drupal

Το Drupal είναι ένα Σύστημα Διαχείρισης Περιεχομένου (CMS) ανοιχτού κώδικα και υποστηρίζεται από μια ανοιχτή κοινότητα προγραμματιστών. Η σταθερότητα, ευελιξία και η ασφάλεια του είναι μερικά από τα σημεία αναφοράς του. Το πλεονέκτημα του Drupal σε σύγκριση με τα άλλα ΣΔΠ είναι η αφαιρετική-τμηματική προσέγγισή του στο περιεχόμενο. Το πλεονέκτημα που απορρέει από το γεγονός ότι το Drupal συμπεριφέρεται σε όλα τα συστατικά περιεχομένου με τον ιδιοτρόπο είναι ότι έτσι έχει τη
δυνατότητα να διαχειρίζεται ουσιαστικά απεριόριστο εύρος διαφορετικών συστατικών περιεχομένου χρησιμοποιώντας μόνο τις συναρτήσεις πυρήνα σε αντίθεση με τα άλλα ΣΔΠ που πρέπει να χειρίζονται διαφορετικά κάθε διαφορετικό τύπο συστατικών περιεχομένου.

7.2 Το Σύστημα Mambo
Το Mambo είναι ένα από τα δημοφιλέστερα ΣΔΠ ανοιχτού κώδικα για την δημιουργία και διαχείριση δικτυακών τόπων μέσω μιας απλής διεπαφής ιστού (web interface). Το mambo έχει προσελκύσει πολλούς χρήστες λόγω της ευκολίας της χρήσης που παρέχει. Περιέχει προχωρημένα χαρακτηριστικά όπως page caching για την βελτίωση της ταχύτητας και της απόδοσης sites με μεγάλο αριθμό επισκεπτών, καθώς και προγραμματισμός τεχνικές template. Είναι εύκολο στην εγκατάσταση, στη διαχείριση και αξιόπιστο. Το Mambo δεν απαιτεί καν από τον χρήστη ή διαχειριστή του συστήματος να γνωρίζει HTML για να το διαχειριστεί, από τη στιγμή που θα εγκατασταθεί και θα τεθεί σε λειτουργία.

7.3 Το Σύστημα Joomla
Το ΣΔΠ Joomla προέρχεται από το Mambo. Το Joomla είναι γεμάτο δυνατότητες αλλά και ταυτόχρονα εξαιρετικά ευέλικτο και φιλικό. Είναι μια εφαρμογή με την οποία μπορεί κάποιος να δημιουργεί στο διαδίκτυο μια προσωπική ιστοσελίδα, αλλά και έναν ολόκληρο εταιρικό δικτυακό τόπο. Οι δυνατότητες επέκτασης του είναι πρακτικά απεριόριστες. Το Joomla! είναι και αυτό μια εφαρμογή ανοιχτού κώδικα. Το Joomla! χρησιμοποιεί μια ισχυρή templating engine που δίνει τη δυνατότητα να χρησιμοποιήσει ο κάθε επισκέπτης το δικό του, εξάπτυσμένο, template. Όταν επιλέγει το νέο template, το περιεχόμενο παρουσιάζεται αυτόματα σύμφωνα με το νέο εικαστικό. Μπορούν ακόμη και να επιλέγουν τα διαφορετικά templates για τα διαφορετικά μέρη του δικτυακού σας τόπου.

7.4 Το Σύστημα PHP-Nuke
Το PHP-Nuke είναι ένα από τα δημοφιλέστερα συστήματα δημιουργίας ειδήσεων και διαχείρισης περιεχομένου. Αποτελεί προϊόν Λογισμικού Ανοιχτού Κώδικα και διατίθενται στο Διαδίκτυο με πάρα πολλά βιβλιοθηκικά εργαλεία, Templates και βοήθεια στην αντιμετώπιση διαφόρων προβλημάτων μέσω πολλών Forums στον τομέα αυτό.
Το σύστημα είναι πλήρως διαχειρίσιμο από γραφικό περιβάλλον και ξεκίνησε σαν παρακλάδι (fork) του συστήματος δημιουργίας πωλών ειδήσεων Thaware. Ο κύριος σκοπός του PHP-nuke είναι να παρέχει την δυνατότητα κατασκευής κόμβων βασισμένον σε κοινότητες όπου θα παρέχεται στους χρήστες η δυνατότητα να δημιουργούν περιεχόμενο (νέα, ειδήσεις, κ.α.). Όπως και στα προηγούμενα ΣΔΠ έτσι και στο Nuke
μπορούμε να ενσωματώσουμε modules ώστε να αυξήσουμε την
λειτουργικότητα και τις υπηρεσίες που μας παρέχει το σύστημα (forums,
faq, κ.α.). Υποστηρίζει πολλές γλώσσες συμπεριλαμβανομένης της
Ελληνικής και μπορούμε να καθορίσουμε την εμφάνιση με themes.

7.5 Το Σύστημα phpWebSite
Το phpWebSite παρέχει ένα ολοκληρωμένο σύστημα διαχείρισης
περιεχομένου. Επιτρέπει στον διαχειριστή του συστήματος να
dιαχειρίζεται και να επεξεργάζεται εύκολα ένα μεγάλο όγκο πληροφοριών
και περιεχομένου. Ο συνεχός αυξανόμενος αριθμός εφαρμογών του
phpWebSite επιτρέπουν την εύκολη λειτουργία ενός δικτυακού τόπου
χωρίς την γνώση εξειδικευμένων γνώσεων html από τον χρήστη.
Το phpWebSite είναι επίσης δωρεάν πρόγραμμα ανοιχτού κώδικα.
Χρησιμοποιείται κυρίως από Online εκπαιδευτικές κοινότητες. Παρόλο
που διατίθεται και στο ευρύ κοινό επικεντρώνεται στην εξουσιοδότηση του
Appalachian State University με την παροχή online υπηρεσιών στους
φοιτητές.

7.6 Το Σύστημα PostNuke
Το PostNuke είναι ένα ΣΔΠ γενικού σκοπού που δίνει την
δυνατότητα σε κάποιον να οικοδομήσει εύκολα και γρήγορα ένα
dυναμικό ιστοχώρο με μεγάλες δυνατότητες και ανήκει στην κατηγορία του ΕΛΛΑΚ.
Επί πλέον χαρακτηρίζεται και ως C3MS (Community Collaboration Content
Management System) αφ' ενός μεν διότι αναπτύσσεται συνεργατικά από
μια μεγάλη κοινότητα προγραμματιστών και αφ' ετέρου διότι επιτρέπει τη
dημιουργία ιστοχώρων όπου τα μέλη έχουν κοινά ενδιαφέροντα
(communitys) και μπορούν να γίνουν συνεργατικές (collaborative)
μαθησιακές δραστηριότητες. Τα χαρακτηριστικά του και οι δυνατότητες
του μπορούν να επεκταθούν επεμβαίνοντας στον κώδικα του ή
eγκαθιστώντας έτοιμα λειτουργικά τμήματα (modules) τρίτων λόγω της
ανοικτής αρχιτεκτονικής του.
Το PostNuke αποτελεί ένα σύστημα διαχείρισης (α) περιεχομένου,
(β) κοινοτήτων και (γ) συνεργασιών ή ένα C3MS. Η δημιουργία του
οφείλεται στον ευκολία εγκατάστασης, διαχείρισης και χρήσης του.
Ένα από τα θετικότερα στοιχεία του PostNuke είναι ότι υπάρχει διαθέσιμη
eκτεταμένη τεκμηρίωση αναφορικά με όλες τις υφιστάμενες εκδόσεις ενώ
παράλληλα διατίθεται και στάνταρτ API, στοιχείο το οποίο επιτρέπει την
ανάπτυξη αυτόνομων τμημάτων από οποιονδήποτε ενδιαφερόμενο.

7.7 Το Σύστημα Xoops
Το σύστημα Xoops είναι και αυτό ένα ΣΔΠ ανοιχτού κώδικα γραμμένο
σε PHP. Είναι σχεδιασμένο τμηματικά και έχει αντικειμενοστρεφή
χαρακτηριστικά. Το XOOPS παρέχει δυνατότητες προσωποποίησεις (personalization), διαχείριση χρηστών, διεπαφή βάσει θεμάτων (theme based interface) πολυγλωσσία και πολλά άλλα.
Το XOOPS είναι ένα αποτελεσματικό και εύκολο στη χρήση ΣΔΠ. Επιτρέπει στους διαχειριστές να διαχειριστούν δυναμικούς κόμβους, να χτίσουν online communities, να διαχειρίζονται τους χρήστες, να καθορίζουν την μορφή του κόμβου και να εισάγουν περιεχόμενο μέσω μιας απλής διαπαραγής.

8. Η Πύλη agroGOV

Μετά την κατάταξη και αξιολόγηση των ΣΔΠ ανοιχτού κώδικα ξεκίνησε η διαδικασία ανάπτυξης του δικτυακού μας κόμβου. Ως όνομα χώρου (domain name) επιλέχθηκε το agroGOV, ως ένα όνομα εύχο, εύκολο στη γραφή, αλλά και να προσδιορίζει την νεοτερικότητα που προσφέρει ο κόμβος. Η ανάπτυξη της πύλης έγινε με το Σύστημα Διαχείρισης Περιεχομένου Joomla που επιλέχθηκε μεταξύ όλων των παραπάνω ΣΔΠ εφαρμόζοντας τη μέθοδο PROMETHEE II. Στην συνέχεια επιλέχθηκε το κατάλληλο πρότυπο template, το οποίο έπρεπε να ανταποκρίνεται στο περιεχόμενο του κόμβου. Έτσι επιλέχθηκε ένα διωρεάν template με διακριτικό τίτλο agriculture από τα Joomla and Mambo Templates. Η πρώτη σελίδα του κόμβου agroGOV.gr μετά την εφαρμογή του template φαίνεται στην παρακάτω εικόνα:

Εικόνα 1: Η αρχική σελίδα του κόμβου agroGOV.gr
8.1 Δομή και περιεχόμενο της πύλης agroGOV.gr

Η δομή και το περιεχόμενο της πύλης είναι το πιο καθοριστικό στοιχείο για την προσέλκυση της επισκευμότητας. Η πύλη agroGOV.gr είναι ένας δικτυακός τόπος για την Ηλεκτρονική Διακυβέρνηση και το management της γεωργικής παραγωγής. Έτσι και το περιεχόμενο της είναι ανάλογο. Πολλές μελέτες παρουσιάζουν το περιεχόμενο αλλά και τις δραστηριότητες που πρέπει να περιλαμβάνει μια πύλη που απευθύνεται στον αγροτικό τομέα. Έτσι, σύμφωνα με τις Vlachopoulos, Manthou, (2002) οι δραστηριότητες μιας πύλης για αγροτικά προϊόντα και υπηρεσίες πρέπει να είναι:

Πίνακας 1: Δραστηριότητες μιας πύλης για τον αγροτικό τομέα.

| Αναζήτηση και διάχυση πληροφοριών | Αγροτικές εκδηλώσεις, εκθέσεις, συνέδρια, νέα, σχετιζόμενα web sites, αναζήτηση, newsletters, ανακοινώσεις, ηλεκτρονικές βιβλιοθήκες, άρθρα, βάσεις δεδομένων, ημερολόγιο, ορθές γεωργικές πρακτικές, λογισμικό, συνδέσμους |
| Επικοινωνία | Ηλεκτρονικό ταχυδρομείο, forum συζήτησεων, chat |
| Εκπαίδευση | Ανακοινώσεις, Σεμινάρια, Συνέδρια |
| Υπηρεσίες Συμβουλών | Υπηρεσίες Logistics, δημόσιοι και ιδιωτικοί οργανισμοί, υπηρεσίες agribusiness |
| E-marketplaces | e-agents, e-brokers, e-auctions |
| E-business | Ηλεκτρονικές πληρωμές, ηλεκτρονικές υπηρεσίες, online παραγγελίες, online διαφήμιση, ηλεκτρονικές συναλλαγές |
| Software | Λογισμικό για την Οργάνωση και Διοίκηση Γεωργικών Εκμεταλλεύσεων και Περιοχών |

Μια αγροτική πύλη απευθύνεται σε όλους τους φορείς που εμπλέκονται στις διαδικασίες της γεωργικής παραγωγής. Έτσι θα πρέπει και στο περιεχόμενο της να εμπεριέχονται πληροφορίες για όλους τους φορείς. Μια πύλη ηλεκτρονικής διακυβέρνησης και management γεωργικής παραγωγής απευθύνεται σε:

Πίνακας 2: Φορείς στους οποίους απευθύνεται μια αγροτική πύλη

| Παραγωγούς | Ερευνητικά Εκπαιδευτικά Ιδρύματα |
| Καταναλωτές | Βιβλιοθήκες |
| Γεωπόνοι | Στατιστικές υπηρεσίες |
| Συνεταιρισμούς | Βιομηχανίες – Μεταποιητές |
| Αγροτικές Ενώσεις | Μεσίτες – Χονδρέμποροι |
| Ειδικοί Επιστήμονες | Εκδόσεις – Τύπο |
Η πύλη μας αναπτύχθηκε σε 3 επίπεδα. Στο 1ο επίπεδο βρίσκεται η αρχική σελίδα και η αναζήτηση στο 2ο επίπεδο οι δραστηριότητες της πύλης και στο 3ο επίπεδο τα ειδικά περιεχόμενα των δραστηριοτήτων (Vlachopoulou & Manthou, 2002).

Εικόνα 2: Τα επίπεδα της πύλης agroGOV.gr

Με βάση αυτή τη λογική αναπτύχθηκε το κυρίως περιεχόμενο της πύλης το όποιο διαχωρίστηκε σε Αγροτικό περιεχόμενο και ηλεκτρονικές υπηρεσίες. Το αγροτικό περιεχόμενο περιλαμβάνει Χρήσιμες Συνδέσεις (με φορείς Ηλεκτρονικής Διακυβέρνησης, Οργανισμούς, Επιχειρήσεις, Εκπαιδευτικά ιδρύματα κτλ.), Forum, Λογισμικό, Προγράμματα, Νόμους, Πληροφορικά Συστήματα κτλ., ενώ οι ηλεκτρονικές υπηρεσίες περιλαμβάνουν τις 2 εφαρμογές για το αγροτικό management και διαφορετικές άλλες υπηρεσίες, όπως προσφορά εργασίας, διαφήμιση κτλ. Η κύρια δομή και το περιεχόμενο της πύλης ανανεώνεται και εμπλουτίζεται συνεχώς και δεν περιορίζεται στα στενά όρια που περιγράφουμε. Η κύρια δομή και το περιεχόμενο της πύλης φαίνεται στην παρακάτω εικόνα.
Εικόνα 3: Δομή και περιεχόμενο της πύλης agroGOV.gr

9. Η Εφαρμογή agroMANAGER

Η εφαρμογή agroMANAGER βοηθά στη συστηματική καταγραφή των τεχνικών και οικονομικών δεδομένων μιας γεωργικής εκμετάλλευσης, της παρακολούθησης των μεταβολών και του υπολογισμού του οικονομικού αποτελέσματος αυτών, με την βοήθεια ηλεκτρονικού υπολογιστή. Η εφαρμογή agroMANAGER δίνει τη δυνατότητα στον χρήστη να παρακολουθήσει τις μεταβολές της γεωργικής εκμετάλλευσης κάθε καλλιεργητικής περιόδου, να διαπιστώσει την οικονομική της θέση και να υπολογίσει μια σειρά από οικονομικά αποτελέσματα, αλλά και άλλα στοιχεία όπως ημερολόγια αγρού, ανά κλάδο παραγωγής και ποικιλία, όπως αυτά απαιτούνται από τα συστήματα ολοκληρωμένης διαχείρισης (Agro 2.1 & Agro 2.2) στα οποία έχουν ενταχθεί πολλοί παραγωγοί τα τελευταία χρόνια. Ο agroMANAGER μπορεί να αποτελέσει ένα χρήσιμο εργαλείο για τον σύγχρονο αγρότη ή για τον σύμβουλο γεωπόνο του, ώστε να αποκτήσει μια εικόνα για την σωστή οργάνωση και διαχείριση της γεωργίκης του εκμετάλλευσης κάνοντας μια καταγραφή των περιουσιακών στοιχείων της εκμετάλλευσης του αρχικά και στη συνέχεια, των καθημερινών καλλιεργητικών φροντιδών κατά την διάρκεια μιας συγκεκριμένης καλλιεργητικής περιόδου. Με την χρήση της εφαρμογής μπορεί κάνεις, να άντληση χρήσιμα στοιχεία για την οικονομικότητα της
γεωργικής εκμετάλλευσης που παρακολουθεί, κατά την διάρκεια μιας καλλιεργητικής περιόδου.

Σκοπός της εφαρμογής agroMANAGER είναι ο προσδιορισμός της υφιστάμενης κατάστασης της γεωργικής εκμετάλλευσης και ειδικότερα της κεφαλαιακής συνθήσεως αυτής η λεπτομερής παρακολούθηση και καταγραφή των φυσικών ή τεχνικών και οικονομικών δεδομένων των διαφόρων κλάδων και μέσων παραγωγής της εκμετάλλευσης και των διαφόρων δοσοληψιών αυτής, καθώς και των μεταβολών της κεφαλαιακής συνθήσεως της κατά τη διάρκεια του έτους. Η εφαρμογή της μεθοδικής και συστηματικής καταγραφής των τεχνικών και οικονομικών δεδομένων επιτυγχάνεται με την βοήθεια του φιλικού για τον χρήστη περιβάλλοντος της εφαρμογής, έτσι ώστε να υπολογιστεί στη συνέχεια το πραγματοποιούμενο οικονομικό αποτέλεσμα.

Ο agroMANAGER είναι κατά βάση μια διαδικτυακή εφαρμογή ανοιχτού κώδικα. Όπως αναφέραμε και προηγουμένως στις εφαρμογές ανοιχτού κώδικα δίνεται η δυνατότητα τροποποίησης του αρχικού προγράμματος. Το νέο πρόγραμμα το οποίο θα προκύψει από τις αλλαγές μπορεί να διατίθεται με την ίδια άδεια χρήσης όπως το αρχικό πρόγραμμα. Με το τρόπο αυτό επιχειρείται, χωρίς όμως να επιβάλλεται, οι βελτιωμένες εκδόσεις του προγράμματος να συνεχίσουν να είναι προσιτές σε όλους. Βέβαια υπάρχει δυνατότητα να εκτελεστεί η εφαρμογή και τοπικά σε έναν μόνο υπολογιστή, ωστόσο ο σχεδιασμός έγινε με την λογική πολλοί χρήστες να μπορούν να έχουν πρόσβαση μέσω του Internet στην εφαρμογή, αρκεί να διαθέτουν έναν browser που να τους επιτρέπει την πρόσβασή στην ιστοσελίδα. Η εφαρμογή στηρίζεται στην php μια γλώσσα προγραμματισμού που σχεδιάστηκε για να δημιουργεί δυναμικές σελίδες στο Internet και στη βάση δεδομένων sql, και πιο συγκεκριμένα τον mysql server.

10. Η Εφαρμογή agroPLAN

Η εφαρμογή agroPLAN είναι μια εφαρμογή για την Οργάνωση Παραγωγής γεωργικών εκμεταλλεύσεων και γεωργικών περιοχών. Ειδικότερα το agroPLAN είναι ένα σύστημα υποστήριξης αποφάσεων που προσομοιώνει διάφορα σενάρια οικονομικά και προειδοποιεί εναλλακτικά σχέδια παραγωγής που επιτυγχάνονται διαφορετικά επίπεδα επιτόκιο στο εισόδημα, στην επιστροφή και στο περιβάλλον. Η μεθοδολογία που χρησιμοποιεί είναι η πολυκριτήρια ανάλυση σταθμισμένου προγραμματισμού πολλαπλών στόχων.

Η εφαρμογή μπορεί να χρησιμοποιηθεί για την οργάνωση παραγωγής αγροτικών περιοχών αλλά και για την οργάνωση παραγωγής κάθε γεωργικής εκμετάλλευσης έξοχος. Η εφαρμογή δημιουργήθηκε σε περιβάλλον Visual Basic και τρέχει σε Windows XP. Για να είναι
εύχρηστη από τον χρήστη επιλέξαμε να ακολουθεί την εφαρμογή της μεθοδολογίας βήμα-βήμα.

11. Συμπεράσματα

Στο σύγχρονο κόσμο του Internet και του ηλεκτρονικού επιχειρείν η ροή πληροφόρησης είναι σχεδόν τόσο κρίσιμη όσο και η ροή χρήματος, ιδιαίτερα στον αγροτικό τομέα ο οποίος χαρακτηρίζεται από την έλλειψη άμεσης, αλλά και έγκαιρης πληροφόρησης.

Με την ανάπτυξη του διαδικτυακού τόπου agroGOV.gr προσπαθήσαμε να συμβάλλουμε στην αντιμετώπιση του προβλήματος της εύκολης και φυλικής πρόσβασης στην πληροφόρηση, από όλους τους φορείς που εμπλέκονται στην γεωργική παραγωγή, αλλά και στην προσφορά βελτιωμένων υπηρεσιών στα πρώτα στάδια της ηλεκτρονικής διακυβέρνησης. Για το σκοπό αυτό προχώρησαμε στην μελέτη των εργαλείων που υπάρχουν για την κατασκευή ενός κόμβου ηλεκτρονικής διακυβέρνησης και στην ανάπτυξη του κόμβου με πραγματική εφαρμογή στο διαδίκτυο. Παράλληλα, αναπτύξαμε και 2 προγράμματα εφαρμογών για το management της γεωργικής παραγωγής α) ένα για τη διοίκηση και διαχείριση γεωργικών εκμεταλλεύσεων και β) ένα για την οργάνωση παραγωγής γεωργικών και εκμεταλλεύσεων και γεωργικών περιοχών.

Η παροχή έγκυρων και έγκαιρων πληροφοριών στον αγροτικό τομέα, είναι απαραίτητη και για τον πολύ σημαντικό λόγο ότι ο αγροτικός κόμβος κατοικεί κυρίως σε μακρινές και δυσπρόσιτες περιοχές, από τις οποίες δεν έχει άμεση πρόσβαση στις υπηρεσίες της δημόσιας διοίκησης του αγροτικού τομέα.

Πιστεύουμε ότι η πύλη agroGOV.gr που αναπτύξαμε θα μπορεί να προσφέρει στον αγρότη-χρήστη πρώτα απ’ όλα αλλά και σε όλους τους αρμόδιους φορείς πληροφόρηση και βελτιωμένες υπηρεσίες που είναι απαραίτητες για την ανάπτυξη των γεωργικών εκμεταλλεύσεων, της γεωργικής παραγωγής και της γεωργικής υπαίθρου γενικότερα.

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Τα Ιστολόγια (e-blogs), ως συμπλήρωμα στην παραδοσιακή
ekpaiedevtnikí diádikasia. H dyvatótita kritikís prose ton
kathgíthi. Synkrrítikí éreuna sto TEP Lárisas kai to
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Περίληψη:
H anexhísi tis online máthshs, odhgei sthn ensoymatwsh neon diadrastrikh thn
paradossiakí trito-kátima ekpaiedvnikí diádikasia. H méchi sýméra bibliostrafía anaféréi óti h chrísh
ton istológu sthn tásèi einai periorishméni. Katá syneipía, upárchi anagíkhi
ei erewnithi kai na kataanóithi eis básous h dyvatótita chríshs tôn istológu
whs epípresi ton didaktikí ergaleióu. Eídikótera sti synkekríménh meléti
exézetai h dyvatótita pou diadetai stous fóiotites méso tôn istológu na
kánovn kritikí prose ton kathghthi tous kai thn ekpaiedvnikí diádikasia
gennikótera. Epísth exézetai pros h synkekríménh dyvatótita epíreázei thn
emplekámenous me kúrio stóch thn kalutéreuši olóklyrhis ths ekpaiedvnikís
 diádikasías.
1. Εισαγωγή
Η χρήση της online μάθησης αυξάνεται πολύ γρήγορα στη παγκόσμια πανεπιστημιακή κοινότητα. Ως φυσικό επακόλουθο έχουμε την ενσωμάτωση νέων επικουρικών διαδραστικών διαδικασιών όπως είναι τα ιστολόγια, wikies κλπ. Με τον όρο ιστόλογο (απόδοση στην ελληνική γλώσσα του αγγλικού ήρον weblog ή blog) εννοούμε ένα ψηφιακό εργαλείο δεύτερης γενιάς που μπορεί να χρησιμοποιηθεί στην παιδαγωγική διαδικασία λόγω της διαδραστικότητας που ενθαρρύνεται από το λογισμικό και της δυνατότητας για ομαδική εργασία που προσφέρεται από το σχεδιασμό του (Vivitsou, 2007). Εννοούμε επίσης ιστοσελίδες που ενημερώνονται συχνά και περιέχουν δημοσιεύσεις, ταξινομημένες χρονολογικά, με την πιο πρόσφατη να εμφανίζεται πρώτη (Bhatt 2005, pp.28-32). Η δημιουργία και τήρηση ενός ιστολογίου σηματοδοτεί την ανάπτυξη περιβάλλοντος δημοσιοποίησης των ιδεών, σκέψεων, απόψεων, γνώσεων των χρηστών χρησιμοποιώντας το λόγο ως μέσο εκφράσης. Η φύση του λόγου που καταγράφεται σε μορφή κειμένων στο ιστόλογο (σχόλια, απαντήσεις και κριτική) δεν παίει να αποτελεί πυρήνα οικοδόμησης της γνώσης (Cheung & Hew, 2003, p.249). Εκτός από το γεγονός ότι το ίδιο το περιβάλλον είναι προϊόν γνωστικής επιεξεργασίας, το περιεχόμενο του αντανακλά το σύστημα αξιών, τις απόψεις, τις προσεγγίσεις του δημιουργού του σχετικά με το θέμα που διαπραγματεύεται. Επομένως, δυναμικά μπορεί να ενεργοποιήσει την κατάθεση επιχειρημάτων, θέσεων αντιθέσεων και κριτικής, με αποτέλεσμα την προώθηση της κριτικής σκέψης και των δεξιοτήτων ανάγνωσης και γραφής (Johnson, Newman, Webb & Cochran, 1997). Το στοιχείο αυτό, καθώς ενσωμάτωσε την προοπτική συμμετοχής και συνεργασίας, καθιστά το ιστόλογο ένα δυναμικό εργαλείο μάθησης του Παγκόσμιου Ιστού στη διαδικτυακή εκπαίδευση. Επομένως, θα μπορούσε να εισπράξει και σύμφωνα με την επισήμανση του Stahl (2006), ότι το ιστόλογο αποτελεί ένα γνωσιακά-βασισμένο περιβάλλον, καθώς, ως ασύγχρονο εργαλείο, ενθαρρύνει τον αναστοχασμό επί του περιεχομένου και υποστηρίζει τη διαδικασία οικοδόμησης της γνώσης σε κοινοικο πλαίσιο μέσω της αλληλεπίδρασης μεταξύ δημιουργού και χρηστών-επισκεπτών. Η δυνατότητα δε που προσφέρεται σήμερα από τους παρόχους εικονικού χώρου για την καταχώρηση πολυάρθρων δημοσιεύσεων και σχόλιων χρησιμοποιήσης επιβάρυνσης, χρονικούς περιορισμούς και με διάρκεια που εξαρτάται από τη βούληση του δημιουργού του ιστόλογο, αυξάνει την αίσθηση μονιμότητας και το βαθμό οικειοποίησης του διαδικτυακού περιβάλλοντος. Επίσης, η ενσυναίσθημη αίσθηση ιδιοκτησίας δρα ως

Η παρούσα μελέτη, έρχεται να συμπληρώσει ένα κενό το οποίο υφίστατα στον συγκεκριμένο τομέα, θεωρώντας ότι είναι αναγκαίο να ερευνηθούν και να κατανοηθούν εις βάθος η εκπαιδευτική λειτουργία και η χρήση του ιστολόγιο ως επιπρόσθετο επικουρικό διδακτικού εργαλείου.

Ειδικότερα εξετάζεται η δυνατότητα που δίδεται στους φοιτητές να κάνουν μέσω του ιστολογίου κριτική προς τον καθηγητή τους και την εκπαιδευτική διαδικασία γενικότερα. Επίσης εξετάζεται ποια η συγκεκριμένη δυνατότητα επηρεάζει τους εμπλεκόμενους φοιτητές και καθηγητές, με κύριο στόχο την ποιοτική αναβάθμιση ολόκληρης της εκπαιδευτικής διαδικασίας.
2. Στόχος
Η συγκεκριμένη μελέτη στόχευσε:

1. στην κατανόηση της χρήσης του ιστολογίου ως συμπλήρωμα στη παραδοσιακή εκπαιδευτική διαδικασία,
2. στην πρόταση ενός νέου, κατάλληλα σχεδιασμένου, εύχρηστου και ανέξοδου τρόπου χρήσης του ιστολογίου μέσα στην τάξη,
3. στον εντοπισμό και στην αξιοποίηση των δυνατοτήτων αξιολόγησης - κριτικής εκ μέρους των φοιτητών
4. στον τρόπο με τον οποίο μπορεί να παρουσιαστεί μέσω ιστολογίου μια εργασία - μελέτη και
5. στη διερεύνηση των λόγων που ωθούν τους φοιτητές να συμμετέχουν σε αυτό το είδος ασύγχρονης εκπαιδευτικής διαδικασίας.

3. Οργάνωση και δομή του μαθήματος
Κατόπιν έρευνας της σύγχρονης βιβλιογραφίας, ένα ιστολόγιο σχεδιάστηκε και παραμετροποιήθηκε στο έκκαιμα του εαρινού εξαμήνου του 2009 (figure 1).

![Figure 1](image1.jpg)

Figure 1. (Αρχική σελίδα του εκπαιδευτικού ιστολογίου)

Στο ίδιο εξάμηνο παρουσιάστηκε από τον καθηγητή στους φοιτητές και υποδείχθηκε η χρήση του. Αρχικά ζητήθηκε να καταθέσουν υπό μορφή σχολιό, τις μέχρι και εκείνη τη στιγμή γνώσεις τους επί θεμάτων που επρόκειτο να διδαχθούν, δηλ. στο ΤΕΙ Λάρισας τι γνωρίζουν για τα Ιστολόγια και τους Φυλλομετρητές (figure 2) και στο Πανεπιστήμιο Ιωαννίνων (figure 3) τι γνωρίζουν για τη Χρήση των Υπολογιστών στο Νηπιαγωγείο.
Figure 2. Ιστολόγιο με σχόλια για το επίπεδο γνώσεων (ΣΔΟ, ΤΕΙ Λάρισας)

Figure 3. (Ιστολόγιο με σχόλια για το επίπεδο γνώσεων ΠΤΝ Πανεπιστήμιο Ιωαννίνων)

Αυτό είχε ως στόχο την κατανόηση εκ μέρους των διδασκόντων, του επιπέδου γνώσης του τμήματος. Οι εργασίες -με σχετική έρευνα-, που ζητήθηκε να κατατεθούν και στα δυο τμήματα, ήταν σχετικές με τις σπουδές τους καθώς και με το συγκεκριμένο μάθημα. Οι φοιτητές είχαν τη δυνατότητα να καταθέσουν τις γνώσεις τους εντός μιας εβδομάδας. Στο επόμενο μάθημα δόθηκαν εργασίες με τη μορφή αναρτήσεων στο ιστολόγιο, οι οποίες απαιτούσαν έρευνα εις βάθος.
Κατά τη διάρκεια της εκπαιδευτικής διαδικασίας, δόθηκε επίσης η δυνατότητα στους φοιτητές να κάνουν σχόλια και να κρίνουν - αξιολογήσουν τον τρόπο διεξαγωγής του μαθήματος καθώς και τον/την καθηγητή/τριά τους. (figure 4) & (figure 5). Η αξιολόγηση - κριτική αναρτάται στο ιστολόγιο υπό μορφή σχολιών, είναι άμεσα προσβάσιμη σε όλους τους συμμετέχοντες, έπρεπε να είναι τεκμηριωμένη, και μπορούσε να γίνει —κάτι πολύ σημαντικό— απόνομα ή επάνω.

Στο ΤΕΙ Λάρισας στην αξιολόγηση — κριτική συμμετέχοντα 18 (δέκα οκτώ) από τους 22 (είκοσι δύο) φοιτητές. Αυτό συνέβη επειδή, ο ίδιος καθηγητής που έκανε την έρευνα κάνει και το συγκεκριμένο μάθημα, οπότε οι φοιτητές είχαν τη δυνατότητα να κρίνουν — αξιολογήσουν τον καθηγητή τους. Κάτι παρόμοιο δεν μπορούσε να γίνει στο Πανεπιστήμιο Ιωαννίνων επειδή άλλος καθηγητής διεξήγαγε το μάθημα και άλλος την έρευνα. Επομένως, στην περίπτωση του Πανεπιστημίου Ιωαννίνων κανένας φοιτητής δεν χρησιμοποίησε τη συγκεκριμένη δυνατότητα αλλά απαντήσαν τους περισσότερους στις ερωτήσεις του σχετικού ερωτηματολογίου που αναρτήθηκε στο ιστολόγιο.

Μέσω της συγκεκριμένης μελέτης θα παρουσιάσουμε τα αποτελέσματα που προκύπτουν από τον τρόπο με τον οποίο δόθηκε στους φοιτητές η δυνατότητα να εκθέσουν τις απόψεις τους και να καταθέσουν την κριτική τους. Στη έρευνα, που πραγματοποιήθηκε το εαρινό εξάμηνο του 2009, συμμετείχαν συνολικά πενήντα δύο (52) αυτοεπελεγμένοι φοιτητές. Οι είκοσι δύο (22) από αυτούς στο εργαστηριακό μάθημα «Σύγχρονο Λογισμικό - Οργάνωση Γραφείου» στο ΤΕΙ Λάρισας και οι υπόλοιποι τριάντα (30) στο Πανεπιστήμιο Ιωαννίνων στο μάθημα «Εισαγωγή στην Πληροφορική και Εκπαίδευση – Νέες Τεχνολογίες».

Figure 4. (1. Παρουσίαση εργασιών στο ιστολόγιο της ΣΔΟ του ΤΕΙ Λάρισας)
Proceedings of the 5th HSSS Conference, Xanthi, Greece, 2009

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(nearest neighbour model). ȀĮĲȐ ĲȘȞ ț ȆĮȖȖȑ (2005) Ș ȤȡȒıȘ ĲȠȣ


συγκεκριμένου μοντέλου εκπαίδευσης βοηθά τους φοιτητές στο να κατανοήσουν καλύτερα και σε βάθος ένα θέμα, επειδή ιδιαίτερα πληροφορίες από πολλές διαφορετικές πηγές με τη χρήση του ηλεκτρονικού ταχυδρομείου καθώς και της αποστολής και λήψης σχολιών. Τοιχογράφουσα, στο ιστολόγιο εισήχθησαν στοιχεία όπως η δόμηση του σε ενότητα, η ευελιξία οργάνωση του, η ενθάρρυνση για συνεργατική μάθηση, η δυνατότητα αξιολόγησης-κριτικής, η εμβάθυνση στην έρευνα και η δημιουργία προσωπικής για τα αποτελέσματά της. Επίσης δόθηκε η δυνατότητα στους φοιτητές να εμπλουτίσουν το διδακτικό υλικό και να μεταφέρουν στην τάξη γνώση η οποία βρίσκεται έξω από αυτή.

5. Αποτελέσματα

Από τις απαντήσεις των φοιτητών του Πανεπιστημίου Ιωαννίνων και του ΤΕΙ Λάρισας σε ερωτήσεις του σχετικού αναρτημένου στο ιστολόγιο ερωτηματολογίου, προέκυψαν τα παρακάτω αποτελέσματα:

<table>
<thead>
<tr>
<th>Σας αρέσει ο τρόπος διεξαγωγής του μαθήματος με χρήση ιστολογίου;</th>
<th>Πανεπιστήμιο Ιωαννίνων</th>
<th>ΤΕΙ Λάρισας</th>
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<td>Πολύ</td>
<td>Λίγο</td>
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<thead>
<tr>
<th>Το interface (περιβάλλον) του ιστολογίου, πόσο κατανοητό και εύχρηστο ήταν στο χρήστη;</th>
<th>Πανεπιστήμιο Ιωαννίνων</th>
<th>ΤΕΙ Λάρισας</th>
</tr>
</thead>
<tbody>
<tr>
<td>Πολύ</td>
<td>Λίγο</td>
<td>Καθόλου</td>
</tr>
<tr>
<td>90%</td>
<td>7%</td>
<td>3%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Σε τι βαθμό σας βοήθησε το ιστολόγιο στην εργασία σας ατομικά και ομαδικά;</th>
<th>Πανεπιστήμιο Ιωαννίνων</th>
<th>ΤΕΙ Λάρισας</th>
</tr>
</thead>
<tbody>
<tr>
<td>Πολύ</td>
<td>Λίγο</td>
<td>Καθόλου</td>
</tr>
<tr>
<td>87%</td>
<td>10%</td>
<td>3%</td>
</tr>
</tbody>
</table>
Τα κείμενα περιλαμβάνονται σε τρεις ταμπλέτες με δεδομένα σε μορφή ταμπλέτα, οι οποίες περιλαμβάνουν τα εξής:

### Έχετε δημιουργήσει δικό της ιστολόγιο;

<table>
<thead>
<tr>
<th>Πανεπιστήμιο Ιωαννίνων</th>
<th>ΤΕΙ Λάρισας</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ναι</td>
<td>Οχι</td>
</tr>
<tr>
<td>79%</td>
<td>21%</td>
</tr>
<tr>
<td>20%</td>
<td>80%</td>
</tr>
</tbody>
</table>

### Αν είχατε, πόσο εύκολη ήταν η δημιουργία του; (Υπάρχει δυνατότητα πολλαπλής επιλογής)

<table>
<thead>
<tr>
<th>Πανεπιστήμιο Ιωαννίνων</th>
<th>ΤΕΙ Λάρισας</th>
</tr>
</thead>
<tbody>
<tr>
<td>Πολύ</td>
<td>Λίγο</td>
</tr>
<tr>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>0%</td>
<td>96%</td>
</tr>
<tr>
<td>100%</td>
<td>4%</td>
</tr>
<tr>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

### Θεωρείτε ότι ενισχύει την εκπαιδευτική διαδικασία και μάθηση σε σχέση με τον παραδοσιακό τρόπο;

<table>
<thead>
<tr>
<th>Πανεπιστήμιο Ιωαννίνων</th>
<th>ΤΕΙ Λάρισας</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ναι</td>
<td>Οχι</td>
</tr>
<tr>
<td>89%</td>
<td>11%</td>
</tr>
<tr>
<td>100%</td>
<td>0%</td>
</tr>
</tbody>
</table>

### Αν θεωρείτε ότι ενισχύει την εκπαιδευτική διαδικασία, τότε σε ποια σημεία; (Υπάρχει δυνατότητα πολλαπλής επιλογής)

<table>
<thead>
<tr>
<th>Πανεπιστήμιο Ιωαννίνων</th>
<th>ΤΕΙ Λάρισας</th>
</tr>
</thead>
<tbody>
<tr>
<td>Έρευνα</td>
<td>Εργασίες</td>
</tr>
<tr>
<td>52%</td>
<td>13%</td>
</tr>
<tr>
<td>37%</td>
<td>22%</td>
</tr>
</tbody>
</table>

### Θα προτιμούσατε σε ομαδική εργασία να συναντήσετε με τα μέλη της ομάδας σε κοινό χώρο ή εξ αποστάσεως με τη βοήθεια του ιστολογίου;

<table>
<thead>
<tr>
<th>Πανεπιστήμιο Ιωαννίνων</th>
<th>ΤΕΙ Λάρισας</th>
</tr>
</thead>
<tbody>
<tr>
<td>Σε κοινό χώρο</td>
<td>Εξ αποστάσεως</td>
</tr>
<tr>
<td>17%</td>
<td>83%</td>
</tr>
<tr>
<td>Σε κοινό χώρο</td>
<td>Εξ αποστάσεως</td>
</tr>
<tr>
<td>50%</td>
<td>50%</td>
</tr>
</tbody>
</table>
Τι σας άρεσε περισσότερο κατά τη χρήση του ιστολογίου και τη μάθηση από απόσταση στην πράξη;  

<table>
<thead>
<tr>
<th>Πανεπιστήμιο Ιοαννίνων</th>
<th>ΤΕΙ Λάρισας</th>
</tr>
</thead>
<tbody>
<tr>
<td>Έρευνα</td>
<td>Έργασίες</td>
</tr>
<tr>
<td>29%</td>
<td>25%</td>
</tr>
<tr>
<td>Κριτική</td>
<td>Συνεργασία</td>
</tr>
<tr>
<td>39%</td>
<td>33%</td>
</tr>
</tbody>
</table>

Τι σας οδηγεί να συμμετέχετε στο μάθημα με χρήση ιστολογίου; (Υπάρχει δυνατότητα πολλαπλής επιλογής)  

<table>
<thead>
<tr>
<th>Πανεπιστήμιο Ιοαννίνων</th>
<th>ΤΕΙ Λάρισας</th>
</tr>
</thead>
<tbody>
<tr>
<td>Καθηγητής</td>
<td>Βαθμός</td>
</tr>
<tr>
<td>12%</td>
<td>16%</td>
</tr>
<tr>
<td>Έρευνα</td>
<td>Κριτική</td>
</tr>
<tr>
<td>40%</td>
<td>32%</td>
</tr>
<tr>
<td>Καθηγητής</td>
<td>Βαθμός</td>
</tr>
<tr>
<td>25%</td>
<td>24%</td>
</tr>
<tr>
<td>Έρευνα</td>
<td>Κριτική</td>
</tr>
<tr>
<td>25%</td>
<td>19%</td>
</tr>
</tbody>
</table>

Πριν την εργασία, είχατε χρησιμοποιήσει ξανά ιστολόγιο;  

<table>
<thead>
<tr>
<th>Πανεπιστήμιο Ιοαννίνων</th>
<th>ΤΕΙ Λάρισας</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ναι</td>
<td>Όχι</td>
</tr>
<tr>
<td>47%</td>
<td>53%</td>
</tr>
</tbody>
</table>

Θα το ξαναχρησιμοποιούσατε στο μέλλον;  

<table>
<thead>
<tr>
<th>Πανεπιστήμιο Ιοαννίνων</th>
<th>ΤΕΙ Λάρισας</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ναι</td>
<td>Όχι</td>
</tr>
<tr>
<td>86%</td>
<td>14%</td>
</tr>
</tbody>
</table>

Τα αποτελέσματα που αφορούσαν στην αξιολόγηση του μαθήματος σε σχέση με την δυνατότητα της αξιολόγησης – κριτικής – έδειξαν ότι οι φοιτητές οφελήθηκαν πολύ από τη χρήση του συγκεκριμένου δυνατότητας. Αυτό προκύπτει από την απάντηση των φοιτητών και σπουδαστών σε ερώτηση πολλαπλής επιλογής του ερωτηματολογίου: «Αν θεωρείτε ότι το ιστολόγιο ενισχύει την εκπαιδευτική διαδικασία, τότε σε
ποια σημεία γίνεται αυτό», για το ΤΕΙ Λάρισας το 41% απάντησε ‘Η δυνατότητα κριτική’ ενώ για το Πανεπιστήμιο Ιωαννίνων το 35%. Σε ερώτηση πολλαπλής επιλογής «Τι σας οδεί να συμμετέχετε στο μάθημα με χρήση ιστολογίου;» για το ΤΕΙ Λάρισας το 19% απάντησε θετικά για την δυνατότητα κριτικής και στο Πανεπιστήμιο Ιωαννίνων το 32%. Επίσης σε άλλη ερώτηση πολλαπλής επιλογής «Τι σας άρεσε περισσότερο κατά τη χρήση του ιστολογίου και τη μάθηση από απόσταση στην πράξη;» για το ΤΕΙ Λάρισας το 19% απάντησε θετικά για την δυνατότητα κριτικής και στο Πανεπιστήμιο Ιωαννίνων το 25%.

6. Συμπεράσματα

Κατά τη διάρκεια της παραμετροποίησης του ιστολογίου, η ευκολία, η απλότητα, η ευχρηστία και η συμβατότητα με την οποία έγινε αυτό, παρείχε την αίσθηση του ‘δημιουργήματος’ με την έννοια που του προσδίδει o Stahl (2006), δηλαδή του αντικειμένου το οποίο είναι προϊόν γνωστικής επεξεργασίας. Επιπρόσθετα, τα παραπάνω είναι σε συμφωνία και με την άποψη ότι η ενισχυόμενη αίσθηση ιδιοκτησίας δρα ως καταλύτης και κινητοποιεί τους χρήστες να εμβαθύνουν τη γνώση τους για τη λειτουργία του λογισμικού και να προσαρμόζουν το περιβάλλον σύμφωνα με τις προτιμήσεις τους, διευκολύνοντας ταυτόχρονα τη διαμόρφωση του προσωπικού τους προφίλ, της διαδικτυακής τους ταυτότητας, Vivitsou (2007). Τα παραπάνω αποτελέσματα ενισχύουν και τη θεωρία του μοντέλου του πιο κοντινού γείτονα (nearest neighbour model) Παγγέ (2005), η χρήση του οποίου βοηθά τους φοιτητές στο να κατανοήσουν καλύτερα και σε βάθος ένα θέμα, επειδή λαμβάνουν πληροφορίες από πολλές διαφορετικές πηγές με τη χρήση του ηλεκτρονικού ταχυδρομείου καθώς και της αποστολής και λήψης σχολιών.

Η μελέτη αυτή παρουσιάζει στοιχεία που αφορούσαν κατ’ αρχάς το επίπεδο γνώσης των φοιτητών του ΠΤΝ του Πανεπιστημίου Ιωαννίνων σε σχέση με τη χρήση των Ηλεκτρονικών Υπολογιστών στο Νηπιαγωγείο και επίσης των σπουδαστών της ΣΧΟΛΗΣ ΣΔΟ του ΤΕΙ Λάρισας ως προς τα Ιστολόγια και τους Φυλλομετρητές. Επειδή δόθηκε στους εκπαιδευτικούς η δυνατότητα να εξερευνούν μέσω του ιστολογίου το επίπεδο γνώσης του τμήματος τους, μπορούσαν να κατευθύνουν το μάθημα εκεί που υπήρχαν πραγματικές ελλείψεις. Η μελέτη αυτή παρουσιάζει επίσης αποτελέσματα που αφορούσαν την αξιολόγηση – κριτική του μαθήματος και του/της καθηγητή/τριας, τα οποία έδειξαν ότι οι φοιτητές είδαν τη συγκεκριμένη δυνατότητα ως προνόμιο και μοναδική ευκαιρία να εκφράσουν ελεύθερα τις απόψεις τους.(Figure 4 & Figure 5)

Η εφαρμογή των Νέων Τεχνολογιών στην εκπαιδευτική διαδικασία είναι ως γνωστό επιβεβλημένη. Υπάρχει όμως μεγάλη ανάγκη για ευκολία, απλότητα, ευχρηστία, συμβατότητα, για να μπορέσουν να πειστούν οι καθηγητές και οι φοιτητές να χρησιμοποιήσουν αυτές τις Νέες
Τεχνολογίες. Ενσωματώνοντας νέες διαδραστικές διαδικασίες, όπως τα
ιστολόγια (blogs), πολλά από τα παραπάνω βρίσκουν την εφαρμογή τους
σε αυτά. Περαιτέρω έρευνα όμως πρέπει να διεξαχθεί για τη δυνατότητα
προσαρμογής και εφαρμογής της νέας αυτής συμπληρωματικής
εκπαιδευτικής διαδικασίας, με μεγαλύτερο δείγμα φοιτητών και σε
περισσότερα Εκπαιδευτικά Ιδρύματα διαφορετικών κατευθύνσεων.

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Σχεδιασμός και υλοποίηση συλλογικού μαθησιακού πράκτορα: εικονικές κοινότητες συνεργασίας και μάθησης εκπαιδευτικών

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Περίληψη (μόνο): Στην εργασία αυτή παρουσιάζουμε μια Συστημική-Κυβερνητική προσέγγιση της εικονικής και υβριδικής συνεργασίας και μάθησης εκπαιδευτικών. Η άλλη προσέγγιση δύναται να επεκτεθεί και σε άλλους επαγγελματικούς τομείς όπου είναι δυνατόν να λειτουργήσουν εικονικές και υβριδικές συνεργατικές δομές. Ακολουθώντας την αυστηρή agent based θεωρητική βάση της Κυβερνητικής όπως αυτή εκφράζεται κυρίως μέσω αυτοποιητικών θεωριών όπως αυτή της Θεωρίας Συζητήσεων του G. Pask μοντελοποιούμε μια Εικονική Κοινότητα Μάθησης και Συνεργασίας ως δομιμένη μαθησιακή συζήτηση με διακριτή υποσυστήματα γνωστικής αντανάκλασης, συνεπαγωγικού πλέγματος, αντικειμενικών γλωσσών και υποσυστήματος ομοιότητας και ρύθμισης. Η Θεωρία Συζητήσεων του Gordon Pask, πιστεύει στις βασικές αρχές της Κυβερνητικής για agent - based αντιμετώπιση ανθρώπων, μηχανών και οργανισμών, επιχειρεί να προσδιορίσει τη συστηματικότητα (systemhood) του φαινομένου της μάθησης σε μια κοινή πλατφόρμα τόσο για τους ζωντανούς οργανισμούς όσο και για τις μηχανές. Ως κυβερνητική θεωρία είναι κονστρουκτιβιστική και ανεξάρτητη από πλατφόρμα υλοποίησης. Το βασικό μοντέλο της Θεωρίας Συζητήσεων είναι το αυτοοργανονόμενο σύστημα (von Foerster, 1960) το οποίο προσαρμόζεται, αποκτά συνήθειες και μαθαίνει. Η Θεωρία Συζητήσεων αντιμετωπίζει την αλληλεπίδραση ανθρώπου με άνθρωπο και ανθρώπου με τη μηχανή ως συνεργατικές αλληλεπιδράσεις για τη δημιουργία αυτοοργανονόμενων συστημάτων (Pask, 1996). Η Θεωρία Συζητήσεων θα μπορούσε, κατά τον Pangaro (2007), να αποτελεί την κεντρική θεωρία της Κυβερνητικής μιας και ασχολείται με τον φορμαλισμό του βασικού οντολογικού προβλήματος της Κυβερνητικής αναφορικά με το τι μπορούμε να γνωρίζουμε, με ποιον τρόπο και πώς θα επιτύχουμε την πιο αντικειμενική αναπαράσταση της γνώσης. Παράλληλα, η Θεωρία Συζητήσεων αποτελεί σημαντικό πλαίσιο διαχείρισης της υποκειμενικότητας και της αβεβαιότητας σε κάθε συλλογικό και ατομικό ανθρώπινη προσπάθεια. Η αλληλεπίδραση αποτελεί για τη Θεωρία
Συζητήσεων γεννήτορα όλων των ατομικών οντοτήτων, αλλά και όλων των εννοιών. Ενσωματώμενες στη Θεωρία Συζητήσεων είναι τεχνικές διαχείρισης των συγκρούσεων που προκύπτουν κατά τις διαλεκτικές αλληλεπιδράσεις που έχουν ως στόχο την εξέλιξη και τη συμπαραγωγή συλλογικών ευστάθιων γνωστικών τοπολογιών. Η Θεωρία Συζητήσεων επιχειρεί να διαμορφώσει μια αντικειμενική γλώσσα αναπαράστασης της γνωστικής τοπολογίας και της αλληλεπίδρασης των εννοιών. O Pask (1996) ονόμασε τη γλώσσα αυτή πρωτογλώσσα . Η χρησιμοποιείται επίσης, και για τη μοντελοποίηση των διαδικασιών στο πλαίσιο των συζητήσεων. Η Θεωρία Συζητήσεων λειτουργεί πολύ καλά τόσο σε ερμηνευτικό όσο και σε ευρήστηκο επίπεδο, συντάσσοντας επαρκείς ερμηνευτικές οντολογίες για την επικοινωνία και τη μάθηση ανθρώπινων συνόλων. Η Θεωρία Συζητήσεων, σύμφωνα με τον Boyd (2001), αποδείχθηκε εμπνευστική και πρακτική για πολλούς που ασχολούνται με την Εκπαιδευτική Κυβερνητική και την Εκπαιδευτική Τεχνολογία, γιατί αποδεικνύει ότι η Κυβερνητική Διέξοδος Τάξης μπορεί να υποστηρίξει τη μάθηση σε πολλάλοκα π-ατομικά δίκτυα με διαφορετικά στυλ μάθησης και σε πολλαπλές πλατφόρμες μάθησης. Η έννοια του αυτόνομου μαθησιακού πράκτορα με κυβερνητική δομή, η δυνατότητα των αυτόνομων μαθησιακών πρακτόρων να συζητούν σε πολλαπλότητας και να δημιουργούν συλλογικούς μαθησιακούς πράκτορες με κυβερνητική δομή όπως οι σχολικές τάξεις, οι κοινότητες μάθησης ή οι επιστημονικές μονάδες, αποτελούν μοναδικές συνεισφορές της Θεωρίας Συζητήσεων στο πεδίο της Εκπαιδευτικής Κυβερνητικής. Η γνωστική αδιάπροκεντρικότητα που καλλιεργείται στο σχολείο εγκλωβίζει τον σύγχρονο άνθρωπο σε τετριμμένες οντολογίες και τετριμμένους τρόπους μάθησης, καθιστώντας δύσκολη την κατανόηση των πολύπλοκων συστημάτων μέσα στα οποία ζούμε. Το μοντέλο των πολλαπλών υπόσχεται να απελευθερώσει τους εκπαιδευτικούς και δημιουργούς εκπαιδευτικού λογισμικού από την αγκάθριση σε κλειστά πρότυπα μάθησης, ενώ δίνει νέες προοπτικές σε σύγχρονες τάξεις, όπως η αυτοκαθοδηγόμενη μάθηση, η διά βίου μάθηση και η οργανωτική μάθηση. Σύμφωνα με τον Pask (1996), η βασική ιδέα πίσω από τη Θεωρία Συζητήσεων είναι η έννοια της αυτοοργάνωσής του Von Foerster (1960). Ένα σύστημα μάθησης, όπως μια σχολική τάξη, μια εικονική κοινότητα ή ένας άνθρωπος σε επαφή με μια μηχανή μάθησης, είναι αυτοοργανωμένα συστήματα, αρκεί o deiktis orγános oποίος να ειχε θετικό ρυθμό. Έχοντας ένα σημαντικό θεωρητικό υπόβαθρο προχωράμε στην υλοποίηση πληροφοριακού συστήματος ανοιχτού λογισμικού με την παράκατο αρχηγικονική:

- Κατάλληλα διαμορφωμένο πληροφοριακό σύστημα CMS – Σύστημα διαχείρισης περιεχομένου με ενσωματωμένο component δοματίων συνεργασίας
- Πλατφόρμα εικονικής συνεργασίας εκπαιδευτικών
- Πλήρης καταγραφή και διαγράμματική απεικόνιση των διαδικασιών διαχείρισης. Η καταγραφή έγινε σε πλατφόρμα DCSYM (Design and Control Systemic Methodology) + BPMN (Business Process Modeling Notation)
- Σύστημα VCAA (Virtual Community Administration Agent). Σύστημα αυτοματοποίησης οργανισμικών και διαχειριστικών διαδικασιών της Εικονικής Κοινότητας. Η ανάπτυξη έγινε με γλώσσα προγραμματισμού Autoit3 σε project Sourceforge.
Λέξεις Κλειδιά:
Συστημικές Πολύ-Μεθοδολογίες, DSYM, Θεωρία Συζητήσεων,
Εικονικές Κοινότητες Συνεργασίας, Εικονικές Κοινότητες Μάθησης
Εκπαιδευτικών
Εικονικές Επιχειρήσεις και Ηλεκτρονική Διακυβέρνηση:
Μια προσέγγιση με χρήση Active Server Pages

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Περίληψη
Μια εικονική επιχείρηση (ΕΕ) αποτελεί μια προσωρινή συνεργασία επιχειρήσεων με στόχο την αποπεράτωση ενός κοινού έργου. Η εικονική επιχείρηση αποτελείται από πλήθος μονάδων γεωγραφικά διασκορπισμένων αλλά διαχειρίζομενων ως μια ενιαία μονάδα, παράλληλα τα υποτέματα μπορεί να υπάγονται σε ένας διοικητικός διοικητή. Μια εικονική επιχείρηση έχει σχετικά μικρή διάρκεια ζωής. Δύο ή περισσότερες επιχειρήσεις μπορούν να συνεργαστούν προσωρινά με στόχο τη δημιουργία ενός προϊόντος. Όταν ολοκληρωθεί η παραγωγή, η ΕΕ δεν έχει πια λόγο ύπαρξης και διαλύεται. Άλλες ΕΕ μπορεί να έχουν μεγαλύτερη διάρκεια ζωής ενός ορισμένου περιοδικού χρόνου ή διάρκειας ζωής ένωνόντας τις σχετικές τους δυνάμεις ώστε να εκμεταλλεύουν την ευκαιρία μιας ολόκληρης αγοράς. Στόχος της εργασίας είναι η κατασκευή μιας εικονικής επιχείρησης για την δημιουργία μιας εφαρμογής ηλεκτρονικής διακυβέρνησης. Όλες οι λειτουργίες της ΕΕ διεξάγονται μέσω του Διαδικτύου και υλοποιούνται με χρήση της τεχνολογίας Active Server Pages (ASP). Η ASP είναι ένα γενικό brand name της αγοράς που προωθήθηκε και υποστηρίζεται από τη Microsoft. Αποτελεί ένα μέσο όπου συνδυάζονται οι δυνατότητες λογικών εποπτών, συνδέσης στο Internet, διαχείρισης πόρων δεδομένων -πολύ πιο λεπτομερειακών από απλές βάσεις δεδομένων- καθώς και οι επικοινωνίες μεταξύ των συσκευών. Η μορφή που η ΕΕ χρειάζεται στο Διαδίκτυο είναι αυτή ενός vortal, βιασμένου σε ένα Σύστημα Διαχείρισης Περιεχομένου (ΣΔΠ), το οποίο συμβάλλει στην εξυπηρέτηση τόσο των υποψήφιων πελατών της, όσο και στις διευκολύνσεις που παρέχει στο έμμονο προσωπικό των συνασπιζόμενων εταίρων, τονίζοντας έτσι τον ανθρωποκεντρικό χαρακτήρα που διέπει τις σύγχρονες ΕΕ που δραστηριοποιούνται μέσω του Διαδικτύου. Το ΣΔΠ παρέχει τη δυνατότητα σε όλα τα μέλη να επικοινωνούν με ασφάλεια μεταξύ τους, αλλά και να μπορούν να γνωρίζουν σε πραγματικό χρόνο σε ποιο στάδιο βρίσκονται οι εργασίες της ΕΕ.
Λέξεις Κλειδιά:
Εικονικές Επιχειρήσεις, Ηλεκτρονική Διακυβέρνηση, ASP, CMS

1. Εισαγγελή

Η Ηλεκτρονική Διακυβέρνηση (e-government) αποτελεί αναμφισβήτητα ένα φαινόμενο της εποχής μας, έχοντας ήδη καταφέρει να γίνει απαραίτητο συστατικό στο δημόσιο τομέα (Giddens, 1998). Με τον όρο ηλεκτρονική διακυβέρνηση χαρακτηρίζεται γενικά η εισαγωγή των Τεχνολογιών Πληροφορικής και Επικοινωνιών (TIE) στη δημόσια διοίκηση. Ωστόσο, η εφαρμογή των TIE στον τομέα της ηλεκτρονικής διακυβέρνησης δεν πρέπει να θεωρείται αυτοσκοπός. Η χρήση των TIE αφορά στην υποστήριξη των υπηρεσιών της ηλεκτρονικής διακυβέρνησης, στο να παρέχει δηλαδή η τεχνολογία, τα απαραίτητα εργαλεία για την καλύτερη εξυπηρέτηση του κοινού και όχι στην υποκατάσταση του ανθρώπινου δυνάμικου, των δημόσιων υπηρεσιών και στη δημιουργία μιας απρόσωπης διακυβέρνησης (Angelopoulos et al., 2009a; Angelopoulos et al., 2009b).


Τα πλαίσια (frameworks) Ηλεκτρονικής Διακυβέρνησης εντάσσονται στο συνολικό σχεδιασμό της Δημόσιας Διοίκησης για την παροχή ηλεκτρονικών υπηρεσιών σε φορείς, επιχειρήσεις και πολίτες (Papadopoulos et al., 2009; Papadopoulos et al., 2008). Αποτελούν τον ακρογωνιαίο λίθο μιας ψηφιακής στρατηγικής για τη μετάβαση και προσαρμογή των υπηρεσιών της σε απαιτήσεις της σύγχρονης εποχής και στοχεύουν στην αποτελεσματική υποστήριξη της Ηλεκτρονικής Διακυβέρνησης σε Κεντρικό, Περιφερειακό και Τοπικό επίπεδο, συμβάλλοντας στην επίτευξη της διαλειτουργικότητας σε επίπεδο πληροφοριακών συστημάτων, διαδικασιών και δεδομένων διακυβέρνησης (Kitsios et al., 2009; Kitsios et al., 2008). Οι Τεχνολογίες Πληροφορικής
και Επικοινωνιών θα πρέπει να επέμβουν με τέτοιο τρόπο ώστε, να εξασφαλίστει αποτελεσματική, γρήγορη, αντικειμενική, ποιοτική, αλλά προπάντων ισότιμη πρόσβαση στις υπηρεσίες ηλεκτρονικής διακυβέρνησης, εξυπηρετώντας πολιτικοκεντρικές ανάγκες. Στην κατεύθυνσή αυτή, τα χαρακτηριστικά των ΕΕ μπορεί να αποδειχθούν πολύτιμα για την γρήγορη κατασκευή αξιόπιστων εφαρμογών ηλεκτρονικής διακυβέρνησης (Angelopoulos et al., 2009b; Angelopoulos et al., 2008).

Μια εικονική επιχείρηση (ΕΕ) αποτελεί μια προσωρινή συνεργασία επιχειρήσεων με στόχο την αποπεράτωση ενός κοινού έργου. Η εικονική επιχείρηση αποτελείται από πλήθος μονάδων γεωγραφικά διασκορπισμένων αλλά διαχειριζόμενων ως μια ολοκληρωμένη μονάδα, παρά άλλο που τα υποτιμάματα μπορεί να υπάγονται σε έξυπνη προσέγγιση. Μια εικονική επιχείρηση έχει σχετικά μικρή διάρκεια ζωής. Δύο ή περισσότερες επιχειρήσεις μπορούν να συνεργαστούν προσωρινά με στόχο τη δημιουργία ενός προϊόντος ή μια υπηρεσίας. Μια εταιρεία μόνη της, δεν μπορεί συνήθως, να αναπτύξει τον απαραίτητο εσωτερικό σχεδιασμό ή τις δυνατότητες παραγωγής για να αντεπεξέλθει σε τόσο σύντομο χρονικό διάστημα (Presley, 1996). Όταν ολοκληρωθεί η παραγωγή, η ΕΕ δεν έχει παράγοντα για να επεκταθεί και διαλύεται. Το πιο σημαντικό σημείο κατά την σύσταση μιας ΕΕ είναι η γρήγορη και αποτελεσματική αφομοιότητα σε αυτήν των Επιχειρηματικών Διεργασιών (ΕΔ) από τις επιμέρους εταιρίες που την απαρτίζουν καθώς και η ομαλή ροή πληροφοριών μέσα σε αυτή (Barnett, 1998; Presley 1995). Ο σκοπός της λειτουργίας της ΕΕ είναι η βελτίωση των προσφερόμενων καθώς και η εξοικονόμηση χρόνου και χρήματος.

Η εργασία εστιάζεται στην κατασκευή ενός πλατφόρμα για την γρήγορη και ικανή αφομοίωση στην εικονική επιχείρηση των διεργασιών που χρειάζονται από τις επιμέρους εταιρίες που την απαρτίζουν. Όλες οι λειτουργίες της ΕΕ διεξάγονται μέσω του Διαδικτύου. Η μορφή που η ΕΕ έχει στο Διαδίκτυο είναι αυτή ενός vortal, βασισμένος σε Content Management System (CMS). Τα CMS χρησιμοποιούνται κατά κόρον για την αποθήκευση, διαχείριση, επεξεργασία και παρουσίαση στο Internet δεδομένων αποθηκευμένων σε βάσεις, παρέχοντας παράλληλα ευελιξία και ταχύτητα στη διαπαθή με το χρήστη. Τα χαρακτηριστικά αυτό το κάνουν υδατίερα ελκυστικά για την δημιουργία εικονικών επιχειρήσεων στο Διαδίκτυο. Το CMS της ΕΕ παρέχει τη δυνατότητα σε όλα τα μέλη να επικοινωνούν με ασφάλεια μεταξύ τους, αλλά και να μπορούν να γνωρίζουν σε πραγματικό χρόνο σε ποιο στάδιο βρίσκονται οι εργασίες της ΕΕ. Στην επόμενη ενότητα παρουσιάζεται η διαδικασία κατασκευής της ΕΕ. Στην άλλη έννοια παρουσιάζονται τα εργαλεία που χρησιμοποιήθηκαν για την υλοποίηση της Ε.Ε ενώ στην 4η ενότητα ξεκινά η παρουσίαση και η λειτουργία της προτεινόμενης εικονικής επιχείρησης. Η εργασία ολοκληρώνεται με την αναλυτική αναφορά στα πλεονεκτήματα και στα συμπεράσματα της προτεινόμενης εφαρμογής.

2. Διαδικασία Κατασκευής μιας Εικονικής Επιχείρησης

Μια εικονική επιχείρηση συστήνεται όταν υπάρχει μια επιχειρηματική ευκαιρία ή ανάγκη. Ετσι υποβάλλεται μια αγγελία-προκήρυξη για την κατασκευή ενός προϊόντος ή μια υπηρεσία στην προτεινόμενη εφαρμογή Virtual Enterprise Administrators (VIENA) και ξεκινούν οι εργασίες δημιουργίας της ΕΕ.

Η αναγνώριση των λειτουργικών απαιτήσεων και η εκτίμηση των οργανιστικών δυνατοτήτων είναι τα απαραίτητα πρώτα βήματα κατά την σύσταση μιας εικονικής επιχείρησης (Strader, 1998). Μια επιχείρηση είναι μια συλλογή από επιχειρηματικές δραστηριότητες οργανωμένη σε μια ομάδα από επιχειρηματικές διεργασίες που συνεργάζονται για την παραγωγή των προϊόντων αποτελούμενων αποτελεσμάτων της εταιρίας. Μια επιχειρηματική δραστηριότητα ορίζεται οπωσδήποτε λειτουργία που μετατρέπει την εισόδο ενός στοιχείου, γεγονότος ή πληροφορίας σε κάποιο εξαγόμενο αποτέλεσμα (Barnett, 1998). Η αγγελία αναλύεται και ανάλυση με τις προδιαγραφές και τις δεσμεύσεις που δίδονται, σχετιζόντας οι επιχειρηματικές διεργασίες που χρειάζονται για την κατασκευή του προϊόντος ή της υπηρεσίας. Η διοίκηση της VIENA αποτελείται από έμπειρα τεχνικά, διοικητικά και οικονομικά στελέχη ειδικευμένα σε διάφορους τομείς για τον λόγο αυτό.

Αρκεί γίνει η αποσαφήνιση των επιχειρηματικών διεργασιών ξεκινά η εύρεση των εταίρων που θα συστήσουν την ΕΕ. Η αναζήτηση γίνεται από
Σχήμα 1: Διαδικασία Κατασκευής μιας Εικονικής Επιχείρησης

Στη συνέχεια γίνεται ο καθορισμός των διαδικασιών και ο προσδιορισμός της σειράς και του τρόπου εκτέλεσης αυτών από την διοίκηση της VIENA. Ο καθορισμός και ο τρόπος σχεδίασης της αρχιτεκτονικής της ΕΕ δεν είναι αντικείμενο και στόχος αυτής της εργασίας. Ο τρόπος με τον οποίο γίνεται έχει παρουσιαστεί και δημιουργείται σε προηγούμενες εργασίες (Assimakopoulos, 2002; Assimakopulos, 2006a; Assimakopulos, 2006b).

Οι οδηγίες και τα χρονοδιαγράμματα παρουσιάζονται στις συναπτιζόμενες επιχείρήσεις. Τα μέλη του συναπτισμού δεσμεύονται μεταξύ τους με νομικές συμβάσεις για την προάσπιση των συμφερόντων κάθε μέλους και ξεκινά η λειτουργία της ΕΕ.

3. Παρουσίαση της Εφαρμογής Virtual Enterprise Administrators (VIENA)

Η δομή στην οποία στηρίχθηκε η κατασκευή της εφαρμογής της VIENA στο Διαδίκτυο είναι αυτή ενός Vortal (Vortal). Συγκεκριμένα γίνεται χρήση τεχνολογίας ASP για την κατασκευή ενός Content Management System (CMS). Τα CMS υποστηρίζουν την μοντελοποίηση της επιχειρηματικής πληροφορίας, τον έλεγχο πρόσβασης στα επιχειρησιακά δεδομένα, μετατρέποντας την πληροφορία σε γνώση η οποία προσδίδει αξία σε επιχειρηματικούς πόρους και διευκολύνει την επιχειρηματική
ανάπτυξη. Από την άλλη μεριά, παρέχουν ένα πλήρες αυτοματοποιημένο περιβάλλον, στα πλαίσια του οποίου ανθρώποι πόροι και εφαρμογές αλληλεπιδρούν μέσω ροών εργασιών, βελτιώνοντας την παραγωγικότητα της επιχείρησης. Στο Σχήμα 2 φαίνεται η αρχική σελίδα της εφαρμογής.

**Σχήμα 2:** Αρχική σελίδα της εφαρμογής VIENA

Στο αριστερό μέρος του Σχήματος 2 υπάρχει το βασικό μενού περιήγησης στο site που αποτελείται από 13 επιλογές. Η επιλογή ‘Home’ (Αρχική Σελίδα) μας δίνει την δυνατότητα να επιστρέψουμε στην αρχική σελίδα του Vortal από όποιο σημείο του site βρίσκεται ο χρήστης της εφαρμογής. Η επόμενη επιλογή ‘Login’ (Σύνδεση) δίνει την δυνατότητα στους άλλους χρήστες είτε αυτοί είναι ανεξάρτητοι χρήστες είτε επιχειρήσεις να εισέλθουν στο σύστημα του VIENA. Για τις επιχειρήσεις και τα άτομα που θέλουν να γίνουν μέλη, το VIENA, έχει ξεχωριστή επιλογή ‘Register’, (Εγγραφή) για να δημιουργήσουν τον δικό τους λογαριασμό.

Συνεχίζοντας η επιλογή ‘News’ (Νέα) εμφανίζει στους χρήστες τις τρέχουσες αγγελίες-προκήρυξεις για την σύσταση εικονικών επιχειρήσεων για την κατασκευή ενός προϊόντος ή μιας υπηρεσίας. Η επόμενη επιλογή ‘PROJECTS’ προβάλλει μια καινούργια σελίδα στην οποία παρουσιάζονται όλες οι εικονικές επιχειρήσεις τις οποίες έχει σχηματίσει το VIENA. Χρήσιμα links και η βάση δεδομένων των πελατών του VIENA μπορούν να παρουσιαστούν κάνοντας χρήση των δύο επόμενων επιλογών αντίστοιχα. Στην επιλογή ‘Portal Poll’ (Στατιστικά) παρέχονται σε real time τα στατιστικά επισκεψιμότητας του site. Τέλος στην επιλογή ‘Partners’ μπορούν οι εταίροι να τοποθετήσουν διάφορα ερωτήματα.
σχετικά με το προϊόν που θα παραχθεί. Οι επιλογές που δεν αναφέραμε παρουσιάζονται αναλυτικά στην συνέχεια της εργασίας.

4. Τα εργαλεία κατασκευής του VIENA

Για την κατασκευή του VIENA έγινε χρήση Microsoft εργαλείων. Η επιλογή των εργαλείων καθώς και η δημιουργία ενός Content Management System (CMS) έγινε με γνώμονα το γεγονός ότι μία εταιρεία ένα brand name συστημάτων όπως είναι η Microsoft δίνει άλλο εταιρικό κύρος.

Αυτό διασφαλίζει την απρόσκοπτη λειτουργία του, την αυξημένη λειτουργικότητα και τα υψηλά επίπεδα ασφάλειας που παρέχει. Σκοπός του CMS είναι να βοηθά τις επιχειρήσεις να δημιουργούν και να προσφέρουν πολύτιμες πληροφορίες και διευκολύνουν τη λειτουργικότητα. Καθώς το καθήκον ενός CMS είναι τόσο στενά συνδεδεμένο με τα ενδιαφέροντα της επιχείρησης, για να κάνει τη δουλειά του, θα πρέπει να ενσωματώνεται πλήρως στην επιχείρηση. Ανεξάρτητα από το μέγεθός ή το αντικείμενο της επιχείρησης, που εξυπηρετεί το CMS ο σκοπός του είναι τόσο στενά συνδεδεμένος με το σκοπό της, ώστε όσο περισσότερο ενσωματώνεται σ’ αυτήν τόσο καλύτερα εξυπηρετεί του στόχους της.

Το CMS ενσωματώνεται στην επιχείρηση με τους εξής τρόπους:

- Οργανώνει πολλά τμήματα και τύπους εργασιών σ’ ένα συνολικό σύστημα.
- Αντλεί πληροφορίες από ολόκληρη την επιχείρηση.
- Ενοποιεί την επικοινωνία της επιχείρησης με τον εαυτό της (για παράδειγμα μέσω intranet) και με τον έξω κόσμο (για παράδειγμα μέσω Internet).
- Συνδέεται με την υφιστάμενη υποδομή διαχείρισης πληροφοριών της επιχείρησης.

Το κόστος κατασκευής που διαθέτει, εκμεταλλεύεται μπροστά στη συμβατότητα της εφαρμογής με άλλες. Αυτό καθιστά τις επικοινωνίες μεταξύ των επιμέρους εταιρειών ευκολότερες διότι όλοι χρησιμοποιούν τις ίδιες βάσεις συστημάτων platforms καθώς και τις ίδιες εφαρμογές applications (Boehm, 2008).

Τα CMS χρησιμοποιούνται κατά κόρον για την αποθήκευση, διαχείριση, επεξεργασία και παρουσίαση στο Internet δεδομένων αποθηκευμένων σε βάσεις, παρέχοντας παράλληλα ευελιξία και ταχύτητα στην διεπαφή με το χρήστη. Το CMS της EE παρέχει τη δυνατότητα σε όλα τα μέλη να επικοινωνούν με ασφάλεια μεταξύ τους, αλλά και να μπορούν να γνωρίζουν σε πραγματικό χρόνο σε ποιο στάδιο βρίσκονται οι εργασίες της EE.

Συγκεκριμένα για την κατασκευή του VIENA χρησιμοποιήθηκαν:
5. Λειτουργίες Εφαρμογής Virtual Enterprise Administrators (VIENA)

Για την καλύτερη παρουσίαση των δυνατοτήτων του VIENA χρησιμοποιήθηκε το παρακάτω σενάριο. Το Τμήμα Μηχανογράφησης του Υπουργείου Δημοσίων Τάξεων προκηρύσσει μειονοτικό διαγωνισμό για την μελέτη, κατασκευή και συντήρηση μηχανισμού πληρωμών με τη χρήση κινητού τηλεφώνου των προστίμων της Τροχαίας. Η δημόσια υπηρεσία αυτή υποβάλλει μια αγγελία-προκήρυξη με την χρήση του λογαριασμού της στη VIENA. Η πρώτη οθόνη (Σχήμα 3) που θα αντικρίζει όπως φαίνεται στο παρακάτω σχήμα είναι η οθόνη όπου είναι συγκεντρωμένες όλες οι αγγελίες που καταγράφθηκαν από τον συγκεκριμένο λογαριασμό του πελάτη.

Σχήμα 3: Αρχική σελίδα υποβολής αγγελίας στο VIENA

Η δημόσια υπηρεσία εισάγει τον τίτλο της αγγελίας όπως φαίνεται στο σχήμα 4. Στην συνέχεια ζητείται το κείμενο με τα όλα τα χαρακτηριστικά της αγγελίας αναλυτικά. Ακόμα δίνεται η δυνατότητα για
πλήρη επεξεργασία του κειμένου καθώς το αντικείμενο που έχει ενσωματωθεί για την καταχώρηση της αγγελίας μας δίνει το περιβάλλον ενός πλήρους επεξεργαστή κειμένου.

Η αγγελία, στην συνέχεια, αναλύεται από την διοίκηση της VIENA και ανάλογα με τις προδιαγραφές και τις δεσμεύσεις που δίδονται, σχηματίζονται οι επιχειρηματικές διεργασίες που χρειάζονται για την κατασκευή του προϊόντος ή της υπηρεσίας. Η διοίκηση της VIENA αποτελείται από έμπειρα τεχνικά, διοικητικά και οικονομικά στελέχη ειδικευμένα σε διάφορους τομείς για τον λόγο αυτό. Αφού γίνει η αποσαφήνυση των επιχειρηματικών διεργασιών έξεινα η εύρεση των εταίρων που θα συντηρούν την ΕΕ.

**Σχήμα 4: Υποβολή Αγγελίας στο VIENA**

Στο συγκεκριμένο παράδειγμα για την κατασκευή της υπηρεσίας ηλεκτρονικής διακυβέρνησης απαιτείται η συνεργασία πολλών συμμετεχόντων εταίρων (Ρίγας, 2001; Assimakopoulos, 2003a). Για την κατασκευή αξιόπιστου, ευέλικτου και ασφαλούς ηλεκτρονικών πληρωμών προτείνεται η ενοποίηση των παρακάτω εταίρων σε μια εικονική επιχείρηση:

**Μιας Τράπεζας:** Είναι υπεύθυνη και εγγυητή για όλες τις ηλεκτρονικές πληρωμές και διαδικασίες.

**Μια εταιρία παραγωγής λογισμικού:** Εγκαθίστα τα λειτουργικά συστήματα και το απαραίτητο λογισμικό για τις ηλεκτρονικές πληρωμές και προσαρμόζει το λογισμικό στο υλικό που παράγεται από την κατασκευαστική εταιρία.
Μια εταιρία Υλικού (Hardware): Τροφοδοτεί την εικονική επιχείρηση με το απαραίτητο υλικό (π.χ. Servers).

Ένα παροχέα Internet (ISP): Ο ISP κάνει την σύνδεση του συστήματος ηλεκτρονικών πληρωμών στην υπάρχουσα κατάσταση του δικτύου της εταιρίας για την οποία κατασκευάζετε η ηλεκτρονική υπηρεσία. Είναι υπεύθυνος για την εγκατάσταση και λειτουργία της μισθωμένης γραμμής, καθώς και για τη δημιουργία του ιδιωτικού δικτύου (VPN), που είναι απαραίτητο για τις ανάγκες επικοινωνίας

Η αναζήτηση των νέων εταίρων από την διοίκηση της VIENA γίνεται με τον τρόπο με το οποίο φαίνεται στο Σχήμα 5. Εισάγεται το αντικείμενο για το οποίο ζητείται εταίρος και η αναζήτηση γίνεται από την βάση δεδομένων της VIENA είτε μέσα από Διαδίκτυο με την χρήση ευρεσιτικών αλγορίθμων. Στο Σχήμα 5, γίνεται αναζήτηση εταιρίας λειτουργικού συστήματος για τον server του διακομιστή που απαιτείται για την υλοποίηση του μηχανισμού πληρωμής λογαριασμών με την χρήση κινητού τηλεφώνου.

Σχήμα 5: Αναζήτηση εταίρων με χρήση ευρεσιτικών αλγορίθμων

Αρκεί γίνει η εύρεση των εταίρων, στην συνέχεια, γίνεται ο καθορισμός των διαδικασιών και ο προσδιορισμός της σειράς και του τρόπου εκτέλεση αυτών από την διοίκηση της VIENA. Οι επιχειρηματικές διεργασίες και το μοντέλο της αρχιτεκτονικής παρουσιάζονται καλύτερα με την βοήθεια της Μεθοδολογίας Δομής Προβλήματος (PSM), όπως
απεικονίζεται μέσω του πακέτου I-Think® (Ασημακόπουλος, 2003; Assimakopoulos, 2003b; HPS). Η συστημική μεθοδολογία της Δομής Προβλήματος (PSM) (Panayiotopoulos, 1987) χρησιμοποιείται για την αναπαράσταση και τον τεχνικό σχεδιασμό όλων των απαραίτητων διαγραμμάτων σαν γλώσσα επικοινωνίας ανάμεσα στα μέρη της αρχιτεκτονικής όπως φαίνεται στο σχήμα 6. Το διοικητικό συμβούλιο αναλαμβάνει να οργανώσει τις λειτουργίες και τα χρονοδιαγράμματα των εργασιών της Ε.Ε και να ενημερώσει αμφότερα τα εμπλεκόμενα μέρη της.

Στο σχήμα 6 απεικονίζονται τα μέρη της Ε.Ε. και οι σχέσεις μεταξύ τους. Η Ε.Ε. αποτελείται από την εταιρία παραγωγής λογισμικού, από την τεχνική-κατασκευαστική εταιρία, τον παροχέα Internet και την τράπεζα. Σε υψηλότερο επίπεδο, βρίσκονται οι διοικούντες της Ε.Ε., οι οποίοι αναλαμβάνουν να οργανώσουν τα μέρη της Ε.Ε.. Τέλος, η δημόσια υπηρεσία, συγκεκριμένα η Τροχαία, η οποία ζήτησε την κατασκευή Ασόρματων Μηχανισμών Ηλεκτρονικών Πληρωμών, συνδέεται με κάποια από τα μέρη της Ε.Ε., με σκοπό την παροχή της συγκεκριμένης υπηρεσίας.

Η εφαρμογή VIENA παρέχει στα μέλη της αυτόνομο και αξιόπιστο σύστημα διεπαφής. Το vortal παρέχει τη δυνατότητα σε όλα τα μέλη να επικοινωνούν με ασφάλεια μεταξύ τους, αλλά και να μπορούν να γνωρίζουν σε πραγματικό χρόνο σε ποιο στάδιο βρίσκονται οι εργασίες της Ε.Ε.

![Diagram showing the architecture of the Virtual Enterprise](image-url)

**Σχήμα 6:** Αρχιτεκτονική Ε.Ε. με χρήση της ΠΣΜ μέσω του I-Think©
Στο παρακάτω σχήμα 7 φαίνεται η οθόνη από όπου μπορεί να μπει το κάθε μέλος για να δημιουργήσει ένα προσωπικό μήνυμα.

**Σχήμα 7: Διεπαφή μέσω του Vortal της VIENA**

Στο Σχήμα 8 η Televox αποστέλλει στην ISP Pro, την εταιρία που έχει αναλάβει την εγκατάσταση της μισθομένης γραμμής, μήνυμα που αφορά πρόβλημα χρονικής καθυστέρησης στην ολοκλήρωση της εργασίας.

**Σχήμα 8: Δημιουργία εσωτερικής αλληλογραφίας μέσω του Vortal της VIENA**

Για την προάσπιση των συμφερόντων κάθε συναπτιζόμενου εταίρου, τα μέλη του συναπτισμού δεσμεύονται μεταξύ τους με νομικές συμβάσεις.
Τα έντυπα των ιδιωτικών συμφωνητικών αποστέλλονται σε ηλεκτρονική μορφή από την εικονική επιχείρηση της VIENA στις επιμέρους επιχειρήσεις, συμπληρώνονται και αποστέλλονται πίσω όπως φαίνεται στα Σχήματα 9 και 10.

Σχήμα 9: Σύμβαση Κοινοπραξίας για το συνασπισμό στην ΕΕ

Σχήμα 10: Ιδιωτικό Συμφωνητικό για το συνασπισμό στην ΕΕ
6. Πλεονεκτήματα εφαρμογής VIENA

Η μορφή που η EE έχει στο Διαδίκτυο είναι αυτή ενός vortal (vertical portal) και αυτό συμβάλει τα μέγιστα στη σχετική πόσο των υποψηφίων πελατών της, όσο και στις διευκολύνσεις που παρέχει στο έμπνευσικό προσώπικο των συναποστόλων εταίρων. Όλες οι λειτουργίες της EE διεξάγονται μέσω του Διαδικτύου. Τα vortal χρησιμοποιούνται κατά κόρον για την αποθήκευση, διαχείριση, επεξεργασία και παρουσίαση στο Internet δεδομένων αποθηκευόμενων σε βάσεις, παρέχοντας παράλληλα ευελιξία και ταχύτητα στην διεπαφή με το χρήστη, κάνοντας το ελκυστικό εργαλείο για την δημιουργία ευκολίες επιχειρήσεων στο Διαδίκτυο. Το vortal της EE παρέχει τη δυνατότητα σε όλα τα μέλη να επικοινωνούν με ασφάλεια μεταξύ τους, αλλά και να μπορούν να γνωρίζουν σε πραγματικό χρόνο σε ποιο στάδιο βρίσκονται οι εργασίες της EE δίνοντας την δυνατότητα για καλύτερο έλεγχο και ανίχνευση λάθων στην δομή της EE.

Το κόστος κατασκευής που διαθέτει, εκμεταλλεύεται μια στη συμβατότητα της εφαρμογής με άλλες. Αυτό καθιστά τις επικοινωνίες μεταξύ των εταιρειών ευκολότερες διότι όλοι χρησιμοποιούν τις ίδιες βάσεις συστημάτων platforms καθώς και τις ίδιες εφαρμογές applications.

Ακόμα σε περιπτώσεις συγχωνεύσεων ή σε αγοραπωλησίες εταιρειών η ικανότητα εύκολης και γρήγορης ενσωμάτωσης συστημάτων είναι ανεκτίμητη και κάνει την εταιρεία να φαίνεται πιο ελκυστική σε πιθανούς συνεργάτες (Strader, 1998). Σε κάθε περίπτωση το να χρησιμοποιεί μιά εταιρεία ένα brand name συστημάτων όπως είναι η Microsoft δίνει άλλο εταιρικό κύρος διασφαλίζοντας την απρόσκοπτη λειτουργία της, την αυξημένη λειτουργικότητά της και τα υψηλά επίπεδα ασφάλειας που παρέχει στα συστήματα που χρησιμοποιεί.

Επειδή η ανατίθεση των υποψηφίων επιχειρήσεων γίνεται είτε από την βάση δεδομένων της VIENA είτε μέσα από Διαδίκτυο με την χρήση ευρεστικών αλγοριθμών και την επιλογή συγκεκριμένων χαρακτηριστικών, δίνει την δυνατότητα για μεγαλύτερη εμπιστοσύνη στην επιλογή των συναποστόλων εταιρειών και την επιτυχία της EE.

7. Συμπεράσματα και θέματα για μελλοντική έρευνα

Η αποτελεσματική Ηλεκτρονική Διακυβέρνηση απαιτεί εσωτερική αναδιοργάνωση, όπως αλλαγές στις δομές και την οργάνωση της εργασίας, εκπαίδευση και ανάπτυξη δεξιοτήτων, αλλά και κατάλληλες συνθήκες δουλείας. Η πορεία προς την ανάπτυξη της Ηλεκτρονικής Διακυβέρνησης και η ανάγκη για διουσική αναμόρφωση γίνονται όλο και περαιτέρω μέρος της πολιτικής ατζέντας των περισσότερων κρατών σε όλο το κόσμο, ενώ η ταχύτατη διάδοση του Διαδικτύου έχει ως αποτέλεσμα την ολοένα αυξανόμενη παροχή ηλεκτρονικών υπηρεσιών εκ μέρους των φορέων της.
πολιτείας προς τους πολίτες και τις επιχειρήσεις. Οι αλλαγές με στόχο την
επίτευξη μιας πραγματικής Ηλεκτρονικής Διακυβέρνησης θα πρέπει να
υπερβούν το αρχικό επίπεδο της απλής παροχής πληροφοριών μέσω
Διαδικτύου, και να φθάσουν στο σημείο της ολοκλήρωσης, προσφέροντας
προηγμένες υπηρεσίες σε ένα πλήρως διαδραστικό (interactive)
περιβάλλον εργασίας για τους πολίτες και τις επιχειρήσεις.

Η εργασία αυτή αναδεικνύει το ρόλο των Ε.Ε. στην κατασκευή
εφαρμογών Ηλεκτρονικής Διακυβέρνησης. Έγινε η δημιουργία μιας
eικονικής επιχείρησης για την δημιουργία μιας εφαρμογής Ηλεκτρονικής
Διακυβέρνησης για την πληροφόρηση των προστίμων της Τροφαίας μέσω
κινητού τηλεφώνου, με τη χρήση Active Server Pages. Όλες οι λειτουργίες
tης ΕΕ διεξάγονται μέσω του Διαδικτύου ενώ η μορφή που η ΕΕ έχει στο
Διαδίκτυο διευκολύνει την εξυπηρέτηση τόσο των υποψήφιων πλατών
της όσο και εμφυγό προσωπικό των συνασπιζόμενων εταίρων, τονίζοντας
έτσι τον ανθρωποκεντρικό χαρακτήρα που διέπει τις σύγχρονες ΕΕ που
δραστηριοποιούνται μέσω του Διαδικτύου.

Η τεχνολογία ASP είναι μια παραδοσιακά δυνατή γλώσσα για Web
e-Commerce εφαρμογές. Το CMS συνεργάζεται με όλα τα υπάρχοντα
ERP. Η χρήση Microsoft εργαλείων αποδεικνύεται η καλύτερη επιλογή για
την υλοποίηση της ΕΕ καθότι πάντα θα υπάρχουν επισήμες ενημερώσεις
για updates και bug fixes σχετικά με το ASP (μιας και είναι προϊόν της
Microsoft), διασφαλίζοντας έτσι την απρόσκοπτη λειτουργία της ΕΕ και τα
υγινά επίπεδα ασφάλειας που παρέχει αυτή. Υποστηρίζεται από τους
υπάρχοντες Server και έχει γρήγορη απόκριση μιας και η πλειονότητα των
επιχειρημάτων έχει παραδοσιακά επενδύσει σε Microsoft Oriented
συστήματα και εφαρμογές.

Σαν θέματα μελλοντικής έρευνας και περαιτέρω μελέτης μπορούν να
γίνουν η σύγκριση του VIENA με αντίστοιχες εφαρμογές που κάνουν
χρήση Open Source εργαλείων, όπως η τεχνολογία PHP ενώ η υλοποίηση
tης αναζήτησης εταίρων και επιχειρήσεων με την χρήση ευφυών
πρακτόρων (agents) μπορεί να κάνει την επιλογή των συνασπιζόμενων
eπιχειρήσεων πιο γρήγορη και πιο αποτελεσματική.

Βιβλιογραφία

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Αναφορές στο Διαδίκτυο – URLs

Συστηματικά «εργαλεία» συζητήσεων για το Κυπριακό

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Περίληψη (μόνο):
Το Κυπριακό, από ένα απλό πρόβλημα εισβολής-κατοχής, που θα μπορούσε να δραματολογηθεί ως «στοίχημα» ταχύριψης τρόπου λύσης με αποχώρηση των τουρκικών στρατευμάτων, κατέστη ένα από τα πιο πολύπλοκα ζητήματα στη βάση πολλών εμπλεκόμενων, ξένων για τους Κύπριους, συμφερόντων.

Το πρόβλημα είναι συστηματικό διότι υπάρχουν: (α) μεγάλος αριθμός στοιχείων (β) πλήθος δυναμικών διαδράσεων μεταξύ συγκρουόμενων στοιχείων, (γ) καθορισμένες και ακαθοριστές «στάσεις» των εμπλεκόμενων stakeholders (δ) πιθανολογημένες συνέπειες από διαδικασίες διαδράσεων (ε) διεισδύσεις απρόβλεπτων στοιχείων και συστημάτων (butterfly effect) (στ) συνεργασίες καταστάσεων επιρροής από εθνικές και εξωγενείς εκκολαπτόμενες συμπεριφορές και (ζ) αδυναμίες διαδράσεων μεταξύ άνισων σε ισχύ «παροιχών».

Η πολυπλοκότητα των στοιχείων που συγκροτούν το πρόβλημα, δεν περιορίζεται μόνο από τη δυναμική «παραγωγικό διάλογο» των Κύπριων stakeholders: «από Κύπρος για τους Κύπριους», που εντοπίζεται στα διάφορα κεφάλαια υποστήριξης: πολιτικό, νομικό, κοινονικοοικονομικό, πεζοποιικό και ηθικό πεδίο συστημάτων και υποσυστημάτων. Πρόκειται για πολυπλοκότητα που διαγωνίζεται εκτιμητικά στο χρόνο, από τη διείσδυση πλήθους ασταθών και απρόβλεπτων στοιχείων, τα οποία άλλοτε σε εμφάνη και άλλοτε σε λανθανόμενα και μεταφρασμένη δυναμική κατάσταση, φορτώνουν το συστηματικό πεδίο με παρεμβαλλόμενες, αλλά καθοριστικές, μεταβλητές, που κυρίως εστιάζονται στη δράση ξένων γεωπολιτικών και γεω-στρατηγικών συμφερόντων («κυρίαρχες βάσεις»), Συνθήκες Εγγυήσεων, νεοπολιτικό ενδιαφέρον των ΗΠΑ στο σταυροδρόμι αυτό των τριών περιοχών, περιφερειακές ηγεμονικές και ενεργειακές στρατηγικές των Τούρκων κλπ.).

Εστιάζοντας στην κατοχή, η πολυπλοκότητα, διαφαίνεται από τη συνεχή αυξανόμενη τάση για πιο συγκεκριμένη στρατιωτική παρουσία των Τούρκων, συνοδευόμενη με προγραμματισμένη τη διείσδυση εποικών, που αριθμητικά ήδη υπερτερούν των Τούρκοκυπρίων στο νησί. Ο παράνομος εποικισμός, εκτός από το ότι αποτελεί παράμετρο συγκαλυμμένου εγκλήματος πολέμου, αλλάζει συστηματικά τις δημογραφικές ισορροπίες στο κατεχόμενο αρχαίο μέρος του.
νησιού. Πρόκειται για μεθοδολογία που διασφαλίζει την κατοχή και την ηγεμονία του εισοδήματος. Εμφανίστηκε η διάταξη τους Τουρκοκύπριους (αναλογία 1,54 εποικών: Τουρκοκύπριους), με δυναμική που αλλοτριώνει βάση και κανόνες διαπραγμάτευσης και επεκτείνεται με το χρόνο, σε όλο το νησί.

Συμπεράσματα, το πρόβλημα, μπορεί να μελετηθεί από τη συστημική διάσταση του, συναθροίζοντας το σύνολο των προβληματικών καταστάσεων και την ποικιλία διαδράσεων των πολύ ανοικτών συστημάτων στο περιβάλλον τους, αλλά και των αυτοαναφερόμενων συστημάτων, που εμπλέκονται στο Κυπριακό.

Η πολυπλοκότητα του προβλήματος, καταδεικνύει την ανάγκη κατασκευής ενός συστημικού μοντέλου συζήτησης, που να περιλαμβάνει γνώση και μέθοδο επεξεργασίας των συμπεριφορών του συνόλου των στοιχείων.

Η συστημική διεπιστημονική μεθοδολογία ανιχνεύει και επεξεργάζεται σύνολα στοιχείων και διαδράσεων σε πολλά επίπονα πεδία ενεργείας. Το προτεινόμενο συστημικό «εργαλείο» συζήτησης, στοχεύει να δώσει προστιθέμενη διαλεκτική αξία στη μεταξύ stakeholders συζήτηση.

Επιλογές στοιχείων από τη θεωρία των παιγνίων και μεταβλητών και από τη θεωρία του χώρου, αποτελούν δεδομένα έμμεσων διαλεκτικών συναρτήσεων/συστημικών διαδράσεων, για επεξεργασία της προβλεπτικότητας και της κατασκευής μοντέλων συζήτησης. Οι εφαρμογές μελέτης πεδίου, σε προτεινόμενο «εργαλείο», είναι στη βάση της αμφιβολίας ροής της πληροφορίας μεταξύ Πραγματικού και Συμβολικού Κόσμου, για τη συνεχή ενημέρωση της δεξιοτήτων γνώσης, και για τη δυνατότητα των stakeholders να αντλούν και να επαληθεύουν, μέσα από διηθητικούς μηχανισμούς, υποδείξεις και θεωρήσεις, και στη συνέχεια να κατασκευάζουν χρήσιμα υποδείγματα συζήτησης που να οδηγούν σε λήξεις αποφάσεων.

**Keywords:**
Μοντέλο συζήτησης, εκτατική πολυπλοκότητα, stakeholders, ανοικτά και αυτοαναφερόμενα πολιτικά συστήματα, έμμεσες συστημικές συναρτήσεις