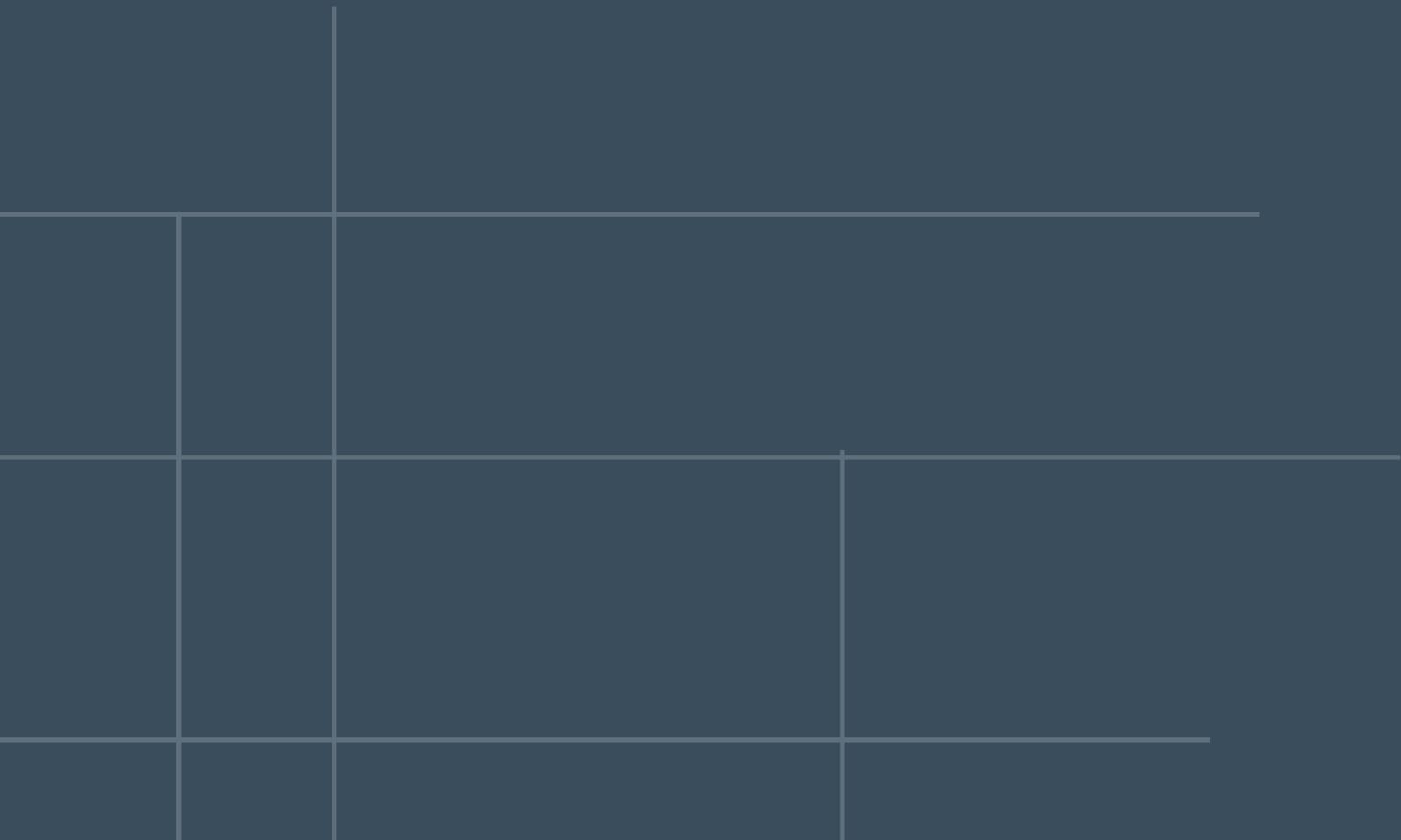


QMEAS

Quantitative and Qualitative
Methodologies in the Economic
and Administrative Sciences

International Conference



KEYNOTE SPEAKER'S ADDRESS
MODELLING ITEM MISSINGNESS IN CROSS-SECTIONAL MULTIVARIATE DATA
AND DROP OUT IN LONGITUDINAL MULTIVARIATE DATA: A LATENT VARIABLE
APPROACH

Professor **Irini Moustaki**

London School of Economics and Political Sciences, Department of Statistics

e-mail: I.Moustaki@lse.ac.uk

ABSTRACT

Sample surveys collect information on a number of variables for a randomly selected number of respondents. Among other things, the aim is often to measure some underlying trait(s) of the respondents through their responses to a set of questions and that is often achieved by fitting a latent variable model.

Surveys are either cross-sectional or longitudinal and missingness occurs in both. Cross-sectional surveys often suffer from item non-response where longitudinal surveys suffer from drop out and item non-response. A latent variable approach is adopted for handling non-ignorable item non-response and drop out. Various model specifications are proposed to model the missing data mechanism together with the measurement and structural model. The model for the missing data mechanism will serve two purposes: first to characterize the item non-response/ drop-out as ignorable or non-ignorable and consequently to study the patterns of missingness/drop out and characteristics of non-respondents but also to study through a sensitivity analysis the effect that a mis-specified model for the missing data mechanism might have on the structural part of the model.

The models proposed will be applied to real data from the European Social Survey and the British Household Panel Survey.

<https://sites.google.com/site/icqqmeas> 2015

GREEK ECONOMY: 1950 - 2014: HOW DID GREECE GET INTO THE PRESENT ECONOMIC CRISIS: INVESTMENTS AND EXPORTS ARE THE WAY OUT

John Chalikias, Athens University of Economics and Business & Exports Research Centre
of the Pan-Hellenic Exporters Association

SUMMARY

Up until the 1970s, Greece was a paradigm of a vigorous economy: Growth rates were high (5-8%), borrowing was low (less than 20% of the Gross Domestic Product - GDP), government budgets run either at a surplus or at small deficit. Even when the international economy experienced a recession in the 1970s on account of the oil crisis, the Greek economy continued to grow (with the exception of 1974, a year marked by political instability and the Turkish invasion of Cyprus). It was by and large for these high growth rates that Greece was accepted in the European Economic Union.

In the 1980s an imprudent fiscal policy mix (involving higher pensions, higher salaries to civil servants, early retirements, overcrowding the civil service and loss-making state-owned enterprises through new hires, etc.) produced large deficits which, in turn, led to increased borrowing (reaching 120% of the GDP by the mid-1990s) as the economy's growth rate slowed down. Between 1995 and 2007, attempts were made to reverse the situation. The relative improvement in a number of areas and economic indicators allowed Greece to enter the Eurozone in 2002. However, to the extent that growth depended almost exclusively on consumption (over 90%), the situation was not sustainable. The advent of the international financial and economic crises in 2008-09 led things to a head: consumption plummeted, incomes (output) and state revenues followed, deficit borrowing rose, and the debt-to-GDP ratio escalated.

The rest of the story is pretty much known. As the country's creditworthiness declined it became harder and to obtain the funds needed. So Greece turned to its lenders of last resort, the International Monetary Fund (IMF), the European Union (EU) and the European Central Bank (ECB), frequently referred to as the troika. To secure the bailout package, Greece had to guarantee (via a memorandum of understanding) to become again a reliable borrower. That is, to gradually bring the deficit down and return to surplus, for it is only then that borrowing will stop. So, harsh steps were taken, steps that any technocrat would recommend. They involved wage and pension cuts, which, in turn, adversely affected consumption, making the recession inevitable. To recap: Our consumption-based economy was not viable. While fueling growth for a long time, it also fed the deficit. Now that borrowing is cut, for no one lends us money just to spend it on consumption, consumption is shrinking, so GDP is shrinking too. Consequently, we are faced with a recession.

It is a problem with a straightforward solution: Increase exports and investments. Both are GDP components. Investments in particular, beyond positively affecting exports, may also stimulate viable consumption (which lately relied on borrowing). The combined effect ought to bring us back to a sustainable growth path. Back in the 1970s, when we had a vigorous economy, investments were more than half of consumption; in 2009 a mere one sixth of it.

In this paper we will demonstrate the beneficial impact of these two variables, exports and investments, on the economy, and present alternative scenarios regarding the evolution of these factors and their impact on the GDP.

**EXPLORATION OF THE IMPACT OF THE INDUSTRY SECTOR
AT THE PROFITABILITY OF THE GREEK LISTED FIRMS AFTER MERGERS
AND ACQUISITIONS**

Dr. Alexandros Alexandrakis, Associate Professor, Dept. of Accounting & Finance, T.E.I. of Central Macedonia,
E-mail: alex@teiser.gr

Dr. Michail Pazarskis, Adjunct Assistant Professor, Dept. of Accounting & Finance, T.E.I. of Central Macedonia,
E-mail: pazarskis@gmail.com

Dr. Panagiotis Pantelidis, Associate Professor, Dept. of Business Administration,
T.E.I. of Central Macedonia, E-mail: pan@teiser.gr

Perperidou Chrisoula, Post-graduate student, Dept. of Business Administration,
T.E.I. of Central Macedonia, E-mail: perperidou-xri@hotmail.com

ABSTRACT

This paper studies the effects of mergers and acquisitions (M&As) of acquiring firms among different industries in Greece. The main objective of this study is to evaluate the post-merger performance of Greek listed firms in the Athens Stock Exchange that executed as acquirers one merger or acquisition in a two-year-period among seven different industry categories. For the purpose of the study, a set of two ratios (ROA and ROE) is employed, in order to measure thirty firms' post-merger performance per industry, as well as on the whole sample, and selected accounting data from 2006 to 2009 are compared for the post-merger performance of the sample firms at two years after the M&As events. The results revealed the post-merger performance of the acquiring firms was affected by their industry type. Also, M&As have lead to a deterioration of the post-merger performance on the whole examined sample.

Key words: merger, acquisition, performance, profitability, industry sector

JEL Classifications: G34, M40

1. Introductory comments

Mergers and acquisitions (M&As) are both aspects of dynamic strategic management and finance in the process of contemporary corporate restructuring for combining different business entities into one new firm. Notwithstanding, the process of internationalisation and the expansion of the European Union has fostered the whole activity in recent years with the increase of foreign direct investment by multinational companies and international trade (Agorastos et al., 2013). Furthermore, the strategy literature commonly argues that M&As are one of the mechanisms by which firms gain access to new resources and, via resource redeployment, increase revenues and reduce cost (Pazarskis, 2008). However, many researchers and business practitioners regard with scepticism this hypothesis, despite the fact that many others are confident and enthusiastic¹.

In order to examine the success of merger decision in Greece, in general and among different industries, this study proceeds to an extensive accounting comparative analysis of the post-merger performance of a sample of thirty firms from different industry categories after their M&As activities, listed at the Athens Stock Exchange (ASE) in Greece, that executed one merger or acquisition in the period from 2006 to 2009, using selected accounting characteristics (financial ratios) from 2004 to 2011, and attempts to investigate the M&As' effects on their post-merger performance. The examined industry sectors are seven different industry categories: industrial companies, medical services, constructions, internet-publications-etc. companies, commercial and tourist companies, information technology, metals and building materials.

The structure of the paper is as follows: the next section analyses the research design of this study (related past researches with accounting data, sample and data, selection of variables-financial ratios, research methodology and hypothesis). The following section presents and analyses the results, and the last section concludes the paper.

2. Research design

Past related studies on post-merger performance

Many past research papers on accounting and finance argue that stock price performance studies are unable to determine whether M&As create real economic gains or losses and to provide evidence on the sources of any merger-related economic result, as it is difficult to distinguish between stock-market inefficiencies and improvements in economic performance resulting from the merger (for a comprehensive review on this argument, see: Healy, et al., 1992). The examined increases or decreases in equity values are typically attributed to some unmeasured source of real economic factors (such as synergy) or to a general and not well established idea (as management past decisions) (Pazarskis, 2008; Pazarskis et al., 2006).

However, this kind of research, along with their explanations, could partially not be correct, as many other factors influence stock prices and their conclusions do not provide clear and conclusive results argumentation. In this context, the use of post-merger accounting data and, especially, financial ratios from financial statements which have been examined for their credibility is a better and safer path to test directly for changes in post-merger performance that result from mergers than stock price studies².

From this point of view, several past studies on post-merger performance after M&As that employed accounting characteristics (financial ratios) concluded on ambiguous results (Pazarskis, 2008). Many of them supported an improvement in the business performance after the M&As action (Cosh et al., 1980; Parrino & Harris, 1992; and others), while other researchers claimed that there was a deterioration in the post-merger firm performance (Meeks, 1977; Salter & Weinhold, 1979; Mueller, 1980; Kusewitt, 1985; Neely & Rochester, 1987; Ravenscraft & Scherer, 1987; Dickerson et al., 1997; Sharma & Ho, 2002; and others), and others researchers concluded a "zero" result or ambiguous results from the M&As action (Kumar, 1984; Healy et al., 1992; Chatterjee & Meeks, 1996; Ghosh, 2001; and others).

Methodology and selection of accounting variables

The M&As action of each company from the sample is considered as an investment that is evaluated by the NPV criterion (if NPV > 0, the investment is accepted). Based on this viewpoint, the study proceeds to its analysis and regards the impact of an M&As action similar to the impact of any other positive NPV investment of the

¹ For an extensive literature review about the motives for M&As, in general, see: Jensen, 1986; Ravenscraft & Scherer, 1987; 1988; Pazarskis, 2008.

² The abnormal returns in order to be calculated with the market model depend on the market index. According several past researches (Spyrou, 1998; Michailidis et al., 2006; Artikis et al. 2010) the Greek market index which is called the General Market Index of the Athens Exchange needs to be redefined in terms of the way it is structured, because it does not represent the Greek stock market well (Pazarskis et al., 2011). Therefore, this study did not want to be exposed to this factor by using abnormal returns and thus it was concentrated on the financial ratios. Furthermore, the purpose of our study is not to do an event study on mergers so that the abnormal returns to be critical to evaluate our results and test our hypotheses. The scope of this study is to evaluate the performance based on the traditional financial ratios.

firm to its ratios over a specific period of time (Healy et al., 1992; Pazarskis, 2008).

For the purpose of the study, the selected financial ratios for each company of the sample over a three-year period before or after the M&As event are calculated, and the mean from the sum of each financial ratio for the years before is compared with the equivalent mean from the years after the M&As, respectively³.

Furthermore, to test the above research form of hypothesis two independent sample mean t-tests for unequal variances are applied.

Also, the post-merger performance of a firm is evaluated with its post-merger performance at some financial ratios. In this study, sixteen financial ratios are employed, which are tabulated with their code and their calculation analysis at the Table 1.

Table 1. Classification of financial ratios

Code	Variable Name	Description
V01	ROA (Return On Total Assets)	earnings/total assets
V02	ROE (Return On Equity)	earnings/equity

To test the research data two independent sample mean t-tests for unequal variances are applied, which are calculated as follows:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

where,

n = number of examined ratios

\bar{X}_1 = mean of pre-merger ratios

\bar{X}_2 = mean of post-merger ratios

s = standard deviation

1 = group of pre-merger ratios

2 = group of post-merger ratios

Last, the study does not include in the comparisons the year of M&A event (Year 0) because this usually includes a number of events which influence firm's economic performance in this period (as one-time M&As transaction costs, necessary for the deal, etc.) (Healy et al., 1992; Pazarskis, 2008).

Sample and data

From a sample of all M&As, the transactions of listed firms in the period from 2006 to 2009 in Greece are tracked. Secondly, from them for further analysis, are excluded the firms that performed M&As activities in less than a two-year period before and after the several M&As examined events. Also, in case of that some firms from this preliminary sample firms have been de-listed from the ASE for various reasons (bankruptcy, not meeting the standards of the market, etc.), they were excluded from the sample, as well as the firms with bank activities, which present special peculiarities in their accounting evaluation. Finally, they are selected and examined only thirty acquiring firms which is the final firm sample that executed at least one M&As action as acquirers in Greece during the period from 2006 to 2009.

³ In this study, the mean from the sum of each financial ratio is computed than the median, as this could lead to more accurate research results (Pazarskis, 2008), as the median is only a point of time in the post-merger period for firm performance without reflecting the midterm of the post-merger performance. This argument is consistent with many other researchers diachronically (Philippatos et al., 1985; Neely & Rochester, 1987; Cornett & Tehnarian, 1992; Sharma & Ho, 2002; Pazarskis et al, 2006; 2009; 2013; 2014a; b; Pramod Mantravadi & A. Vidyadhar Reddy, 2008; and others).

The examined industry sectors of these firms are seven different basic industry categories: industrial companies: 7 firms, medical services: 3 firms, constructions: 3 firms, internet-publications-etc. companies: 4 firms, commercial and tourist companies: 3 firms, information technology: 4 firms, metals and building materials: 6 firms.

The final sample with thirty five M&As events is satisfying as it includes all the M&As events of listed firms in the Greek market at the above referred period (according to the sample criteria of this study) and reliable in comparison to prior accounting studies conducted in significantly larger markets such as US and UK (Sharma & Ho, 2002), with similar sample firms, as: Healy et al., 1992 : $n = 50$, Cornett & Tehranian, 1992: $n = 30$, Clark & Ofek, 1994: $n = 38$, Manson et al., 1995: $n = 38$, etc.

The study proceeds to an analysis only of listed firms as their financial statements are published and it is easy to find them and evaluate from them firm post-merger performance. Furthermore, it should be remarked that the M&As activities of the listed Greek firms have been tracked from their announcements on the web sites of the ASE. The data of this study (accounting ratios) are computed from the financial statements of the M&As-involved firms and the databank of the Library of the University of Macedonia (Thessaloniki, Greece).

Research hypotheses

In this study the following hypotheses have been formulated:

H_1 : The post-merger performance of the acquiring firms is not expected to have a relative change after M&As.

H_2 : The post-merger performance of the acquiring firms is not affected by industry type.

Data analysis

The study tries to investigate the evaluation of the post-merger performance for the sample firms from many sides in a particular way. Firstly, tries to find the final post-merger performance of the sample firms in general after a three-year-period, and secondly, from the whole sample examines different particular characteristics, such as: the impact of the choice of domestic or international M&As at the post-merger performance of the acquiring firms, and of conglomerate or non-conglomerate M&As.

(i) Post-merger performance - all mergers

The post-merger performance of the sample firms that executed M&As during the period 2006-2009 is evaluating for two years before and after the M&As event. The selected financial ratios for each company of the sample over a two-year period before (year T-2, T-1) or after (year T+1, T+2) the M&As event are calculated, and the mean from the sum of each financial ratio for the years T-2 and T-1 is compared with the equivalent mean from the years T+1 and T+2, respectively.

(ii) Post-merger performance - among different industries

The post-merger operating performance of the sample firms that executed an M&As transaction during the period 2006-2009 is evaluating for two years before and after the M&As event in similar process than the above among the following examined different industry categories: industrial companies, medical services, constructions, internet-publications-etc. companies, commercial and tourist companies, information technology, metals and building materials. The results are discussed in details for each industry category and in comparison among them depicting the existence of eventual special peculiarities.

The results for each hypothesis separately, and by industry analysis, are presented in the following section.

3. Analysis of Results

Post-merger performance - all mergers

The hypothesis H1 of this research is that: "The post-merger performance of the acquiring firms is not expected to have a relative change after M&As". Within this prospect in this section presented the results of the final post-merger performance of the sample firms in general after a two-year-period for M&As activities in Greece.

The results revealed that over a two-year-period before and after the M&As event all of the accounting ratios (ROA; ROE) had change significantly and they actually have a particular negative impact on post-merger accounting performance of merger-involved firms (see, Table 2 for ratio mean analysis). Furthermore, the results of this study revealed that merger decisions of the sample firms, even two years after the M&A transaction, do not lead them to enhanced business performance.

This result is not consistent with the results of some studies such as Kumar, 1984; Healy et al., 1992; 1997; Chatterjee & Meeks, 1996; and Ghosh, 2001. However, it is consistent with the results of some other studies whereby: Neely & Rochester (1987) found a decline of the profitability ratios, especially the ROA, in the post-merger period, for the US market for the year 1976. Sharma & Ho (2002) also found a decline for the ROA and the ROE ratios. Similar results, with a decline of the profitability ratios, have been found by Meeks (1977), Salter & Weinhold (1979), Mueller (1980), Kusewitt (1985), Mueller (1985), Ravenscraft & Scherer (1987); Kaplan & Weisbach (1992); Dickerson et al. (1997). Furthermore, our results for the Greek market, since there is no significant profitability improvement, do not support the hypothesis of market power (Lubatkin, 1983; 1987). According to this approach, the market power that was gained by the acquirer after the merger or the acquisition should increase the new firm's profit margins and therefore, its profitability.

In conclusion, the hypothesis H1 of this research, as there is, in general, a worsening at the post-merger performance of all the acquiring firms, is rejected.

Table 2: Mean pre-merger and post-merger ratios before/after M&As

Variable	Pre-merger (2 years avg.)	Post-merger (2 years avg.)	T-statistic (Two-tail)	P-Value	Confidence Interval 95%
V01	3,43	-0,85	-4,57	0,000 ^a	(-6,135; -2,422)
V02	6,8	-3,8	-4,98	0,000 ^a	(-14,74; -6,34)

Note:

a, b, c indicate that the mean change is significantly different from zero at the 0.01, 0.05, and 0.10 probability level, respectively, as measured by two independent sample mean t-tests.

More analytically, the P-value interpretation levels for the above referred three cases are described below:

p<0.01 strong evidence against Ho (see, ^a)

0.01£p<0.05 moderate evidence against Ho (see, ^b)

0.05£p<0.10 little evidence against Ho (see, ^c)

0.10£p no real evidence against Ho

Post-merger performance - among different industries

The hypothesis H₂ of this research is that: "The post-merger performance of the acquiring firms is not affected by industry type". Within this prospect in this section presented the results of the final post-merger performance of the sample firms after a two-year-period for M&As activities in Greece among the following examined different industry categories: industrial companies, medical services, constructions, internet-publications-etc. companies, commercial and tourist companies, information technology, metals and building materials.

The results revealed that over a two-year-period before and after the M&As event all of the accounting ratios (ROA; ROE) had change significantly and they actually have a particular negative impact on post-merger accounting performance of merger-involved firms (see, Table 3 for ratio mean analysis) at five out of seven examined different industry categories. Furthermore, the results of this study revealed that merger decisions of the sample firms, even two years after the M&A transaction, do not lead them to enhanced business performance at none case. Similar conclusions could be made in relation to the previous section, regarding the profitability performance and the hypothesis of market power. In conclusion, the hypothesis H₂ of this research, as there are, in general, different results at the post-merger performance for the examined acquiring firms of each industry, is rejected.

Table 3: Mean pre-merger and post-merger ratios before/after M&As

Variable	Pre-merger (2 years avg.)	Post-merger (2 years avg.)	T-statistic (Two-tail)	P-Value	Confidence Interval 95%
Industrial companies					
V01	2,50	-2,88	-2,34	0,032**	(-10,23; -0,51)
V02	4,24	-4,25	-3,02	0,006***	(-14,33; -2,65)
Medical services					
V01	0,75	0,30	-0,14	0,892	(-8,46; 7,57)
V02	1,16	-6,7	-1,52	0,190	(-21,15; 5,46)
Constructions					
V01	1,48	0,74	-0,42	0,687	(-4,79; 3,30)
V02	4,60	0,89	-1,80	0,106	(-8,38; 0,95)
Metals and building materials					
V01	4,36	0,74	-2,07	0,051*	(-7,25; 0,01)
V02	8,03	-0,5	-2,43	0,026**	(-15,93; -1,14)

Internet-publications-etc. companies					
V01	4,37	-3,93	-3,32	0,009***	(-13,96; -2,65)
V02	13,5	-4,4	-2,48	0,029**	(-33,59; -2,15)
Information technology					
V01	2,49	-1,45	-2,07	0,063*	(-8,13; 0,26)
V02	-0,6	-17,1	-1,95	0,075*	(-35,08; 1,98)
Commercial and tourist companies					
V01	8,36	2,87	-1,79	0,106	(-12,42; 1,43)
V02	17,72	7,84	-1,98	0,078*	(-21,13; 1,38)

Note:

a, b, c: statistically significant at the 0.01, 0.05 and 0.1 level, respectively.

5. Summary and conclusions

M&As are considered as modern aspects in dynamic strategic management and finance with the implementation of contemporary corporate restructuring and the combination of different business entities into one new firm. However, many researchers and business practitioners are confident and enthusiastic, while others regard with scepticism this statement.

This study examines the success of merger decision of acquiring firms in Greece among different industries using accounting data (financial ratios) after two years of their M&As transactions. For the purpose of the study, a set of two ratios (ROA and ROE) is employed, in order to measure thirty firms' post-merger performance per industry, as well as on the whole sample, and selected accounting data from 2006 to 2009 are compared for the post-merger performance of the sample firms at two years after the M&As events. The examined industry sectors are seven different industry categories: industrial companies, medical services, constructions, internet-publications-etc. companies, commercial and tourist companies, information technology, metals and building materials companies.

Within this prospect, this research examines with its hypotheses: (1): if the post-merger performance of the acquiring firms is not expected to have a relative change after M&As, and (2): if the post-merger performance of the acquiring firms is not affected by industry type. The results revealed for the examined firms of each industry different results per industry and that there is after their M&As, in general, a worsening at the post-merger performance. From this could be presumed that their post-merger performance was affected by their different industry type. Also, M&As have not provided a better post-merger performance for the acquiring firms on the whole examined sample.

Last, future extensions of this study could examine a larger sample that could include not only M&As-involved Greek firms listed in the Athens Exchange, but also non-listed firms and within other or larger time frame periods.

References

- Agorastos, K., Pazariskis, M. and Karagiorgos, T. (2013) "Does Corporate Performance Improve after Domestic or International Mergers? Evidence from Greek Business at South-East Europe", in M. Pazariskis, Ed.: "Mergers and Acquisitions in Greece: Evidence from Past Experience", Lambert Academic Publishing, Saarbrücken, Germany, pp. 43-74.
- Artikis, P., Vrakas, S. and Karmi E. (2010) "Factors Affecting Expected Stock Returns: Evidence from the Secondary and Tertiary Sectors of the Athens Stock Exchange", *International Journal of Financial Services Management*, 4(3), pp 175-198.
- Chatterjee, S. and Meeks, G. (1996) "The Financial Effects of Takeover: Accounting Rates of Return and Accounting Regulation", *Journal of Business Finance & Accounting*, 23, pp. 851-868.
- Clark, K. and Ofek, E. (1994) "Mergers as a Means of Restructuring Distressed Firms: An Empirical Investigation", *Journal of Financial and Qualitative Analysis*, 29(4), pp. 541-565.
- Cornett, M. and Tehnarian, H. (1992) "Changes in Corporate Performance Associated with Bank Acquisitions", *Journal of Financial Economics*, 31, pp. 211-234.
- Cosh, A., Hughes, A. and Singh, A. (1980) "The Causes and Effects of Takeovers in the U.K.: An Empirical Investigation for the late 1960s at the Micro-economic Level", in D. Mueller, eds., "The Determinants and Effects of Merger: An International Comparison", Gunn & Horn Publications, Cambridge, U.K.
- Dickerson, A., Gibson, H. and Tsakalotos, E. (1997) "The Impact of Acquisitions on Company Performance: Evidence from a Large Panel of U.K. Firms," *Oxford Economic Papers*, 49, pp. 344-361.
- Ghosh, A., (2001) "Does Operating Performance Really Improve Following Corporate Acquisitions?", *Journal of Corporate Finance*, 7, pp. 151-178.
- Healy, P., Palepu, K. and Ruback, R. (1992) "Does Corporate Performance Improve After Mergers?", *Journal of Financial Economics*, 31, pp. 135-175.
- Healy, P., Palepu, K. and Ruback, R. (1997) "Which Takeovers are Profitable: Strategic of Financial?", *Sloan Management Review*, 38, pp. 45-57.
- Jensen, M. (1986) "Agency Costs of Free Cash Flow, Corporate Finance and Takeovers", *American Economic Review*, 76, pp. 323-329.
- Kaplan, S. and Weisbach, M. (1992) "The Success of Acquisitions, Evidence from Divestitures", *Journal of Finance*, 47, pp. 107-138.

<https://sites.google.com/site/icqqmeas2015>

- Kumar, M. (1984) "Growth, Acquisition and Investment", Cambridge University Press, Cambridge, U.K.
- Kusewitt, J. (1985) "An Explanatory Study of Strategic Acquisition Factors Relating to Performance", *Strategic Management Journal*, 6, pp. 151-169.
- Lubatkin, M. (1983) "Merger and the Performance of the Acquiring Firm", *Academic of Management Review*, 8, pp. 218-225.
- Lubatkin, M. (1987) "Merger Strategies and Stockholder Value", *Strategic Management Journal*, 8, pp. 39-53
- Manson, S., Stark, A. and Thomas, H. (1995) "A Cash Flow Analysis of Operational Gains from Takeovers", Certified Research Report 35, The Chartered Association of Certified Accountants, London, UK.
- Meeks, G. (1977) "Disappointing Marriage: A Study of the Gains from Merger", University of Cambridge: Occasional Paper 51, Cambridge University Press, Cambridge, U.K.
- Michailidis, Gr., Tsopoglou, S., Papanastasiou, D., and Mariola, E. (2006) "Testing the CAPM: The Case of the Emerging Greek Securities Market", *International Research Journal of Finance and Economics*, 4, pp. 78-91.
- Mueller, D. (1980) "The Determinants and Effects of Merger: An International Comparison", Gunn & Horn Publications, Cambridge, U.K.
- Mueller, D. (1985) "Mergers and Market Share," *Review of Economics and Statistics*, 67, pp. 259-267.
- Neely, W. and Rochester, D. (1987) "Operating Performance and Merger Benefits: The Savings and Loans Experience", *Financial Review*, 22, pp. 111-129.
- Parrino, J. and Harris, R. (1992) "The Effects of Taxation on FDI: Evidence from U.S., U.K. and Canadian Acquisitions of U.S. Firms", University of Virginia Working Paper, Virginia, U.S.
- Pazarskis, M., Vogiatzoglou, M., Christodoulou, P., and Drogalas, G. (2006) "Exploring the Improvement of Corporate Performance after Mergers - the Case of Greece", *International Research Journal of Finance and Economics*, 1(6), pp. 184-192.
- Pazarskis, M. (2008) "Exploration of Mergers and Acquisitions of Greek Firms with the Application of Statistical Methods" (in Greek), Ph.D. Thesis, University of Macedonia, Thessaloniki, Greece.
- Pazarskis, M., Karagiorgos, T., Christodoulou, P. and Eleftheriadis, I. (2009) "The Impact of Mergers and Acquisitions on Economic Performance of Greek Firms: an Accounting Perspective", 2nd International Conference on Quantitative and Qualitative Methodologies in the Economic and Administrative Sciences (ICQQMEAS '09), May 25-27, 2009, Athens, Greece, Conference Proceedings, pp. 385-388.
- Pazarskis, M., Lyrouti, K., Pantelidis, P. and Christodoulou, P. (2011) "An Accounting Examination of the Long Run Performance of Greek Acquiring Firms", *International Journal of Financial Services Management*, 5(2), pp. 159-176.
- Pazarskis, M., Alexandrakis, A., Pantelidis, P. and Serifis, P. (2013) "A Note on Corporate Mergers, Business Performance and the Theory of the Firm: Evidence from Greek Acquiring Listed Firms", 3rd International Conference on Quantitative and Qualitative Methodologies in the Economic and Administrative Sciences (ICQQMEAS '13), May 23-24, 2013, Athens, Greece, Conference Proceedings, pp. 309-317.
- Pazarskis, M., Pantelidis, P., Alexandrakis, A. and Serifis, P. (2014a) "Successful Merger Decisions in Greece: Facts or Delusions?", *Corporate Ownership and Control Journal*, 11(2), pp. 650-659.
- Pazarskis, M., Charalampidou, D., Pantelidis, P., and Paschaloudis, D. (2014b) "Examining Bank Mergers and Acquisitions in Greece before the Outbreak of the Sovereign Debt Crisis", *Corporate Ownership and Control Journal*, 11(4), pp. 175-183.
- Ravencraft, D. and Scherer, F. (1987) "Mergers, Sell-Offs and Economic Efficiency", Brookings Institution, Washington, U.S.
- Ravencraft, D. and Scherer, F. (1988) "Mergers and Managerial Performance", in J. Coffee, L. Lowenstein, and S. Rose-Ackerman, eds., "Knights, Raiders and Targets: The Impact of the Hostile Takeover", Oxford University Press, Oxford, U.K.
- Salter, M and Weinhold, W. (1979) "Diversification Through Acquisition; Strategies for Creating Economic Value", Free Press, New York, U.S.
- Sharma, D. and Ho, J. (2002) "The Impact of Acquisitions on Operating Performance: Some Australian Evidence", *Journal of Business Finance & Accounting*, 29, pp. 155-200.
- Spyrou, S. (1998) "The Capital Asset Pricing Model", (in Greek), *Economic Chronicles*, Issue 101.

A QUALITATIVE APPROACH TO THE INTRODUCTION OF PROFESSIONAL SKILLS IN THE GREEK HIGHER EDUCATION ACCOUNTING COURSES

Sofia Asonitou

Technological Educational Institute of Athens,

Department of Business Administration

e-mail: sasonitou@teiath.gr

ABSTRACT

The present study forms part of a larger research project on accounting education which included three main stakeholders, accounting teachers, business administration and accounting students and practicing accountants. The aim of the project was to investigate the views of the stakeholders regarding: a) the importance and therefore necessity for accountants to possess professional skills b) the degree to which business administration and accounting students acquire professional skills during their studies c) how to incorporate professional skills into the BAA curriculum. Additionally the project investigated the obstacles to the development of professional skills into the accounting curriculum. To achieve the above aims the author used a wide range of data collection methods, including questionnaires, interviews, documentary analysis, web-site scanning, and informal discussions with stakeholders. In the present study the author presents the analysis of the interviews that were conducted with the accounting teachers as well as part of the main results of the qualitative analysis.

Keywords: professional skills, Higher Education, accounting courses, qualitative analysis

1. Introduction

Higher Education is being under constant reforms in the recent decades in order to keep pace with the fast changing globalised economic world. In Europe changes in the Higher Education Institutions (HEIs) have originated by governments and their commitment to the Bologna Agreement (1999) and the European Union (EU). EU coordinated the creation of the European Higher Education Area and the establishment of the European Credit Transfer and Accumulation System (ECTS) in order to promote professional skills and competences and, through them, the employability prospects of HE graduates (EU, 2008). Credits (ECTS) measure the workload of students in order to achieve the desired learning outcomes which include knowledge, skills and competences (EU, 2009). Although these objectives are common, the contexts in which they must be achieved differ, since the culture of the individual European countries themselves differ (González, Montano and Hassall, 2009). The present study as part of a larger research project has investigated how Greek HEIs are handling the pressure to introduce an educational convergence policy with particular regard to the introduction of generic employability skills in Accounting Education.

The paper is structured as follows: Section 2 outlines the background to the research while Section 3 investigates methodological issues like sampling, reliability and validity concerns. Section 4 focuses on the qualitative analysis and results and finally Section 5 presents the conclusions.

2. Background to the Research

Research has indicated that the introduction of professional skills in HEIs curriculum have significantly positive effects on students' learning and on graduates' preparation for their professional life (Kennedy and Sorensen, 2006; Stanley and Marsden, 2013). Improved accounting education based on skills development means that graduates are more readily employable, are able to make a significant contribution to the overall strategy of the business and help employers to make good decisions, especially important for SMEs that are the lynch-pin of many European economies, including Greece. Furthermore, students who have developed personal skills and emotional intelligence can succeed better in areas other than their professional life and have the knowledge, skills and ability to be members of management teams that can support enterprises to gain competitiveness in the global marketplace (Elliott and Jacobson, 2002; Emsley, 2005). The accounting profession has been moving from traditional accounting work activities to newer, more value-added activities, including long-term strategic planning, process improvement, and customer and product profitability (Brock and Powell, 2005; Goretzki, Strauss and Weber, 2013). Management accountants work in cross-functional teams and are actively involved in decision-making. This necessitates them spending more time communicating with others, meaning that good interpersonal skills are essential for success. The most important knowledge, skills and abilities (KSAs) necessary for success are communication skills followed by team-work ability, analytical skills, technical accounting knowledge, and an understanding of how a business functions (IMA, 1999; IFAC, 2001). In Greece the subject of introducing professional skills in HEIs accounting courses is starting to emerge (Asonitou, 2014; Santouridis et al., 2014; EKPA, 2014; Asonitou, 2015a; 2015b). The scope of the present study is to present the qualitative methodological analysis of 5 interviews with accounting teachers. The interviews have been part of the mixed methods approach (Creswell, 2007) that aimed to investigate the development as well as the obstacles for the introduction of professional skills in the Greek HE accounting courses. Combined results from the qualitative and quantitative approach were interpreted using the New Institutional Sociology (DiMaggio and Powell, 1983). In this research, professional skills include: communication, interpersonal, problem-solving skills, pressure and time management skills, information technology, and professional values.

3. Qualitative Research Method

Qualitative research using the interview method can provide further insights and deepen our understanding of the issues raised during the quantitative analysis. Saunders et al. (2007, p. 313) suggest that, in an exploratory study, conducting non-standardised interviews can help researchers to "find out what is happening and to seek new insights". The author has formulated the below research sub-questions that aimed to answer through the interviews with the accounting teachers:

1. How do accounting teachers rate the importance of introducing professional skills into HEI courses in Greece?
2. How do accounting teachers rate graduates' performance in relation to professional skills in Greece?
3. Is there a gap between the importance assigned to accountants' professional skills and those exhibited by graduates in Greece?

<https://sites.google.com/site/icqqmeas 2015>

4. If it is imperative to introduce professional skills, then what is the best way to incorporate them within the accounting curriculum in Greece?
5. What are the barriers regarding the policy of introducing professional skills into the HE accounting courses in Greece?

3.1 Sampling

The sampling of the participants was purposive. Sampling in qualitative research as Silverman (2006) states is neither statistical nor purely personal; it is or should be theoretically grounded. This type of sampling makes choices more sensible and meaningful than others which can represent a wider population. In the present study the teachers were chosen from the pool of teachers who volunteered during previous quantitative phase two to participate in the interviews. Among the teachers who volunteered purposeful sampling was used from people who represent the different type of HEIs (Universities and Technological Institutions), the capital and the periphery (Athens area and Central Greece), the staff hierarchy (tenured, not tenured, Assistants, Associates and Professors), and the departments (Business Administration and Accounting departments). The teachers were in total six persons; 2 teachers from ATEIs as tenured staff and 2 teachers that teach at Universities, all in the Athens area. One accounting teacher from a rural University as tenured teacher and one more teacher on contract who works at both the Athens area and occasionally at the periphery working both in ATEI and University.

3.2 Reliability

Reliability pertains to the consistency of the research findings. Reliability concerns whether alternative researchers would reach similar results (Easterby-Smith et al., 2002). Bias problems can also affect a study's reliability. There are various types of bias to consider. Interviewer reliability concerns the leading questions which may inadvertently influence the answers. It is also possible that the research shows interpretation bias (Saunders et al., 2007). In order to deal with the interviewer bias an interview guide was prepared. It was separated into four main parts within which the interviewee had the freedom to answer. Most questions were open-ended that according to Easterby-Smith et al. (2002) should help to avoid bias and would allow the interviewee to pursue other issues and to introduce new material as deemed appropriate with the subject. The interviews were tape-recorded in order to avoid misunderstandings and misinterpretations of the responses. Tape-recording provides an accurate and unbiased record of data and gives the opportunity to use direct quotes from the participant phrases.

3.3 Validity

Kvale (1996, p. 244) states that "the complexities of validating qualitative research need not be due to an inherent weakness in qualitative methods, but may on the contrary rest on their extraordinary power to picture and to question the complexity of the social reality investigated". The emphasis on validation for Kvale should move from inspection at the end of the production line to quality control throughout the stages of knowledge production (thematizing, designing, interviewing, transcribing, analyzing, validating, and reporting). Regarding the analyzing process the validity claim has to do with whether the questions put to an interview text are valid and whether the logic of the interpretations is sound" (Kvale, 1996, p. 237). To ensure validity of the present study the researcher processed the data and double-checked a part of the material (around 20%) analysed about consistency on coding themes with a second researcher. Furthermore the processed data were sent back to the interviewees in order to verify that the researcher had accurately and precisely interpreted and presented their beliefs and opinions. The analysis was done by hand and comprised around 120 pages of transcribed data for 5 of the total 13 interviews. The interviewer confirmed with the participants the use of the tape-recorder again and presented the questions by giving the participants complete freedom and time to express their views and flexibility to uncover any hidden dimensions on the subjects under discussion.

3.4 Interview Design

The interviews were designed by consulting several sources, like the literature review, the theoretical framework as well as the findings from phases one (qualitative) and two (quantitative) of the overall project. The interview questions were reviewed and discussed with academics and accountants in Greece. The intention of the interviews was to allow the uncovering of new factors or emergence of new explanations and new reasoning about the related issues and relationships. The interview guide was divided into four main parts as follows: **Part One:** The need to connect accounting education with market requirements and to present participants' views about the introduction of professional skills in Greek HEIs. **Part Two:** Obstacles and endogenous weaknesses related to the introduction of professional skills. **Part Three:** Driving forces towards the introduction of professional skills. **Part Four:** Attitude and responses of the HEIs towards the reforms.

4. Qualitative Analysis and Results

4.1 Interview Analysis

A common feature of most qualitative data analysis strategies involves organising the mass of qualitative data collected into meaningful and related parts or categories (Miles and Huberman, 1994). The procedure includes the following activities; categorisation, “unitising” data, recognising relationships, developing categories, and developing and testing theories to reach conclusions (Saunders et al., 2007). In order to proceed to the categorisation process, firstly, the author read the interviews to get an overall picture, then read each one again more carefully, seeking to distinguish explicit notions or concepts discussed by the interviewees. Through rereading the material, it became possible to identify those parts which were unrelated to our issue. Then the data were read yet again accompanied by labelling the paragraphs, phrases or sentences with the appropriate category (open coding). A matrix was drawn up with a number of columns corresponding to the number of participants in each group. In one column, all of the common themes (categories) identified in the transcripts were listed, then in the next column stated which person referred to this concept and where (for example: George, page 24, paragraph 3, line 17). The processing of the qualitative data for each group revealed broad categories of interest. The analysis of the teachers’ data produced the following seven thematic categories; the Bologna Agreement, educational system and skills, obstacles to skills introduction, pressures to introduce skills, market characteristics, the New Frame Law 4009/11 and Private HE. The above categories were re-organised and re-categorised in relation to our sub-questions. A careful reading of the data led to our interpretation of the participants’ views about each element.

Importance of Professional Skills (question 1)

Teachers generally agreed with the introduction of professional skills in the curriculum of Higher Education: *“We do not live in a world with unlimited resources where we can satisfy all our wishes... and education is expensive... certainly it aims to develop and widen culture to citizens but at the same time it aims to more materialistic targets, to educate people to succeed in the professional field”*.

Other teachers were not really sure what is included or what is meant by skills, for example “using visual aids”:

“Visual aids are useful and some people use them, I use them, and I anticipate them as useful technical tools. I wonder, as a skill, how can we see it besides a technical tool that supports...ehhh... the teaching of the course? How can we see it behind that ...as a skill provided to students, how we can see it?”

Some of them thought that professional skills were limited to the computer skills and specifically the knowledge of a relevant software and introduction of accounting data in it. So they justifiably saw a risk at this point:

“I agree that skills should be introduced in a more structured system. However there is a risk at this point, a problem. For example, in accounting, what does this mean acquire skills? ... that is, I learn a software package and press the buttons F1, F2, to ask for the trial balance, do this, do that, what is this?...The risk that I refer to is that it is easy to escape from theoretical knowledge and go only towards the practical direction, and this is dangerous, ... so that the student does not understand what he is doing”.

Exhibited Performance of Graduates (question 2)

According to interviewees graduates are lower than medium at the scale of skills possession. They emphasise that students are provided only with technical knowledge, they do not solve unstructured problems and do not receive broad spectrum of knowledge that would support them in participating at decision making:

“We prepare good accountants to sign the financial statements, the programs, to know the laws, the tax issues...ehhh...to do well all the accounting postings but we do not teach them how to be supporters at decision making, that is the courses...maybe because they give too much emphasis at the technical training but I have the feeling that there is a lack towards other tools and skills which...ehhh...would help accountant to function as a business advisor”.

Actual versus Expected Performance (question 3)

The gap between the importance assigned to skills development and the performance of students signifies a missing link in the educational chain. Teachers provided the reasons for this gap and how the efforts to cover the gap are mainly personal and sporadic. Big size classes are an obstacle to this effort:

“In our university here, we have started to introduce specific courses that aim to the development of personal skills or to introduce at management courses to have... an important part of this material of the total teaching hours. Beyond this, we can say that even in more technical courses, informally...some colleagues have included this...as part of students’

<https://sites.google.com/site/icqqmeas2015>

activities, either to present a work study or write a work study or both write and present it... Personally at my course, analysis of financial statements, which is taught at the 4th year, students cannot make presentations because I have 300 students, it is impossible to do it”.

Accounting Curriculum (question 4)

Interviews analysis showed that teachers agreed with the teaching simultaneously with the technical-accounting knowledge however they did not agree with the integration into all subject areas. Almost all of them agreed that there should be a separate course to teach skills preferably at the early semesters. Teachers could eventually use the skills development as proper foundations for their courses at a later semester:

“There should be one course dedicated to skills, so that students can realize the importance of this subject... then the rest of the teachers will realize and understand its importance ...and having ensured the foundations, the knowledge background, then the teachers of other courses can make the proper connections of their course to skills...”

Barriers to Skills Development (question 5)

Barriers were identified as coming from the system and the teachers themselves.

Barriers from the system: Weaknesses from the system include a wide range of sources like the top and middle management of HEI, the policies, the political activities, the state etc.

a) Lack of Communication

Teachers talk about the communication problems within HEIs. There is lack of information dissemination about skills development and learning outcomes. It became obvious from the participants that the teachers have not connected ECTS with learning outcomes. Also teachers say that they have not been informed on the laws and their reference to skills development, or that they ignored the connection between ECTS, skills development and learning outcomes. ECTS were introduced rather as a technical calculation “imposed” by the top management for a vague unknown reason:

“I am not aware of the law about introducing skills alongside with ECTS...I do not know how teachers are informed in other countries but here there is a gap on information about changes on education. I know about credit units... all the rest you talk about...ehhh... has never happened any conference or meeting in our department about the issues you are referring to... “.

b) Lack of Explicit Policy

Teachers emphasise the lack of a systematic and explicit policy that would inform and would support the development of skills. If there is no a master plan with institutionalised procedures then the information stays within closed drawers. This issue was mentioned at least at eleven different instances during discussions with teachers:

“...it is possible that some members of management are aware of them...so it is something that there was not a clear policy and...we can say regarding the application of these was not given through a definite direction... that is somehow to force you to do it, to ask you, to put it as an unambiguous target”.

c) Lack of Motivation – Promotion criteria

Teachers insist that in order to apply reforms there should be either motives established (extra rewards) or strict obligations to follow. Since there are no motivations from the system like promotion criteria or some kind of other (financial) rewards the teachers find it normal not to act, not to take initiative and to keep the status quo:

“To do something should either be obliged to do it or to have motivation, here nothing of the two is happening. That is, there is no extra reward”.

d) Impunity

Impunity, lack of control and sanction system have been some of the most important barriers for reforms since teachers referred to these at least in 25 instances during the interviews. They notice impunity in every case: there are no sanctions if a teacher or administrative employee performs badly and there are no consequences if a person does not perform his duties at all.

The overall tendency to ignore the laws is identified as the reason that skills have not been incorporated in Higher Institutions in Greece:

“One of the reasons that skills have not been incorporated in Higher Institutions is that in Greece several laws are

<https://sites.google.com/site/icqqmeas> 2015

voted but not applied. It is not only the issue that we discuss now but in general, issues about education are not applied although the parliament has voted for them”.

e) Equipment and support

Lack of space and proper equipment are also recognised as barriers to skills development: It is impossible to work with teams and apply any innovative teaching method when there are more than a hundred students in the classroom:

“In the course that I teach, financial statement analysis, I have 300 students, so there is no possibility to have teamwork and presentations”.

Barriers from the teachers

a) Skills versus Knowledge – Are professional skills proper to teach in HEIs?

Discussing with teachers sometimes has not been easy to figure out if they were in favour of skills development or not. There were very often contradictions in their own words. I had the feeling that they agreed to skills introduction sometimes because they felt it was the right thing to say but they did not “really” felt this to be important. For example a teacher said that

“ECTS which were the basics to be introduced is already accomplished”.

b) Teachers’ professional skills

Adopting new teaching methods, being open minded for new initiatives, discussing on teaching issues implies professional attitude and strong professional skills. Many of these qualities are missing from academic teachers although this may sound strange enough. They admit themselves how they miss certain attributes like the ability for team work, coordination skills, time management and other skills:

“We may see as a group the need for change...but we do not act as a group...We have never worked as a group... this never happened”.

Lack of professional skills and micro-politics could be the reason for an attitude based on envy, vanity and personal quarrels with serious implications for the overall progress and function of faculties. Personal ambitions can sometimes stop or change direction to collective policies as is the case with the credit units:

“There were departments until recently which did not want to have credit units...why?...because teachers did not know which courses would have half credits. In the ECTS system there are half credit units. No one teacher would accept his course to have half credits. So you see it is not only a matter of being informed on a subject, there are other issues behind”.

c) Institutional inertia and fear for the unknown

The negative reactions lead people to apathy and to “institutional inertia”:

“If a person or a group of persons try to change something it is certain that they will fail. If 10% tries to change things, there will be another... 30% that will react strongly against the change and the rest of the people will stay apathetic and indifferent, because they do not believe in success...or they are not interested...We have reached a level of “institutional inertia” where every reform provokes negative reactions...”

d)Teacher training and Accounting education

Teachers identify the lack of training as one of the barriers to skills development. They notice the absence of an academic unit dedicated to academic issues within HEIs:

“I talk with many accounting teachers,...ehhh...there is not a team that we could meet and talk...on where accounting is going...about accounting education and interpersonal relationships and skill in accounting...this never happened. A seminar at country level never happened, I have never heard about it and I do not know ...”

e) Can skills be taught or are they traits of character?

Teachers may say that professional skills are important however, a few believe that skills are inherited. Either you are born with it or not. Education would not harm and could help somehow but would not add much to the skills acquisition by a person:

“In principle, I believe that all is dependent on the student and professional skills and everything can be acquired during the teaching of the theory of the course”.

5. Conclusions

Rich data were provided by analysing the participants' interviews. Teachers like other stakeholders (accountants and students) agreed on the importance of professional skills. They also referred to the gap between the actual and the expected skills of graduates. Teachers acknowledged a variety of barriers for the incorporation of professional accounting skills which arise from the system, educational or political, and the teachers themselves. These include lack of effective communication within HEIs, lack of explicit policy, planning and coordinated efforts that would support the development of skills, lack of promotion criteria and impunity in case of non-conformance to rules. Teachers refer to the "top-down" approach to implementing changes and new institutional reforms that are not effective in most cases. Finally the lack of equipment and support are also recognised as a barrier to systemic teaching of skills. The plethora of barriers to the skills development underlines the necessity for further investigation on this important issue.

References

- Asonitou, S. (2014) Embedding generic employability skills in the Greek Accounting Education Studies: Development and Impediments, Unpublished PhD, Sheffield Hallam University, Sheffield, UK
- Asonitou, S. (2015a) Employability Skills in Higher Education and the Case of Greece, *Procedia - Social and Behavioral Sciences*, 175, 283-290, Proceedings of the 3rd international conference on Strategic Innovative Marketing Conference (IC-SIM 2014) accessed at: <http://dx.doi.org/10.1016/j.sbspro.2015.01.1202>
- Asonitou, S. (2015b) Skills Development and Learning in an Undergraduate Accounting Information Systems Course, *Journal of Regional & Socio-Economic Issues*, 5(2), June 2015
- Brock, M. D. and Powell, J. M. (2005) Radical strategic change in the global professional network: the "Big Five" 1999-2001, *Journal of Organizational Change Management*, 18 (5), 451-468
- CBI (2009) Stronger together: universities and business in turbulent times, Confederation of British Industry, London
- Creswell, W. J. and Plano Clark, V. (2007) *Designing and conducting mixed methods research*, Thousand Oaks, CA: Sage
- DiMaggio, P.J. and Powell, W.W. (1983) The iron cage revisited: institutional isomorphism and collective rationality in organisational fields, *American Sociological Review*, 48 (2), 147-160
- Easterby-Smith, M., Thorpe, R. and Lowe, A. (2002) *Management Research, An Introduction*, GB: Sage Publications
- EKPA (2014) E-Learning, Personal Skills Development [Online] last accessed at http://elearn.elke.uoa.gr/show_programs.php?catID=all&prID=122, June 2014
- Elliott, K. R. and Jacobson, D. P. (2002) The evolution of the knowledge Professional, *Accounting Horizons*, 16 (1), 69-80
- Emsley, D. (2005) Restructuring the management accounting function: A note on the effect of role involvement on innovativeness, *Management Accounting Research*, 16, 157-177
- EU (2008) On the establishment of the European Qualifications Framework for lifelong learning, European Parliament Council, (2008/C 111/01), Official Journal of the European Union [online], at: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2008:111:0001:0007:EN:PDF>
- EU (2009) ECTS User's Guide, Education and Training, European Communities, Luxembourg [online] at: http://ec.europa.eu/education/lifelong-learning-policy/doc/ects/guide_en.pdf
- González, J. M., Montano, J. L. and Hassall, T. (2009) Bologna and Beyond: A Comparative Study Focused on UK and Spanish Accounting Education, *Higher Education in Europe*, 34 (1), 123-135
- Goretzki, L., Strauss, E. and Weber, J. (2013) An institutional perspective on the changes in management accountants' professional role, *Management Accounting Research*, 24, 41-63
- IFAC (2001) Education Committee, Competence-based approaches to the preparation and work of professional accountants. Exposure draft discussion paper, IFAC, New York
- IMA (1999) Counting More, Counting Less, Transformations in the Management Accounting Profession, A research project of the Institute of Management Accountants [online] Last accessed 5 September 2011 at <http://www.imanet.org>
- Kennedy, A. F. and Sorensen, E. J. (2006) Enabling the management accountant to become a business partner: Organizational and verbal analysis toolkit, *Journal of Accounting Education*, 24, 149-171
- Kvale, S. (1996) *Interviews, an Introduction to Qualitative Research Interviewing USA*: Sage Publications
- Miles, B. M. and Huberman, A. M. (1994) *Qualitative Data Analysis*, (2nd ed.), USA: Sage Publications
- Santouridis, I., Tsiforaa, E., Trivellas, P. & Nikolopoulos, S. (2014) Revising Greek Accounting & Finance Education in an economic crisis environment, ICSIM, *Procedia - Social and Behavioral Sciences*
- Saunders, M., Lewis, P. and Thornhill, A. (2007) *Research Methods for Business Students*, Pearson Education Limited, England
- Silverman, D. (2006) *Qualitative Research, theory, method and practice*, GB: Sage Publications
- Stanley, T. and Marsden, S. (2013) Accountancy capstone: Enhancing integration and professional identity, *Journal of Accounting Education*, 31, 363-382

SUSTAINABLE DEVELOPMENT AND CORPORATE SOCIAL RESPONSIBILITY WITHIN THE BUSINESS SECTOR IN GREECE

Olga-Eleni Astara^{1*}, Roido Mitoula², Christina Beneki³

¹Lecturer, TEI of Ionian Islands, School of Business and Economics, Department of Business Administration, Philosophon & Tzeveleki, 31100, Lefkada, Greece

²Associate Professor, Harokopio University, Department of Home Economics and Ecology, 70 El. Venizelou Str., 17671, Athens, Greece

³Associate Professor, TEI of Ionian Islands, School of Business and Economics, Department of Business Administration, Philosophon & Tzeveleki, 31100, Lefkada, Greece

ABSTRACT

Sustainable development has been systematically studied by researchers in the last 40 years and has renewed hope for citizens and state officials in the achievement of a growth which will not burden nor destroy but will rather protect natural and social resources to the extent that this will be possible and will yield a profit. Businesses adopted the term Corporate Social Responsibility (CSR) as they became increasingly aware of this change and in an effort to adapt to the tremendous pressure both by the globalized society and civil society. The present study aims at investigating the relationship between CSR and sustainable development in businesses which have adopted CSR by comparison to those which have not done so. The selection of businesses within our sample was made among those that are listed in the Athens Stock Exchange, inasmuch as the Stock Exchange reflects the business sector of each country and economy. More specifically, our study concerns the businesses listed in the Athens Stock Exchange for the years 2006-2012. Furthermore, what was studied was the relationship between sustainable development and the fields of action of CSR so as to demonstrate whether these two notions are linked or occur together within the business sector. It is proved that indeed the greatest part of businesses which implement sustainable development policies engage themselves in all four fields of action of CSR: workplace, market, community and environment. This also constitutes a very important finding because it confirms the co-occurrence of CSR, even unconsciously, with Sustainable Development within business activities, which is also corroborated by Keijzers (2000), Marrewijk (2003), and Montiel (2008) who agree that these notions appear to converge even if there are certain differences.

Keywords: Sustainable Development, Corporate Social Responsibility

Introduction

The concept of Sustainable Development was first introduced by the World Commission on Environment and Development (WCED) in 1987. The then Norwegian Prime Minister, Gro Harlem Brundtland, defined sustainable development as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” (Jonathan, 2000).

In the process of conceptualising Sustainable Development (SD) the term “development” was expanded and enriched. At the risk of being overly simplistic, it could be argued that the discourse on SD in fact expanded the concept of development into two directions: i) development must be seen in a broader sense, to encompass, among others, social and environmental aspects, not just economic aspects; and ii) development must be achieved without compromising the ability of future generations to meet their needs, whilst ensuring intergenerational equity.

Expanding the concept into the first direction clearly requires changes in the way economy as a circular flow model is seen. This is because, whilst the circular flow model of economic activity suggests a closed system, the comprehensive concept of a socio-ecological and economic system clearly refers to an open economic system that interacts with the environment. Expanding the concept into the second direction requires the integration of an evaluation of intra- and intergenerational equity, namely, an evaluation of purely ethical values (Sartzetakis and Papandreou, 2002).

Nevertheless, Mitoula et al. (2008) argue that the characteristics of SD could be attributed in terms of:

- Space: i) a vertical approach of space: on a local, regional, national and international development level; ii) an horizontal approach of space: on an equitable development of developing countries.
- Time: long-term objectives/duration and short-term activity, equal opportunities to development for present and future generations.
- Themes: three thematic areas which are examined as to their scope and interactions between them. Those are: Economy (economic development), Society (social development) and the Environment.
- Integration: The incorporation of the environment dimension into the decision-making process to the fullest extent possible and the examination of interactions between socio-economic and environmental factors that affect the decision-making process.

Thus, scientists may have different views on what is SD, depending on the scientific field they are coming from and the various sectors dealing with natural resource management. The concept borrows heavily from physical and social science. It is a vision for ecologists, a challenge for economists, an ideological motto for those working to increase citizen awareness on the protection of nature (Mitoula et al., 2008).

On an international level, enterprises are invited to include sustainable development and social policy practices into their business strategies. Galanis (2007) purports that the main reasons for this are the global environment within which enterprises are operating, the speed and abundance of information, the need for greatest transparency, the discredited or insufficient role of the Public Sector in addressing the social issues citizens are facing and the long-standing request from the stakeholders' side.

The prevailing view of the European Union is that “the key to the long-term prosperity across Europe and to the rest of the world is sustainable development, namely, the finding of ways to improve quality of life without compromising the environment or future generations” (Kaloyiannis, 2002).

Lea (2002) argues that Corporate Social Responsibility (CSR) goes beyond the legal obligations of enterprises and other organisations to manage their impact on the environment and the society. More specifically, this could include the way in which they interact with their employees, suppliers, customers and communities within which they operate, as well as the extent of efforts they make for the protection of the environment.

Hardjono and Marrewijk (2001) argue that companies with a CSR strategy include their social and environmental concerns in their business operations and in their interactions with stakeholders and demonstrate their performance using the triple-bottom-line. In 2003, Marrewijk added corporate sustainability to the definition of CSR, pointing out that corporate sustainability and corporate social responsibility refer to company activities - voluntary by definition- demonstrating the inclusion of social and environmental concerns in business operations and in interactions with stakeholders.

In 2011, the European Commission redefined CSR as “the responsibility of enterprises for their impact on society” and added that for enterprises to fully respond to corporate social responsibility, they should have in place a process of integrating social, environmental, ethical, consumer, and human rights concerns into their business operations and strategy working closely with the stakeholders in order to maximise the creation of common value for their owners/shareholders and for the other stakeholders and society as a whole; identify, prevent and mitigate any adverse effects.

<https://sites.google.com/site/icqqmeas2015>

Finally, Dahlsrud (2006) argues that providing a definition for CSR is not an easy task, as there are too many who would rather describe Corporate Social Responsibility as a phenomenon and not as a concept. This could also be the cause of the confusion in this definition. The confusion is not so much about how CSR is defined, as about how CSR is socially constructed in a business environment.

The available definitions for CSR according to Dahlsrud (2006) often have five dimensions: 1) The voluntariness dimension, 2) The stakeholder dimension, 3) The social dimension, 4) The environmental dimension, and 5) The economic dimension.

What emerges from literature is that the difficulty in defining CSR lies in the fact that literature describes more what CSR is rather than providing an explicit definition. That said, everyone seems to converge on the five dimensions above presented by Dahlsrud, i.e. voluntariness, the stakeholder dimension, the social dimension, the economic dimension and the environmental dimension.

Although the ways in which CSR and SD are correlated and the theories supporting their interaction are more or less different, there are points of congruence or certain common characteristics.

Ebner and Baumgartner (2006) approached the theories that associate the concepts of CSR and SD in a systematic and highly theoretical way. More specifically, using the literature, they grouped the theories that link those two terms, presented them and divided them into clusters. The authors consider that a general trend concerning the use of definitions is difficult to recognize. Two major streams exist. A large number of scientists describe CSR as stakeholder-orientated, social pillar of SD, and others tend to replace the term SD by CSR, without restrictions. It is hard to say whether CSR is more likely to be used as a synonym for SD in the future or if it is rather seen as the new stakeholder approach or as the social dimension of SD.

Marrewijk (2003) made a distinction between SD for companies, making use of the term Social Sustainability (CS). He also elaborated on the relation between those two concepts and arrived at the conclusion that those two terms converge or are merged into a two-dimensional cluster. Keijzers (2000) also demonstrated that the concepts of CSR and CS have followed distinct paths which were joined only recently. For Keijzers, however, there is a small but material distinction. CSR is associated with a sense of social unity among people and organisations and therefore, it is related to social issues, whereas CS is correlated with the principles of the organisation. Therefore, CSR is associated with phenomena such as transparency, dialogue with stakeholders and sustainability reporting, whereas CS is mainly focused on value creation, environmental management, environmental production systems, human resource management, etc.

Whilst Marrewijk (2003) draws the conclusion that the two concepts converge, Montiel (2008) argues that the definition and resetting of boundaries between the two concepts –CSR and CS– is important for all those conducting a research on social and environmental aspects. Montiel's analysis shows that it should be determined whether CSR and CS warrant a more detailed distinction or whether they should be merged into one construct that will account for all social and environmental-related issues in the management field. According to Montiel, companies use CSR and CS interchangeably. If we have a look at the Global Reporting Initiative (GRI), overlapping of these two terms becomes even more evident. Out of the 112 US companies enrolled in the GRI we find all kind of terminology used to refer to the companies' social and environmental reports. Companies have used titles as varied as "Global Citizenship Report", "Corporate Responsibility Report", "Environmental Sustainability Report", "Sustainability Report" and "Environmental & Social Responsibility Report" to refer to their annual social and environmental initiatives.

There is no doubt and no opposing views that CSR is associated to CS, despite the plethora of different terms emerging through literature. These terms include among others Corporate Responsibility (CR), Corporate Social Accounting (CSA) instead of CSR and, on a company level, CS instead of SD. From the literature it can be seen that some researchers consider CSR as the social pillar of SD, whereas others as a way to achieve SD from the companies' side. At the same time, there is a large number of scientists who consider both concepts as synonymous. This can be proven on a company level where overlapping of these two concepts becomes more evident.

This research is intended as a complement to the current Greek and international bibliography on the study of the relationship between CSR and SD.

It addresses the following research question: *Does an association exist between CSR and SD?*

The empirical approach

For the purposes of this research, we used a sample of listed companies in the Athens Stock Exchange during the period 2006–2012. Banking institutions were excluded from the sample as their balance sheets are different to those of companies of other sectors. Thus, it would be difficult to compare their financial indicators to those of other dissimilar enterprises. During the period 2006 to 2012, the total number of companies was 1,514. The

<https://sites.google.com/site/icqqmeas> 2015

listed enterprises were divided into two groups: those that adopted CSR practices and those that did not.

At first, we noted down their company details and financial data, namely:

- Sector, they operate in.
- Enterprise Status, using six variables 0-5 (0=Suspension, 1=Under Deletion, 2=Normal, 3=Low Dispersion, 4=Surveillance, 5=Main Market)
- Merger-Deletion, using two variables (0=No, 1=Yes)
- Profit/Loss before tax
- Total Assets
- Total Equity
- Turnover
- Fixed Assets
- Current Assets
- Short-term Liabilities
- Long-term Liabilities
- Earnings per Share
-

Then, the following indicators were calculated:

- $ROA = \text{Return on Assets} = \text{Profit/Loss before tax} / \text{Total Assets}$
- $ROE = \text{Return on Equity} = \text{Profit/Loss before tax} / \text{Total Equity}$
- $ROS_1 (\text{Return on Sales})_1 = \text{Turnover} / \text{Total Assets}$
- $ROS_2 (\text{Return on Sales})_2 = \text{Turnover} / \text{Total Equity}$
-

Companies were classified in the:

- Wider Sector using variable values from 1-3 (1= Raw material sourcing, primary production coming from agriculture, fisheries, livestock farming and the manufacturing industry, 2=Commerce, 3= Services)

Then, the following quality variables were created only for the enterprises that adopted CSR practices:

- CSR Declaration on the Financial Statement to establish whether or not a trend has been formed to consolidate CSR/Sustainability and Financial Reporting
- Member of the Hellenic Network for CSR
- CSR Declaration on the Company Website
- CSR/ Workplace
- CSR/ Marketplace
- CSR/ Community
- CSR/ Environment
- Other/Charity (the preliminary concept of CSR)
- Sustainable Development (investigating its matching to CSR or its complementary role according to literature)
- Quality Assurance and how it associates with CSR
- Environmental Policy, if it exists regardless of the existence of SD and/or CSR
- Comments (on the type of CSR practices that enterprises adopted, characteristics, areas of application, CSR reporting, etc.)
-

From the comments supplied by the enterprises, we used an extra variable:

- CSR/Sustainability Reporting as per GRI, using two variables (0=No, 1=Yes).

For the purpose of this paper, we performed a Pearson's chi-square (χ^2) test between the Sustainable Development, Quality Assurance, Enterprise Status variables and independent variables in order to examine each separate variable's effect on the dependent variable and then identify the possible cause and effect between variables during the period from 2006 to 2012. We considered the following independent variables: CSR/ Workplace, CSR/Marketplace, CSR/Community, CSR/Environment, Member of the Hellenic Network for CSR.

Additionally, we carried out a pre- and post-crisis Pearson's chi-square test, namely for the periods 2006-2009 and 2010-2012 respectively, using the enterprises that have adopted CSR practices in order to establish whether the results of the statistical analysis were changing or not. For this analysis, the level of significance was set to 0.05.

Results

The association between the variables Sustainable Development and CSR/Workplace is statistically significant, since the associated p-value of the test statistic is found to be less than 0.05 ($p < 0.001$). 49.4% of all enterprises that adopted CSR practices and applied SD policies were committed to good workplace practices. Conversely, 98.5% of all enterprises that adopted CSR practices but did not apply SD policies were not committed to good workplace practices.

In terms of marketplace commitment, 54% of total enterprises that adopted CSR practices were also committed to CSR practices in the marketplace, whilst 88.2% of all enterprises that adopted CSR but did not apply SD policies were not committed to CSR practices in the marketplace. Since the p-value is less than the significance level 0.05 ($p < 0.001$), we cannot accept the null hypothesis. Thus, we conclude that there is a relationship between Sustainable Development and CSR/Marketplace.

Regarding community involvement, the results indicate there is statistically significant relationship between Sustainable Development and CSR/Community ($p < 0.001$). 46.2% of all enterprises that adopted CSR and applied SD policies were also actively involved in the community. Conversely, 80% of all enterprises that adopted CSR practices and applied SD policies were not actively involved in the community.

The Pearson's chi-square test that examines the Sustainable Development variable against the CSR/ Environment variable reveals that there is a statistical significance between SD and environmental action ($p < 0.001$). 54.3% of total businesses that adopted CSR practices, implemented sustainable development policies, whereas 100% of those businesses that did not implement sustainable business policies did not engage into any environmental action.

88.3% of all enterprises that adopted CSR practices and applied a Quality Assurance System were committed to good workplace practices. Conversely, 56.1% of all enterprises that adopted CSR practices and did not apply a Quality Assurance System were not committed to good workplace practices. There is a statistical significance between Quality Assurance and CSR/Workplace ($p < 0.001$).

As regards marketplace commitment, 87.2% of all enterprises that adopted CSR practices and had a Quality Assurance System in place were committed to CSR practices in the marketplace. Conversely, 33.6% of all enterprises that adopted CSR practices and did not have a Quality Assurance System in place were not committed to CSR practices in the marketplace. There is a statistical significance between Quality Assurance and CSR/Marketplace ($p < 0.001$).

As regards community involvement, 84.9% of all enterprises that adopted CSR practices and had a Quality Assurance System in place were actively involved in the community as well. On the contrary, 37.1% of all enterprises that adopted CSR practices yet did not have a Quality Assurance System in place were not actively involved in the community. There is a statistical significance between Quality Assurance and CSR/Community ($p < 0.001$).

The Pearson's chi-square test on the Quality Assurance variable against the CSR/Environment variable revealed that there is statistical significance between the two variables ($p < 0.001$). 87.9% of all enterprises that adopted CSR practices and had a quality assurance system or systems in place were also engaged in environmental action. Conversely, 41.1% of all enterprises that adopted CSR practices but had no quality assurance system in place were not engaged in environmental action.

98.8% of all enterprises that adopted CSR practices and were operating in the main market were members of the Hellenic Network for CSR. Conversely, 98.5% of all enterprises that adopted CSR and were under suspension/surveillance were not members of the Hellenic Network for CSR. There is a statistically significant association between the Enterprise Status variable (value: Main Market) and the Member of the Hellenic Network for CSR variable.

The conclusions drawn for the pro-crisis period 2006-2009 under study were the following.

49.8% of all enterprises that adopted CSR practices and applied Sustainable Development policies were committed to good workplace practices. Conversely, 97.6% of all enterprises that adopted CSR practices but did not apply Sustainable Development policies were not committed to good workplace practices. There is a statistically significant association between Sustainable Development and CSR/Workplace ($p < 0.001$).

53.1% of all enterprises that adopted CSR practices and applied Sustainable Development policies were committed to CSR practices in the marketplace. Conversely, 88.2% of all enterprises that adopted CSR practices but did not apply Sustainable Development policies were not committed to CSR practices in the marketplace. There is a statistically significant association between Sustainable Development and CSR/Marketplace ($p < 0.001$).

45.8% of all enterprises that adopted CSR practices and applied Sustainable Development policies were also actively involved in the community. Conversely, 80.0% of all enterprises that adopted CSR practices and

applied Sustainable Development policies were not actively involved in the community. There is a statistically significant association between Sustainable Development and CSR/Community ($p=0.002$).

The Pearson's chi-square test, which examines the Sustainable Development variable against the CSR/ Environment variable, showed that there is a statistically significant association between SD and environmental action ($p<0.001$). 54.0% of total enterprises that adopted CSR practices had implemented sustainable development policies, whereas 100% of those enterprises that did not implement sustainable business policies did not engage in any environmental action.

89.1% of all enterprises that adopted CSR practices and applied a Quality Assurance System were committed to good workplace practices. Conversely, 59.5% of all enterprises that adopted CSR practices and did not apply a Quality Assurance System were not committed to good workplace practices. There is a statistically significant association between Quality Assurance and CSR/Workplace ($p <0.001$).

85.7% of all enterprises that adopted CSR practices and had a Quality Assurance System in place were committed to CSR practices in the marketplace. Conversely, 32.4% of all enterprises that adopted CSR but did not have a Quality Assurance System in place were not committed to CSR practices in the marketplace. There is a statistically significant between Quality Assurance and CSR/Marketplace ($p <0.001$).

83.7% of all enterprises that adopted CSR practices and had a Quality Assurance System in place were actively involved in the community. On the contrary, 35.0% of all enterprises that adopted CSR practices yet did not have a Quality Assurance System in place were not actively involved in the community. There is a statistically significant association between Quality Assurance and CSR/Community ($p=0.006$).

87.7% of all enterprises that adopted CSR practices yet had no quality assurance system in place were not actively engaged in environmental action. Conversely, 42.9% of all enterprises that adopted CSR practices yet had no quality assurance system in place were not engaged in environmental action. There is a statistically significant association between Quality Assurance and CSR/Environment ($p<0.001$).

Finally, the following conclusions were drawn for the post-crisis period of 2010-2012 under study.

48.9% of all enterprises that adopted CSR practices and applied Sustainable Development policies were committed to good workplace practices. Conversely, 100.0% of all enterprises that adopted CSR practices but did not apply Sustainable Development policies were not committed to good workplace practices. There is a statistically significant association between Sustainable Development and CSR/Workplace ($p <0.001$).

55.3% of all enterprises that adopted CSR practices and applied Sustainable Development policies were also committed to CSR practices in the marketplace, whilst 88.2% of all enterprises that adopted CSR practices but did not apply sustainable development policies were not committed to CSR practices in the marketplace. There is a statistically significant association between Sustainable Development and CSR/Marketplace ($p <0.001$).

Conversely, 46.7% of all enterprises that adopted CSR practices and applied Sustainable Development policies were also actively involved in the community. Conversely, 80.0% of all enterprises that adopted the CSR and applied Sustainable Development policies were not actively involved in the community. There is a statistically significant association between Sustainable Development and CSR/Community ($p = 0.007$).

54.8% of total enterprises that adopted CSR practices and applied sustainable development policies were engaged in environmental action, whilst 100% of all enterprises that adopted CSR practices yet did not implement sustainable development policies were not engaged in environmental action. There is a statistically significant association between Sustainable Development and CSR/Environment ($p<0.001$).

87.2% of all enterprises that adopted CSR practices and applied a Quality Assurance System were committed to good workplace practices. Conversely, 50.0% of all enterprises that adopted CSR practices and did not apply a Quality Assurance System were not committed to good workplace practices. There is a statistically significant association between Quality Assurance and CSR/Workplace ($p <0.001$).

89.5% of all enterprises that adopted CSR practices and had a Quality Assurance System in place were committed to CSR practices in the marketplace. Conversely, 35.3% of all enterprises that adopted CSR practices and did not have a Quality Assurance System in place were not committed to CSR practices in the marketplace. There is a statistically significant association between Quality Assurance and CSR/Marketplace ($p <0.001$).

86.7% of all enterprises that adopted CSR practices and had a Quality Assurance System in place were actively involved in the community. On the contrary, 40.0% of all enterprises that adopted CSR practices yet did not have a Quality Assurance System in place were not actively involved in the community. There is a statistically significant association between Quality Assurance and CSR/Community ($p = 0.006$).

88.1% of all enterprises that adopted CSR practices yet had no quality assurance system in place were not actively engaged in environmental action. Conversely, 38.5% of all enterprises that adopted CSR practices but had no quality assurance system in place were not engaged in environmental action. There is a statistically significant association between Quality Assurance and CSR/Environment ($p = 0.012$).

Conclusions

Based on the above results, there are indications that SD converges or closely identifies with CSR in the context of business activities, as the largest proportion of companies implementing sustainable development policies are active in the following CSR fields (according to the theory of stakeholders, Freeman, 1984): workplace, marketplace, community and environment. This confirms that, in the context of business activities, CSR is synonymous to SD, even if this is subconscious. This view is also purported by Keijzers (2002), Marrewijk (2003) and Montiel (2008) who all agree that these concepts seem to converge despite their points of difference.

Furthermore, indication shows that the majority of enterprises adopting CSR practices apply one or more quality assurance systems. It is therefore concluded that most enterprises committed to CSR practices either in the field of environment, marketplace, workplace or community, consider quality assurance systems as part of a successful CSR implementation. This is further corroborated by literature, as Skouloudis et. al. (2010) argue that timely adaptation to international standards such as the UN Global Compact, the GRI Guidelines, the AA 1000 Standard and the upcoming 26000 ISO Standard "Guidelines for Social Responsibility" may shape the effective implementation of CSR practices and raise non-financial reporting awareness of domestic organizations.

Finally, 98.9% of enterprises under the main market category are also members of the Hellenic Network for CSR, a fact that underlines the close relationship of the Hellenic Network for CSR with the enterprises operating in the main market. This is further supported by the result of enterprises that are under suspension or surveillance. The majority of those enterprises are not members of the Hellenic Network for CSR, i.e. 98.5%. This shows two things: either that the Hellenic Network for CSR is addressed to main market enterprises or that main market enterprises use their capacity as members of the Hellenic Network to further enhance their value. In addition, it is concluded that enterprises that do not operate in the main market and which are under surveillance or suspension do not have the option of being members of the Hellenic Network either because they are not interested or because they are not informed of the possible benefits. A reason for this could be that the Hellenic Network for CSR does not approach such enterprises.

Finally, it is observed that the relevance between the quality variables using the Pearson's chi-square test for the pre- and post-crisis period does not alter their statistically significant relevance. Therefore, the conclusions drawn for the pre-crisis period can be drawn for the post-crisis period as well.

References

- [1] Dahlsrud, A. (2006). How Corporate Social Responsibility is defined: an Analysis of 37 Definitions Corporate, *Journal of Social Responsibility and Environmental Management*, Vol. 15, pp.1-13.
- [2] Galanis, G. (2007). Corporate image and its relationship with the concept of Corporate Social Responsibility [online], *Scientific Marketing*, Available at: <http://www.epistimonikomarketing.gr/i-eikona-ton-epiheiriseon-kai-i-shesi-tis-me-tin-ennoia-tis-etairikis-koinonikis-euthunis/> [Accessed September 10, 2014].
- [3] Ebner, D. and Baumgartner, J.R. (2006). The relationship between Sustainable Development and Corporate Social Responsibility. In *Corporate Responsibility Research Conference*. Dublin. Available at: <http://www.crrconference.org/downloads/2006ebnerbaumgartner.pdf> [Accessed September 1, 2014].
- [4] Hardjono, T.W. and Marrewijk van, M. (2001). The Social Dimensions of Business Excellence, *Corporate Environmental Strategy*, Vol. 8, No. 3, pp. 223-233.
- [5] Jonathan, M.H. (2000). *Rethinking Sustainability: Power, Knowledge and Institutions*, Ann Harbor: University of Michigan Press, USA.
- [6] Lea, R. (2002). *Corporate Social Responsibility: IoD member opinion survey*, London UK: The Institute of Directors.
- [7] Kalogiannis, K.G. (2002). *National Strategy for Sustainable Development: 2002 Greece progress report*, Hellenic Ministry for the Environment, Physical Planning and Public Works.
- [8] Keijzers, G. (2000). The evolution of Dutch Environmental Policy: the changing ecological arena from 1970-200 and beyond, *Journal of Cleaner Production*: Vol. 8, pp. 179-200.
- [9] Marrewijk van, M. (2003). Concepts and Definitions of CSR and Corporate Sustainability: Between Agency and Communion, *Journal of Business Ethics*, Vol. 44, No. 2/3, pp. 95-105.
- [10] Mitoula, R., Astara, O. and Kaldis, P. (2008). *Sustainable development – concepts, international & European dimensions*, ed. Rosili, Athens.
- [11] Montiel, I. (2008). *Corporate Social Responsibility and Corporate Sustainability: Separate Pasts, Common Futures*, *Organization & Environment*, Vol. 21, pp. 245-269.
- [12] Papandreou, A. and Sartzetakis, E.S. (2002). *Sustainable Development: Economics and International Legal Framework*, *Market without Borders*, Vol. 8, No. 2, pp. 103-117.
- [13] Skouloudis, A., Evangelinos, K. and Kourmoussis, F. (2010). Assessing nonfinancial reports according to the Global Reporting Initiative guidelines: evidence from Greece, *Journal of Cleaner Production*, Vol. 18, No. 5, pp. 426-438.

EMPLOYEES APPRAISAL: A FIELD RESEARCH OF VARIABLE AND CONSTANT ERRORS ON PERFORMANCE RATING

Dr. John Bouris

Professor

Technological Educational Institute (TEI) of Athens

School of business and economics

Department of Business Administration

e-mail: jbouris@teiath.gr

ABSTRACT

The purpose of this study was to explore, in a public interest Financial Institution, the relationships among several possible sources of errors and bias as they are investigated in the performance appraisal process.

The errors and bias are categorized into two main factors: a) the constant errors or latent tendency toward a 'groupthinking' appraisal b) the variable errors dealing with either discrepancies among raters or longitudinal disagreements on the same subject.

The significance of the constant errors (i.e. halo effects, leniency or strictness bias), on the distortion the performance appraisals drive us to formulate and investigate the following hypotheses:

1. the leniency or strictness evaluation is highly depended on the job the employee assigned
2. the line personnel is evaluated more strictness than the staff personnel
3. there is an heterogeneous performance evaluation procedure between staff and line personnel

Accepting the alternative hypothesis, a group of 'underdeveloped' relationships is raised among reliability, validity, acceptability, dissatisfaction, objectivity fairness and consistency, paternalism, manipulations and non-transparency of human resource policies.

The importance of these relationships arises from the facts that performance ratings are often used (a) to aid in the determination of promotions, assign human resource to organization positions, merit increases, lateral transfers, and (b) to guide the organization in its estimate of training, educational and developmental needs and changes in hiring and career pathing policy.

The sample in this study were N=300 employees whose performance evaluated for a year period 2010 under 'Criteria-Based Performance Reviews'. The employees (ratees) were equivalently splitted in staff and line personnel derived from a public interest financial institution which organizational structure consist of two tiers : (a) the central or strategic (steering committee) and administrative schema (b) the peripheral or operational one.

The performance appraisal form contained eight criteria (ie. quality of work, quantity of work, initiative, reliability, interpersonal relationship, dependability, knowhow, and administrative competency).

The over all performance rated on eighth point scale ratings from 1=unsatisfactory.....8=exceptional.

For data processing, transforming data collected into a form appropriate to analysis and hypothesis testing, we use the software: S.P.S.S. statistics v. 17 release 17.0.0.

In summary, Human Resource Decisions based on Performance Appraisal Models have significant human consequences and should embrace a moral balance between equity and effectiveness.

Keywords: Multi criteria Decision Making Analysis, Performance Appraisals

1. Theoretical Background

Several problems undermine performance appraisal. In particular our field research has identified rating leniency or strictness as one of the most troublesome of evaluating errors. Specifically, raters have the tendency to rate ratees either high or low [8]. H. John Bernadin [1] have related the personality traits of the raters with performance appraisal rating and concluded that a conscientiousness personality tends to be too strict with respect to agreeable one which is more lenient.

Studies [2] & [3] suggest ways of reducing the problems of leniency or strictness in performance appraisals such as : a) rank employees b) conduct a job analysis to establish criteria and standards for successful performance c) administer and score appraisals in a standardized fashion d) use clearly defined job performance dimensions.

Common appraisal problems mainly arise because appraisal often says more about the appraiser than about the appraisee. [7]. This is a powerful reason for using multiple raters. In other words the performance appraisals may be conducted by: the immediate supervisor and the peers and the rating committees

In our field study, the so far implied knowledge concerning the relationship between leniency or strictness and employees assignments is hypothesized and tested.

To approach our goal, we testing the following hypothesis:

- 1: the leniency or strictness evaluation is highly depended on the job the employee assigned
- 2: the line personnel is evaluated more strictness than the staff personnel
- 3 : there is an heterogeneous performance procedure between staff and line personnel

Accepting the alternative hypothesis, a 'latent' factors launches: the paternalism and non-transparent manipulation on human resource policies .

Despite recent exhortations to scholars in performance appraisal , rating paternalism trends on human resource polices has received little attentions. Therefore, little is known about the extent of bias due to paternalism subject to 'political' manipulation on both the fairness and integrity of performance procedures.

Paternalism indicates a more intricate relationship between the involved parties than an organizational hierarchy requires. In such a relationship, there are two parties first, a patron who protects, helps, cares, and guides; second, a subordinate who is loyal and deferent to the patron. So between rater and ratee there is a reciprocal relationship [6].

Paternalism indicates managers take a personal interest in their subordinates' off -the-job lives and attempt to promote ratees' personal welfare [4]

Studies [5] distinguish between two forms of paternalism: authoritative and benevolent. Authoritative paternalism includes emphasis on duty and lacks sincere generosity on the part of the superior. Benevolent paternalism emphasizes the subordinate's loyalty and the superior's generous concern for that subordinate.

In paternalistic cultures, people in authority assume the role of parents and consider it an obligation to provide protection to others under their care. Subordinates, in turn, reciprocate such care and protection of the paternal authority by showing

loyalty, deference, and compliance. In a paternalistic relationship, the subordinates voluntarily depends on the manager. Paternalism implies voluntary compliance; therefore, subordinates who experience high levels of trust, obligation, and respect in their relations with a manager (i.e., high quality rater-ratee exchange) may be more likely to accept the manager's authority as a father figure.

Researchers [9] & [10] trying to monitoring and eliminating the paternalism and enhance ethics in human resource polices. develop the Performance Appraisal Fairness Scale

The original questionnaire has 56 items. The questions are grouped under the following categories:

- Setting performance expectations (six items, including: "the performance planning and review process makes sure that my performance expectations measure what I really do for the organization" and "the expectations set during performance planning session reflect the most important factors in my job")
- Rater confidence (five items, including: "My organization makes sure that I am assigned a rater who is qualified to evaluate my work" and "My organization ensures that I am assigned a rater who knows what I am supposed to be doing")
- Clarifying expectations (six items, including: "My rater clearly explains to me what he or she expects for my performance" and "My rater explains how I can improve my performance")
- Providing feedback (six items, including: "My rater frequently lets me know how I am doing" and "My rater reviews with me my progress towards my goals")

<https://sites.google.com/site/icqqmeas2015>

- Accuracy of rating (five items, including: “My performance rating is based on how well I do my work” and “My performance rating reflects how much work I do”)
- Explaining rating decisions (five items, including: “My rater gives me clear and real examples to justify his or her rating of my work” and “My rater helps me to understand the process used to evaluate and rate my performance”)
- Seeking appeals (six items, including: “I have ways to appeal a performance rating that I think is biased or inaccurate” and “I know I can get a fair review of my performance rating if I request one”)
- Concern over ratings (seven items, including: “My rater gives me the rating that I earn even when it might upset me” and “The rating I get is a result of my rater applying performance rating standards consistently across employees”)

2. Methods and procedures

Sample: Ratees in this study were 300 employees in a public interest Financial Institution. We use the stratified sampling methods by grouping the population into two homogeneous group: a) the line personnel b) the staff personnel.

In each group we recruited 150 employees having the same demographic and administrative characteristics. So, a high degree of homogeneity between and within the two groups has succeeded.

In other words, to achieve comparability between the two groups we select each case based on the following variables:

a) **age** (1=31-40; 2=41-50; 3=51-60; 4=60+) b) **gender** (1=male; 2=female) c) **position** (1=operational; 2=administrative) d) **years of total employment** e) **tenure** in the organization (1=junior; 2=senior employee) f) tenure in the job

By recruiting each case and matching randomly in each group based on the above variables, we succeed the ceteris paribus-all the others remain stable hypothesis. It means that neither demographic nor system-organization variables affects the human resources polices. So an latent variable has been revealed which is the parenamism.

Rating instrument

The performance appraisal form contained eight criteria (ie. quality of work, quantity of work, initiative, reliability, interpersonal relationship, dependability, knowhow, and administrative competency)

The over all performance rated on eighth point scale ratings from 1=unsatisfactory.....8= exceptional

Procedure

1. Testing the hypothesis concerning the difference between means of performance evaluation

Ho : There is **no** evidence of significant difference in evaluation scores between groups

$$\mu_1 = \mu_2$$

Ha1: There is evidence of significant difference in evaluation scores between groups

$$\mu_1 \neq \mu_2$$

Based on **Table 1**, since $P < 0,025$ the evaluation scores between groups differ significant at the level of significance $\alpha=0,05$ (2-tailed alternative). **We accept the alternative hypothesis**

2. Testing the hypothesis concerning the difference between variances between groups

Ho : There is equality of variances between groups¹

$$\text{Var}(\text{group}_1) = \text{Var}(\text{group}_2)$$

Ha2 : There is evidence of significant inequality of variances between groups

$$\text{Var}(\text{group}_1) \neq \text{Var}(\text{group}_2)$$

Based on **Table 1**, since $P > 0,025$ the evaluation scores between groups differ significant at the level of significance $\alpha=0,05$ **We accept the Null hypothesis**

¹ Levene's test of equality of variances

Table 1: Independent Samples Test

Levene's Test for Equality of Variances			Test for Equality of Means					
							95% Confidence Interval of the Difference	
	F	Sig.	t	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	,901	,351	6,252	,000	5,40000	,86373	3,63073	7,16927
Equal variances not assumed			6,252	,000	5,40000	,86373	3,62328	7,17672

Based on the values of Table 2 we observe the following:

1. For the Line personnel

- a. the coefficient of skewness >0 indicates a positively skewed distribution (skewed to the Right)
 - b. the line personnel (lower part of Figure 1) is evaluated stricter than the staff personnel
- The raters tent to rate the line personnel consistently low, problem know as strictness

2. For the Staff personnel

- a. the coefficient of skewness <0 indicates a negatively skewed distribution (skewed to the left)
 - b. the Staff personnel (upper part of Figure 1) is evaluated lenient as compare to Line one.
- The raters tent to rate the Staff personnel consistently high, problem know as leniency

Table 2 : DESCRIPTIVE STATISTIC

		Statistic	Std. Error	
Line Personnel	Mean	11,5333	,69773	
	95% Confidence Interval for Mean	Lower Bound	10,0369	
		Upper Bound	13,0298	
	5% Trimmed Mean	11,5093		
	Median	11,5000		
	Variance	7,302		
	Std. Deviation	2,70229		
	Minimum	6,50		
	Maximum	17,00		
	Range	10,50		
	Interquartile Range	4,00		
	Skewness	,196		
Kurtosis	,115	1,121		
Staff Personnel	Mean	16,9333	,50912	
	95% Confidence Interval for Mean	Lower Bound	15,8414	
		Upper Bound	18,0253	
	5% Trimmed Mean	16,9815		
	Median	17,0000		
	Variance	3,888		
	Std. Deviation	1,97183		
	Minimum	13,00		
	Maximum	20,00		
	Range	7,00		
	Interquartile Range	2,50		
	Skewness	-,377		
Kurtosis	-,232	1,121		

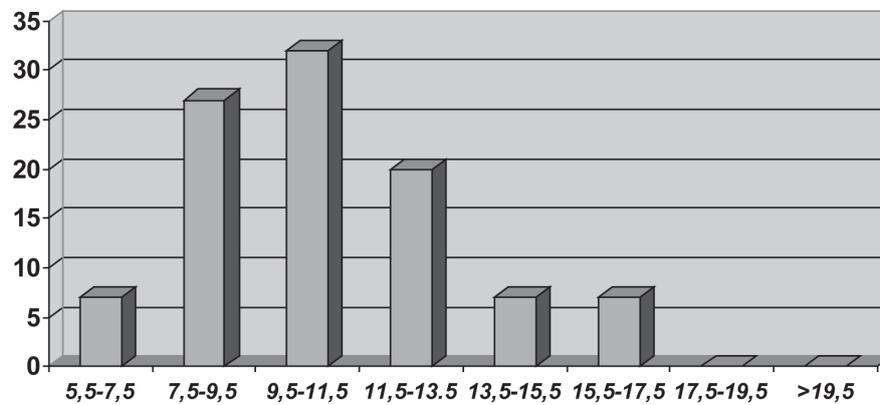
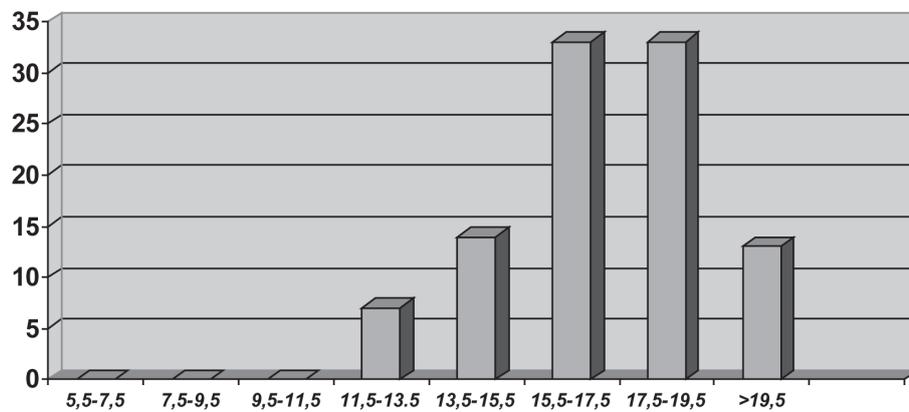


Figure 1: Negatively & Positively skewed distribution between Staff & Line Personnel

3. Results and main themes

1. The 'propitious niche' of performance appraisal are Fairness and integrity —The first challenge for the management is to make sure the subordinate views the appraisal as fair. However, there is evidence that in hierarchical type oriented organization, the management doesn't focus on the developmental aspect of the appraisal, but instead use it for political purposes.
2. The skewness distribution in scores due to technical problems can affect the fairness of the process . These are the followings:
 - a. Unclear Standards—Ambiguous traits and degrees of merit can result in an unfair appraisal.
 - b. Halo Effect—the influence of a rater's general impression on ratings of specific qualities.
 - c. Central Tendency—where supervisors stick to the middle of the rating scales, thus rating everyone average.
 - d. Leniency or Strictness—Supervisors have the tendency to rate everyone either high or low.
 - e. Bias—the tendency to allow individual differences such as age, sex, education to affect the appraisal ratings employees
3. The validity of appraisal can be achieved by using different potential raters to appraise a person's performance. The advantages of using several raters (either a rating committee or a combination of peer, supervisor, and subordinate ratings) are that the ratings tend to be more valid than those of one individual rater.
4. The appraisal must focus on develop plans to correct performance deficiencies and must not limited to administrative transactions (promotions, demotions, transferring, firing)
5. A fair performance appraisal process itself must be deployed in three steps: 1) define the job, 2) appraise performance, and 3) provide feedback. Defining the job means making sure that the rater and ratee agree on his or her duties and job standards. Appraising performance means comparing the employee's actual performance to the standards that have been set. Finally, the performance appraisal process requires one or more feedback sessions. In these sessions, the manager and employee discuss the employee's performance and progress and make plans for any development required.

4. Conclusion

The study has some implications regarding drawing the attention on the crucial role of performance appraisal fairness. Managers will develop appropriate strategies for enhancing the influence of their appraisal systems on work attitudes and outcomes.

Despite lots of attention, money, and effort, performance appraisals remain an area with which few managers or employees are satisfied. The following questions may be worth further investigations.

Is it just that we don't have a good enough system yet, is there an intrinsic problem with performance appraisals, or is it just human nature to dislike them?

To conclude, the effectiveness of the appraisal is so high quality, as it is high the Board of Directors' "Gnothi Seauton (Greek) Know thyself» towards organization endogenous problems.

It is hoped that this article can give a starting point and assumptions to be further researched by other scholars and practitioners on the main themes of how managerial attitudes, values, behaviours, and efficacy in a paternalistic managerial environment affects the fairness of appraisal.

References

- [1] Bernardin, H. John (2000), 'Conscientiousness and Agreeableness as Predictors of Rating Leniency', *Journal of Applied Psychology*, 85, 232-234.
- [2] Clinton, *Wingrove*, (2003) "Developing an Effective Blend of Process and Technology in the New Era of Performance Management," *Compensation & Benefits Review* Jan.-Feb.: 25-30
- [3] Gary, Gregures et al. (2003), "A Field Study of the Effects of Rating Purpose on the Quality of Multiscore Ratings" *Personnel Psychology* 56: 1-21
- [4] Lam, S.S.K., Schaubroeck, J., & Aryee, S. (2002). Relationship between organizational justice and employee work outcomes: A cross-national study. *Journal of Organizational Behaviour*, 23(1), 1-18.
- [5] Levine, H.Z. (1986). Performance appraisal at work. *Personnel Journal*, 6, 63-71.
- [6] London Manuel, Mone Edward M., Scott John C. (winter 2004) 'Performance management and assessment: Methods for improved rater accuracy and employee goal setting' *Human Resource Management* 43 : 319-336
- [7] Mead, R. (1994). *International management: Cross cultural dimensions*. Oxford, England: Blackwell.
- [8] Posthuma, Richard (2011) 'Twenty Best Practices for just Employee Performance Reviews' *Compensation & Benefits Review* Jan.-Feb.: 146-164
- [9] Uichol Kim (Editor), Harry C. Triandis (Editor) et.al. , *Individualism and Collectivism: Theory, Method, and Applications (Cross Cultural Research and Methodology)* Paperback – July 15, 1994 () (No. 18, pp. 251-266). Thousands Oaks, CA: Sage.
- [10] Walsh, M.B. (2003). *Perceived fairness of and satisfaction with employee performance appraisal* (Unpublished doctoral dissertation). Louisiana State University and Agricultural and Mechanical College, Baton Rouge.

THE ADMINISTRATIVE ABILITIES OF PRINCIPALS OF PRIMARY SCHOOLS

Dimitriadis Efstathios*, Didaskalou Theano¹, Kaltsidou Despoina²

*Department of Business Administration, Eastern Macedonia and Thrace Institute of Technology, Agios Loukas, 65404
Kavala, edimit@teikav.edu.gr

¹Master in Business Administration, Eastern Macedonia and Thrace Institute of Technology, Agios Loukas, 65404 Kavala

²Department of Social Administration, Democritus University of Thrace, 69100 Komotini

ABSTRACT

The schools of primary education on a daily basis have to cope with a diversity of strategic and organizational issues, such as decision making on educational issues, improvement of infrastructures, cooperation with the Directorate of Primary Education, cooperation with parents and the local community. Nowadays the school has to be flexible and competitive. The growing needs require capable managers with qualifications such as strong personality, leadership, knowledge and mainly developed social and communication skills. For the management of the school, the Principal is required to have management knowledge and a multifaceted and continuous scientific training in topics such as planning, organizing, counselling, assessment, motivation, efficiency, effectiveness, achieving goals, management and human resource management.

This study investigates the level of skills of principals, as perceived by primary school teachers of regional unit of Kavala. A survey that was carried out on a sample of 387 teachers showed that teachers consider that the management of teaching staff, the management and administration of the school, communication and relationship with the external environment by their principal is successful. It also showed how important is the role of principal in the development and progress of the school.

Keywords: Administration, School Unit, Directorate of Primary Education

JEL Classification

1. Introduction

The school unit is an independent and self-reliant organization of education, has specific project, identifies and pursues goals, utilizing effectively the resources that it has at its disposal, providing the right to knowledge and learning to students [1]. Management is the process by which the objectives of an organization are achieved by combining the efficiency, effectiveness and equity, to have the most success with the help of few resources available and with the participation of other workers [2]. The school administration is an ongoing and continuous energy, which coordinates its members, to provide education with positive results [3]. Undoubtedly, the role of management is very important and crucial to the growth and development of the school. The development of a common vision, organization and focus on discussing issues with staff, focus and protect the values and goals of the school community, the adoption by teachers and parents clearly rules for decision-making, implementation of decisions community, the pressure on the political and local community play an essential role in the administration [4]. Management of primary school education units in Greece, exercised in accordance with Law 3848/2010 by the Director, the Deputy Principal and Teachers' Association.

The leadership in the school plays a key role in the operation and its effectiveness depends on the planning, organization, guidance and motivation, as well as the control of all persons who are members of the specified school [5]. The leadership capacity of the managers of the management of schools is often the key factor of the difference between effective and ineffective school [6]. According to some scholars, the manager who has the administration-leadership capability encourages a positive school climate, including high school culture, teaching and learning, assessment, academic and non-academic performance, two-way communication, accountability, teaching staff and attitudes of the student population and the relationship between schools, families and the wider community [7], [8], [9].

Robinson [10] states that the effective leader plays a decisive role in the course of the school with a positive impact, providing quality teaching and learning. For this reason, the principal of the school shall be equipped with a range of appropriate skills to bring the school unit, teaching staff and the student population at a high level of success and maintain its effectiveness [11].

2. Literature Review

The characteristics of the people who manage the administration of schools according to [12] and [13] are: broad vision, creativity, good communication skills, self-confidence, building administrative participation, influence, respect, the charisma and decency.

The manager-leader must be ready in all respects and in particular have knowledge, academic abilities, skills and experience to be able to apply them in every situation [14]. Communication skills, leadership skills and decision making skills are necessary features for effective management of teaching staff [15]. The managers of the administration must be people open and receptive to change and innovation, lifelong learning and to keep alive the prospect of organizing learning in the school [16], [17], [18].

Eren [19] states that leadership is a combination of skill and knowledge to achieve a common goal of a group of people animating them to take action to implement this. It is the sum of knowledge and skills for the collection and management of people around an idea or an object [20].

According Andrews and Soder [21] a feature which must have greatly the management of school is to always know what is happening within the school environment and to note the presence [17], and to be governed by democratic principles in working with faculty, possessed by industriousness to a model, be decisive as regards the role of leadership, mentor and guide.

The relationship management with the teachers is very important for the proper functioning of the school [22], while the good relationship management with students helps to develop a healthy school environment [23]. The contribution of the chief management of staff and financial resources, cooperation of the administration with teachers to make decisions and solve problems, encouragement and motivation of teachers to their professional development and crisis management is found in studies of [24], [25], [22], [26], [27].

The director of the school should have communication skills with the outside world, the local community and organizations [28], [25]. The management of the school should have good relations with the local community and local government to resolve issues relating to building infrastructure, maintenance, supply of consumables, stationery to school, purchase necessary equipment (electronic computers, photocopiers, printers, interactive whiteboards, illumination boxes, etc.), the organization of public events to inform and address the concerns in education, making programs to students employed outside the school unit creatively. Securing financial resources of local authorities is crucial to a very high degree to provide quality and upgraded educational work in a school [29], [30], [31], [32], [24].

İmamoğlu and Yerlisu [33] in their research on management-leadership skills among managers with different ages and gender showed that there is no difference between management and leadership subjects. The survey results of Chua et al. [34] show that the management-leadership of managers is important and related to years of service in the administration of the school and academic qualifications. This finding suggests that formal training is necessary for the managers before taking their position. The selection of people capable to govern contributes to the development and evolution of school [35].

From the literature review it is clear that the principal of schools should be a person who is distinguished for management and collaboration capabilities with school staff, students and their parents as well as with the external environment. Also must have leadership skills needed in management and organization of schools. This work aims to capture the view of teachers of regional unit of Kavala on the aforementioned skills of their managers.

3. Research Methodology

3.1 Population and Sample

The Population of the study is consisted of 1.200 teachers of primary education of Regional Unit of Kavala. From them, 40% are male and 60% are female. The collection of necessary data for the implementation of the research objectives was done using a structured questionnaire which was sent via internet to all permanent teachers of regional unit of Kavala, during May and June of 2014. The final sample of the study consisted of 387 teachers (33% of the population), and 26,6% of whom are male and 73,4% female. The average age of teachers is 42 years and the average length of service is 15 years. Specifically, the average age for men is 46 years and for women 40, while the average length of service for men is 20 years and for women 13 years. The average length of service in particular school is approximately 5,5 years. In the 43,4% of the schools, the principal is male and in the remaining 56,6% is female. Regarding the additional qualification of teachers, found that 1% holds a doctorate degree, 11% a postgraduate degree, 11% hold another degree, 17% have Retraining, while 46,3% have ICT1 and 13,5% ICT2. A great part of teachers have a certification title of foreign language, with most important of them the English language.

3.2 Questionnaire's Description

The questionnaire that was the research tool of this research consists of two parts. The first part includes questions relating to demographic data (gender, age, experience, qualifications, additional qualifications, etc.) and questions through which the view of teachers reflected on the factors that might affecting the administrative capacity of managing the school unit (gender, age).

In the second part of the questionnaire, which resulted from an extensive literature review, contained 31 questions which are the basic administrative skills which teachers were asked to express their degree of agreement.

Specifically, the first factor that refers to the teaching staff management skills consist of eight (8) questions which arose from the work of Powell [24], Grissom and Loeb [25], Ching [22], Yildirim and Bastug [26], Boonla and Treputtharat [36] and Ross and Gray [37]. The second factor relates to the ability of organizing school consists of six (6) questions which were adopted by Deeboonmee and Ariratana [38], Grissom and Loeb [25], Yildirim and Bastug [26], Shun [28], Taylor [27], Robinson et al. [39], Louis et al. [40], Costellow [23]. The third factor that also consists of six (6) questions concerning the management skills of school and were selected from the work of Shun [28], Deeboonmee and Ariratana, [38], Grissom and Loeb [25], Ghimire and Martin [41] and Costellow [23]. The fourth factor refers to the management capacities of the school environment and consists of eight (8) questions that are selected from the work of Grissom and Loeb [25], Taylor [27], Shun [28], Costellow [23], Horng et al. [42], Boonla and Treputtharat [36], Louis et al. [40] and Robinson et al. [39]. Finally, the fifth factor includes three (3) questions that are raised by the work of Grissom and Loeb [25] and Shun [28] and refer to communication skills with the external environment.

All the questions of second part are statements and have been evaluated in a 5-point Likert scale from 1: strongly disagree to 5: strongly agree.

3.3 Validity and Reliability Test

To ensure the appropriateness of the research instrument it was tested for Content Validity and Construct Validity through (1) a review of questions for face validity, (2) factor analysis and (3) computation of Cronbach's Alpha. Previously validated measures are used whenever possible and a pilot test in a panel of experts (professors and professionals) was done. Factor analysis reveals that all measures are uni-dimensional. The extraction

of factors was done with Principal Component Analysis method, using Orthogonal rotation of the axis and Varimax method which is one of the most popular methods of Orthogonal rotation according to Sharma [43] and Haier et al. [44]. In order to test if the data are appropriate for factor analysis, Bartlett's test of sphericity was performed. Furthermore, the Measure of Sampling Adequacy (M.S.A) of Kaiser-Mayer-Olkin (K.M.O) was used. Sharma (1996) suggests that K.M.O has to be greater than 0.8. In order to determine the number of factors the criterion of Eigenvalue was used. Factors whose Eigenvalue is over one are selected. Finally, the significance of loadings was checked. In a sample of more than 350 individuals, a loading more than 0.30 is considered as significant [44]. After running a factor analysis with 31 items, a factor model was created with 5 distinctive factors. The reliability of each factor was checked with Cronbach's alpha index which is the most widely used method of reliability assessment in operations management research. Nunally [45] suggests that Cronbach's alpha should be greater than 0,7. The results can be seen on table 1 and are very satisfying as they cover the restrictions which were mentioned earlier.

Table 1. Factor Analysis and Reliability Analysis

Statements:	Loadings	Factors
The Principal:		
Collaborates with teachers to make decisions	0,777	Management of teaching staff Eigenvalue =8,395 Cronbach's a=0,928
Encourages and motivates teachers for their professional development	0,670	
Solves the problems together with teachers	0,795	
Respects the views of teachers	0,798	
Advises and guides teachers in strategic decisions	0,623	
Allows teachers to work in their work with their own way	0,660	
Creates trust climate	0,816	
Contributes significantly to the reduction of teacher stress	0,763	
Develops a safe school environment	0,725	Organization of unit school Eigenvalue =4,741 Cronbach's a=0,879
Deals with concerns from staff	0,672	
Manages budgets & resources	0,794	
Maintains campus facilities	0,777	
Manages non-instructional staff	0,760	
Interacts/networks with other principals	0,505	
Manages the teaching staff and students	0,507	Management of unit school Eigenvalue =3,690 Cronbach's a=0,891
Manages crises	0,501	
Fulfills the paperwork and requirements	0,750	
Manages students services	0,529	
Completes specific training requirements	0,514	
Understands legal issues	0,563	
Develops relationships with students	0,606	Internal Relationships Eigenvalue =5,631 Cronbach's a=0,931
Communicates with parents	0,663	
Advises students and parents	0,701	
Resolves conflicts among staff	0,548	
Speaks informally with teachers for students	0,689	
Contributes to positive climate between teachers-students-parents	0,679	
Supports teachers and students	0,637	
Interacts socially with school staff	0,509	
Communicates with the local community to obtain financial resources	0,695	External Relationships Eigenvalue =1,974 Cronbach's a=0,843
Collaborates with the local community and organizations	0,522	
Uses the communication with the Municipal Authority to strengthen the school goals	0,563	
Kaiser-Meyer-Olkin Measure of Sampling Adequacy:	0,964	
Bartlett's Test of Sphericity	Approx. Chi-Square	10796,115
	df	465
	Sig.	0,000
Total Variance Explained:		72,27%

4. Data Analysis- Results

4.1 Basic Measures

The 92% of the teachers believe that the level of management is not depend from the gender of the Principal and moreover they believe that male and female have the same administrative abilities. However, half of them (50%) believe that the level of management depends on the age of the principal.

According to the teachers' opinion, the skills of principals of schools are very satisfactory as the average value ranges between 4,36 and 4,46. In particular, assess as higher the management of teaching staff (4,46) and the ability of organizing school (4,45), and although very high, assessed lower the school management capacity (4,45). The deviations that are shown are due to the different view of teachers and are relatively small and suggest their almost identical views.

Table 2. Basic Measures

Factor	Mean	Standard Deviation	Coefficient of Variation
Management of teaching staff	4,46	0,60884	13,65%
Organization of unit school	4,45	0,58706	13,19%
Management of unit school	4,38	0,64699	14,77%
Internal Relationships	4,41	0,61740	14,00%
External Relationships	4,36	0,73263	16,80%

4.2 Analysis of Variance

Through variance analysis there isn't any significant difference found between male and female teachers according to the view for the Principals' capacities'. F-statistics is not statistically significant for all factors (Sig.>0,05). As a conclusion, the educational staff regardless gender, appreciate to the same extent the Principals' capacities.

Table 3. ANOVA by Gender

Factors	F	Sig.
Management of teaching staff	0,265	0,607
Organization of unit school	0,658	0,418
Management of unit school	0,170	0,897
Internal Relationships	0,040	0,949
External Relationships	0,251	0,617

The type of teacher (teacher, kindergarten teacher, trainer, English, etc.) is a factor which is responsible for the differentiation of assessment of competencies of managers to factor "Administration of School" as the value of the statistics F (10,546) is significance (Sig. = 0,001 <0,05). In particular, the kindergarteners appreciate less (4,2) capabilities of the directors in relation to teachers of primary schools (4,5). Diversification is also observed in factor "Communication and Relations with the External Environment» (F = 6,096 Sig. = 0,014 <0,05) where teachers evaluate higher (4,4) the abilities of managers to communicate with the external environment, relative to kindergarten (4,2).

Table 4. ANOVA by type of teachers

Factors	F	Sig.
Management of teaching staff	0,095	0,758
Organization of unit school	2,982	0,085
Management of unit school	10,546	0,001
Internal Relationships	0,746	0,388
External Relationships	6,096	0,014

4.3 Cluster Analysis

Different groups of perceived abilities of principals were identified using a cluster analysis based on the z-transformed scores of the mean of five factors. The squared Euclidean distance, in combination with Ward's method was used for combining clusters. Examination of the dendrogram and the agglomeration schedule suggested a two cluster solution. In the first cluster belongs the 37% of the teachers and in the second the 63%. The first cluster is characterized by a conservative evaluation of principals' abilities and is composed by younger teachers with less experience and teachers who work in kindergartens. The second cluster consists of primary school teachers, older and more experienced. Their opinion about the skills of principals is clearly better than the teachers of the first cluster.

Table 5. Cluster Analysis

Factors	1st Cluster Means	1nd Cluster Means	F	Sig.
Management of teaching staff	3,89	4,79	393,047	0,000
Organization of unit school	3,84	4,82	711,260	0,000
Management of unit school	3,72	4,77	632,517	0,000
Internal Relationships	3,82	4,77	499,250	0,000
External Relationships	3,75	4,71	265,748	0,000

5. Conclusions

The modern school is affected by the new standards and requirements in order to achieve its objectives. The existence of many difficulties in achieving these objectives makes necessary and appropriate the management by the heads of schools in many areas. From the analysis of the survey, the results confirmed that the majority of principals of primary schools are men whereas of kindergartens are women. The majority of teachers who constitute the sample of the research beyond the basic qualifications have attended at least one training course and one out of five hold a master's degree. The opinion of teachers about the skills of the principals of the schools is identified as positive. They say that the management of teaching staff, the management and administration of the school, the external relationships are being managed successfully. In particular, in the factor "teaching staff management" teachers believe that the principal helps to build a climate of trust and confidence and respects the views of the teachers.

In the factor organizational management of the school, the principals pay special attention to developing a safe school environment and to the maintenance and configuration of the school. Concerning the administration of the school unit the principals perform efficiently their bureaucratic obligations while effectively contribute in creating a positive climate between teachers and students. Finally, they manage to develop trusting and collaborating relations with the local community and the organizations. The results of the study showed how important the role of the principal of the school unit is for its development and progression as seen in the research of Shun [28], which contributes firstly to the professional development of teaching staff and then follows the assurance of quality, the strategies which he/she apply, the training curriculum, communication with parents, the external environment and the local community, and finally the management of resources and teaching staff.

The management of the student population, the assurance of a safe school environment and the appropriate developmental strategies were outcomes that emerged also in the investigation of Deeboonmee and Ariratana [38]. The management capability found not to be affected by the sex of the school principal, but mostly by the years of service as an administrative member and his/her qualifications and agrees with the research of Piaw et al. (2013), in which the results showed that men and women have about the same capacity in the school administration which is more dependent on management experience and years in administration. The data are also consistent as far as the understanding of legal issues by the Executive is concerned. The results in terms of the contribution of the head teacher to student management but also to assurance of a good school climate and environment agree with the survey results of Deeboonmee and Ariratana [38].

The contribution of the principal, to the management of staff and financial resources, to the cooperation of the administration with teachers for decision making and problem solving, in the encouragement and motivation of teachers towards their professional development and in the crisis management is found in the investigation of Powell [24], Grissom and Loeb [25], Ching [22], Yildirim and Bastug [26], Taylor [27], Robinson et al. [10], Louis et al. [40], Costellow [23], Shun [28]. Regarding the advisory role of the principal to teachers for the conflicts between them, his informal conversation with teachers about students, communication with

the local community to obtain financial resources, the use of communication with the Municipal Authority to strengthen the school goals, communication and cooperation with other Managers of school principals, management of support staff and the care for the maintenance and shaping the school, the results of research related to the research of Shun [28].

References

- [1] Petridou, E. (2000). Proposal for a standard planning process of the work of school, Aristotle University of Thessaloniki, Greece.
- [2] Naylor, F. D. (2007). Theory and Educational Research. University of Melbourne, Australia.
- [3] Kampouridis, G. (2002). Organization and Management schools. Athens: Kleidarithmos
- [4] Lambert, L. (2000). Building Leadership Capacity in Schools. California State University - Hayward, Australian Principals Centre, Monograph Number 1.
- [5] Saitis, A., Saitis, X. (2012a). Organization and Administration of Education. Athens, Self- publication. [6] Blackburn, D. (2009). Socio-cultural leadership. The art of restructuring schools through research-based principal leadership. NSW: Booktopia Pty Ltd
- [7] Glanz, J. (2008). What every principal should know about cultural leadership. Thousand Oaks, CA: Corwin Press
- [8] Chen, I. J. (2003). Leadership competencies of vocational high school principals in Taiwan. ASPA Conference paper, ανακτήθηκε από http://www.aspa.asn.au/content/view/109/43/σύνδεση_30/03/2014
- [9] Hallinger, P. (2004). Meeting the challenges of cultural leadership: the changing role of principals in Thailand. Discourse: Studies in the Cultural Politics of Education. 25 (1), 12-18
- [10] Robinson, V. M. J. (2007). School Leadership and Student Outcomes: Identifying What Works and Why. The University of Melbourne. Victoria, Australia
- [11] Chua, Y.P., Tie F.H, Rashid I., Lu H. Y. (2013). Factors of leadership skills of secondary school principals. University of Malaya, Institute of Educational Leadership, Kuala Lumpur, Malaysia.
- [12] Juito, S. (2009). Vision and strategies of modernized leaders. Nontanuri: Sukothai Thammatirat University
- [13] Wongkiatjorn, P. (2010). Modernized administrative leaders. Bangkok: Panyachon
- [14] Duangjai, B., Saowanee T.(2014). The Relationship between the Leadership Style and School Effectiveness in School under the office of Secondary Education Area 20. Faculty of Education, Khon Kaen University, Thailand, 991-996
- [15] Ibunkun, W.O. (2003). Toward Performance of Teachers in Ondo State: Vision, Mission and Philosophy of Government on Education in Taiwo, E.A. & Fadipe J. (Eds). Skills Improvement Programme for Effective Performance of Teachers in Nigerian Schools. (pp 1 - 13) Ondo: NIEPA Printing Press
- [16] Hsiao, H., & Chang, J. (2011). The role of organizational learning in transformational leadership and organizational innovation. Asia Pacific Education Review, 12(4), 621-631
- [17] Hallinger, P. (2003). Leading educational change: Reflections on the practice of instructional and transformational leadership. Cambridge Journal of Education, 33(3), 329-352
- [18] Kwan, P. (2011). Development of school leaders in Hong Kong: Contextual changes and future challenges. School Leadership & Management: Formerly School Organisation. 31(2), 165-177
- [19] Eren, E. (2000). Yönetim ve Organizasyon, Beta Basım Yayım Dağıtım. İstanbul παράθεται στο Zembata, R., Koçyigita, S., Tuğluk, M. N., Dogan, H. (2009). The relationship between the effectiveness of preschools and leadership styles of school managers. Marmara University Atatürk Education Faculty Department of Primary Education Specialization in Preschool Education, Istanbul. Turkey
- [20] Katkat, C. (2013). The Leadership Abilities of The Teachers. Dept of Sport Sciences, Ataturk University, Turkey
- [21] Andrews, R. L., Soder, R. (1987). Principal Leadership and Student Achievement. Educational Leadership 44(6): 9-11
- [22] Ching, Y. Y. (2012). Empowering leadership behaviors and work outcomes: mediating role of psychological empowerment and moderating role of need for achievement. Hong Kong Baptist University
- [23] Costello, T., D. (2011). The Preferred Principal: Leadership Traits, Behaviors, and Gender Characteristics School Teachers Desire in a Building Leader. Western Kentucky University, Kentucky, Dissertations. Paper 9
- [24] Powell, S. T. (2004). Leadership and school success: The behaviors and practices of principals in successful at-risk schools. Blacksburg, Virginia
- [25] Grissom, J., Loeb, S. (2009). Triangulating Principal Effectiveness: How Perspectives of Parents, Teachers, and Assistant Principals Identify the Central Importance of Managerial Skills. Calder, The Urban Institute, Washington
- [26] Yildirim, A., Bastug, I. (2010). Teachers' views about ethical leadership behaviors of primary school directors. Procedia Social and Behavioral Sciences 2 (2010) 4109-4114
- [27] Taylor, K., C. (2007). A study of Principal's perceptions regarding time management. Manhattan, Kansas
- [28] Shun Wing Ng. (2010). The leadership capacities of aspiring principals in Hong Kong. Hong Kong Insitutte of Education, Hong Kong, 1840-1844
- [29] Athanasoula- Reppa, A. (1999). Decision making in education. Management of School Units, Open University of Patra, A'.
- [30] Stravakos, P. (2003β). The director of the school of primary education as an engine operation:-an empirical research. Kiriakidis Bros, Thessaloniki.
- [31] Pasiardis, P. (2004). Educational Leadership: From the period of the benign indifference in modern times. Athens, Metechmio.
- [32] Saitis, X. (2008). Organization and Administration of Education. Athens, Self- Publication.
- [33] Imamoğlu AF, Yerlisu T, (2003). Gazi Physical Education and Sports Sciences Book, pp: 61-71
- [34] Chua, Yan Piaw, Tie Fatt Hee, Nik Rashid Ismail, Lu Huang Ying. (2013). Factors of leadership skills of secondary school principals. University of Malaya, Institute of Educational Leadership, Wisma R & D, Jalan Pantai Baru, Kuala Lumpur, Malaysia
- [35] Chua, Y. P., Zuraidah, M. D. (2013). Predictors of multiple intelligence abilities for Malaysian school leaders. University of Malaya, Kuala Lumpur, Malaysia, 5164 - 5168
- [36] Boonla, D., Treputtharath, S. (2013). The Relationship between the Leadership Style and School Effectiveness in School under the office of Secondary Education Area 20. Thailand, 991-996
- [37] Ross, J. A., Gray, P.(2006). School Leadership and student achievement: The mediating effects of teacher beliefs. Canadian Journal of Education 29, 3: 798-822
- [38] Deebonmee, W., Ariratana, W. (2013). Relationship between Strategic Leadership and School Effectiveness. Thailand, 982-985
- [39] Robinson, V., M., J., Lloyd, C., A., Rowe, K., J. (2008). The Impact of Leadership on Student Outcomes: An Analysis of the Differential Effects

<https://sites.google.com/site/icqqmeas> 2015

of Leadership Types. *Educational Administration Quarterly* Vol. 44, No. 5, 635-674

[40] Luis, K., S., Dretzke, B., Wahlstrom, K. (2010). How does leadership affect student achievement?1 Results from a national US survey. University of Minnesota, Minneapolis, MN, USA. *School Effectiveness and School Improvement*. Vol. 21, No. 3, 315-336

[41] Ghimire, N., R., Martin R., A. (2011). The Educational Process Competencies: Importance to Extension Educators. *Education Research Journals* Vol. 1(2) pp. 14 - 23

[42] Horng, E. L., Klasik, D., Loeb, S. (2009). Principal Time-Use and School Effectiveness. *School Leadership Research Report No. 09-3*. Institute for Research on Education Policy & Practice, Stanford University

[43] Sharma, S. 1996. *Applied Multivariate Techniques*. New York, Willey.

[44] Hair, F., Anderson, R., Tatham, R and Black, W. 1995. *Multivariate Data Analysis with Readings* 4th Ed. London, Prentice-Hall International.

[45] Nunnally, J.C. 1978. *Psychometric Theory*, 2nd ed. McGraw Hill, New York.

SOCIO-DEMOGRAPHIC AND HEALTH FACTORS INFLUENCING THE HOSPITAL LENGTH OF STAY FOR ELDERLY PATIENTS RESIDENT OF THREE GEOGRAPHICAL AREAS OF PELOPONNESE-GREECE

Dimopoulos F. I.^{1*}, Kotsilieris Th.¹, Mavridoglou G.¹, Giakoumatos S.¹ and Gnardellis C.²

¹Technological Educational Institution (T.E.I.) of Peloponnese, Faculty of Management and Economics

Department of Business and Organization Administration, Antikalamos 24100, Kalamata

²Technological Educational Institution (T.E.I.) of Western Greece, Faculty of Agriculture, Food and Nutrition Technology

Department of Fisheries and Aquaculture Technology, Nea Ktiria 30200, Mesolonghi

*ydimop@gmail.com

ABSTRACT

The length of stay (LOS) at a hospital of a patient contains important information in health statistics. A longer stay may result in resource restrictions with regard to the availability of beds at hospitals. Some of the determinants of LOS are the socio-demographic characteristics and hospital characteristics. This study try to explain the variation in LOS for elderly patients who hospitalized from 2008 to 2011 with respect to socio-demographic variables as age, gender, social security contract, living in rural or urban area, distance of place of abode from hospital, medical departments, clinical related characteristics. Computerized inpatient hospital discharge data, over a 4-year period, 2008–2011, was provided by the Administrations of Kalamata, Pyrgos, Amaliada and Sparta Hospitals. A total of 110606 hospitalizations were analyzed. The distribution of the outcome measure (LOS) was skewed and so the relationship between the independent variables and LOS was examined using parametric with log transformed LOS and non-parametric tests. Generalized linear regression models were fit to test the association between the LOS and patient demographic and clinical characteristics.

Keywords: Hospitalization, length of stay, predicting models.

JEL Classification:

1. Introduction

Hospitals consume a significant proportion of recurrent expenditure by the Government of Greece. Funding of hospitals is also currently at the center of discussions on the Greek Government's health care reform agenda to improve the efficiency and safety of the health care system.

Analysis of cost data is important in providing reliable information about the overall cost to health system of a particular medical condition. Since the most financial expenditures made by hospital are fixed in a short run, decision-makers need a new cost variable. Length of stay (LoS) is an important metric for assessing the quality of care and planning capacity within a hospital. The length of time patients spend in hospital beds will not release much cash, but is known to be a good representation of the amount of resource utilised.

Department of Health in Greece use average LoS as a key performance indicator for the efficacy of the hospital and Hellenic Statistical Authority publish the LoS by sick category on the website. The length of stay at hospital by patients contains important information, which can be used for policy making and future projections on resource requirements by government as well as hospitals. This is also an important ingredient for insurance companies from the point of view of severity of claims. The disease elasticity of LOS will be of help to hospital management in estimating the release of beds. Insurers can use such studies in calculating the likely losses in the case of hospitalization given the probability of a disease.

However, certain features of LoS, as many other cost variables, make it difficult to analyse.

Length of stay in Hospital distribution is typically found to be positively (right) skewed, as most patients undergo routine treatments and have roughly similar days in the hospital, but a small proportion of patients with complication or severe disease need to stay more days in the hospital.

As efficacy evaluation need to provide arithmetic mean of the LoS, but the typically non-normal nature of LoS data may lead to violations of assumptions required for the calculation of the arithmetic mean using methods based on the normal distribution (Barber & Thompson, 2000).

For the analysis of LoS primary interest is usually whether the LoS of a particular group is greater (or less) than those associated with an alternative group (a second or a prototype hospital). Non parametric methods or transformation of skewed data to achieve approximate normality are widely used in practice. Usually a log, shifted log, square root and reciprocal transformations are used. The weakness of this is that log-LoS is not useful for policy making, log-models are about geometric, not arithmetic, means, and retransformation is complicated by heteroscedasticity (Faddy, Graves, & Pettitt, 2009). A generalization linear model using gamma error distribution and a log-link function avoids the problem of retransformation and is recommended by Dodd et al. (Dodd S Bodger K, 2006). Five different approaches was compare to modeling cost data, OLS regression on untransformed and log transformed outcomes, OLS with bootstrapping and robust standards errors, median regression and gamma regression using log-link function. The best residuals were obtained from the gamma regression but not method can predict extreme values.

Manning and Mullahy assessed the performance of OLS regression with log -transformation and gamma regression with log -link function on nonzero and right skewed data. They identified problems with both methods, the garden variety distributional problems – skewness, kurtosis and heteroscedasticity – can lead to an appreciable bias for some estimators or appreciable losses in precision for others (Manning & Mullahy, 2001).

Older Greek people have lengthy hospital stays, the reasons for delay discharges are medical issues, hospital factors (delayed diagnostic services etc) , patient and carer needs, as well as problems in accessing alternative or social care.

This study try to explain the variation in LOS for elderly patients who hospitalized from 2008 to 2011 with respect to socio-demographic variables as age, gender, social security contract, living in rural or urban area, distance of place of abode from hospital, medical departments, clinical related characteristics. Also, the purpose of this paper is to compare different approaches to model LoS data from older patients, a poisson loglinear model, a gamma regression with log-link function model and a negative binomial log link function.

2. Methods

Data

Data used in this study were obtained as primary data from discharge records of all elderly admissions at the four hospital of the Peloponnese, General Hospital of Pirgos, General Hospital of Amaliada, General Hospital of Kalamata and General Hospital of Sparti, from 1/1/2008 to 31/12/2011. Inclusion criteria were ≥ 65 years of age and a minimum inpatient stay of one night. The registers included the following collected determinants for individual patients: age, gender, date of admission and discharge, residence area, reasons for admission,

treatment outcome, hospital clinic, number of admission per week day and type of social security. Reasons for admission was recode to ICD-10 classification and residential area to municipality classification.

From other official registers the database was filled with geographical attributes like elevation, distance for closer health services provider etc.

The final database contains 72412 cases.

Models

The purpose of this paper is to compare different approaches to model LoS data, a poisson loglinear model, a gamma regression with log-link function model and a negative binomial log link function were used.

The number of days each patient stay at the hospital is record as count. As a consequence, the Poisson regression model is particularly appropriate for this type of response (Faddy et al., 2009). Poisson regression assumes the response variable Y has a Poisson distribution, and assumes the logarithm of its expected value can be modeled by a linear combination of unknown parameters.

The distribution of the number of days using Poisson model is of the form (McCullagh & Nelder, 1989:

$$Prob(Y = y) = \frac{e^{-\lambda T} (\lambda T)^y}{y!}, \text{ with } \lambda = e^{\beta'x} > 0.$$

The conditional mean is:

$$E[Y|x] = \lambda = e^{\beta'x}.$$

The variance of the random variable is constrained to be equal to the mean $Var[Y|x] = \lambda$.

If a Poisson regression model doesn't fit the data and it appears that the variance of y is increasing faster than the Poisson model allows, then a simple scale-factor adjustment is not appropriate. One way to handle this situation is to fit a parametric model that is more dispersed than the Poisson. A natural choice is the negative binomial.

Suppose that $y \sim \text{Poisson}(\lambda)$, but λ itself is a random variable with a gamma distribution. That is, suppose $y | \lambda \sim \text{Poisson}(\lambda)$, $\lambda \sim \text{Gamma}(\alpha, \beta)$, where $\text{Gamma}(\alpha, \beta)$ is the gamma distribution with mean $\alpha\beta$ and variance $\alpha\beta^2$, whose density is :

$$P(\lambda) = \frac{1}{\beta^\alpha \Gamma(\alpha)} \lambda^{\alpha-1} e^{-\frac{\lambda}{\beta}}$$

for $\lambda > 0$ and zero otherwise.

The unconditional distribution of y is negative binomial, this distribution has mean $E(y) = \alpha\beta$ and variance $Var(y) = \alpha\beta + \alpha\beta^2$. For building a regression model, it is natural to express the negative binomial distribution in terms of the parameters $\mu = \alpha\beta$ and $\kappa = 1/\alpha$, so that $E(y) = \mu$ and $Var(y) = \mu + \kappa\mu^2$. The variance function is quadratic (Jong & Heller, 2008).

For regression purposes, we typically assume $y_i \sim \text{Negbin}(\mu_i, \kappa)$ and apply a log link, so that

$$\log \mu_i = \eta_i = xT_i \beta.$$

Or we can use $\log \mu_i = \eta_i = o_i + xT_i \beta$ if an offset is needed.

Good of fit can be tested by the ratio (deviance)/(degree of freedom), value close to 1 indicate good of fit. Large or small values of the ratio may indicate an over-dispersion response. Additional measures of goodness of fit include the Bayesian Information Criterion (BIC).

Covariates

Martin and Smith (1996) showed that demographic characteristics of patients and some hospital characteristics are two important determinants of LOS. The important demographic characteristics are age, gender, type of disease etc. Hospital size, location of the region, the type of hospital etc. are some of the hospital characteristics which have impact on LOS.

The covariates to our models are presented to Table 1.

3. Results

Figure 1 displays the distribution of LoS in the group of all patients. The LoS is highly positive skewed, with a mean 4.83 days and median value 3 days. The mean value is different by Hospital.

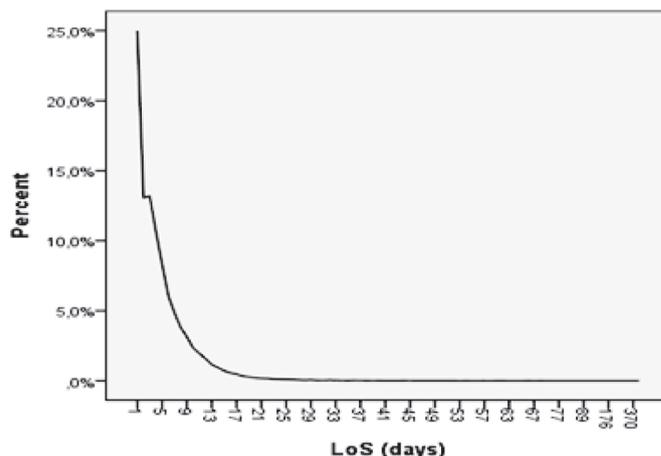
Table 1. Covariates for the model

Covariate	Summary Statistics
Sex	Men 50,1% , Women 49,9%
Age Category	64-74 32% , 75-84 48% , 85+ 20 %
Urbanization	Urban 46% , Suburban 50% , Rural 4%
Elevation	Mean 149 m (SD 146 m)
Social Security	Agriculturalist 59% , Employees 36%

Figure 1. Distribution of LoS

Average LoS to General Hospital of Kalamata is 3.97 (SD 4.87) while the ALoS to General Hospital of Pirgos is 5.6 (SD 5.6), to General Hospital of Amaliada 5.7 (SD 9.8) and to General Hospital of Sparti 6.0 (SD 5.3).

Taking into account variables as sex, age group etc, the difference of LoS between the groups was examined.



The results are presented at Table 2.

Table 2. Difference of LoS between independent groups

Variable	ELIA (2 hospitals)	LAKONIA	MESSINIA
Sex	** M<W	-	-
Age category	** (64-74)<(75-84)<85+	** (64-74)<(75-84)<85+	** (64-74)<(75-84)<85+
Urbanization	** Urban < Rural < Suburban	** Urban< Rural < Suburban	** Urban> Suburban >Rural
Distance	**	**	**
Elevation	** (Pir): 0-100<100+	** 500+>0-500	-
Social Security	** (Am) Agriculturalist >Employee	** Agriculturalist >Employee	** Agriculturalist < Employee
Health services	** (Am) 1,2<3		** 3<1,2
Admission day	** Tuesday, Thursday <...< Saturday, Sunday	** Tuesday, Thursday <...< Saturday, Sunday	** Tuesday <...< Saturday, Sunday
Clinical	** Orthopedics >...> Surgery	** Pathological >...> Surgery	** Orthopedics >...> Surgery
Number of Admission	** 1-15>16-20> 21+	** 1-10>11-15> 16+	** 1-20,21-30> 31+

** indicates statistical significant difference

Taking into account the sex, the LoS for the men is smaller than the women but this difference is significant only for patients to the two hospitals in Prefecture of Elis. According age categories statistical significant differences appeared, smaller ages have smaller LoS, older people are “bed blockers”, as they don’t have alternative care.

For a group of variables like social security form, urbanization, residential area health services the differences are significant but also have different direction between the Prefectures.

Table 3. Models comparison

Model	df	Deviance/df	Pearson Chi-Square/df	Bayesian Information Criterion (BIC)
Poisson loglinear	42981	1,92	2,23	205233,68
Gamma (log link)	42981	0,57	,68	182324,55
Negative binomial (log link)	42981	0,43	,51	202697,05

Table 3 displays evidence of goodness of fit for the three models. The best fitting model is the gamma log link model. Included covariates to the gamma model

Table 4. Significance level of included covariates

Source	Type III		
	Wald Chi-Square	df	Sig.
(Intercept)	1029,556	1	,000
Sex	9,338	1	,002
Age category	395,015	2	,000
Urbanization	4,851	2	,088
Health services	14,193	2	,001
Distance	31,620	4	,000
Elevation	6,205	3	,102
Number of Admissions	22,503	6	,001
Admission Day	45,979	6	,000
Admission reason	2548,437	18	,000
Number of admission reasons	14,412	2	,001
Social security	177,605	10	,000
Hospital Clinic	1313,418	13	,000

4. Conclusions

This paper aimed first to examine factors that affect to the LoS in to a hospital for elderly patients to Peloponnesus and secondly to compare methods of multivariable regression analysis of the LoS. Age, social security scheme, admission day, clinical, urbanization, elevation affecting to LoS, some of them with different direction accordingly the hospital.

The three models that were compared were Poisson loglinear, Gamma (log link) and Negative binomial. The gamma model with log-link seemed to be the fitting model for the highly skewed LoS data presented in this paper.

Acknowledgements

This research has been co-financed by the European Union (European Social Fund – ESF) and Greek national funds through the Operational Program “Education and Lifelong Learning” of the National Strategic Reference Framework (NSRF) - Research Funding Program: ARCHIMEDES III.

<https://sites.google.com/site/icqqmeas> 2015

References

- Barber, J. a, & Thompson, S. G. (2000). Analysis of cost data in randomized trials: an application of the non-parametric bootstrap. *Statistics in Medicine*, 19(23), 3219–3236. [http://doi.org/10.1002/1097-0258\(20001215\)19:23<3219::aid-sim623>3.0.co;2-p](http://doi.org/10.1002/1097-0258(20001215)19:23<3219::aid-sim623>3.0.co;2-p)
- Dodd S Bodger K, B. a. (2006). A comparison of multivariate regression models to analyse cost data. *J Eval Clin Pract*, 12(76-86), 76–86.
- Faddy, M., Graves, N., & Pettitt, A. (2009). Modeling length of stay in hospital and other right skewed data: Comparison of phase-type, gamma and log-normal distributions. *Value in Health*, 12(2), 309–314. <http://doi.org/10.1111/j.1524-4733.2008.00421.x>
- Jong, P. de, & Heller, G. Z. (2008). *Generalized Linear Models for Insurance Data (I)*. Sao Paulo: Cambridge University Press.
- Manning, W. G., & Mullahy, J. (2001). Estimating log models: To transform or not to transform? *Journal of Health Economics*, 20(4), 461–494. [http://doi.org/10.1016/S0167-6296\(01\)00086-8](http://doi.org/10.1016/S0167-6296(01)00086-8)
- McCullagh, P., & Nelder, J. (1989). *Generalized linear models*. London: Chapman and Hall.

<https://sites.google.com/site/icqqmeas> 2015

FITTING BINOMIAL DISTRIBUTION TO ONLINE RATINGS OF GREEK TOURISM ATTRACTIONS

Yiannis Dimotikalis^{1*} and Stelios E. Papadakis²

¹Dept. of Accounting and Finance, T.E.I. of Crete, Estavromenos, Heraklion, Crete, Greece

²Dept. of Business Administration, T.E.I. of Crete, Lakonia, Aghios Nikolaos, Crete, Greece

*jdimit@staff.teicrete.gr

ABSTRACT

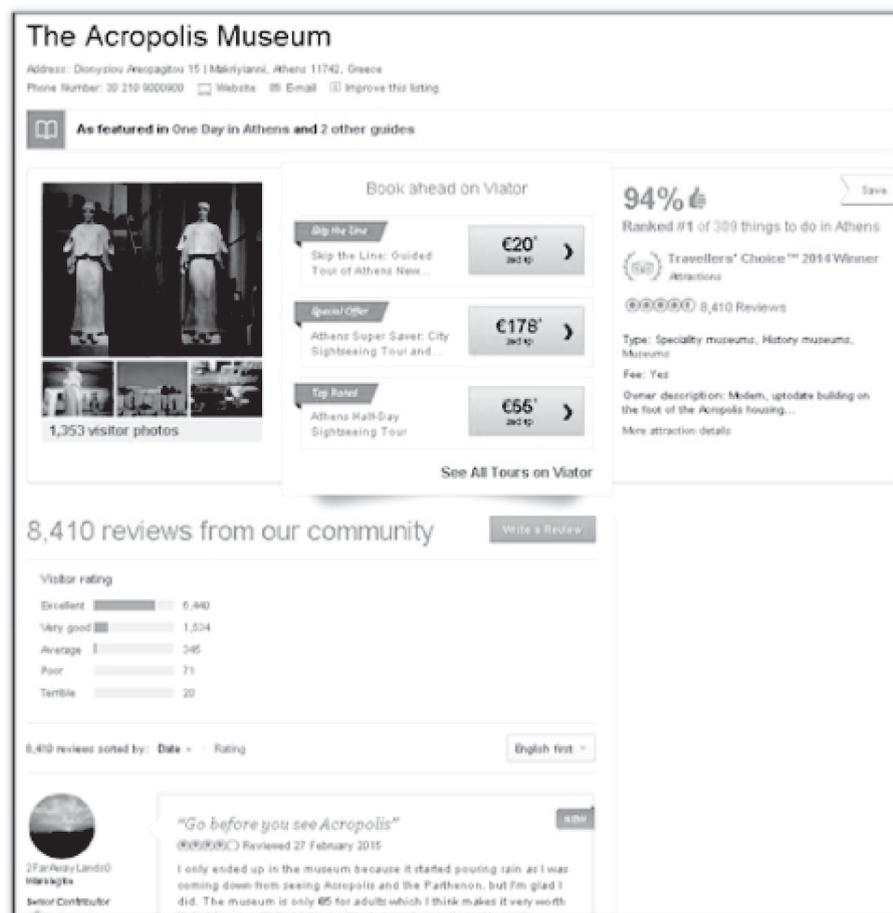
In this paper, we identify the distribution of the visitor's online ratings for 100 tourism attractions in Greece. Provided that the visitors' rating follows the Binomial distribution, we identify the parameter of Binomial distribution by using Particle Swarm Optimization (PSO). The objective of modeling is to investigate the possible bias on user ratings and the performance of fitting method compared to traditional Least Squares and Maximum Likelihood estimation. A novel statistical error measure, namely, "False Rate" is used for the rating data. We used a real world dataset of 100 Greek Tourism Attractions, downloaded from TripAdvisor website. The implications of the tourist attractions, the fitting performance and the five stars rating system is also being discussed. Keywords: Online Rating, Binomial Distribution, Fitting, Greek Attractions, TripAdvisor, Particle Swarm Optimization, False Rate.

1. Introduction

Today, the five stars rating system is a typical scheme, used in online rating of products and services. The fast growing of User Experience Sites or User Content Sites is transformed into a business model capable of attracting visitors, advertising revenues and then profits. Visitors of those internet sites are asked to give their reviews and ratings about books, hotels, articles, electronics, computer applications, etc., both for products and services. The 5 stars rating, before internet growth and diffusion in the last two decades, was known by the car safety rating system, hotels categories, etc. The use of a 5 point scale to answer an opinion question, established by a Likert scale [14] in questionnaires of opinion surveys.

According to the Likert Scale System with 5 points (choices-items), a rating question must have a middle neutral choice, two positive choices (good, very good) and two negative ones (bad, very bad) to express the responder's opinion about the question issue. For example, the implementation of five star rating system by TripAdvisor is presented in Figure 1. Users (members) of the TripAdvisor community write a review and rate an attraction, selecting one of the five available linguistic values: "Excellent", "Very good", "Average", "Poor", and "Terrible". Those 5 values symbolize the opinion of each visitor from very positive to very negative with a neutral choice ("Average") in the middle. The rate of each individual is based on his personal skill, ideas, culture, education and other factors and conditions. In right down side of Figure 1 displayed that 8.410 members' reviews and rates the specific attraction (Acropolis Museum). Follows a graphical representation of the "score" (Nr of rates distribution) each one of the five choices received. On the right upside of the Figure 1 all those 8.410 ratings are converted to a scheme of 5 circles (five stars system) with four and half of the fifth circle filled, meaning that the overall rating is about 4.5 stars out of 5. In this area of Figure 1 the 94% overall rating is promoted (a hand up icon displays that 94% of the reviewers "recommend" the attraction). This 94% overall percentage rate based on the ratings of all 8.410 reviewers. The calculation and reliability of this average percentage rate are the main subject of this paper.

Figure 1. The Acropolis Museum presentation in TripAdvisor Website



TripAdvisor [19] announced more than 200 million reviews covering more than 4.5 million accommodations, restaurants and attractions. All those millions of ratings on TripAdvisor and also millions of ratings on Amazon, Google Play, Yelp, etc., attract the public interest, especially in cases where those rating used as part of a business model. TripAdvisor uses the rating and reviews to attract visitors (travelers) to his web pages and advertising revenues from businesses related to rated objects, usually from the tourism industry domain.

The importance of ratings for business success caused phenomena like ratings and reviews fraud, questions about their trustiness and reliability. The public interest voiced by newspaper articles in W.S.J. [6] and scientific magazines like MIT Sloan Management Review [2] about rating fraud. In scientific domain the area of accommodation systems (or collaborative filtering) is affected and start to study large dataset of reviews and rating, their impact on sales, profitability, product or service or company reputation, etc.[17], [20]. Especially in the data mining field a lot of papers [3] trying to describe the relation of the text review with ratings or to discover possible fraud reviews.

Probably because of Likert Scale literature popularity, the distribution of ratings in the 5 item scale was not studied in depth. Typically in the analysis of Likert Scale questionnaires (IRT: Item Response Theory), Normal Distribution of the response distribution suggested and some statistical parameters calculated like Cronbach A [21], [16].

The distribution of ratings to rating scale is critical from another point of view. In the presence of false or biased ratings (rating manipulation) by reviewers, the examination of ratings distribution can be used as a tool to investigate and examine the biasness and manipulation. To this direction, in literature, there are published works based on review text inspection and the associated rating possible biasness [8], [9]. Also discussed from statisticians the deviation of ratings distribution from Normal Distribution, which is visible to the naked eye, typically the majority of ratings located in the two positive choices resulting to an average in the area of 4 stars. An explanation of this situation is that only people who like an attraction (or generally a rated object) review it and rate it, causing to observed reality of high overall rating.

Another interesting point [7] is the known “j-shaped” distribution of ratings observed in Amazon and other sites. The “j-shaped” term used to explain that in the ratings scale of 5 stars, very often observed an increasing number of ratings moving from the center of 3 stars in both directions of 5 stars (positive) and 1 star (negative), that seems to remind the j letter and specifically two modes (maxima) of the distribution curve.

The rest of the paper organized as follows: In section 2 present the Binomial Distribution, suitable fitting methods and some error criteria for the fitting. In section 3 Binomial Distribution fitted to a dataset of 100 Greek tourism attractions ratings¹, rated by TripAdvisor members. Finally, in section 4 some concluding remarks and suggestions for future work discussed.

2. Binomial Distribution and Fitting to Online Ratings

The rating of a TripAdvisor user is one of five linguistic values (“Excellent”, “Very good”, “Average”, “Poor”, “Terrible”), mathematically represented as a Discrete Random Variable X taking the values $x_i=1,2,3,4,5$ with probability $P(X=x_i)=f_i$, where f_i is the relative % frequencies of attraction rating by reviewers. Setting N as the number of users who rate the attraction and $N_i, i=1,2,3,4,5$ the number of users rate with value x_i , then $P(X=x_i)=f_i= N_i/N$.

Because X is defined as a Discrete Random Variable, the Expected Value of X , $E(X)$ calculated by the known equation:

$$E(X) = \sum_1^5 x_i P(X = x_i) = \sum_1^5 x_i f_i = \sum_1^5 x_i \frac{N_i}{N} \quad (1)$$

Obviously $E(X)$ is a value between 0 and 5 and is the overall rating of attraction (a weighted “average”) by all reviewers. Setting $p=E(X)/5$ (because 5 is the maximum rate by user) the obtained value p is a percentage in the range 0%-100% can be seen as overall rate %, in probability theory, explained as the **probability of attraction likeness** or **average likeness of attraction**.

For the random variable X described above, the next modeling step is to find a theoretical distribution that X follows, e.g. a statistical probability distribution function. Choosing a specific distribution is possible to test if the real data sets of ratings follow this distribution (a mathematical function).

¹ The data set is available for download at: <https://sites.google.com/site/ydimotikalis/home/onlinering/greekattractions>

2.1 Binomial and other Distributions

Let X a random variable which describes the rate of an attraction by a visitor. There are five alternatives to reviewers, X take the values $x_i=1,2,3,4,5$. An appropriate theoretical statistical distribution, is the Multinomial Distribution $M(k=5, p_1, p_2, p_3, p_4, p_5)$, where $k=5$ are the five alternative values and p_i the probability of each alternative. Although this is an optimal distribution in the case of ratings, a serious problem appears. In the real rating datasets the application of $M(k=5, p_1, p_2, p_3, p_4, p_5)$ simply implies that p_i estimated by observed relative frequencies f_i . Only if are known the theoretical values of p_i a priori, from other sources, it is possible to test for error in the real data sets, but this is not the case in this work. Multinomial Distribution is an optimal choice theoretically, but without practical implications to study the real data sets.

A special case of Multinomial Distribution is for the value of $k=2$, the Binomial Distribution $B(m, p)$, where m is the number of trials and p the probability of success in each trial. By definition in Binomial $B(m, p)$ the one alternative called success with probability p and the other failure with probability $q=1-p$. For the five stars rating the random variable $X \sim B(m=4, p)$, the acceptance of Binomial $B(4, p)$ means that each user rating is the result of 4 Bernoulli trials, each one with probability of success p , which remain constant on all 4 trials and each trial is independent with others. To explain the case, each reviewer in his/her rate selection (mathematically one of the numbers $0,1,2,3,4$) thinks of 4 equally important issues and if none of 4 is satisfied then select 0, if one of 4 satisfied select 1, etc.

The classical example in statistics for $B(m, p)$ is the coin tossing procedure. If a "fair" coin tossed 4 times, then the probabilities of results in Heads (success) and Tails (failure) is given by $B(m=4, p=0.50)$. The number of successes (Heads) ranges from 0 to 4, with most probable value 2, because the probability of success is $p=0.50=50\%$ and $p \cdot m=0.50 \cdot 4=2$. Back to ratings, the probability of success p could be explained as probability of attraction likeness p and each visitor rate is expected to depend on this value. An important point is that, as in the "fair" coin tossing, the result of 4 trials is not always as expected: 2 Heads and 2 Tails, but this is the most likely result. All the other alternatives (events in statistics): 3 Heads-1 Tail, 1 Head-3 Tails, 0 Heads-4 Tails, 4 Heads-0 Tails, is possible to observed, but with different probabilities (frequencies in a series of coin tossing experiments). This means that, as in the coin tossing example, for ratings is expected to observe not only one particular rate selected, but all the five alternatives with different frequencies (probabilities), which are dependent on probability of attraction likeness parameter p defined before.

If a random variable $X \sim B(m, p)$, follows the Binomial Distribution with parameters m, p , then, the formula of the Binomial Distribution probabilities is:

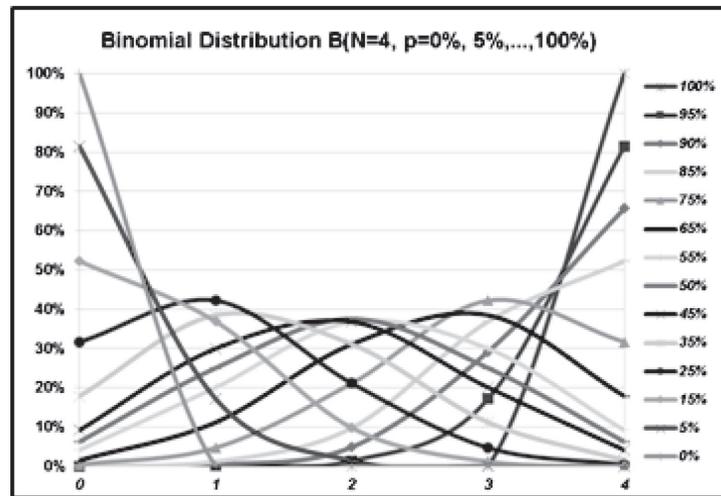
$$P(X = x) = \binom{m}{x} p^x (1 - p)^{m-x} = \frac{m!}{x!(m-x)!} p^x (1 - p)^{m-x} \quad (2)$$

Where m is the number of trials, x the number of successes and p the probability of success in each trial. In our case $m=4$ and $x=0,1,2,3,4$ (corresponding to 1,2,3,4,5 stars respectively) and p the probability of attraction likeness. Then for each value of x eq. 1 gives the following set of equations:

$$\begin{aligned} P(1 *) &= P(X = 0) = (1 - p)^4 \\ P(2 *) &= P(X = 1) = 4p(1 - p)^3 \\ P(3 *) &= P(X = 2) = 6p^2(1 - p)^2 \\ P(4 *) &= P(X = 3) = 4p^3(1 - p) \\ P(5 *) &= P(X = 4) = p^4 \end{aligned} \quad (3)$$

Where the parameter p is the probability of attraction likeness. In Figure 2 we present the values of the above equations 3, Binomial Distribution $B(m=4, p)$, for values of $p=0\%, 5\%, 10\%, \dots, 95\%, 100\%$. The Binomial is a discrete distribution; in each colored curve of the graph there are only five values (points); the connecting smooth lines are used for improved optical illustration and understanding. The curves of parameters' values $p\%$ and $1-p\%$ are symmetrical around the average value of 2, only the curve for $p=50\%$ is symmetrical. For $p=50\%$ is well known the Normal approximation of Binomial Distribution.

Figure 2. Binomial Distribution Curves for different P parameter values



Another Discrete Distribution is the Uniform Distribution $U(m)$, where m is the number of alternatives. This distribution is practically appropriate when all the alternatives have equal probability (like a fair dice). Iannario and Piccolo [10] use Uniform as a part of a mixture model, to take into account the case where part of raters makes random choices. In Likert scale literature the Normal Distribution of Item Response Rate is the standard hypothesis, but this explained mainly because of the several questions analyzed in a questionnaire. Also, it is known that Normal Distribution is the limit of Binomial Distribution when the number of trials (alternatives in rating) increases and is greater than 30, practically. In our opinion the 5 star ratings do not expect to follow Normality, as a result of only 5 alternatives (stars) used.

2.2 Distribution Fitting Methods to Real Rating Data

To fit a mathematical model to real data, Least Squares estimation is the standard mathematical method. In the case of theoretical statistical distributions fitting to frequencies data, from a statistical point of view, Maximum Likelihood Estimation (M.L.E.), proposed by Fisher [5], is the preferable method. In the Binomial distribution case the M.L.E. of p is the expected value $E(X)=p$ and calculated as the weighted average of the relative observed frequencies (see eq. 1). We call this value p_{MLE} , estimation of p parameter by M.L.E. method.

Also the goodness of the fit X^2 statistical test, proposed by Karl Pearson [17] in 1900, is a method to examine the goodness of fit of a statistical distribution function to real data. The value of the test statistic X^2 given by:

$$X^2 = \sum_{i=0}^4 \frac{(O_i - E_i)^2}{E_i} = \sum_{i=0}^4 \frac{(f_i - P(X=i))^2}{P(X=i)} \quad (4)$$

where O_i are the observed and E_i the expected frequencies. Pearson paper include some examples of “big datasets” like the throw of 12 dices 26306 times by prof. Weldon and computation the theoretical frequencies of the observed 5 or 6 using Binomial Distribution $B(m=12, p=1/3)$. In some way our analysis of ratings is the opposite: given the observed frequencies of each 5 stars scale, calculate the probability p .

Least Squares method is the minimization of the Sum of Squared Errors (S.S.E.):

$$S.S.E. = \sum_{i=0}^4 (P(X=i) - f_i)^2 \quad (5)$$

where f_i are the observed (real data) relative frequencies of ratings and $P(X=i)$ is the probabilities (theoretical frequencies), calculated by Binomial distribution function (eq. 3). The modern Spreadsheets solver tool can be used to find the value of parameter p that minimizes the S.S.E. We call the estimated value of parameter p by Least Squares p_{LSE} .

The source of error in every real data set, generally called noise, in rating can be viewed as false (unexpected) rates from some of the visitors of the attraction. A detailed analysis of this error or noise is needed.

2.3 Fitting Criteria and Error of Rating Data

By fitting Binomial Distribution to real data a value of p parameter calculated and then by eq. 3 the theoretical frequencies estimated (associated with the observed frequencies f_i). Using theoretical (Binomial) $P(X=i-1)$ and observed frequencies (Data) f_i several error criteria are available.

After the fitting (estimation of Binomial p parameter) calculated 5 error values $e_i = P(X=i-1) - f_i$, $i=1,2,3,4,5$ and is known that the sum of all errors in fitting is zero $\sum e_i = 0$. Either all the errors are zeros (perfect fit) or some of them are positive the others negative and the sum is zero. When $e_i \geq 0$ then $P(X=i) \leq f_i$ the Binomial overestimate and when $e_i \leq 0$ then $P(X=i) \geq f_i$ the Binomial underestimate real data. But because of the $\sum e_i = 0$ in every data set the overestimation errors (positive) are equal (in absolute value) to underestimation errors (negative). If only one rater moves his vote from one point of scale to another then he produces an underestimation error to the first point and an overestimation error to the second point. Every one false rate by a visitor produces a double error, a positive one and a negative one at the same time. This remarkable property of error in rating can used to define the False Rate (F.R.) as the number of users who provided false (unexpected) rates. Mathematically, it is related to the Sum of Absolute Error (S.A.E.) defined by:

$$S.A.E. = \sum_{i=0}^4 |e_i| = \sum_{i=0}^4 |P(X=i) - f_i| \quad (6)$$

where f_i are the observed relative frequencies of ratings and $P(X=i)$ is the theoretical frequencies, calculated by the Binomial distribution function (eq. 3). Because of the equality of positive and negative errors e_i , S.A.E. will be twice the False Rate %, thus $F.R.\% = \frac{1}{2} S.A.E. = \sum |e_i| / 2$. This F.R.% is easily explained to everyone as the percentage of the whole N users whose rates are false (different than expected by the Binomial Distribution). The source or cause of false rate can be random noise (not a specific reason) or biasness (an intention to change the expected average rate of the attraction).

By F.R. value, checking the particular point (value) where the expected rates are more than expected it is possible to discover the outcome of false rate. If rate moved to a higher point of scale it is expected to increase the average value of the rating parameter p , or the opposite if moved to lower points. Both cases can happen for certain reasons. Our approach to set the F.R. error as an indication of fraud or manipulation is very clear. Because of the probabilistic nature of the rating procedure, small error values on ratings is expected, bigger values of error are suspicious for manipulation. The examination of the scale values where the error observed helps to discover possible biasness.

Each one of the equations 4, 5, 6 based on error e_i , can be used as a criterion for estimating the p parameter. Eq. 4 can be seen as a weighted S.S.E. (eq. 5), where $1/P(X=i)$ are the weights. The question of the convergence to the same parameter p value is discussed in our results. Because of direct relation of F.R. to S.A.E., the S.A.E. is used as a preferred fitting criterion.

2.4 Calculation of Optimal

The shape of a binomial distribution given in the form of Eq. 2 is parametrically defined by the value of parameter. The optimal value of parameter is the one which minimizes the error norm:

$$E(p) = |f_i - P_i(X=i)|_L \quad (7)$$

where $L = 0.1, 2, \dots, \infty$. In this work we used $L=1$, which is equivalent to the Sum of Absolute Errors (S.A.E.) and $L=2$ which is equivalent to the Sum of Squared Errors (S.S.E.). Since the equality constraint $\sum_{i=0}^4 P_i = 1$

must be hold, the problem of calculating the optimal value of p can be formulated as a typical constraint optimization problem in the form of Eq. 8:

$$\begin{aligned} & \text{minimize : } E(p) \\ & 0 \leq p \leq 1 \\ & \text{s.t.} \\ & \sum_{i=0}^4 P(X=i) = 1 \\ & 0 \leq P(X=i) \leq 1, i = 0, 1, 2, 3, 4 \end{aligned} \quad (8)$$

Actually, $P(x=i)$ values depend on the value of parameter p as it is explained by Eq. 2. Generally, the fulfillment of equality constraints is a hard job for any optimization algorithm. Typically, a constraint optimization problem can be transformed into an unconstrained one by imposing a penalty function to deteriorate the infeasible solutions (the solutions which violate the constraint). We adopt the following penalty function:

$$PF(p) = a \cdot \left| 1 - \sum_{i=1}^4 P(x=i) \right| \quad (9)$$

Where a is an arbitrarily large, non-negative, real number. Please note that the inequality constraints in Eq. 8 are guaranteed, by definition. The equality constraint was dealt with by using the penalty function of Eq. 9 to penalize the infeasible solutions. The constraint optimization problem of Eq. 8 is transformed into the unconstrained optimization problem in the form of Eq. 10:

$$\begin{aligned} & \text{minimize : } E(p) + a \cdot \left| 1 - \sum_{i=1}^4 P(x=i) \right| \\ & 0 \leq p \leq 1 \end{aligned} \quad (10)$$

The problem of Eq. 10 can be solved by using any non-linear optimization method. In this work we use a particle swarm optimization method. Particle swarm optimization, or PSO for short, was initially introduced by Kennedy [12]. It is a stochastic, evolutionary, derivative free, optimization technique with strong ability of escaping from local optimum as well as plateau regions of the search space. Moreover, the simplicity of PSO's implementation was an additional reason for employing it.

2.5 PSO Description

A particle swarm optimizer includes a population of particles. Each particle is an entity consisting of a *position* and a *value of importance*. The position of each particle encodes a solution of the problem being solved, while the value of importance is an evaluation of the respective solution. The position of particles is updated through simple equations (motion equations) by using the particle's previous information (local knowledge) as well as information from other particles (social knowledge). The objective of update is the improvement of particles' position, that is, the discovery of better solutions. The motion equations for a particular particle are given by Eq. 11:

$$\begin{aligned} V(t+1) &= \alpha(t) \cdot V(t) + c_1 \cdot u(0,1) \cdot [X(t) - x(t)] + c_2 \cdot u(0,1) \cdot [G(t) - x(t)] \\ X(t+1) &= X(t) + \beta(t) \cdot V(t+1) \end{aligned} \quad (11)$$

, where: t denotes the current time step of evolution; $\alpha(t), \beta(t)$ namely, inertia and restriction factor respectively, could be either time decreasing or constant real numbers; $c_1, c_2 \in (0,1] \subseteq \mathbb{R}$ are predefined, constant, real numbers, namely, *learning factors*; $x(t)$ is the current position of particle at time step t ; $X(t)$ is particle's best known position, while $G(t)$ is the population's best known position; $u(0,1)$ is a random number in the range $[0,1]$, generated by a uniform random $[0,1]$, number generator. $V(t)$ is the velocity of particle at time t . At the beginning ($t=0$) of evolution all particles have random positions: $x(0) = u(x_{min}, x_{max})$, where x_{min}, x_{max} are the minimum and the maximum allowed value of particle's position. Each particle is evaluated according to the value of the objective function for the specific position (solution) and the best position over all particles ($G(t), t=0$) of the population is memorized. The local best ($X(t), t=0$) of each particle is also memorized. At the next time step ($t=1$) a new position for each particle is calculated by Eq. 11. The new positions are reevaluated and both local ($X(t), t=1$) and global ($G(t), t=1$) are updated (if a better position was achieved). The evolution is terminated at time t_{stop} when a predetermined *stopping criterion* is reached. Usually, the stopping criterion is either a predefined number of time steps (T_{max}), or a predefined number of successive no improvements of $G(t)$. The final solution is the best attained position $G(t_{stop})$.

In this work we employed a PSO with a population of ten particles. The position of each particle was a real number in the range $[0,1]$, representing the value of parameter p . The evaluation function was the objective function given by Eq. (10). According to the norm in Eq. 7 we used either $L=1$ or $L=2$ with equivalent results. The stopping criterion was a predefined number of successive no improvements for 100 time steps. The total time for 100 attractions was 75sec, or less than a second per attraction.

3. Fitting Binomial Distribution to Greek Attractions Rating Dataset

3.1 The Greek Attractions Dataset

The website of TripAdvisor is organized to present tourism destinations worldwide. Each destination includes a number of attractions, mainly suggested by site users. From the TripAdvisor website, we collected the data of 100 Greek Attractions ratings at 1-10/2/2015, a sample of more than 1000 rated attractions of the most popular 30 Greek tourism destinations. Our sample includes 33 beaches, 21 archeological sites, 11 museums, 31 natural or other interest sites, 2 water parks and 2 aquariums, totally rated by 95897 members of TripAdvisor. Each attraction was rated by a number of visitors. In our sample the average was 959 rates/attraction, fluctuating from a minimum of 173 to a maximum of 8153 with a median of 651. The average rating given by TripAdvisor to our dataset of attractions was 87.70% having: min of 56%, max 99% and median 89.50%.

3.2 Statistical Analysis of Fitting Results

The fitting statistics of the parameter p value, for the whole dataset of 100 attractions, is presented in Table 1. The second column presents the values of p provided by TripAdvisor (see Figure 1, upper right side). The values of p M.L.E. (3rd column of table 1) calculated by eq. 1 (Maximum Likelihood Estimation for Binomial Distribution). The next two columns of table 1 present p S.S.E. and p F.R. calculated by the P.S.O. by minimizing the S.S.E. and F.R.%, respectively. The average p value of F.R. 87.32% is slightly smaller than that of S.S.E. and about 1% smaller than that of M.L.E.

Table 1. Fitting Statistics by Method in 100 Greek Attractions

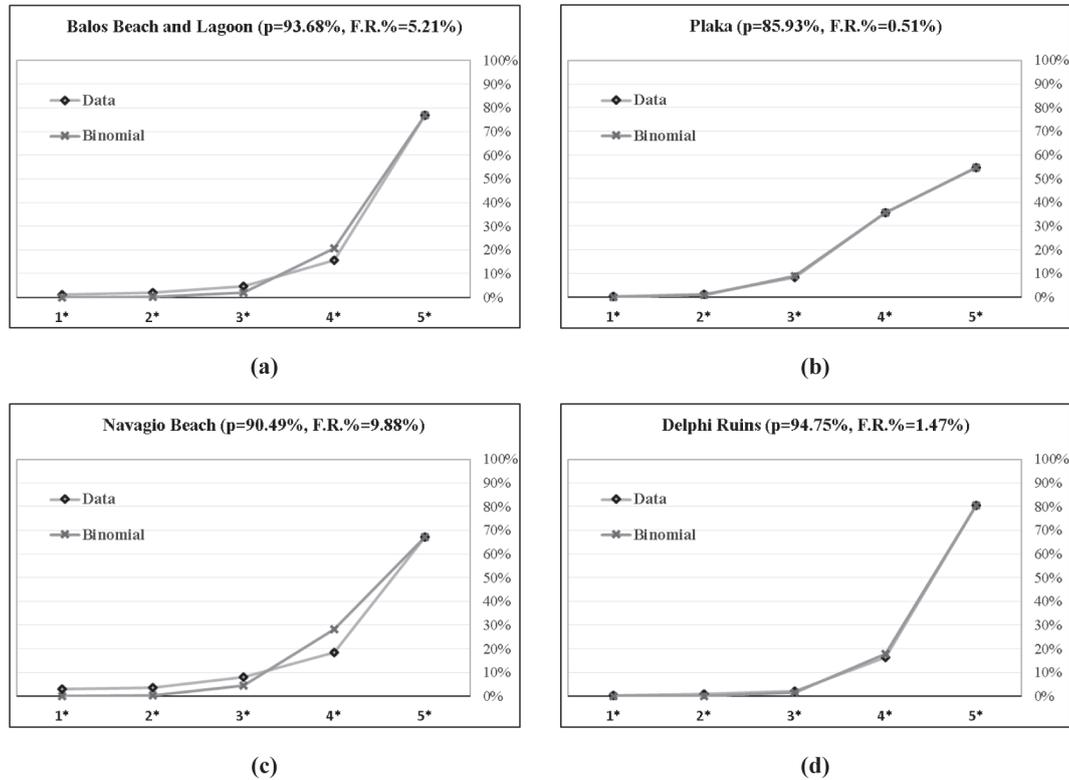
Method (Criterion)	TripAdvisor	M.L.E.	S.S.E.	F.R.
Average P	87.50%	88.63%	87.56%	87.32%
Min P	56.00%	72.10%	67.21%	68.36%
Max P	99.00%	98.32%	98.13%	98.06%
Median P	89,00%	89,29%	88,60%	88,51%
False Rate Average	-	6.27%	3.95%	3.64%
False Rate Min	-	0.97%	0.08%	0.08%
False Rate Max	-	13.98%	12.99%	11.51%
False Rate Median	-	5.65%	3.20%	2.92%

Observing the values of False Rate Average (6th line of table 1) by F.R. criterion, the improvement over M.L.E. is significant (42.86% on average from 6.27% to 3.64%) and about 7.85% smaller than S.S.E. (3.64% from 3.95%). The minimum value of F.R.% is 0.08% in the 100 attractions and corresponds to Sacred Monastery of Arkadi in Crete. The value of F.R. is zero in Nr of raters (all 486 users rates were exactly as it was expected!). Only 4 attractions have F.R.% values greater than 10% including 2 beaches and 2 sites. The 2 beaches and 2 sites, which were very suspicious for manipulation. TripAdvisor announces yearly the top 20 beaches of the world voting, as a promotional issue of his site to mass media, possibly this is the cause of the observed beaches rating manipulation. The case is illustrated in Figure 4(c) where in the 4* point the difference the actual and the expected rates was high. This is an indication of manipulation for increasing attraction's overall rate (likeness).

The value of F.R. in the attractions, illustrated in Figure 4, is presented in parenthesis of each chart title with the best value of the fitted parameter p (by minimization of F.R.%). In Figure 5 the histogram (empirical distribution) of False Rate % error to our 100 datasets is illustrated.

By M.L.E. criterion the curve of F.R.% value distribution is centered around the average of 6%, it is not precisely symmetrical, but follows a bell shaped curve. The other two curves, F.R.% by S.S.E. and S.A.E. criterion are clearly better concentrated on the lowest error values 1-2-3%. The S.S.E. and S.A.E. (F.R.%) curve are very close each other, but have a serious difference with the third of M.L.E., the first two are of "binomial" type, with higher frequencies to lower values of False Rate%. An explanation of this characteristic of M.L.E. curve explained by observing eq. 1, the computation of $p=E(X)$ treats all the observed data equally, even those that are false (manipulated). Then the calculated p M.L.E. value, a priori affected by false rates. This is an undesirable property for ratings data, but it is known in principle that M.L. Estimation is the best estimator of the observed data $E(X)$.

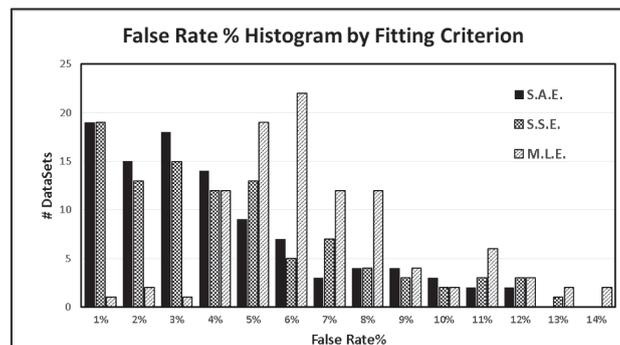
Figure 4. Fitting to Greek Tourism Attractions Examples



Finally, to test the linear relation of several parameters of ratings data, some linear regressions performed by using the sample of 100 data sets values of the following “parameters”:

- I. **Y: False Rate % vs X: Nr of Attraction Rates**, the equation of linear regression is: $y=2E-07x+0.0363$, $R^2=6E-05$, it is clear that there is not a linear correlation between the 2 variables. In our sample the Nr raters do not affect the False Rate, i.e. even with small nr of raters the False Rate performs well.
- II. **Y: False Rate % vs X: TripAdvisor Rating**, the equation of linear regression is: $y=-0.2606x+0.2645$, $R_2 = 0.5292$, the value of R^2 is greater than 50% and the x coefficient negative, means that in average greater values of TripAdvisor Rating corresponds to lower False Rate. This is the stronger linear relation found. Explanation: TripAdvisor treats the rates and uses some unknown algorithm to adjust the calculated rate. Our False Rate is able to partially uncover the unknown TripAdvisor algorithm.
- III. **Y: False Rate % vs X: $p_{S.A.E.}$** , the values of linear regression are: $y = -0.2496x + 0.2544$, $R^2 = 0.1965$, the value of R^2 is low and the x coefficient negative but not significant. It means that False Rate% does not linearly dependents on $p_{S.A.E.}$ value.

Figure 5. False Rate % by fitting criterion



4. Conclusions and Suggestions

The approximation of Greek Attractions ratings is generally good or very good by a simple mathematical model. The model is the Binomial Distribution with one parameter p , the parameter is explained as the attraction likeness probability. The probabilistic empirical distribution of ratings appears to follow simple statistical rules. The known “j-shaped” distribution of ratings phenomenon [7] is not present or more precisely is very limited to affect the fitting in our dataset, seriously. The best fitting in terms of F.R.% is significantly better than that of M.L.E. on attractions ratings data. This was also previously observed to other data sets from TripAdvisor (Hotels) in [4].

The False Rate% introduced and used as error and fitting criterion is very clear and understandable by all the audience. Our fitting dataset includes several Greek attractions where the False Rate achieved is extremely low (in the values of 1-2%). The higher False Rate% values is an indicator of possible rating manipulation in both sides of the 5* rating scale.

Our fitting results are useful to authorities and businesses related to tourism attractions. The F.R.% value is a sign of possible problems and “irregularities”. The examination of biggest error point in 5* scale (visible to fitting chart), in parallel with inspection of text reviews, is capable to help the discovery of the source and the cause of the issue. By our fitting procedure the likeness of the attraction does not change with the addition of few new rates as happen to $E(X)$ value regularly.

The P.S.O. method is perfect as the fitting method, because of the p parameter definition as probability. In standard unconstrained nonlinear regression methods tested, the problem of non-converging starting values occur, a disadvantage not present on P.S.O. method.

Motivating future directions of this work:

- I. The used Binomial Distribution fitting can be tested to other rating datasets like that of apps rated on Google Play, products on Amazon, movies on IMDB, restaurants on YELP, etc. Also, large datasets are available and suitable to test the evolution time of parameter p [13]. The time variation of p is an interesting question [15], especially on tourism attractions where the factors and issues evaluated by visitors may vary over time.
- II. Modification of Binomial model and test of similar models (distributions) to improve fitting performance, variants of such models are known in the literature [1], [11].

References

- Allik J., (2014). A mixed-binomial model for Likert-type personality measures, *Frontiers in Psychology*, Vol 5, 371.
- Aral S., (2013). The Problem with Online Ratings, *MIT Sloan Management Review*, 55(2).
- Chung C.-Y., Hsu P.-Y., Huang S.-H., (2013). βP : A novel approach to filter out malicious rating profiles from recommender systems, *Decision Support Systems* 55, 314-325.
- Dimotikalis Y., (2014). Fitting Binomial Distribution to Online Rating Data: TripAdvisor Ratings in Crete Island, SMTDA2014: 3rd Stochastic Modeling Techniques and Data Analysis International Conference, 11-14 June 2014, Lisbon Portugal.
- Fisher R. A., (1922). The goodness of fit of regression formulae and the distribution of regression coefficients, *J. Roy. Statist. Soc.* 85, 597-612.
- Grant K. B., (2013). 10 things online reviewers won't say: Why consumers can't trust five-star ratings - or nasty complaints, *MarketWatch*, *The Wall Street Journal*, Available at: <http://www.marketwatch.com/story/10-things-online-reviewers-wont-say-2013-03-01> accessed: 20/1/2015.
- Hu N., Zhang J., and Pavlou P. A., (2009). Overcoming the J-shaped distribution of product reviews, *Commun. ACM* 52, 10, pp. 144-147.
- Hu N., Liu L., Sambamurthy V., (2011a). Fraud detection in online consumer reviews, *Decision Support Systems* 50, pp. 614-626.
- Hu N., Bose I., Gao Y., Liu L., (2011b). Manipulation in digital word-of-mouth: A reality check for book reviews, *Decision Support Systems* 50, pp. 627-635.
- Iannario M. and Piccolo D., (2010). A New Statistical Model for the Analysis of Customer Satisfaction, *Quality Technology & Quantitative Management*, Vol. 7, No. 2, pp. 149-168.
- Kadane J. B., Krishnan R., Shmueli G., (2006). A Data Disclosure Policy for Count Data Based on the COM-Poisson Distribution, *Management Science*, Vol. 52, No. 10, pp. 1610-1617.
- Kennedy, J. and Eberhart, R. C. (1995). Particle swarm optimization. *Proc. IEEE intl conf. on neural networks* Vol. IV, pp. 1942-1948.
- Leskovec J. and Krevl A., (2014). SNAP Datasets: Stanford Large Network Dataset Collection, <http://snap.stanford.edu/data>.
- Likert R., (1932). A technique for the measurement of attitudes, *Archives of Psychology*, Vol 22, No 140, 55.
- McAuley J. and Leskovec J., (2013). From Amateurs to Connoisseurs: Modeling the Evolution of User Expertise through Online Reviews, *WWW 2013*, Rio de Janeiro, Brazil.
- Norman G., (2010). Likert scales, levels of measurement and the “laws” of statistics, *Adv in Health Sci Educ* 15, pp. 625-632.
- Park D. H., Kim H. K., Choi I. Y., Kim J. K., (2012). A literature review and classification of recommender systems research, *Expert Systems with Applications* 39, pp. 10059-10072.
- Pearson Karl, (1900). “On the criterion that a given system of deviations from the probable in the case of a correlated system of variables is such that it can be reasonably supposed to have arisen from random sampling”, *Philosophical Magazine Series* 5, 50 pp. 157-175.
- TripAdvisor (2014). About TripAdvisor, Available at: http://www.tripadvisor.com/PressCenter6About_Us.html accessed: 20/1/2015.
- Zhao Y., Yang S., Narayan V., and Zhao Y., (2013). Modeling Consumer Learning from Online Product Reviews, *Marketing Science* 32, 1, pp. 153-169.
- Zumbo B. D., Gadermann A. M., and Zeisser C., (2007). Ordinal Versions of Coefficients Alpha and Theta for Likert Rating Scales, *Journal of Modern Applied Statistical Methods*, Vol. 6, Iss. 1, Article 4.

AN ECONOMIC ANALYSIS OF MUTUALLY BENEFICIAL EXPORT POTENTIAL BETWEEN GREECE AND TURKEY

Seda Ekmen Özçelik

Yıldırım Beyazıt University, Department of International Trade and Business, Cinnah Cad. Güven Mah.

No: 16 Çankaya / Ankara /TURKEY

E-mail: ekmen@ybusm.info

ABSTRACT

Greece as a member of the EU is a traditional trading partner of Turkey. But, the trade volume between the two countries is quite low, despite geographical proximity. Recently, government officials from Greece and Turkey held a formal meeting, and they expressed their wish to realize stronger trade relations between the two countries. They also determined a \$10-billion target for volume of trade between the two countries. Increasing trade between Greece and Turkey has a great potential to result in mutually beneficial consequences. Indeed, Greece can find it even more beneficial to increase its exports to Turkey, especially at a time when Greece has been suffering from serious economic hardship. The main aim of this paper is to provide an academic and economic analysis of the export potential between Greece and Turkey. The main research questions are: “Which of Turkey’s export products have the highest export potential in the Greek market?”, and “Which of Greece’s export products have the highest export potential in the Turkish market?” Export potential can be measured in several ways. In this paper, the methodology of Revealed Comparative Advantage developed by Balassa (1965) and the methodology of Dynamic RCA index developed by Edwards and Schoer (2002) will be used to measure export potential of trade between Greece and Turkey. To my knowledge, this will be the first academic contribution to focus on this subject-matter by using that methodology. It is hoped that, this paper will be helpful in the development of a sector-specific and mutually beneficial export strategy between these two neighbor countries.

Keywords: Export potential, RCA, Turkey, Greece

JEL Classification: F14

1. Introduction

Globalization process urges countries, especially the developing ones, to increase their competitiveness in international markets. One of the most practical ways of increasing competitiveness is to increase export revenues. By this way, countries can gradually shift to a path of sustainable growth and development.

Turkey has been trying to increase its export revenues by increasing exports to the existing trading partners and also by attempting to export to new export markets. In this regard, Greece as a member of the EU is a traditional trading partner of Turkey. But, the trade volume between the two countries is quite low, despite geographical proximity. Recently, government officials from Greece and Turkey held a formal meeting, and they expressed their wish to realize stronger trade relations between the two countries. They also determined a \$10-billion target for volume of trade between the two countries. Increasing trade between Greece and Turkey has a great potential to result in mutually beneficial consequences. Indeed, Greece can find it even more beneficial to increase its exports to Turkey, especially at a time when Greece has been suffering from serious economic hardship.

This study aims to provide an academic and economic analysis of the export potential between Greece and Turkey. More specifically, from Turkey's point of view; we analyze the position of Greek market in Turkey's export structure and the change in this position over time especially parallel to the enlargement process of EU and prospective membership of Turkey in the EU. Similarly, from Greece's point of view, we analyze Greece's export patterns to Turkey as well as to the world market. By this way, we are able to observe promising export relations between Turkey and Greece.

In this paper, analysis of export performance between Turkey and Greece will be based on evaluation of Revealed Comparative Advantage (RCA) index, which was developed by Bela Balassa (1965), and dynamic RCA index, additional newer methodology developed by Edwards and Schoer (2002) to analyze the performance and market positions of Turkey's exports in Greek market as well as those of Greece's exports in Turkish market over time.

This study covers the period 2005-2014. The data is based on five-digit Standard International Trade Classification (SITC Rev.3) industries and the data source is United Nations Commodity Trade Statistics ("UN-comtrade").

To my knowledge, this will be the first academic contribution to focus on this subject-matter by using that methodology. It is hoped that, this paper will be helpful in the development of a sector-specific and mutually beneficial export strategy between these two neighbor countries.

2. Descriptive Statistics

In this part, we provide some general and preliminary descriptive statistics for exports of Turkey and Greece. Table-1 and Table-2 provides information for the total export performances of Turkey and Greece, respectively.

According to Table-1, on average, Turkey's export volume to the world market is 121 billion\$ and nearly 57% of these exports goes to the EU market. On the other hand, the share of Greece in Turkey's exports to both the world market and the EU-market are 1.7% and 1.4%, respectively and these shares are relatively very low.

Table-1 also shows that Turkey's exports to the world increases over time (from 72.9 in 2005 to 157 billion\$ in 2014). The share of EU in these exports also increases from 41.5% in 2005 to 68.6% in 2014. However, the share of Greece in Turkey's exports to the world and to the EU decreases from 2008 to the end of the period despite the increase between 2005 and 2008. Therefore, according to the table, we can claim that Turkey's export volume to the world market has been increasing over time and the highest share of these exports goes to the EU market. However, Turkey's exports to Greece and the EU follow a different pattern; namely, Turkey is unable to benefit from the Greece market during the period. The reasons behind this fact can be related to the Turkey's export strategies or the developments in Greece itself.

Table-2 shows Greece's exports to the world, to the Extra-EU (non-EU28 countries) and to Turkey. It also shows the shares of Extra-EU and Turkey in Greece's total exports to the world as well as shares of Turkey in Greece's total exports to the Extra-EU.

According to Table-2, Greek exports to the world nearly doubled from 2005 to 2014. Actually, world exports of Greece increased remarkably between 2005 and 2008. There is a deep decline in 2009 and 2010, and then it starts to increase until 2014. The sharp decline in Greece's export performance in 2009 and 2010 may be related to the world financial crisis in those years.

On the other hand, the share of Extra-EU in Greece's total exports increases over time during the period. The share of Turkey in those exports also increases over time especially after 2007. This shows that exports of Greece have been moving towards non-EU countries rather than the EU countries. There may be several reasons

Table 1. Turkey's exports to World, EU-28, Greece and their shares; 2005-2014

2005	WORLD	EU-28	GREECE		2010	WORLD	EU-28	GREECE
Exports (billion US\$)	72.9	41.5	1.1		Exports (billion US\$)	114.3	53.0	1.5
Share in World (%)		57.0	1.5		Share in World (%)		46.3	1.3
Share in EU-28 (%)			2.7		Share in EU-28 (%)			2.7
2006	WORLD	EU-28	GREECE		2011	WORLD	EU-28	GREECE
Exports (billion US\$)	85.0	48.1	1.6		Exports (billion US\$)	135.6	62.6	1.6
Share in World (%)		56.6	1.9		Share in World (%)		46.2	1.1
Share in EU-28 (%)			3.3		Share in EU-28 (%)			2.5
2007	WORLD	EU-28	GREECE		2012	WORLD	EU-28	GREECE
Exports (billion US\$)	106.7	60.7	2.3		Exports (billion US\$)	153.2	59.4	1.4
Share in World (%)		56.9	2.1		Share in World (%)		38.8	0.9
Share in EU-28 (%)			3.7		Share in EU-28 (%)			2.4
2008	WORLD	EU-28	GREECE		2013	WORLD	EU-28	GREECE
Exports (billion US\$)	131.0	63.7	2.4		Exports (billion US\$)	152.6	63.0	1.5
Share in World (%)		48.6	1.9		Share in World (%)		41.3	1.0
Share in EU-28 (%)			3.8		Share in EU-28 (%)			2.4
2009	WORLD	EU-28	GREECE		2014	WORLD	EU-28	GREECE
Exports (billion US\$)	101.8	47.2	1.6		Exports (billion US\$)	157.4	68.6	1.5
Share in World (%)		46.4	1.6		Share in World (%)		43.6	1.0
Share in EU-28 (%)			3.5		Share in EU-28 (%)			2.2
AVERAGE (2005-2014)				WORLD	EU-28	GREECE		
Exports (billion US\$)				121.1	56.8	1.7		
Share in World (%)					48.2	1.4		
Share in EU-28 (%)						3.0		

Table 2. Greece's exports to World, Extra-EU, Turkey and their shares; 2005-2014

2005	WORLD	Extra-EU	TURKEY		2010	WORLD	Extra-EU	TURKEY
Exports (billion US\$)	17.7	7.8	0.9		Exports (billion US\$)	27.8	14.5	1.7
Share in World (%)		43.9	5.3		Share in World (%)		52.4	6.0
Share in Extra-EU (%)			12.1		Share in Extra-EU (%)			11.5
2006	WORLD	Extra-EU	TURKEY		2011	WORLD	Extra-EU	TURKEY
Exports (billion US\$)	21.3	9.0	1.1		Exports (billion US\$)	32.5	17.5	2.6
Share in World (%)		42.3	5.0		Share in World (%)		53.8	8.1
Share in Extra-EU (%)			11.9		Share in Extra-EU (%)			15.0
2007	WORLD	Extra-EU	TURKEY		2012	WORLD	Extra-EU	TURKEY
Exports (billion US\$)	23.4	9.5	0.9		Exports (billion US\$)	33.5	20.0	3.8
Share in World (%)		40.5	3.6		Share in World (%)		59.8	11.3
Share in Extra-EU (%)			9.0		Share in Extra-EU (%)			18.9
2008	WORLD	Extra-EU	TURKEY		2013	WORLD	Extra-EU	TURKEY
Exports (billion US\$)	31.3	14.4	1.3		Exports (billion US\$)	34.6	20.2	4.3
Share in World (%)		46.1	4.2		Share in World (%)		58.3	12.3
Share in Extra-EU (%)			9.2		Share in Extra-EU (%)			21.1
2009	WORLD	Extra-EU	TURKEY		2014	WORLD	Extra-EU	TURKEY
Exports (billion US\$)	24.4	12.1	1.2		Exports (billion US\$)	34.3	19.7	4.3
Share in World (%)		49.5	4.9		Share in World (%)		57.4	12.7
Share in Extra-EU (%)			9.9		Share in Extra-EU (%)			22.1
AVERAGE (2005-2014)				WORLD	Extra-EU	TURKEY		
Exports (billion US\$)				28.1	14.5	2.2		
Share in World (%)					50.4	7.3		
Share in Extra-EU (%)						14.1		

behind this movement. This can be related to the preference of EU consumers towards the products of new members, or price differentials between Greek products and products of new member countries, or increasing demand for Greek products by the consumers in the non-EU countries etc.

When we compare Turkish exports to Greece and Greek exports to Turkey during the period, we can say that while Turkey becomes an important export market for Greece especially after 2008, the same for Greece is not valid.

Next we analyze Turkish exports to Greek market and Greek exports to Turkish markets in terms of fragmentation of production. Fragmentation of production refers that different stages of production take place in different countries and each country specialize in the individual stage of production in which it has a comparative advantage. So, we identify in what stages of the production process Turkish and Greek exports are specialized. To do so, we use The United Nations' classification of Broad Economic Categories (BEC). BEC classification groups products according to their end-use. The classification is the following: Primary goods, Intermediate goods (Semi-finished products and parts and components) and Final goods (capital goods and consumption goods)

Table-3 and Table-4 show the share of Turkish exports to Greece and the share of Greek exports to Turkey for primary, intermediate and final goods, respectively.

Table 3. Share of Turkey's exports to Greece (%), BEC, 2005-2014

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	AVERAGE
PRIMARY GOODS	3.2	3.7	3.0	5.5	8.8	3.2	3.7	3.3	3.5	2.0	4.0
INTERMEDIATE GOODS	46.7	56.6	58.0	55.4	48.7	57.8	62.0	66.9	63.5	59.3	57.5
<i>Semi-finished Goods</i>	42.6	52.8	54.9	52.0	45.0	52.9	57.4	61.5	58.0	54.1	53.1
<i>Parts and Components</i>	4.1	3.8	3.1	3.4	3.7	4.9	4.6	5.3	5.5	5.2	4.4
FINAL GOODS	50.1	39.7	39.0	39.1	42.5	39.0	34.3	29.8	33.0	38.6	38.5
<i>Capital Goods</i>	9.0	10.9	9.7	9.4	11.5	7.7	7.4	6.4	7.1	8.6	8.8
<i>Consumption Goods</i>	41.1	28.8	29.3	29.7	31.0	31.3	26.9	23.5	25.9	30.0	29.7

According to Table-3, Turkey's exports to Greece are concentrated in intermediate goods. Moreover, the share of those goods has been increasing over time. This shows that intermediate goods imported from Turkey have become more important for production in Greece over time. However, most part of Turkish intermediate exports consists of semi-finished goods rather than parts and components. This shows that Greece does not prefer to import from Turkey the technologically independent products in order to assemble into final goods. Table-3 also shows that 38.5% of Turkey's exports to Greece are final goods, especially the consumer goods. This shows that a significant part of Turkish exports meet the demand of Greek consumers for domestic use.

Table 4. Share of Greece's exports to Turkey (%), BEC, 2005-2014

According to Table-4, Greece's exports to Turkey are concentrated in intermediate goods, especially on semi-

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	AVERAGE
PRIMARY GOODS	20.4	21.6	17.7	15.0	24.5	21.8	8.1	8.8	8.5	5.8	15.2
INTERMEDIATE GOODS	70.4	70.8	68.1	72.3	63.5	64.8	84.9	86.9	87.4	88.2	75.7
<i>Semi-finished Goods</i>	68.3	68.3	65.1	70.0	60.0	62.0	82.5	85.9	86.5	87.1	73.6
<i>Parts and Components</i>	2.1	2.5	3.0	2.3	3.5	2.8	2.4	1.1	0.9	1.1	2.2
FINAL GOODS	9.2	7.6	14.2	12.7	12.0	13.4	7.0	4.3	4.1	6.0	9.1
<i>Capital Goods</i>	2.6	2.5	4.9	6.8	5.0	6.9	2.2	1.9	1.6	3.2	3.8
<i>Consumption Goods</i>	6.6	5.1	9.3	5.8	7.1	6.5	4.7	2.4	2.5	2.8	5.3

finished goods. Similar to Turkish exports to Greece, the share of parts and components in Greek exports to Turkey are very small. So, we can say that both Turkey and Greece are not assembly countries for each other. In other words, we can claim that international fragmentation of production, a recently popular way to acquire high-technology and benefit from technological spillovers, does not play a crucial role in trade relations between Turkey and Greece. Table-4 also shows that final goods constitute only 9.1% of Greece's total exports to Turkey. So we can say that Greek exports are not intended to meet final demand of Turkish consumers.

3. Methodology

The methodology of analyzing export performances of Greece and Turkey involves the computation of static and dynamic RCA indexes

The RCA index by Balassa (1965)

Balassa (1965) assumes that trade patterns reflect both relative costs and differences in non-price factors. Then, he suggests that comparative advantage can be ‘revealed’ by observing trade patterns. He formulated the RCA index as follows:

$$RCA_{ij} = \frac{X_{ij} / X_i}{X_{wj} / X_w} \quad (1)$$

where RCA_{ij} is the revealed comparative advantage index for commodity j of country i; X_{ij} is the exports of commodity j of country i; X_i is the total exports of country i; X_{wj} is the world exports of commodity j; and X_w is total world exports. Rearranging the terms on the right-hand side, it can be shown that the RCA_{ij} index compares “country i’s share in the world market for commodity j” to “its share in the world market for all commodities”.

The value of the RCA index varies between zero and infinity at product level. When RCA is higher (lower) than 1, “the share of country i’s exports of commodity j in its total exports” is higher (lower) than “the share of world’s exports of commodity j in world’s total exports”; and hence, country i has a revealed comparative advantage (disadvantage) in commodity j.

Dynamic RCA index

Edwards and Schoer (2002) developed an index to analyze the changing comparative advantages over time. They called it the “Dynamic RCA index”. They built the index by decomposing the growth in RCA into its components. Formally, by taking the logs of the conventional RCA index and then by total differentiation, they decomposed the growth in the RCA index as follows:

$$\frac{\Delta RCA_{ij}}{RCA_{ij}} = \frac{\Delta(X_{ij}/X_i)}{X_{ij}/X_i} - \frac{\Delta(X_{wj}/X_w)}{X_{wj}/X_w} \quad (2)$$

In this formula, the first term on the right-hand side reflects the growth in the share of commodity j in total trade of country i, and the second term reflects the growth in the share of commodity j in world trade.

Observing the relative trends in the share of commodity j in country i and world exports, Edwards and Schoer (2002) analyze the market positions of the products. Edwards and Schoer (2002) classification of products with the adjustments by Ekmen-Özçelik and Erlat(2014)¹ is summarized in Table- 9 below. In this ‘so-called ‘dynamic RCA index’, export goods are categorized into six groups as (i) rising stars, (ii) falling stars, (iii) lagging retreat, (iv) leading retreat, (v) lagging opportunity, (vi) lost opportunity

In this approach, thus, we compare “the increase or decrease in the share of a product in a country’s total exports (Turkey or Greece)” and “the increase or decrease in the share of that product in world’s total exports to Turkey or Greece”. The most preferred location for a product is “rising star” since the market share of the country is increasing in products for which demand is growing worldwide. The cases of “rising stars” and “leading retreat” are evaluated as “successful restructuring of exports”, while the cases of “falling stars” and “lost opportunity” are evaluated as “poor restructuring of exports”.

3. Results

The results of our analysis are summarized in Table-6 and Table-7 for Turkey and Greece, respectively.

Table-6 shows the number of over-unity RCA products in Turkish exports to Greece, their percentages in the total number of exported products to Greece from Turkey and shares of these exports in total exports of Turkey to Greece for overall industries and each SITC industries.

¹For details, see Ekmen-Özçelik and Erlat (2014)

Table 5. Market Positions of Exports according to Dynamic RCA index

Share of commodity j in country i's exports		Share of commodity j in World exports	
↑	>	↑	Rising Stars
↑		↓	Falling Stars
↓	<	↓	Lagging Retreat
↓		↑	Lost Opportunity
↓	>	↓	Leading Retreat
↑	<	↑	Lagging Opportunity

Source: Edwards and Schoer (2002)

Table 6. Export Performance of Turkey in Greece Market, Static and Dynamic RCA indices, Total and SITC industries, 2005-2014.

	Average Number of RCA Products	Average % of RCA products in Total # of Exported Products	Share of RCA products in Total Exports	Dynamic RCA (% of total exports)					
				Rising Stars	Falling Stars	Leading Retreat	Lagging Retreat	Lagging Opp.	Lost Opp.
TOTAL	631	40.1	88.1	35.4	17.3	7.7	4.0	16.1	19.4
SITC-0	52	41.5	92.9	12.3	7.5	8.1	0.0	32.9	39.2
SITC-1	1	20.3	66.8	5.8	8.4	0.4	84.7	0.6	0.0
SITC-2	34	53.5	93.6	14.0	6.2	29.6	2.6	27.3	20.4
SITC-3	4	71.2	57.5	97.4	0.0	0.6	0.0	0.4	1.6
SITC-4	1	30.6	70.3	6.1	0.0	0.0	0.0	41.6	52.3
SITC-5	57	32.7	79.7	78.1	5.5	0.3	0.1	6.9	9.1
SITC-6	271	53.1	95.9	31.9	11.4	8.6	2.9	25.0	20.1
SITC-7	106	27.9	79.7	27.8	48.7	4.5	8.0	2.0	8.9
SITC-8	105	34.5	86.9	15.1	11.7	13.8	4.2	18.2	37.0

According to Table-6, during the period 2005-2014, Turkey has 631 over-unity RCA products averagely. These 631 RCA products constitute 40.1% of Turkey's total number of exported products and the exports of these 631 products constitute 88.1 per cent of Turkey's total exports to Greece.

In terms of dynamic RCA indices, Table-6 indicates that 35.4% of Turkey's total exports fall in the category of "rising stars", 17.3% in "falling stars", 7.7% in "leading retreat", 4.0% in "lagging retreat", 16.1% in "lagging opportunity" and 19.4% in "lost opportunity". We see that the highest part of Turkish exports is classified as rising stars. This is a preferred location for Turkey since her market share is increasing in products for which Greek demand is also growing. So, the highest share of "rising stars" is good news for Turkey since a considerable portion of Turkish exports consist of promising products in Greece market. On the other hand, nearly 20 per cent of Turkish exports are classified in lost opportunity. So, 20 per cent of Turkish exports can be considered in the worst position since share of Turkish exports is falling in products for which demand in Greek market is rising.

Table-6 also shows the export performance of Turkey in each SITC industry. According to Table-6, in SITC-0, 52 over-unity RCA products constitute 93% of Turkey's total exports to Greece. Also, 39.2 per cent of Turkey's total SITC-0 exports fall in the category of lost opportunities. That is to say, Turkey is losing market share in most of the SITC-0 products, for which Greek demand is growing. In addition, 33 per cent of Turkey's total SITC-0 exports fall in the category of lagging opportunities. This shows that a considerable portion of Turkey's SITC-0 exports gaining share for the products for which Greek demand is also growing, however this gain is not sufficient to move this sector into rising stars. Therefore, Turkey should reconsider its export policy in SITC-0 sector to exploit the opportunities in Greece market.

<https://sites.google.com/site/icqqmeas 2015>

According to Table-6, in SITC-1 sector, only one product has over-unity RCA. This product constitutes 66.8% of Turkey's total SITC-1 exports to Greece. When we analyze this sector according to dynamic RCA index, we see that 84.7 per cent of Turkey's SITC-1 exports fall in the category of lagging retreat. This implies that a considerable portion of Turkish SITC-1 exports are declining in terms of their share in the Greece market. In fact, "retreat" can be seen as a rational way of restructuring away from the products with declining demand by Greece, and hence the year-by-year decrease in the exports of these products can be a good development for Turkey, provided that the rate of this decrease accelerates so that Turkey can restructure its exports from 'lagging retreat' to 'leading retreat'.

In SITC-2 sector, 34 over-unity RCA products constitute 93.6% of Turkey's total exports in this sector. Table-6 also shows that 29.6 per cent of Turkey's total SITC-2 exports located in leading retreat. This is a successful position since Turkey is decreasing its SITC-2 exports year by year in accordance with the declining demand in Greece. On the other hand, the share of exports located in lagging opportunity is very close to that in leading retreat. This means that in this sector, Turkey is gaining share for the products for which demand of Greece is also growing, however this gain is not sufficient to move Turkey to an optimal dynamic position.

In SITC-3 sector, 4 products have over-unity RCA coefficients and exports of these four products constitute 57.5 per cent of the Turkey's total exports in SITC-3 sector. Also, most part of Turkish exports in this sector is located as rising stars. This shows that Turkey has significant potential in this sector.

In SITC-4 sector, there is only one product having over-unity RCA and exports of this product constitute 70 per cent of Turkey's total SITC-4 exports to Greece. Also, Turkey's SITC-4 exports are located in lagging opportunity and lost opportunity. There are significant export opportunities for this sector in Greek market but Turkey is unable to exploit these opportunities.

SITC-5 has 57 over-unity RCA products. These products constitute 32.7% of Turkey's total number of exported products in this sector and 79.7 per cent of Turkey's total SITC-5 exports to Greece. So, we can say that SITC-5 sector has a concentrated structure. Also, 78.1% of Turkey's SITC-5 exports to Turkey are located in rising stars. This shows a successful positioning of Turkey's SITC-5 exports in Greece.

In SITC-6 sector, there are 271 over-unity RCA products. These products constitute 93.6 per cent of Turkey's total SITC-6 exports to Greece. Most part of SITC-6 exports is located in rising stars. Lagging opportunity and leading retreat follow rising stars. So, we can say that despite the successful position of Turkish exports to Greece in this sector, Turkey has still unexploited opportunities in this market.

In SITC-7, there are 106 over-unity RCA products. These products constitute 79.7 per cent of Turkey's total SITC-7 exports to Greece. Also, nearly half of Turkey's SITC-7 exports fall in the category of falling stars. This shows that Greece's demand for the products of this sector has been declining while Turkey's exports in this sector have been increasing year by year. We can suggest that most probably it would be more useful for Turkey to channel its high export potential in this sector to other markets as well as Greek market.

In SITC-8, there are 105 over-unity RCA products. These products constitute 86.9 per cent of Turkey's total SITC-8 exports to Greece. Also 37 per cent of Turkey's SITC-8 exports to Greece are located in lost opportunity. Lagging opportunity follows it. This shows that in this sector Turkey is unable to exploit the opportunities in Greek market.

Now, we evaluate market positions of Turkey's 5-digit exported products with the highest RCA coefficients in each sector.

SITC-05775 (Hazelnuts or filberts, freshed or dired) and SITC-08113 (forage kale and similar forage products) have the highest RCA coefficients in SITC-0 sector. However, dynamically, these products are classified in lost opportunity. The decrease in the share of these products in Turkey's total SITC-0 exports year by year, despite the increase in their share in total world exports to Greece, has led these products to such an unsuccessful position. SITC-06195 (pure fructose) is also a product having high RCA coefficient but it is located in "lagging opportunity". This shows that Turkey has a potential to increase its exports of this product and at the same time Greek market has opportunities for the countries to increase the imports of this product. But Turkey is unsuccessful to use its export potential and to exploit the opportunities in Greek market.

SITC-1211 (Tobacco, not stemmed) is the only over-unity RCA product in this sector and it is located in lagging retreat. That is to say, the share of Turkey's SITC-1211 exports to Greece is decreasing in accordance with the decreasing demand for this product in Greek market. But Turkey should accelerate the rate of this decrease in order to restructuring its export composition successfully towards the products for which Greek demand is increasing.

SITC-27824 (Natural magnesium carbonate) is the product having highest RCA among all the products exported from Turkey to Greece. And this product is located in lagging opportunity. We can suggest that Turkey should increase its exports of this product faster in order to utilize the opportunities in Greek market. SITC-

2223 (Cottonseeds) is also an important product for Turkey in terms of having a high RCA coefficient but this product is located in lost opportunity. This means that Turkey's export of this product has been decreasing while demand for this product in Greece has been increasing year by year. In other words, So, Turkey is unable to adjust its cottonseeds exports in accordance with the increasing demand for this product in Greece.

SITC-32221 (Ignite, pulverized or not) and SITC-3421 (Propane, Liquefied) are over-unity RCA products and dynamically they are located in rising stars. These are some of Turkey's promising export products in SITC-3 sector.

SITC-42299 (Palm oil and its fractions) is an over-unity RCA product and it is located in lagging opportunity. Also, SITC-42171 (Colza or Mustard Oil, Crude) and SITC-4311 (Animal or vegetable fats and oils) are products whose RCA coefficients are very close to 1 on average and higher than 1 in some years. Those products are located in lost opportunity. So, since demand for these products are increasing in Greece, Turkey has an opportunity to increase its export revenues by using its potential rationally and increasing exports of these products to Greek market.

SITC-52361 (Phosphinates and phosphonates), SITC-55431 (Polishes, creams and similar preparations for footwear and leather), SITC-51372 (Esters and Acetic Acid) and SITC-51221 (Ethylene glycol) are some of the over-unity RCA products and they are located in rising stars. So, these are promising products for Turkey in SITC-5 sector. On the other hand, SITC-51383 (Dioctylorthophthalates) and SITC-51241 (Phenol) are also examples of high RCA products but they are located in lost opportunity. This shows that demand for these products in Greece is increasing while Turkish exports are decreasing year by year. So, we can say that in these products, Turkey is unable to utilize export opportunities to Greece market

SITC-65185 (Yarn of artificial staple fibers), SITC-67941 (Iron and steel line pipe used for oil gas or gas pipelines) and SITC-68427 (Aluminum and aluminum alloy tube and pipe fittings) are some of the products having high RCA and located in rising stars. Therefore, these are promising products for Turkey in Greece market. On the other hand, SITC-66121 (Cement Clinkers), SITC-65159 (Synthetic filament yarn), SITC-65952 (Textile floor coverings, woven), SITC-65134 (Cotton yarn), SITC-65529 (Knitted or crocheted fabrics) are also products with high RCA but they are located in lagging opportunity. We can claim that in order to benefit most from the opportunities in Greek market, Turkey should increase its exports of these products.

SITC-78311 (Public-transport type passenger motor vehicles with compression-ignition internal combustion engine), SITC-78683 (Trailers and semi-trailers,n.e.s.), SITC-73313 (Machines, bending folding straightening metal), SITC-72127 (Machines for cleaning, sorting or graining seed and grain) and SITC-77589 (Parts of electrothermic appliances, n.e.s.) are some products having high RCA and located in rising stars. So, these are promising products for Turkey in SITC-7 sector. On the other hand, SITC-77328 (Insulating fittings for electrical machines) are SITC-72721 (Machinery for the extraction or preparation of animal or fixed vegetable fats) are products having high RCAs but located in falling stars. This shows that Turkey has continued to increase its exports of these products, without considering the fall of these products in the Greece market. This situation is not sustainable in the medium-to-long run. In a dynamic view, Turkey should direct its export potential in these products to other markets.

SITC-89985 (Slide fasteners), SITC-84422 (Ensembles) and SITC-84429 (Other hosiery) are some of the products having high RCA and located in rising stars. On the other hand, SITC-81211 (Radiators, and parts thereof), SITC-82115 (Seats, other than garden seats or camping equipment, convertible into beds) and SITC-82118 (Other seats) are some RCA products but located in lost opportunities. In other words, Turkey's share has been declining despite the fact that the Greece's demand for these products has been rising. Of course, this is an undesirable situation for Turkey. Highest RCAs of these products show the favorable circumstances for Turkey. Turkey should use its capacity fully to increase the exports of these products and move them into an optimal position rather than exhibiting the 'lost opportunity' position.

Next, we analyze the export performance of Greece in Turkish market based on static and dynamic RCA indices. Table-7 shows the number of over-unity RCA products in Greece's exports to Turkey, their percentages in the total number of exported products to Turkey from Greece and shares of these exports in total exports of Greece to Turkey for overall industries and each SITC industries.

Table-7 shows that Greece in Turkish markets has significant unexploited opportunities in most of the sectors. In total, Greece has 246 over-unity RCA products. These 246 RCA products constitute only 27.5 % of Greece's total number of exported products and the exports of these 246 products constitute 86.2 per cent of Greece's total exports to Turkey. We can conclude that Greece has a very concentrated export structure in Turkish market. This concentrated export structure is observed in most of the SITC sectors. In terms of dynamic RCA indices, Table-7 indicates that a significant part of Greece's total exports to Turkey fall in the category of "lagging opportunity". This means that Greece is gaining share in Turkish market for the products for which Turkey's

Table 7. Export Performance of Greece in Turkish Market, Static and Dynamic RCA indices, Total and SITC industries, 2005-2014.

	Average Number of RCA Products	Average % of RCA products in Total # of Exported Products	Share of RCA products in Total Exports	Dynamic RCA (% of total exports)					
				Rising Stars	Falling Stars	Leading Retreat	Lagging Retreat	Lagging Opp.	Lost Opp.
TOTAL	246	27.5	86.2	9.3	4.6	1.3	1.1	63.9	19.8
SITC-0	40	60.5	83.8	24.1	7.4	1.4	0.1	45.4	21.6
SITC-1	4	32.5	87.0	6.2	1.7	0.3	0.0	85.2	6.5
SITC-2	25	53.1	89.4	3.0	1.8	1.4	0.3	1.3	92.2
SITC-3	3	50.9	90.7	2.6	0.1	0.0	0.0	97.3	0.0
SITC-4	3	74.3	62.1	3.4	34.1	0.0	2.9	59.3	0.3
SITC-5	37	30.4	81.9	14.8	16.1	1.5	0.7	4.0	63.0
SITC-6	68	27.6	79.5	36.1	14.3	4.2	11.3	20.8	13.3
SITC-7	37	16.7	62.0	36.7	19.5	5.3	1.0	8.7	28.7
SITC-8	29	17.5	58.7	31.9	21.2	23.4	0.9	9.3	13.3

demand is growing however this gain is not sufficient to move Greece to an optimal dynamic position. This finding is also valid for SITC-0, SITC-1, SITC-3 and SITC-4 sectors. This shows that in overall and in these sectors, Greece is “lagging” prominently in materializing the “opportunities” in Turkish market. However, Greece can easily move itself to an optimal position since it has an improving trend in terms of increasing share of its exports for the sectors for which Turkey’s demand is also growing. In SITC-2 and SITC-5 sectors, significant shares of Greece’s exports are located in lost opportunity. This shows that in these sectors Greece’s share has been declining despite the fact that Turkey’s demand for the products of this sector has been rising. This is not a desirable situation for Greece. SITC-6 has 68 over-unity RCA products. These products constitute 27.6 per cent of Greece’s total number of exported products in this sector and 79.5 per cent of Greece’s total SITC-6 exports to Turkey. Highest part of Greece’s SITC-6 sector is located in rising stars, and lagging opportunity follows it. This shows that even Greece is in a successful position in this sector; it has opportunities those are not utilized fully. SITC-7 and SITC-8 sectors are also located in rising stars but over-unity RCA exports of both sectors constitute a relatively lower share of Greece’s total exports of those sectors. Therefore, by increasing the number of exported products might be a way of increasing export performance of Greece in Turkish market.

Now, we evaluate market positions of Greece’s 5-digit export products with the highest RCA coefficients in each sector. SITC-05895 (Apricots, cherries and peaches) and SITC-0581 (Jams, fruit jellies, marmalades, fruit, being cooked preparations) are rising stars of Greece in SITC-0 sector. These products also have very high RCA coefficients. So, these are promising products of Greece in Turkish market. On the other hand, SITC-05793 (Apricots, cherries, peaches, plums and sloes, fresh), SITC-09813 (Cooked fruit preparations, homogenized) and SITC-05752 (Grapes, fresh or dried) are products having high RCAs but located in lagging opportunities.

SITC-12232 (Smoking tobacco), SITC-11102 (Waters containing added sugar or other sweetening matter or flavoured, and other non-alcoholic beverages, n.e.s.) are over-unity RCA products and they are located in rising stars. On the other hand, SITC-11101 (Waters, including natural or artificial mineral waters and aerated waters, not containing added sugar or other sweetening matter nor flavoured; ice and snow) and SITC-1222 (Cigarettes containing tobacco) are some of high RCA products which are located in lagging opportunities.

SITC-2223 (Cotton seeds), SITC-25113 (Waste and scrap of paper or paperboard made mainly of mechanical pulp) are the highest RCA products in SITC-2 sector and these products are also located in rising stars. So, they are promising export products of Greece in Turkish market. On the other hand, SITC-27323 (Gypsum; anhydrite), SITC-27861 (Granulated slag from the manufacture of iron or steel) and SITC-2631 (Cotton (other than linters), not carded or combed) are also some of the highest RCA products but located in lost opportunity.

SITC-33541 (Petroleum bitumen and other residues of petroleum oils or of oils obtained from bituminous minerals) and SITC-3510 (Electric current) have high RCAs in SITC-3 sector and they are located in rising stars. On the other hand, SITC-334 (Petroleum oils and oils obtained from bituminous minerals (other than crude); preparations, n.e.s.) constitute more than half of Greece’s SITC-3 exports to Turkey and it has over-unity RCA but located in lagging opportunity. So, we can conclude that Greece should use its resources to support the production and export of this product to increase the export revenues from Turkish market.

SITC-42121 (Crude cottonseed oil) is a product having highest RCA in SITC-4 sector and it is located in rising stars. This product is the only promising product of Greece in this sector.

SITC-55133 (Resinoids) is the highest RCA product in SITC-5 sector and it is located in rising stars. On the other hand, SITC-53119 (Other synthetic organic colouring matter) and SITC-57211 (Polystyrene expansible) are also high RCA products but located in lost opportunities. We can claim that Greece should restructure its exports of these products in order to enjoy the benefits in Turkish market.

SITC-68271 (Tubes and pipes), SITC-66334 (Other articles of cement, of concrete or of artificial stone, reinforced or not) and SITC-66134 (Marble, travertine and alabaster and articles thereof, simply cut or sawn, with a flat or even surface) are over-unity RCA products and they are located in rising stars. On the other hand,

SITC-63423 (Particle board and similar board of ligneous materials other than wood, whether or not agglomerated with resins or other organic binding substances) is the highest RCA product in SITC-6 sector but located in lost opportunity. This shows that demand for this product in Turkey has been increasing year by year but Greek exports have been decreasing despite the high export potential of Greece for this product. SITC-6132 (Heads, tails, paws and other pieces or cuttings, not assembled) is another product with very high RCA but located in lagging opportunity.

SITC-74564 (Agricultural or horticultural appliances for projecting, dispersing or spraying liquids or powders), SITC-79328 (Cruise ships, excursion boats and similar vessels principally designed for the transport of persons; ferry-boats of all kinds) and SITC-77521 (Refrigerators, household-type (electric or other), whether or not containing a deep-freeze compartment) are highest RCA products of Greece that are located in rising stars. So, these are some of the promising export products for Greece. On the other hand, SITC-74493 (Parts suitable for use solely or principally with the machinery of headings), SITC-79351 (Dredgers), SITC-79399 (Floating structures, n.e.s), and SITC-74341 (Table, floor, wall, window, ceiling or roof fans) are also high RCA products but located in lost opportunity.

SITC-84831 (Articles of fur skin), SITC-89732 (Articles of goldsmiths' or silversmiths' wares, and parts thereof, of precious metal or of metal clad with precious metal), SITC-8424 (Dresses) and SITC-84322 (Ensembles) are high RCA products and located in rising stars. These are some of the promising products for Greece. On the other hand, SITC-89221 (Newspapers, journals and periodicals, whether or not illustrated or containing advertising material) is the highest RCA product in SITC-8 sector but located in falling stars. This shows that Greece has been increasing its exports of these products in a shrinking market. This is not an optimal position for a product especially in the long run. Greece should direct its export potential to the other markets whose demand for this product has been increasing over time.

4. Conclusion

In this study, we evaluated Turkey's export performance in Greek market and Greece's export performance in Turkish market from both static and dynamic points of view. We based our evaluation on the RCA index (due to Bela Balassa, 1965) and on the analysis of dynamic RCA index (due to Edwards and Schoer, 2002).

Our results show that Turkey and Greece are different countries in terms of the variety of products in which they have comparative advantages, whereas they are relatively more homogeneous in terms of the contribution of the RCA-exports to their total export earnings. In other words, Turkey and Greece may have many or few RCA sectors; however, the major source of export revenue remains to be the RCA sectors for both of the countries.

We can conclude that for both countries, they are unexploited export opportunities in each market especially for the products they have already over-unity RCAs. So, they can increase their export earnings easily, because each-RCA product is a potentially promising export-earner. In other words, each country has a chance to improve their export performance by specializing more in the products in which they have already RCA. Also, in some sectors, there is an opportunity, especially for Greece, to improve export earnings by exporting new products.

All in all, for both countries, a potential loss of ground in each market can be avoided and also their export performance can be improved in line with the recent dynamics in these markets.

References

- Balassa, B.(1965). Trade Liberalization and 'Revealed' Comparative Advantage. The Manchester School. Vol.33. pp. 99-123.
- Edwards, L. and Schoer, W. (2002), Measures of Competitiveness: A Dynamic Approach to South Africa's Trade Performance in the 1990s. The South African Journal of Economics. Vol. 70, No. 6 6, pp. 1008-1046.
- Ekmen Özçelik, S. and Erlat, G. (2014), Turkey's Comparative Advantages and Dynamic Market Positioning in the EU Market. Emerging Markets Finance & Trade. Vol.2014, No.5 (September-October), pp. 17-40.

<https://sites.google.com/site/icqqmeas2015>

**COMPARISON OF FIXED AND RANDOM EFFECTS META-ANALYTIC MODELS WITH
REGARDS TO A DATA SET OF CLONIDINE FOR DIARRHEA**

Fragkos Konstantinos

University College London, Department of Medicine

e-mail: Constantinos.Fragkos.09@ucl.ac.uk

Frangos Christos C.

Technological Educational Institute of Athens Department of Business Administration

e-mail: cfragos@teiath.gr

ABSTRACT

STATISTICAL ANALYSIS OF THE PREDICTIVE FACTORS OF WORK RELATED INJURIES IN GREEK FIRMS: DANGEROUS CONSEQUENCIES OF THE ECONOMIC CRISIS

Christos C. Frangos

Technological Educational Institute of Athens, Dept . of Business Administration,
e-mail: cfragos@teiath.gr

Constantinos C. Fragkos

University College, London, Department of Medicine,
e-mail: Constantinos.Frangos.09@ucl.ac.uk

Sotiropoulos Ioannis

Technological Educational Institute of Athens, Dept. of Auditing and Finance,
e-mail: sotiropoulosioan@yahoo.gr

ABSTRACT

The strong commitment of the management of a company to the maintenance of a safe work environment is an important stimulus for its workers to be loyal to the company and to make every effort to keep the company profitable. In this paper we investigate by a sample survey in a sample of 763 workers who work in heavy industries in Greece the factors which contribute to the occurrence of accidents at work. An exploratory factor analysis, Reliability Analysis and Multinomial Logistic Regression revealed the following factors which increase the frequency of occurrence of accidents at work:

Exposure of the workers to physical or technical dangerous conditions at work, lack of inspections by the Government's Safety Inspectors, lack of training programs designed by the company in order to protect the workers from harmful machinery and to show to them the proper use of tools, lack of proper maintenance of machinery and negligence in the part of the company in following the recommendations of safety inspectors. Cronbach's Alpha for the variables of the questionnaire referring to the factors contributing to the occurrence of accidents is 0,81. A Multinomial Logistic Regression with dependent variable the question: did you have in the past an accident at work, was carried out and revealed that the independent variables: lack of inspection of the machinery of the company, lack of proper training procedures for the workers of the company, inadequate work experience of the workers, lack of proper supervision and nature of work, were statistically significant. The sample survey was carried out in January of 2013 and it shows that the Safety Inspectors, which were public employees, should make every effort to keep, with their efficient inspection visits, the industrial base of this country functioning properly in order to decrease the unemployment level in times of deep financial, social and political crisis in Greece.

Key Words: accidents at work, industrial companies, safety inspectors, Logistic Regression, Factor Analysis, Cronbach's Alpha.

1. Introduction

The aim of the present paper is to identify and study predictors of work related injuries in a sample of 737 workers in Greece.

The Health and Safety Executive (2014) of the British Statistical Service, estimates that Greece has the lowest percentage of businesses with a health and safety policy in place (figure 1) and the workers in Greece think at percentage of 39%, which is the fourth highest in EC that their health or safety is at risk because of their work. The fatal injury rate from accidents at work, excluding road traffic accidents, is 0,9 (per 100, 000 workers) in Greece, whereas the European mean rate is 1, 5, (EUROSTAT, 2012). In United States and elsewhere, several researchers have recently attempted to estimate the magnitude and the related costs of occupationally-related mortality (Leigh et al., 1997), (Nurminen and Karjalainen, 2001).

Considering the United States, (Leigh et al., 1997) estimated that 65, 800 deaths per year can be attributed to occupational injury or illness with a total cost to society of over \$23 billion. Hence, it is very important to examine the causes of work related injuries (WRI) and to discuss measures preventing accidents at work. Despite the high rates of work related accidents, research is limited in this area which aims at identifying the likely causes of WRI.

Steenland et al. (2003) discuss the magnitude of United States Mortality from selected causes of death associated with occupation. They conclude that occupational deaths are the 8th leading cause of death in the United States after diabetes (64, 751) but ahead of suicide (30, 575) and greater than the annual number of road traffic accidents.

Bull et al.(2002) identify the significant health, environmental and safety (HES) factors in small enterprises as follows: personal protection devices and safety equipment on machines. They conclude that safety inspection of machinery is the most effective means of attaining the desired result of reducing work related injuries.

Hofmann and Stetzer (1998) identify the lack of safety climate and communication as the underlying causes of accidents at work. They conclude that larger organizational factors –such as safety climate and communication about safety measures between supervisors and workers can influence the interpretation of information emerging from investigations of the special circumstances in which work related accidents occur.

Frone (1998), investigates the work related accidents among young employees and identifies 5 general categories of risk factors, as follows: demographic elements of the employees, personality, employment, health and substance use. According to Frone (1998) the statistically significant risk factors for WRI were gender, negative affectivity, job tenure, exposure to physical hazards, excessive workloads, job boredom, poor physical health and on-the-job use of substances.

Salminen et al. (2013) compared organizational and individual factors as predictors of workplace accidents frequency. They conclude that the influence of organizational factors is stronger than that of individual factors. Individual factors were gender, age, education, marital status and job tenure. The injury risk of males was 3.3 times higher than that of females. Men had more serious injuries than women as the risk of fatal injuries is 13 times higher for males than for females (Salminen, Saari, Saarela, and Rasanen, 1992). Organizational factors were job satisfaction, (Locke, 1976). Perceived organizational support (POS) refers to the impression of workers about their managements' or organizations' contributions and concern for their well being(Aselage and Eisenberger, 2003). There is a positive association between supportive perceptions and workers' level of job satisfaction, safety performance, organizational involvement and affective commitment (Michael et al.2005;Gyekye and Salminen, 2007).POS refers to the support of supervisor and co-workers and it is an important factor of accident frequency. (Rhoades and Eisenberger, 2002).Salminen et al. (2013) develop a theoretical model about the relationships between organizational and individual factors related to occupational accidents.

DeJoy et al. (2003)identify three factors of safety climate: environmental conditions, safety-related policies and programs and general organizational climate. They conclude that safety climate is a leading indicator of the safety level of the organization or the workplace.(Mearns and Flin, 1999).

Zolnierczyk-Zreda et al. (2014) support by a large cross-sectional study the view that mental ill health is the most frequent cause of long-term sickness absence and disability retirement in Denmark and long working hours are the cause of mental ill health. They advocate that even 'moderate overtime'(41-48 workhours/week) are the source of both anxiety and depression.

Gimeno et al. (2004) investigate the relation between occupational and organizational factors and work related injuries(WRI) among Hospital employees in Costa Rica.They find that workers exposed to chemical and physical hazards have higher WRI rate than non-exposed workers.

Dembe, et al. (2004) consider the association of the factors: overtime and long work hours and WRI.They support the view that long hours and shift work are increasing the likelihood of a WRI.

Roelofs et al.(2011) report that Hispanic workers in construction projects have higher rates of injury than workers of other ethnicities. They conclude that the key to fewer WRI is better training of supervisors and workers and better enforcement of workplace standards.

In this paper, we find two new variables that contribute significantly to the increase of WRI in Greece: Few and not properly organized safety inspections of workplaces by the Government Inspectorate and no compliance of the companies concerned with the recommendations of the safety inspectors because of the high costs for keeping a safety environment. These conclusions are the results of detailed statistical analysis of a sample survey among 763 workers in Greece during January 2013. We should point out that the Greece is in the middle of a deep financial, social, political crisis which has a further result of a health and workplace safety crisis. In Chapter 2, we describe the method of research through a questionnaire. In Chapter 3 we present the statistical analysis of the results of the sample survey. In Chapter 4, we discuss our findings and in Chapter 5 we present the final conclusions of the sample survey.

2. Method

2.1 Sample and Procedure

We have carried out a sample survey among 763 workers in Greece, trying to identify the predictors of Work Related Injuries (WRI). 259 respondents were women and 498 were men. 6 respondents did not answer the question referring to Gender. Their age was as follows: 261 were 17-29 years of age, 221 were 30-39 years of age, 178 were 40-49 years, 86 were 50-59 years of age and the rest of the workers were either less than 17 years of age or more than 59 years of age. Most of the workers(670) were Greek, 49 workers were from Albania, 14 from Roumania, 7 from Boulgaria and the rest from African Countries. The statistical analysis of the questionnaires has been carried out with the help of SPSS 21.0, (Pallant, 2007).

3. Statistical Analysis

3.1 χ^2 tests of independence

We perform χ^2 tests of independence in order to test the hypothesis:

H0: The variable: did you have in the past a Work Related Injury (WRI)

Is independent of the variable V_k

H1:: The variable V: did you have in the past a Work Related Injury (WRI)

Is dependent of the variable V_k ,

Where

VK (K=1,n) is a demographic variable or a variable related to the characteristics of the organization, or the personality of the worker or the safety conditions of the environment or the regulations of the government concerning WRI's.

The following table shows the results of the χ^2 tests:

Table 1. χ^2 tests of independence. χ^2 statistic, Degrees of Freedom, p-value, Level of significance: 0, 05.

Variable V_k	Variabile V: did you have in the past a work related injury ?	X2 Statistic	Degrees of Freedom	p-value
Demographic				
1.Gender		23, 53	1	0, 000
2.Age		5, 37	5	0, 370
3.Nationality		19, 37	10	0, 040
Employment				
4.Number of Workhours per week		30, 23	8	0, 000
5.Nature of work		61, 70	17	0, 000
6.Organization providing Job		115, 60	14	0, 000
7.Heavy workload		23, 99	1	0, 000
8.Exposure to Physical or Technical hazards		33, 23	1	0, 001

9.Unhealthy work		23, 08	1	0, 000
10.Existence of Safety Equipment		22, 10	2	0, 000
11.Supervision		7, 70	4	0, 100
12.Job boredom		32, 87	4	0, 000
13.Knowledge of nature of work		8, 37	4	0, 050
14.Supervisor conflict		24, 40	4	0, 000
15.Coworker conflict		22, 63	4	0, 000
16.Work and study conflict		19, 47	5	0, 002
17.Job satisfaction		16, 78	3	0, 001
Personality				
18.Lack of concentration		23, 31	3	0, 001
Health				
19.Depression		29, 21	3	0, 001
20.Feeling of helpless person		25, 53	4	0, 001
21.Lack of sufficient sleep		12, 20	3	0, 007
22.Work and family economic problems conflict		3, 67	1	0, 050
Drink consumption				
23.Consumption of alcoholic drinks on-the-job		18, 26	5	0, 003
Safety Regulations and Market Categories				
24.Market Category of Business		43, 45	21	0, 003
25.Frequent safety inspections from government inspectors		9, 84	5	0, 080

It is interesting to note that when there is 1 inspection per 2 months from the safety inspectors, the percentage of workers who did not have a WRI in the past in a private company which is a gymnasium is 80%, whereas the percentage of workers who had a WRI under the same conditions is only 20%.

3.2 Nonparametric Spearman Correlations

The following table shows the Spearman Correlation Coefficients between the each one of the 25 variables of section 3.1 and the variable: Did you have in the past a WRI?

Table 2. Intercorrelations, Level of significance: 0, 05

Variable Vk	Variable V: Did you have in the past a WRI?	correlation	p-value
Demographic			
1.Gender		0, 177	0, 00
2.Age		0, 009	0, 810
3.Nationality		0, 064	0, 078
Employment			
4.Number of Workhours per week		0, 086	0, 019
5.Nature of work		0, 046	0, 211
6.Organization providing Job		-0, 195	0, 000
7.Heavy workload		0, 183	0, 000
8.Exposure to Physical or Technical hazards		0, 213	0, 000
9.Unhealthy work		0, 178	0, 000
10.Existence of Safety Equipment		0, 167	0, 000
11.Supervision		0, 058	0, 116
12.Job boredom		0, 105	0, 004

13.Knowledge of nature of work		0, 109	0, 003
14.Supervisor conflict		0, 173	0, 000
15.Coworker conflict		0, 129	0, 000
16.Work and study conflict		-0, 136	0, 000
17.Job satisfaction		-0, 106	0.000
Personality			
18.Lack of concentration		0, 150	0, 000
Health			
19.Depression		0, 030	0, 413
20.Feeling of helpless		0, 179	0, 000
21.Lack of sufficient sleep		0, 109	0, 003
22.Work and family economic problems conflict		0, 070	0, 055
Drink consumption			
23.Consumption of alcoholic drinks on-the-job		0, 065	0, 074
Safety Regulations and Market Categories			
24.Market Category of Business		-0, 070	0, 058
25.Frequent safety inspections from government inspectors		-0, 193	0, 000

3.3. Factor Analysis

The 25 items of the Questionnaire for identifying the predictors of WRI, which are shown in Table 1 were subjected in Principal Component Analysis(PCA) USING spss Version 21. Prior to performing PCA the suitability of data for Factor Analysis was assessed. Inspection of the Correlation matrix revealed the presence of many coefficients of .5 and above. The Kaiser-Meyer-Olkin value was 0, 77, exceeding the recommended value of 0, 6(Kaiser, 1970, 1974) and Bartlett's Test of Sphericity(Bartlett 1954) reaching statistical significance, supporting the factorability of the correlation matrix.

Principal Components Analysis revealed the presence of five components with eigenvalues exceeding 1, explaining 17, 14%, 9, 03%, 7, 14%, 5, 79% and 5, 23% of the variance respectively.

We name the five components as follows:Personality Characteristics, Workload-age, Job conditions of organization, Communication of Workers, Safety Inspections-Alcohol Consumption.

Table 3, contains, the factors, the variables which belong to each factor and all the dimension coefficients:

Table 3. Pattern Matrix for PCA with Oblimin Rotation of five Factor solution of the Questionnaire variables, with factor loadings of each of the variables.

Item	Factor 1 Personality	Factor 2 Workload-Age	Factor 3 Job conditions of Organ.	Factor 4	Factor 5
Personality Characteristics	0, 735				
Feeling of unworthy person	0, 640				
Feeling helpless	0, 574				
Boring job	0, 723				
Depression	0, 563				
Lack of sleep	0, 697				
Job satisfaction	-0, 531				
Workload-Age					
Work experience		0, 855			
age		0, 829			
Workload		0, 556			
Job conditions of Organization					
Unhealthy work			-0, 738		

Exposure to hazards			-0,714		
Communication					
Supervisor conflict				9,730	
Coworkers conflict				0,593	
supervision				0,581	
Safety Inspections and measures					
Safety inspections					-0,556
Alcohol consumption					-0,517

3.4 Logistic Binary Regression

Direct Logistic Regression was performed to assess the impact of a number of factors on the likelihood that respondents would report that they had a work related injury(WRI). The model contained nine independent variables(few and unorganized safety inspections, safety environment, exposure to physical or technical hazards, heavy workload, supervision, supervisor conflict, coworkers conflict, no worth feeling and workin who reported and didg in shifts). The dependent variable is: Did you have in the past a WRI?. The full model containing all predictors was statistically significant, $\chi^2(32, N=640)=154,88, p<0,0001$, indicating that the model was able to distinguish between respondents who reported and did not report that they had a WRI. The model as a whole explained between 21,5% (Cox and Snell R Squared) and 30,7% (Nagelkerke R Squared) of the variance in frequency of WRI, and correctly classified 76,4% of cases. As shown in the following Table 4 all nine independent variables made a unique Statistically significant contribution to the model(existence of WRI or not in the past) The strongest three predictors of reporting a WRI were: insufficient supervision, with Odds Ratio (3,08), small number of safety inspections by the government appointed inspectors, with Odds Ratio (3,61) and coworkers conflict, with Odds Ratio (2,74). As regards safety inspections, the Odds Ratio (3,61) means that respondents who were working in a work environment with few and not organized safety inspections were over three times more likely to report a WRI than those who were working in a workplace with sufficient safety inspections and follow up of the inspectors' advices, controlling for all other factors in the model.

Table 4. Logistic Regression Predicting Likelihood of Reporting a WRI

INDEPENDENT VARIABLE	B	S.E.	WALD TEST	DF	p	EXP(B) Odds Ratio	95% C.I. For Odds Ratio	
							Lower	Upper
Few Safety Inspections	1,286	,441	8,497	1	,004	3,61	1,52	8,59
Safety Equipment	,815	1,050	,603	1	,437	2,260	,289	17,682
Exposure to physical or technical hazards	1,012	,229	19,600	1	,000	2,751	1,758	4,306
Heavy Workload	,576	,230	6,266	1	,012	1,779	1,133	2,792
Supervision	1,125	,393	8,196	1	,004	3,080	1,426	6,652
Supervision Conflict	1,125	,393	8,196	1	,004	3,080	1,426	6,652
Coworkers conflict	1,010	,419	5,801	1	,016	2,746	1,207	6,247
Feeling of no worth	1,397	,586	5,682	1	,017	4,042	1,282	12,746
Work schedule in shifts	2,502	1,076	5,408	1	,020	,082	,010	,675

3.5 Discussion

The results of this paper add to the growin body of evidence indicating that the causes of work related injuries(WRI) are both due to organization characteristics and to worker peculiarities. The most important or- ganizational characteristics which can be a cause for an accident in the workplace are: Small number of safety inspections, Safety equipment creating a safety environment, Overtime work, Exposure to physical or technical hazards, Insufficient supervision and peculiar work schedule due to working long hours in shifts. The causes of WRI due to worker characteristics are: Supervisor conflict, Coworkers conflict, Feeling that the work is of no value. Two causes have the greatest Odds Ratio: Lack of safety inspections(OR: 3,61) and feeling that the work

of employees is of no value (OR:4, 04) and subsequently that the workers themselves are melancholic because of the prevailing impression that their work is no worthy. Many authors have indicated that overtime work is a cause for accidents (Dembe, et al., 2006, Spurgeon et al., 1997).

The new finding of this paper is that the lack of safety inspections is an important cause of WRI. Possible explanations for this situation are the following: Today, in Greece, there is a considerable shortage of staff in many public organizations because of the Economic Crisis of the country. The number of employees in many public organizations has been reduced considerably. The same happens in the Public Service of the Inspectorate of the workplace in the Ministry of Employment. On the other hand, because of widespread corruption, the recommendations resulting from the few safety inspections are not followed from the employers, who manage not to get or to pay any fine from the State.

It is a striking result that in a steel works factory in the district of Elefsina, Athens, when there is one visit per month from the safety inspectors, there are no WRI at all, whereas the percentage of WRI when there is one visit from the safety inspectors per two months is 4, 3% and the percentage of WRI when there are rarely visits of safety inspectors climbs to 65, 2%.

Another result of the economic crisis is that the companies, because of high costs, do not install safety equipment and do not organize any systematic training programs for their workers in the use of safety equipment. The following table indicates that there is a statistically significant association between the nature of work in different companies and the likelihood of a WRI.

Table 5. χ^2 test between category of company and likelihood of having a WRI

COMPANY CATEGORY	Did you have in the past a WRI?		Total
	No	Yes	
Steel Factory	4, 8%	3, 2%	8%
Gymnasium	3, 8%	18, 3%	22, 1%
Textiles company	0, 8%	8%	8, 8%
Taxi company	2, 3%	4, 6%	6, 9%
Fast food company	1, 9%	1, 9%	3, 8%
Public Hospital	3, 8%	5%	8, 8%
Import of Medicines Company	1, 5%	2, 3%	3, 8%
Construction Company	1, 5%	8%	9, 5%

A finding of this paper is that many companies prefer not to declare the WRI to the Ministry of Employment because of suspicion of imposition of fines or of visits by the safety inspectors.

We found that males are more likely to have an WRI (34% of male workers had a WRI) than females (17, 5% of females had an WRI).

3.6 Policy Implications

Important policy measures which must be taken in order to reduce the number of WRI are the following:

- a. Increase of frequency of visits by the safety inspectors.
- b. On-the-job-training of the workers.
- c. Installation of safety equipment.
- d. Psychological support to the workers.
- f. Training of the supervisors.
- e. Meritocracy in the system of distribution of wages.

References

- Angelov, N. and Eliason, M.(2014).Factors associated with occupational disability classification.IFAU, Institute for Evaluation of Labour, Market and Education Policy, Working Paper 2014:25.
- Bartlett, M.S. (1954). A note on the multiplying factors for various chi square approximations. Journal of the Royal Statistical Society, 16, (Series B), 296-298.
- Bull, N., Riise, T. and Moe, B.E.(2002). Work Related Injuries and Occupational health and safety factors in smaller enterprises, a prospective study.
- Carrillo, J.A., Guadix, J. and Onieva, L.(2012). Safety Management Models in Manufacturing Companies.Annals of Industrial Engineering,

<https://sites.google.com/site/icqqmeas2015>

- DeJoy, D.M., Schaffer, B.S., Wilson, M.G., Vandenberg, R.J. and Butts, M.M.(2004). Creating Safer Workplaces: assessing the determinants and role of safety climate. *Journal of Safety Research*, 35, 1, p.81-90.
- Dembe, A.E., Erickson, J.B., Delbos, R.G. and Banks, S.M. (2005). The impact of overtime and long work hours on occupational injuries and illnesses: new evidence from the United States. *Occupational and Environmental Medicine*, 62, 588-597.
- Frone, M. (1998). Predictors of Work Injuries Among Employed Adolescents. *Journal of Applied Psychology*, 83, 4, p.565-576.
- Jimeno, D., Felknor, S., Burau, K.D. and Delclos, G.L. (2004). Organisational and occupational risk factors associated with work related injuries among public hospital employees in Costa Rica. *Occupational and Environmental Medicine*, 62, p.337-343.
- Gyekye, S.A. and Salminen, S.(2007). Workplace safety perceptions and perceived organizational support: Do supportive perceptions influence safety perceptions? *International Journal of Occupational Safety and Ergonomics*, 13, p. 189-200.
- Health and Safety Executive(2014). European Comparisons. <http://www.hse.gov.uk/statistics/european/>
- Hofmann, D.A. and Stetzer, A. (1998). The role of Safety Climate and Communication in Accident Interpretation: Implications for learning from Negative Events. *Academy of Management Journal*, 41, 6, p.644-657.
- Kaiser, H. (1970). A second generation Little Jiffy. *Psychometrika*, 35, 401-405.
- Kaiser, H. (1974). An index of factorial simplicity. *Psychometrika*, 13, 31-36.
- Leigh, J.P., Markowitz, S., Fahs, M., Shin, C. and Landrigan, J. (1997). Occupational injury and illnesses in the United States: Estimates of costs, Morbidity and mortality. *Archives of International Medicine*, 157, p. 1557-1568.
- Locke, E.(1976). The nature and causes of job satisfaction. In M.D. Dunnette(Ed.), *Handbook of Industrial and Organisational Psychology*, Chicago: Rand McNally.
- Mearns, K.J. and Flin, R. (1999). Assessing the state of occupational safety-culture or climate. *Current Psychology: Development, Learning, Personality, Social*, 18, p. 5-17.
- Michael, J.H., Evans, D.D. Jasen, K.L. and Haight, J.M. (2005). Management commitment to safety as organizational support: Relationship with non-safety outcomes in the wood manufacturing employees. *Journal of Safety Research*, 36, p.171-179.
- Nurminen, M. and Karjalainen, A. (2001). Epidemiologic Estimate of the proportion of fatalities related to occupational factors in Finland. *Scandinavian Journal of Work, Environment and Health*, 27, 161-213.
- Pallant, J.(2007). *SPSS, Survival Manual*, McGrawHill, Open University Press.
- Rhoades, L. and Eisenberger, R.(2002). Perceived organizational Support: A review of the literature. *Journal of Applied Psychology*, 87, p. 698-714.
- Roelofs, C., Sprague-Martinez, L. and Brunette, M.(2011). A qualitative investigation of Hispanic construction worker perspectives on Factors impacting worksite safety and risk. *Environmental Health*, 10:84. <http://www.ehjournal.net/content/10/1/84>.
- Salminen, S., Saari, J., Saarela K.L. and Rasanen, T. (1992). Risk factors for women in serious occupational accidents. *Journal of Occupational Health and Safety-Australia and New Zealand*, 8, p. 341-347.
- Salminen, S., Gyekye, S.A. and Ojajarvi, A. (2013). Individual and Organizational Factors of Safe Behaviour among Ghanaian Industrial Workers. *Engineering Management Research*, 2, 1, p.98-110.
- Spurgeon, A., Harrington, J., Cooper, C.(1997). Health and safety problems associated with long working hours: a review of the current position. *Occupational and Environmental Medicine*, 54, 367-375.
- Steenland, K., Burnett, C., Lalich, N., Ward, E. and Hurrell, J.(2003). Dying for Work: The Magnitude of US Mortality From Selected Causes of Death Associated With Occupation. *American Journal of Industrial Medicine*, 43, p.461-482.
- Zolnierczyk-Zreda, D. and Bedynska, S. (2014). Psychometric Properties of the Polish Version of Karasek's Job Content Questionnaire. *International Journal of Occupational Safety and Ergonomics*, 20, 4, p. 583-593.

**IMPACT OF ECONOMIC CRISIS ON GREEK NATIONAL HEALTH SYSTEM:
NEW DISTURBING EVIDENCE FROM A SAMPLE SURVEY AMONG PATIENTS
IN GREEK PUBLIC HOSPITALS**

Christos C. Frangos, Technological Educational Institute of Athens, Dept. of Business Administration,
e-mail: cfrangos@teiath.gr

Constantinos C. Frangos, University College, London, Department of Medicine,
e-mail: Constantinos.Frangos.09@ucl.ac.uk

Sotiropoulos Ioannis, Technological Educational Institute of Athens, Dept. of Auditing and Finance,
e-mail: sotiropoulosioan@yahoo.gr

Litsi Christina, Technological Educational Institute of Athens, Dept. of Business Administration
e-mail: afro_litsi2@hotmail.gr

ABSTRACT

The Greek National Health System (GNSH) has been established in 1983. Its purpose was the free provision of medical and hospital treatment to the population of Greece through the establishment of Centers of Health in every part of the Greek State. We investigate through a sample survey among 1393 patients the degree of satisfaction of Greeks for their National System as well as the factors which contribute to the inefficiency of the services of the Greek National System of Health, in the context of the present economic crisis.

An Exploratory Factor Analysis was carried out and it has identified the following main factors of inefficiency of GNSH:

(a) Shortage of medical doctors and fully equipped medical centers in the Greek islands and remote areas. (b) Corrupt dealings of medical doctors with patients in order to have prompt medical assistance. (c) Corrupt dealings between Medical administrators and pharmaceutical companies. (d) High cost of medical services and medicines provided by GNSH. (e) Inefficiency and loose functioning of the System of National Medical Emergency Services (EKAV).

A Binary Logistic Regression reveals that the following factors of dissatisfaction with GNHS : Shortage of medical Doctors, Corruption in the areas of medical services and Medicines, High cost of Services and Inefficient service of (EKAV), are statistically significant at the 0,05 level of significance.

Key Words: Greek National Health System (GNHS), Logistic Regression, Public Healthcare in Greece.

1. Introduction and literature review

Since October 2009, Greece has been undergoing a severe economic crisis due to a debt of 330 billion Euro which the previous governments have been accumulating on the Greek Economy with their mismanagement. This Crisis has led to the signing of the Memorandum of Economic and Financial policies (“Mnimonion”) with the three lenders: the International Monetary Fund (IMF), The European Commission (EC) and the European Central Bank (ECB) in exchange of a 110 Billion Euro loan, initially. The loan has been given under strict austerity conditions which led to a rise of unemployment to 25 % ,to the reduction by 20% of the Greek Gross Domestic Product(GDP) and to disturbing socioeconomic consequences in every sector. The Greek National Health System (GNHS) has been affected badly in the following two areas (Economou, 2010), (Kentikelenis et al., 2012), (Simou and Koutsogeorgou, 2013):

- a. General population Health(GPH), which includes : Mental Health, Suicides, Epidemics, Eating Disorders.
- b. Public Healthcare ,which includes :Public health expenditure and Management, Healthcare workforce and services, Pharmaceutical market and Biomedical research.

1a. Public Health Expenditure and Management

The Ministry of Health (MoH) has introduced the following measures since the beginning of the crisis, seeking to reduce public expenditure on healthcare : a.the merging of four of the largest social security organizations under the National

Organization for the Provision of Healthcare Services (EOPYY). b. cutting Medical Doctors’ and Nurses’ salaries.

c. implementing a Diagnosis-Related Group (DRG) system of payments d. introducing the electronic prescription system e. reducing the price of medicines and medical supplies by introducing more transparent practices and f. limiting recruitment of medical Doctors and other health personnel,(Fragkoulis,2012) and (Polyzos et al, 2013).

1b. Healthcare workforce

The salaries of the medical personnel have been cut by 15% initially and the pensions by 10%.Today the GNHS operates with 10-40% fewer medical workers whose salary has been cut by 30-40%. (Pavlopoylos,2012), (Karatzanis et al, 2012).

1c. Healthcare Services

The Primary Health Care (PHC) and the University Hospitals have been affected badly by the economic crisis with respect to staffing and medical equipment. (Falagas et al, 2012).According to some researchers

(Zavras et al, 2013), (Emmanouilidou and Bourke, 2013),

the cost of services, the waiting time for the admission to hospital, the limited access to healthcare, the travel distance to public health centers, have been some disturbing issues of GNHS and a constant obstacle to the provision of Public medical services in Greece (Vandoros et al, 2014).

These issues are examined in this paper through a sample survey among 1393 patients in Greek public hospitals . The respondents’ answers are statistically analyzed in the following sections.

1d. Pharmaceutical market

During the last decade the pharmaceutical expenditure has increased more than threefold with the pharmaceutical expenditure per capita being less than 200 Euro in 2000,whereas in 2008 it was 700 Euro (Vandoros and Stargardt, 2013). The government imposed reductions in pharmaceutical prices in order to reduce costs. Specifically, it imposed wholesale margin profit and decreased the price of generic medicines (“genosima”) (at 90% of original medicines’ prices). It increased, also, the value-added tax(VAT). These increases, along with the frequent strikes of pharmacists have caused a wide dissatisfaction of the public to the government and to GNHS in particular.

1e. Informal payments and clientism in the dealings between Medical Doctors, patients, politicians, Hospital administrators and pharmaceutical companies.

In an important paper (Liaropoulos et al, 2008), describe the ways of informal payments(“fakellaki”, small envelope in Greek) (Brian-Abel Smith et al. ,2004) to the Medical Doctors from patients who were afraid of receiving substandard care (if they did not pay) or because the Doctors were demanding such a payment. They estimate that the probability of extra payments is 72% higher for patients aiming to “jump the queue” compared to those who were following the regulations. They estimate, further, that 42% of patients have given to doctors

informal payments. Hence, informal payment is like an ugly flower which is growing in the fields of GNHS, and the existence of economic crisis multiplies its numbers continuously.

The hospital administrators purchase medicines and medical equipment at inflated prices from pharmaceutical companies and they are getting monetary gifts and trips abroad, whereas the politicians are hiring administrative and medical staff without qualifications, only with the promise to vote for them in future elections.

1f. The need for a sample survey exploring the feelings of patients towards GNHS

In this paper we present a sample survey among patients in a panhellenic basis in order to achieve the following:

- To examine the consistency of survey estimates of patients' satisfaction or not with the different characteristics of the GNHS functions with interpersonal aspects of hospital experience.
- To assess the influence of gender, age, marital status, income and social insurance type of a patient on the degree of his or her satisfaction with the GNHS.
- To monitor the performance of the units of GNHS and to stimulate improvements in the healthcare system.

2. Methods

2.1 Sample and Procedure

We have carried out a sample survey among 1393 patients who were treated in public hospitals operated by GNHS in Greece, trying to identify the factors of dissatisfaction with GNHS. 808 respondents were women and 585 were men. Their age was as follows: 556 were 17-29 years of age, 283 were 30-39 years of age, 240 were 40-49 years, 170 were 50-59 years of age and 144 were more than 59 years of age. Most of the patients (1302) were Greek, 41 patients were from Albania, 8 from Romania, 5 from Bulgaria, 6 from Western Europe countries or from North America and the rest from African Countries. The statistical analysis of the questionnaires has been carried out with the help of Statistical Package for the Social Sciences (SPSS) 21.0, (Pallant, 2007).

3. Statistical Analysis

3.1. χ^2 tests of independence

We perform χ^2 tests of independence in order to test the hypothesis:

H0: The variable :Are you satisfied from the quality of health care which is provided by the GNHS?

Is independent of the variable V_K ,

where

V_K ($K=1, \dots, n$) is a demographic variable or a variable related to the problematic areas of GNHS, as they have been described in section 1.

H1: The variable: Are you satisfied from the quality of health care which is provided by the GNHS?

Is dependent on the variable V_K ,

The following table shows the results of the χ^2 tests :

Table 1. χ^2 tests of independence. χ^2 statistic, Degrees of Freedom, p-value, Level of significance: 0,05.

Variable V_K	Variable V: Are you satisfied from the health care services of GNHS?	χ^2 Statistic	Degrees of Freedom	p-value
Demographic				
1. Gender		16,9	6	0,012
2. Income		133,3	6	0,002
3. Profession		45,4	6	0,332
Highest degree obtained		157,6	6	0,001
Type of health insurance provider		45,2	6	0,006

Problematic areas of GNHS				
Shortages of workers, centers, instruments				
1. Shortage of well equipped Centers of Health	158,5	12	0,0001	
2. Shortage of Centers of Health in islands and in not easily accessible areas	157,5	6	0,0001	
3. Shortage of Diagnostic Centers equipped with modern medical instruments	176,8	12	0,0001	
4. Shortage of Medical Doctors and Nurses	165,2	6	0,0001	
5. Treatment of patients with chronic diseases	47,7	6	0,0001	
6. Shortage of Units of Intensive Care	94,7	6	0,0001	
7. Excessive cost of Medical and pharmaceutical services	72,9	12	0,0001	
Corruption, clientism, overpricing of services				
8. Hiring of health workers by political party affiliations criteria	96,3	6	0,0001	
9. Non existent real postgraduate seminars for Doctors	75,3	6	0,0001	
10. Existence of corrupt dealings of management in hospitals and pharmaceutical companies for provision of overpriced medicines and machines ('promithia', 'grigosimo')	172,2	6	0,0001	
11. Illegal informal payments "fakellaki" from patients to doctors for providing efficient and fast services	176,2	6	0,0001	
12. Insufficient participation of EOPYY to medical expenses	146,3	6	0,0001	
13. Introduction of Electronic prescription system	43,3	12	0,0001	
14. Delays in arriving of EKAV ambulances to homes of patients to carry them to hospital	119,1	6	0,0001	
15. Waste of medicines and medical equipment due to bad management	395,9	6	0,0001	

It is interesting to note that in 13 women the 12 ones have the opinion that there are taking place informal illegal payments ("fakellaki") from patients to doctors to do their duty reliably and fast ("grigosimo"). The correspondent ratio for men is 1 in 9.

3.2. Factor Analysis

The 15 items of the Questionnaire for identifying the problematic areas of GNHS causing dissatisfaction to patients, which are shown in Table 1 were subjected in Principal Component Analysis (PCA) using SPSS Version 21. Prior to performing PCA, the suitability of data for Factor Analysis was assessed. Inspection of the Correlation matrix revealed the presence of many coefficients of .5 and above. The Kaiser-Meyer-Olkin value was 0,873, exceeding the recommended value of 0,6 (Kaiser, 1970, 1974) and Bartlett's Test of Sphericity (Bartlett 1954) is 4749,1 reaching statistical significance, supporting the factorability of the correlation matrix.

Principal Components Analysis revealed the presence of five components with eigenvalues exceeding 1, explaining 23,7%, 6,9%, 6,4%, 5,9% and 5,2% of the variance respectively.

We name the five components as follows: Corrupt Practices in GNHS, Inferior Postgraduate Education for Doctors, Shortage of Medical Doctors, Nurses and Medical Centers, Exorbitant cost of medical treatment and improper conditions of patient examinations at outpatient clinics.

Table 2, shows, the factors, the variables which belong to each factor and all the dimension coefficients:

Table 2. Pattern Matrix for PCA with Oblimin Rotation of five Factor solution of the Questionnaire variables, with factor loadings of each of the variables

Item	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
F1. Corrupt practices in GNHS					
Unlawful payment(fakellaki) from patients to Medical Doctors in order to have prompt medical care	.64				
Shortage of Integrated and fully Equipped Centers of Health in the Greek Islands and in not easily accessible areas	.60				
Corrupt relation between some Pharmaceutical Companies, Heads of Hospitals, Medical Doctors and Politicians	.52				
F2. Inferior Postgraduate Education					
Shortage of Real further Postgraduate Education of Medical Doctors		0,77			
Tendency to hire Medical and Nursing Personnel according to Political Party affiliation		0,72			
F3. Shortage of Medical Workforce and Medical Hospitals and Clinics					
Shortage of Medical and Nursing Personnel			0,75		
Shortage of properly educated Medical Personnel			0,69		
Shortage of a sufficient number of units of Intensive care			0,59		
Shortage of Integrated and fully Equipped Centers of Disease Prevention			0,58		
F4. Exorbitant cost of medical treatment					
Problematic treatment of patients suffering from chronic deceases				0,65	
High cost of medical and pharmaceutical services				0,59	
F5. Improper examination of patients					
Public Medical examination of patients in the emergency Clinics Of GNHS					-0,85
Inadequate updating of patients in the corridors of a hospital without any sort of privacy					-0,79

3.3 Logistic Binary Regression

Direct Logistic Regression was performed to assess the impact of a number of factors on the likelihood that respondents would report that they were satisfied from the services of GNHS. The model contained seven independent variables (Shortage of Integrated and fully Equipped Centers of Health in not easily accessible areas and in the islands, Shortage of sufficient and well paid Doctors and Nurses, Corrupt relationships between Doctors, Hospitals, Politicians and pharmaceutical companies, Illegal informal payments (“fakellaki”) by patients to Doctors, Insufficient participation of EOPYY to medical expenses, Improper examination and updating of patients in the corridors of hospitals and considerable waiting time by EKAV to take and bring to the hospital an emergency case). The dependent variable is: Satisfaction of patients from the services of GNHS. The full model

containing all predictors was statistically significant, $\chi^2(10, N=1318)=347,08$, $p<0,0001$, indicating that the model was able to distinguish between respondents who reported and did not report that they were satisfied from GNHS. The model as a whole explained between 23,9% (Cox and Snell R Squared) and 36,1% (Nagelkerke R Squared) of the variance in frequency of satisfaction cases from GNHS, and correctly classified 83,1% of cases. The Hosmer and Lemeshow test (9,35 with 6 degrees of freedom, $p=0,15$) is showing a good fit of the model. As shown in the following Table 3 all seven independent variables made a unique Statistically significant contribution to the model (Satisfaction or not from the services of GNHS).

Table 3. Logistic Regression Predicting Likelihood of patients' satisfaction from services of GNHS

INDEPENDENT VARIABLE	B	WALD TEST	DF	p	EXP(B) Odds Ratio	95% C.I. For Odds Ratio	
						Lower	Upper
Shortage of Integrated and fully Equipped Centers of Health in not easily accessible areas and in islands	-20,1	0,001	1	0,99	0,43	0,30	0,60
Shortage of sufficient and well paid Doctors and Nurses	-0,84	24,73	1	0,01	0,47	0,30	0,75
Corrupt relationships between Doctors, Hospitals, Politicians and pharmaceutical companies	-0,73	9,9	1	0,02	0,39	0,24	0,66
Illegal informal payments ("fakellaki") by patients to Doctors	-0,92	12,30	1	0,01	0,44	0,31	0,62
Insufficient participation of EOPYY to medical expenses	-1,1	39,32	1	0,002	1,50	1,08	2,1
Improper examination and updating of patients in the corridors of hospitals	0,40	5,85	1	0,98	0,30	0,18	0,42
Considerable waiting time by EKAV in emergency cases	-18,1	0,001	1	0,001	0,55	0,39	0,71
Constant	2,73	83,1	1	0,001	15,47	11,3	19,2

3.4 Discussion

The results of this paper added to the growing body of evidence indicating that the causes of dissatisfaction with the health care provided by GNHS are both due to shortages of Health centres and medical staff in not easily accessible areas and the islands, the endemic Corruption practices between the managers of the Hospitals and pharmaceutical companies and between the patients and medical staff in order to have fast service ('grigorosimo') and proper treatment. The delays caused by the EKAV system in transporting emergency cases to hospitals are worth mentioning because they contribute significantly to the general dissatisfaction. An important step towards reducing the cost and eliminating the corruption practices is the establishment of the electronic prescription system.

The new finding of this paper is that the lack of proper examination rooms for the emergency cases and the treatment of patients in the general view is a very unpleasant picture of a public hospital which contributes to the general miserable picture of shortages. Also, the lack of organizational qualities of GNHS contributes to significant corruption practices and waste of resources. Today, in Greece, there is a considerable shortage of staff due to the economic crisis and there is also a health crisis because of severe shortage and inequalities of medical staff.

Table 4, shows the percentages of answers of the 1393 respondents with respect to the functions and conditions of healthcare provided by the the GNHS:

Table 4. Percentages (N;%) of the answers of respondents as regards problematic characteristics of GNHS. N=1393 respondents

Problematic Area of Functioning of GNHS	Percentage of accepting the existence of the problem by respondents (Answer 'YES')	Percentage of rejecting the existence of the problem by respondents (Answer 'NO')
F1. Corrupt practices in GNHS		
Unlawful payment(fakellaki) from patients to Medical Doctors in order to have prompt medical care	91,1	8,9
Shortage of Integrated and fully Equipped Centers of Health in the Greek Islands and not easily accessible areas	89,8	10,2
Corrupt relation between some Pharmaceutical Companies, Heads of Hospitals, Medical Doctors and Politicians ('promithia', 'grigorosimo')	87,8	12,2
F2. Inferior Postgraduate Education		
Shortage of Real further Postgraduate Education of Medical Doctors	74,7	25,3
Tendency to hire Medical and Nursing Personnel according to Political Party affiliation	76,3	23,7
F3. Shortage of Medical Workforce and Medical Centers		
Shortage of Medical and Nursing Personnel	76,8	23,2
Shortage of properly educated Medical Personnel	69,5	30,5
Shortage of a sufficient number of units of Intensive care	80,5	19,5
Shortage of properly equipped Diagnostic Centers	79,3	20,7
Shortage of Integrated and fully Equipped Centers of Disease Prevention	80,8	19,2
F4. Exorbitant cost of medical treatment		
Problematic treatment of patients suffering from chronic deceases	58,8	41,2
High cost of medical and pharmaceutical services	82,9	17,1
F5. Improper examination of patients		
Public Medical examination of patients in the emergency Clinics of GNHS, in the ayes of many people	64,8	35,2
Inadequate updating of patients in the corridors of a hospital without any sort of privacy	68,8	31,2
F6. Medical Equipment, Drugs, EKAV, EOPYY		
Shortage of Modern Medical Equipment	78,2	21,8
Introduction of Electronic Prescriptions system to fight corruption	62,6	37,4
Considerable waiting time for EKAV AMBULANCE to Transport aa emergency case to hospital	75,3	24,7
Considerable waste, because of disorganization ,of drugs, resources, instruments	86,3	13,7
Insufficient coverage of medical expenses by EOPYY	75,7	24,3
F7 . Salary of medical and nursing personnel		
Cuts in salary and overtime pay of medical and nursing personnel	78,8	21,2
F8. Satisfaction from the healthcare provided by GNHS		
Did you use the services of GNHS during the past twelve months?	83,2	16,8
Are you on the whole satisfied from the healthcare provided by the GNHS?	24,1 (answer: YES)	75,9 (answer: NO)

3.5 Policy Implications

Important policy measures which must be taken by the Ministry of Health (MoH) in order to reduce the level of dissatisfaction of patients with the GNHS are the following:

- a. Increase of control and audit mechanisms within the GNHS.
- b. Impose severe penalties to the persons who are caught blackmailing patients and officials having underground dealings with service providers.
- c. Transparency in the system of hiring medical staff.

References

- Bartlett, M.S. (1954). A note on the multiplying factors for various chi square approximations. *Journal of the Royal Statistical Society*, 16 (Series B), 296-98.
- Brian-Abel Smith et al. Restructuring the Greek NHS. The report of the experts. (2004). Ministry of Health, Athens.
- Economou, M., Madianos, M., Peppou, L. E., Patelakis, A. and Stefanis, C.N. (2013). Major depression in the area of economic crisis: a replication of a cross-sectional study across Greece. *Journal of affective disorders*, 145,308-14.
- Emmanouilidou, M., Bourke, M. (2013). A thematic review and a policy- analysis agenda of electronic health records in the Greek National Health System. *Health Policy*, 109, 31-37.
- Falagas, M.E., Bardakas, V., Mavros, M.N.(2012). Biomedical research productivity in Greece: effect of the financial crisis. *International Journal of Epidemiology*, 41,1206-7.
- Fragkoulis, E. (2012). Economic crisis and primary healthcare in Greece: 'disaster' or 'blessing' ? *Clinical Medicine*, 12, 607.
- Kaizer, H. (1970). A second generation little Jiffy. *Psychometrika*, 35, 401-15.
- Kaizer, H. (1974). An index of factorial simplicity. *Psychometrika*, 39, 31-6.
- Kalavrezos, N. (2009). Gender and access to healthcare in Greece. *Social Cohesion and Development* ,4,2,205-216.
- Karatzanis, A.D., Symvoulakis, E.K., Nikolaou, V., Velegarakis, G.A. (2012). Potential impact of the financial crisis on the outpatient hospital visits due to otorhinolaryngologic disorders in Crete, Greece. *International Journal of Medical Science*, 9, 126-8.
- Kentikelenis, A., Papanicolas, I.(2012). Economic crisis, austerity and the Greek public health system. *European Journal of Public Health.*, 22, 4-5.
- Kentikelenis, A., Karanikolos, M., Papanicolas, I., Basu, S., McKee, M. and Stuckler, D.(2011). Health effects of financial crisis: Omens of a Greek tragedy. *Lancet*, 2011, 1457-8.
- Liaropoulos, L., Siskou, O., Kaitelidou, D., Theodorou, M., Katostaras, T. (2008). Informal payments in public hospitals in Greece. *Health Policy*, 87, 1, 72-81.
- Pallant, J. (2007). *SPSS Survival Manual*, Open University Press, Third Edition, McGraw Hill, U.K.
- Polyzos, N., Karanikas, H., Thireos, E., Kastanioti, C., Kontodimopoulos, N. (2013). Reforming reimbursement of public hospitals in Greece during the economic crisis: implementation of a DRG system. *Health Policy*, 109, 14-22.
- Poulopoulos, C.(2012). Economic crisis in Greece: risks and challenges for drug policy and strategy. *Drugs and alcohol Today*,12,132-140.
- Simou, E. and Koutsogeorgou, E. (2014). Effects of the economic crisis on health and healthcare in Greece in the literature from 2009 to 2013 :A systematic Review. *HealthPolicy*. <http://dx.doi.org/10.1016/j.healthpol.2014.02.002>.
- Vandoros, S., Stargardt, T.(2013). Reforms in the Greek pharmaceutical market during the financial crisis. *Health Policy*, 109, 1-6.
- Vandoros, S., Hessel, P., Leone, T., Avendano, M, (2013). Have health trends worsened in Greece as a result of the financial crisis? A quasi-experimental approach. *European Journal of Public Health*.(Early publ. Ahead of print).
- Zavras, D., Tsiantou, V., Pavi, E., Mylona, K., Kyriopoulos, J. (2013). Impact of economic crisis and other demographic and socio-economic factors on self-rated health in Greece. *European Journal of Public Health*, 23, 206-10.

PSYCHOLOGICAL AND BEHAVIORAL PREDICTORS OF MUSIC MEDIA PREFERENCES: A BINARY LOGISTIC REGRESSION BASED ON A SURVEY AMONG GREEK ADOLESCENTS

Christos Frangos^{1*}, Stavros Chaniotis¹, Alexandros Chatzis¹, Konstantinos Fragkos² and Androniki Kavoura³

¹Technological Educational Institute of Athens, Department of Business Administration

²University College, London, Department of Medicine

³Technological Educational Institute of Athens, Department of Marketing

*e-mail: cfragos@teiath.gr

ABSTRACT

Music is an integral part of the social and emotional world of adolescence. In this paper, we investigate: a) The degree of addiction of adolescents to music and music media, b) The relation of adolescents' preoccupation with blogs and social media, alcoholic addiction with their habit to listen over a long time everyday to a particular kind of music and music videos.

We analyze statistically the results of a sample survey between Greek adolescents. We are doing Factor Analysis and Reliability Analysis of the different psychosocial factors that contribute to music addiction. We are doing a Binary Logistic Regression with depended variable: Perceived music addiction and independent variables: continuous and uncontrollable preoccupation with music and existence of quarrels with relatives about listening many hours per day to music.

Results are indicating existing statistically significant relationships between the particular psychological and behavioral characteristics of a person and the perception that he is addicted to music.

Key-Words: Addiction to Music, Drug Addiction, Alcohol Addiction, Factor Analysis, Blog, Social Media, Logistic Regression.

1. Introduction

1.1 Importance of music to adolescents and influence of music lyrics on their lives

Music is a way of life for adolescents and reflects feelings, values, needs and conflicts (Arnett, 1995; Larson, 1995, Schwartz and Fouts, 2003). An important component of the social and emotional world of adolescents is music. As the young people grow and develop their personality, in the same way the preferences for music develop and change. In April 2007 there was the double suicide of two Australian teenage girls, and the media linked the preferences of "emo" music, (short for emotional music), by the girls with their mental state, (Schliebs M. (2007). In 1999 two American students went on a shooting rampage, killing 12 students, while having the habit of listening to Marilyn Manson's music coined shock-rock or industrial metal. Felicity Baker and William Bar, in an important paper¹ express the following question: "Does music contribute to the acting out of behaviours described in the music lyrics or the preferred music represents the already existing behavioural tendencies of the subject"

Research by Rustad et al. (2011) and the American Academy of Pediatrics advisory Council (2009) shows that there is correlation between certain behavioural patterns of children and adolescents and certain types of music and music videos to which they are listening continuously. Further more, the articles by *Roberts and Christensen. (2001), Leming, (1987) and North et al. (2000)*, emphasize that the perception and the effect of music-video messages are important, because social surveys have shown that exposure to violence, sexual messages and use of substances of abuse in music videos might produce significant changes in behaviors and attitudes of young viewers. Pediatricians and parents should be aware of this information.

1.2 Studies on the relation between Music Preference and Personality

Ekinci et al. (2012) argue that there is an association of music preferences and depressive behavior in High School students. They use the Children's Depression Inventory (CDI). Statistical analysis of their sample survey results on adolescents revealed that the children who were listening to heavy metal music and experienced problematic parent relations had higher scores on the CDI instrument than the children with normal parent relations and other types of favorite music.

Rap music has been found to be associated with alcohol and illicit drug use (Chen et al. 2006; Diamond, Bermudez and Schensul, 2006; Doak, 2003; Took and Weiss, 1994, Miranda and Claes, 2004). Heavy metal music has been found to be associated with depression, suicidal tendencies, alcohol abuse and recklessness (Arnett, 1991, 1992; Martin, Clarke and Pearce, 1993; Scheel and Westefeld, 1999; Schwartz and Fouts, 2003; Took and Weis, 1994, Baker and Bor, 2008).

Two studies in the United States of University Students used the NEO Personality Inventory to investigate the relationships between listeners' to music characteristics and music preference. (Costa and McCrae, 1992; Rawlings and Ciancarelli, 1997) The results indicate that aggressive behavior, indifference to the feelings of others, pessimism and low self esteem is associated with listening to heavy metal music.

Two Canadian researchers (Swartz and Fouts, 2003) have applied the Millon Adolescent Personality Inventory to find that, listening to Pop music was linked with a variety of values such as: being overly responsible, struggling with issues of sexuality and peer acceptance, being autonomous and having a strong sense of identity.

A Canadian study associated the music preference of 14-18 -year olds with the Parental Bonding Instrument (Parker, Tuping and Brawn, 1979) to find that self-perception of alienation drug use and serious suicide ideation was linked with listening to rock and heavy metal music. (Rustad et al., 2003). Related to this scale is the hopelessness scale by Beck et al. (1974).

1.3 Investigating music addictive behavior in Greek adolescents

In this paper we investigate through a sample survey the following: a. The percentage of heavy listeners to music lyrics in our sample. b. The socioeconomic and psychological predictors of a continuous listening to music. c. The parallel or resulting habits, like drug use and smoking which are associated with listening to a certain type of music.

2. Methods of Research

2.1 Sample survey and Procedure

We have carried out a sample survey among 159 Greek adolescents with ages from 6 to 35 years. We distributed a structured questionnaire contained the parts: Demographics, types of music listening to and time devoted to music, psychosocial characteristics of the person listening for a long time to music and videos and other

habits, like alcohol drinking, use of substances and smoking. The aim of the questionnaire is to identify the factors of addiction to music and videos and the consequences of this addiction. 87 respondents were women and 72 were men. Their age was as follows: 60% were 20-24 years of age, 23, 5% were 6-19 years of age and 16, 5% were 25-35 years of age. The statistical analysis of the questionnaires has been carried out with the help of Statistical Package for the Social Sciences (SPSS) 21.0, (Pallant, 2007).

3. Statistical Analysis of Answered Questionnaires

3.1 χ^2 tests of independence

We perform χ^2 tests of independence in order to test the hypothesis:

H_0 : The variable: Do you think that you are addicted to listening to music and music videos

Is independent of the variable V_k

where

V_k ($k=1, \dots, n$) is a variable related to the psychosocial characteristics of the heavy listeners to music, as they are described in column 1 of the following table 1

H_1 : The variable: Do you think that you are addicted to listening to music and music videos

Is dependent of the variable V_k ,

The following table shows the results of the χ^2 tests:

Table 1. χ^2 tests of independence. χ^2 statistic, Degrees of Freedom, p-value, Level of significance: 0, 05.

Variable V_k $K=1, 2, 3, \dots, 8$	Variable V:	χ^2 Statistic	Degrees of Freedom	p-value
Psychosocial characteristics of the person who listens for a long time to music and music videos	DO YOU THINK THAT YOU ARE ADDICTED TO LISTENING TO MUSIC AND TO MUSIC VIDEOS?			
1. ARE YOU ABSORBED CONTINUOUSLY BY LISTENING TO MUSIC AND YOU ARE NOT THINKING OF ANYTHING ELSE?		22, 82	1	0, 001
2. WHEN YOU TURN ON THE RADIO IN ORDER TO LISTEN TO MUSIC FOR A GIVEN TIME(EG 1 HOUR) DO YOU, FINALLY CONTINUE TO LISTEN TO MUSIC OVER 1 HOUR?		9, 40	1	0, 002
3. WHEN YOU TURN ON THE RADIO IN ORDER TO LISTEN TO MUSIC FOR A GIVEN TIME(EG 1 HOUR) DO YOU, FINALLY CONTINUE TO LISTEN TO MUSIC OVER 1 HOUR?1		4, 25	1	0, 039
4. WHEN YOU TURN 1ON THE RADIO IN ORDER 1TO LISTEN TO MUSIC FOR1 A GIVEN TIME(EG 1 HOU1R) DO YOU, FINALLY CONTINUE TO LISTEN TO MUSIC OVER 1 HOUR?		3, 32	1	0, 06
5. HAVE YOU EVER LOST AN IMPORTANT MEETING IN ORDER TO SIT IN YOUR ROOM AND LISTEN TO MUSIC?		6, 10	1	0, 014

6. HAVE YOU EVER LIED TO YOUR RELATIVES WHO HAVE ASKED YOU WHAT YOU ARE DOING IN YOUR ROOM AND YOU DID NOT WANT TO REVEAL TO THEM THAT YOU ARE LISTENING TO MUSIC?	9, 43	1	0, 009
7. IS LISTENING MUSIC FOR YOU A WAY OUT FROM THE PROBLEMS OF LIFE?	5, 99	1	0, 014
8. HAVE YOU EVER HAD A QUARREL WITH YOUR PARENTS/ FRIENDS BECAUSE THEY TOLD YOU THAT YOU ARE SPENDING TOO MUCH TIME LISTENING TO MUSIC?	4, 85	1	0, 028
9. LENGTH OF TIME(IN HOURS PER DAY) SPENT IN LISTENING MUSIC AND MUSIC VIDEOS	21, 16	7	0, 004
10. GENDER	7, 96	1	0, 005

It is worth mentioning that 80, 1% of the people who spend six (6) hours and more per day listening to music think that they are addicted to music.

We note, also, that 73% of the people that they are absorbed by listening continuously and thinking about music lyrics think that they are addicted to music and music videos. The overall percentage of the respondents who think that they are addicted to music is 27, 7 %, with 32 women and 12 men out of 159 respondents, who think that they are addicted to music.

3.1.1. Reliability Analysis of the group of variables which represent the psychosocial Characteristics $V(i)$, $i=1, 2, 3, \dots, 10$) of Table 1.

We found Cronbach's Alfa Correlation Coefficient of the 10 items $V(i)$, ($i=1, 2, 3, 4, \dots, 10$) to be 0, 773, which is a satisfactory result for our questionnaire.

3.2. Factor Analysis

The 10 items of the Questionnaire which identify the Psychosocial characteristics of the person who listens for a long time to music and music videos, were subjected in Principal Component Analysis(PCA) using SPSS Version 21. Prior to performing PCA, the suitability of data for Factor Analysis was assessed. Inspection of the Correlation matrix revealed the presence of many coefficients of .5 and above. The Kaiser-Meyer-Olkin value was 0, 747, exceeding the recommended value of 0, 6 (Kaiser, 1970, 1974) and Bartlett's Test of Sphericity (Bartlett 1954) is 236, 56 reaching statistical significance, supporting the factorability of the correlation matrix.

Principal Components Analysis revealed the presence of 3 components with eigenvalues exceeding 1, explaining 26, 1%, 12, 18% and 10, 08 of the variance respectively.

We name the three components as follows: psychological, social and demographic characteristics of perceived addicted persons to music, respectively. Table 2, shows, the three factors, the variables which belong to each factor and all the dimension coefficients:

Table 2. Pattern Matrix for PCA with Oblimin Rotation of three Factor solution of the Questionnaire variables, with factor loadings of each of the variables.

Pattern Matrix ^a	Component		
	1	2	3
IS LISTENING MUSIC FOR YOU A WAY OUT FROM THE PROBLEMS OF LIFE?	,800		
WHEN YOU TURN ON THE RADIO IN ORDER TO LISTEN TO MUSIC FOR A GIVEN TIME(EG 1 HOUR) DO YOU, FINALLY CONTINUE TO LISTEN TO MUSIC OVER 1 HOUR	,768		
WHEN YOU LISTEN TO MUSIC AND FOR SOME REASON YOU STOP LISTENING, ARE YOU FEELING BAD TEMPER AND MELANCHOLIC ?	,597		
HOW MANY HOURS PER DAY DO YOU SPEND LISTENING TO MUSIC?			
HAVE YOU EVER LOST AN IMPORTANT MEETING IN ORDER TO SIT IN YOUR ROOM AND LISTEN TO MUSIC			
HAVE YOU EVER LIED TO YOUR RELATIVES WHO HAVE ASKED YOU WHAT YOU ARE DOING IN YOUR ROOM AND YOU DID NOT WANT TO REVEAL TO THEM THAT YOU ARE LISTENING TO MUSIC		-,731	
HAVE YOU EVER HAD A QUARREL WITH YOUR PARENTS/FRIENDS BECAUSE THEY TOLD YOU THAT YOU ARE SPENDING TOO MUCH TIME LISTENING TO MUSIC		-,667	
ARE YOU ABSORBED CONTINUOUSLY BY LISTENING TO MUSIC AND YOU ARE NOT THINKING OF ANYTHING ELSE?		,536	
WHEN YOU LISTEN TO MUSIC IS IT DIFFICULT OR IMPOSSIBLE TO STOP LISTENING AND TOBE OCCUPIED TO SOMETHING ELSE?		-,502	
AGE OF RESPONDENT			873
GENDER OF RESPONDENT			

Extraction Method: Principal Component Analysis.
 Rotation Method: Oblimin with Kaiser Normalization.
 a. Rotation converged in 14 iterations.

3.3 Logistic Binary Regression

Direct Logistic Regression was performed to assess the impact of a number of factors on the likelihood that respondents would report that they were music and music videos addicted. The model contained six independent variables(Gender, choice of preferred kind of music, easy funding for buying cd's and videos, state of complete absorbtion by listening to music, answer with lies to relatives asking questions about activities in own room, length of time in hours per day spent listening to music).

The dependent variable is: Perceived music and music videos addiction. The full model containing all predictors was statistically significant, $\chi^2(25, N=159)=77,71$, $p<0,0001$, indicating that the model was able to distinguish between respondents who reported and did not report that they were music addicted. The model as a whole explained between 38,7% (Cox and Snell R Squared) and 55,8% (Nagelkerke R Squared) of the variance in frequency of music addiction, and correctly classified 84,3% of cases. The Hosmer and Lemeshow test (7,71 with 8 degrees of freedom, $p=0,46$) is showing a good fit of the model. As shown in the following Table 3 all six independent variables made a unique statistically significant contribution to the model (Perceived music and music videos addiction).

Table 3. Logistic Regression Predicting Likelihood of music perceived addiction by respondents.

INDEPENDENT VARIABLE	B	WALD TEST	DF	p	EXP(B) Odds Ratio	95% C.I. For Odds Ratio	
						Lower	Upper
Gender	1,680	7,13	1	0,008	5,36	1,56	18,40
Choice of preferred kind of music(Rock music)	3,42	13,5	1	0,001	30,5	4,9	189,2
Easy funding for buying cd's and videos	-2,2	2,97	1	0,085	0,11	0,009	1,35
State of complete absorption by listening to music	2,79	10,2	1	0,001	16,3	2,94	90,84
Answer with lies to relatives asking questions about activities in own room	2,71	3,74	1	0,053	15,1	0,96	236,3
Length of time in hours per day spent listening to music	1,91	3,21	1	0,073	6,8	0,83	55,3
CONSTANT	-3,95	8,5	1	0,004	0,02	0,01	0,04

3.4 Discussion

In this paper we have proved through the χ^2 tests that the perceived addiction to music is related to the continuous and uncontrollable preoccupation of the addicted person with music and music videos, the behavioral change of him regarding the lies to his relatives asking for his preoccupation with music, the loss of important meetings because of his addiction to music, the finding of music as a way out of his problems and the great length of time devoted every day listening to music. Parallel to the mentioned psychosocial characteristics of the addicted is the possible lack of sleep and the slow educational progress.

The exploratory factor analysis has shown that there are two factors of addiction to music: the psychology factor, which includes the state of psychological preoccupation with music and the inability of controlling the habit of the continuous listening to music and the social behavior factor, which includes the quarrels and lies to relatives asking for control of the habit and the isolation from the outside world because of the music addiction.

The Logistic Regression Analysis has shown that the components of the two factors found in factor Analysis as well as the length of time devoted every day listening to music are statistically significant predictors of music addiction and they could be used as a tool for the diagnosis of this addiction.

A limitation of the study is the small sample (N=159) and the absence of respondents beyond 35 years of age. Another important dimension which is worth exploring through further research is the influence of social media (facebook, twitter e.t.c. to music addiction). Indeed, if we test the hypothesis H₀: The variable :Do you have your own blog, with main subject playing songs and discussing social themes, is independent from the variable: I think that I am addicted to music, we reject H₀ because $\chi^2=6,66$, N=159, p=0,010.

The following table 4 shows the percentages of the state of uncontrollable preoccupation with music for continuous listeners to music and perceived music addiction .

Table 4. Percentages (N;%) of the answers of respondents as regards the state of preoccupation with music. N=159 respondents.

Psychosocial characteristics of the person who listens for a long time to music and music videos	Percentage of accepting the statement by respondents (Answer 'YES')	Percentage of rejecting the statement by respondents (Answer 'NO')
1. ARE YOU ABSORBED CONTINUOUSLY BY LISTENING TO MUSIC AND YOU ARE NOT THINKING OF ANYTHING ELSE?	11,9	88,1
2. WHEN YOU TURN ON THE RADIO IN ORDER TO LISTEN TO MUSIC FOR A GIVEN TIME(EG 1 HOUR) DO YOU, FINALLY CONTINUE TO LISTEN TO MUSIC OVER 1 HOUR?	57,9	42,1
3. WHEN YOU TURN ON THE RADIO IN ORDER TO LISTEN TO MUSIC FOR A GIVEN TIME(EG 1 HOUR) DO YOU, FINALLY CONTINUE TO LISTEN TO MUSIC OVER 1 HOUR?1	28,9	71,1
4. WHEN YOU TURN ON THE RADIO IN ORDER TO LISTEN TO MUSIC FOR A GIVEN TIME(EG 1 HOUR) DO YOU, FINALLY CONTINUE TO LISTEN TO MUSIC OVER 1 HOUR?	30,2	69,8
5. HAVE YOU EVER LOST AN IMPORTANT MEETING IN ORDER TO SIT IN YOUR ROOM AND LISTEN TO MUSIC?	7,5	92,5
6. HAVE YOU EVER LIED TO YOUR RELATIVES WHO HAVE ASKED YOU WHAT YOU ARE DOING IN YOUR ROOM AND YOU DID NOT WANT TO REVEAL TO THEM THAT YOU ARE LISTENING TO MUSIC?	5	95
7. IS LISTENING MUSIC FOR YOU A WAY OUT FROM THE PROBLEMS OF LIFE?	72,3	27,7
8. HAVE YOU EVER HAD A QUARREL WITH YOUR PARENTS/ FRIENDS BECAUSE THEY TOLD YOU THAT YOU ARE SPENDING TOO MUCH TIME LISTENING TO MUSIC?	8,2	91,8
9. LENGTH OF TIME(IN HOURS PER DAY) SPENT IN LISTENING MUSIC AND MUSIC VIDEOS	<=3 hours : 73	>=4 hours : 27
10. DO YOU THINK THAT YOU ARE ADDICTED TO LISTENING TO MUSIC AND TO MUSIC VIDEOS?	27,7	72,3

References

- Arnett, J.J. (1991). Adolescence and heavy metal music: from the mouths of metalheads. *Youth and Society*, 23, p.p.76-98.
- Arnett, J.J. (1992). The soundtrack of recklessness: musical preferences and reckless behavior among adolescents. *Journal of Adolescent Research*, 7, p.p.313-331.
- Arnett, J.J. (1995). Adolescents' uses of media for self-socialization. *Journal for Youth Adolescence*, 24, p.p. 519-533.
- Baker, F. and Bor, W. (2008). Can music preference indicate mental health status in young people? *Australasian Psychiatry*, Vol 16., No 4 , p.p.284-288, Taylor and Francis, Doi:10.1080/10398560701879589
- Bartlett, M.S. (1954). A note on the multiplying factors for various chi square approximations. *Journal of the Royal Statistical Society*, 16 (Series B) , 296-98.
- Beck, A.T. , Weissman, A., Lester, D. and Trexler, L. (1974). The measurement of pessimism: The Hopelessness Scale. *Journal of Consulting and Clinical Psychology*, 42, p.p. 861-865.
- Costa, P.T. and McCrae, R.R. (1992). *The Revised Neo Personality Inventory Manual*. Odessa: Psychological Assessment Resources
- Diamond, S., Bermudez, R., and Schensul, J. (2006). What's the rap about Ecstasy? . *Journal of Adolescent Research*, 21, p.p.269-298.
- Doak, B.A. (2003). Relationship between psychiatric diagnoses, music preferences and drug preferences. *Music Therapy Perspectives*, 21, 69-73.
- Ekinci, O., BezY. , Sabuncuoglu, O., Berkem, M., Akin, E. and Imren, S.G. (2012). The association of music preferences and depressive symptoms in high school students: A community-based study from Istanbul. *Psychology of Music*, 41, 5, p.p. 565-578.
- Kaizer, H. (1970). A second generation little Jiffy. *Psychometrika*, 35, 401-15.
- Kaizer, H. (1974). An index of factorial simplicity. *Psychometrika*, 39, 31-6.
- Larson, R. (1995). Secrets in the bedroom: Adolescents private use of media. *Journal of Youth and Adolescence*, 24, p.p.535-550.
- Leming, J.S. (1987). Rock music and the socialisation of moral values in early adolescence. *Youth and Society*, 18, p.p. 363-383.
- Martin, G., Clarke, M. and Pearce, C. (1993). Adolescence suicide: Music preference as an indicator of vulnerability. *Journal of the American Academy of Child Adolescent Psychiatry*, 32, p.p. 530-535. S.
- Miranda, D. and Claes, M. (2004). Rap music, genres and deviant behaviours in French-Canadian adolescents . *Journal of Youth and Adolescence*, 33, p.p. 113-122.
- North, A.C. , Hargreaves, D.J. and O'Neill, S.A. (2000). The importance of Music to adolescents. *British Journal of Educational Psychology*, 70. p.p.255-272.
- Pallant, J. (2007). *SPSS Survival Manual*, Open University Press, Third Edition, McGraw Hill, U.K.

<https://sites.google.com/site/icqqmeas> 2015

Roberts, D.F. and Christenson, P.G. (2000). 'Here's Looking at you, Kid': Alcohol, Drugs and Tobacco in Entertainment Media. A literature Review Prepared for the National Center on Addiction and Substance Abuse at Columbia University. Report no. 99-1452-01, Columbia University, New York, NY. National Center on Addiction and Substance Abuse.

Rowlings, D, and Ciancarelli V. (1997). Music preference and the five-factor Model of the NEO Personality Inventory. *Psychology of Music*, 25, p.p.120-132.

Rustad, R., Small, J.E., Jobs, D.A. Safer, M.A. and Prterson, R.J. (2003). The impact of rock videos and music with suicidal content on thoughts and attributes about suicide. *Suicide and Life threatening Behavior*, 33, p.p. 120-131.

Scheel, K.R. and Westefeld, J. (1999). Heavy metal music and adolescent suicidality: An empirical investigation. *Adolescence*, 34, p.p. 253-273.

Schliebs, M. (2007). Police investigate MySpace "RIP" .<http://www.news.com.au/story/0.23599,21603808-2,00.html?CMP=KNC-GOOGLE>(accessed 3 May 2007).

Swartz, K.D. and Fouts, G. (2003). Music preferences, personality styles and development of issues to adolescents. *Journal of youth and adolescence*, 32, p.p. 205-213.

Took, K.J. and Weiss, D.S. (1994). The relationship between heavy metal and rap music and adolescent turmoil. Real or Artifact. *Adolescence*, 30, p. 321-332.

INVENTORY MANAGEMENT AND ITS IMPACT ON FIRMS' PERFORMANCE: AN EMPIRICAL STUDY IN THE REGION OF EPIRUS, GREECE

Ioannis Ganas¹, Alina Hyz^{2*}

¹Department of Accounting and Finance, Technological Educational Institute of Epirus, Psathaki, 481 00 Preveza, Greece,
ganas@teiep.gr

²Department of Accounting and Finance, Piraeus University of Applied Sciences, Petrou Ralli & Thivon, 122 44 Egaleo,
Greece, alinahyz@teipir.gr

ABSTRACT

The term “inventory” in manufacturing companies refers to the stockpile of the products a firm is offering for sale and the components that make up the product. The assets which firms store as inventory in anticipation of need are raw materials, work in progress, finished goods, stores and supplies. The last asset, normally form a very minor part of total inventory and does not involve significant investment. The major objective of the research presented here is to provide empirical evidence about the effects of inventory management on the profitability of a sample of small and medium enterprises (SME) in the region of Epirus, in Greece. The study covers a time period from 2002 to 2012. We collected data for 612 enterprises. The results of this research showed that there is statistical significance between profitability, measured through gross margin, and inventories management. Moreover, managers can create profits for their companies by handling correctly inventory turnover ratios and keeping each different component (raw materials, work in process and finished goods).

Keywords: inventory, inventory turnover, firm performance, elasticity, small and medium enterprises (SME), financial crisis, Greece

JEL CLASSIFICATION: G31, L25

1. Introduction

During the previous years, increasing attention was devoted to effective inventory management. Excessive inventories are one of the most important problems faced by many companies all over the world. Inventories are engaged primarily funds, usually unproductive, freezing high capital of the company. Inventories also cause an increase in costs associated with their maintenance and service. This is especially important today, when the rising cost of operations and increase competition in the market eliminate companies which are not effective in costs reduction.

In the last years inventory management has become the integral part of all companies. Inventory planning and control attempts to balance the advantages against the disadvantages of holding stock (Bonney, 1994). However, the question of whether inventory reduction has been achieved and whether it has been beneficial to firm's performance have not been subject to systematic investigation in the Greek setting. For the Greek enterprises inventory studies are sparse and there is a lack of research concerning small and medium enterprises sector. Attempting to fill this research gap, this study examines Greek inventories using data from the SME sector in the region of Epirus in Greece. The reason for the selection of small and medium enterprises was the fact that these companies are the basis of the economy of Greece in general. It is also the case of Epirus region, which belongs to one of the least developed regions in the European Union. We assume that improper management of inventories is one of the main reasons behind failures or pure financial performance of many Greek small and medium enterprises. During the period of recession, the inventory management get even more importance due to the firm's financial constraints (Hyz, 2011).

This study hypothesizes that there is a positive relationship between inventory management and firm performance. Proper inventory management will improve the management efficiency, which translates into profit growth. It is obtained by 1/. increasing reliability of business processes in the company guaranteed by a reasonable level and structure of inventory, 2/. increasing the speed of movement of backup, which leads to the liberation of funds (capital) involved in inventories, 3/. lowering inventory costs by reducing their level, improving the structure.

Although the link between operations and finance has been studied extensively, to our best knowledge this is the first study that investigates the relationship between firm level inventory and financial performance using as a sample all sectors of activities in one region. Also, due to the fact that the relationship may differ depending on the discrete components of inventory we analyze also their correlation with financial performance. The study covers ten years period, which we analyze first as a total period and then we divide it in the period prior 2008 and post 2008 using this year of the beginning of the recession in Greece and first year of serious financial constraints for Greek firms. A comparison of our findings with those from previous research provides important implications for managing companies.

The paper is organized as follows: in the next section we briefly review the existing body of literature and summarize major findings. This is followed by the presentation of research methodology where hypotheses are introduced as well as the data sources used in the analysis. The results are presented and discussed in section four. We conclude with further opportunities for research.

2. Literature review

In last decades, inventories have been decreased in many firms, but evidence of improved firm performance is mixed. Grablowsky (1984), has compared the inventory management practices of small and large firms and has concluded that small business firms should also use some efficient inventory management techniques for better results. Demeter (2003) found that inventory improvement tends to influence only indirectly the firm's profitability. Gaur et al. (2004), showed that the annual inventory turnover is negatively correlated with gross margin and positively correlated with capital intensity and sales surprise. Chen, et. al. (2005), have found that inventory has reduced considerably over 1981-2000. They found that firms with abnormally high inventories had a poor long term stock return, firms with low inventory showed ordinary returns while the firms having an average inventory had shown good stock returns. Their study uses Tobin's q as a measurement for performance and number of days in inventory as a measurement for inventory management. They found also that raw-material and work in process inventories have declined significantly and finished goods inventory remained steady during this period. Roumiantzen and Netessine (2005), analyse inventories in US companies for the ten years period, and they found that firms operating with more uncertain demand, longer lead times, higher gross margins and lower inventory holding costs have higher inventory levels. Furthermore, larger companies appear to benefit more from economies of scale and therefore have relatively less inventory than small companies. Guar and Kesavan (2007), tried to find out the various factors that could affect the positive or negative relations with

respect to size and sales growth rate with inventory turnover using 353 public listed US retailers for the period 1985-2003. With respect to size, they found strong evidence of diminishing economies of scale. With respect to sales growth rate, they found that inventory turnover increases with sales growth rate, but its rate of increase depends on firm size and on whether sales growth rate is positive or negative. Boute et al. (2006), have studied the financial impact of inventories in Belgian manufacturing industry, wholesale and retail. The results of the regression analysis are not very clear. They found negative coefficients relationship between the inventory ratio and financial performance (ROA), but these coefficients are only significant in 29% of the cases studied. Also, the analysis of variance showed that companies with a very high inventory ratio have much more chance to be bad financial performers than companies with a very low inventory ratio. Shah and Shin (2007), analyzed sector level data and showed that inventory performance is positively associated with financial performance. Cannon (2008), focuses on assessing the relationship between inventory performance and overall firm performance. He uses firm's annual percentage change in inventory turnover as a measurement for inventory management and return on assets as a measure of performance. He concludes that turnover improvement on average had a slightly negative effect on ROA. Cannon includes also capital intensity in this study and he finds that capital intensive firms tended to be below average with regards to ROA and the variable's presence in the model did not significantly alter the relationship between inventory turnover improvement and ROA over time. Capkun et al. (2009), found a significant positive correlation between inventory performance and measures of financial performance for firms in manufacturing industries. The correlation between the performance of discrete types of inventory and financial performance varies significantly across inventory types. RMI performance has the highest correlation with all financial performance measures. Between WIPI and FGI performance, the former is more highly correlated with gross profit measures while the latter is more highly correlated with operating profit measures.

There have been only a few research papers that investigate the relations between the inventory management and firm performance in Greece. For example, Voulgaris et al. (2000), found that the efficiency of inventory management policy is the main factor of the performance of the Greek firms. They used the financial data of Greek SMEs performance on the basis of a financial ratio analysis using a sample of 143 industrial firms for ten years period. Dimelis and Lyriotaki (2007), using a type of stock-adjustment model augmented with financial and fixed capital variables suggested by the portfolio model, tried to explore any differences in the inventory investment behaviour between domestic firms and firms with foreign ownership (partially or fully) in Greek manufacturing firms as well as between firms of different size. The results suggest that the portfolio model variables improve substantially the performance of the traditional stock-adjustment model in particular among the foreign-owned firms and the group of relatively small in size firms. Statistically significant differences were observed in the parameters of the model between small and large firms, as well as between domestic and foreign-owned firms. Koumanakos (2008), tried to investigate the existence of a possible linear relationship between inventory holdings and accounting based measures of performance for a recent group of Greek manufacturing firms belonging to the food, textiles and chemicals sectors. Results confirm the existence of a robust linear relationship but only in the sector of chemicals. Koliass et al. (2011), attempted to investigate the determinants of inventory turnover ratio for Greek retail firms for the period 2000-2005. It was found that inventory turnover ratio (as a measurement of inventory management) is negatively correlated with gross margin and positively correlated with capital intensity and a measure of sales surprise. It was also estimated that changes in sales ratio bring on bigger changes in the "sales-declined region" than in the "sales increased region".

3. Methodology

We use data from SME in Epirus region. The data was extracted from ICAP database, containing detailed financial reports annuals (income statements and annuals balance sheets) and statistics on Greek companies. This results in a data set of 612 companies split up over 18 sectors. We use the European NACE classification scheme of economic activities. We define three main sectors of economic activities in the region, based on the number of firms and percentage of total sales: wholesale and retail trade, manufacturing and construction. These three sectors represents about 87% of total sales in region and above 58 per cent of total number of firms.

The criteria used for selection of the companies' are two: 1/. European Commission criteria for small and medium enterprises¹, namely: headcount \leq 250, turnover \leq 50 million euro, total balance sheet \leq 43 million euro. 2/.

¹ http://ec.europa.eu/enterprise/enterprise_policy/sme_definition/index_en.htm

Data available for ten years continuously. We exclude all firm-year observations without data available on inventories and their components, sales, cost of goods sold, net fixed assets and total assets.

As a result we obtained a balanced panel dataset of 612 firms and a number of 6120 firms-years observations. Since outlier observations can cause problems, we implied standard method of winsorization of the data. For all used variables we replace 5% of the data by the highest and lower, respectively value that is not removed. Outlying observations were removed via 5% winsorization.

The following variables were calculated for the estimation of above purposes in our study:

Inventory turnover ratio. Inventory turnover ratio is velocity of which total inventories (raw materials, work in process and finished goods) converted into sales. This indicator suggests the ability of company to transform inventories in sales (cash or trade receivables) in particular period of time. The lower the number of days the better the inventory management.

$$ITR_{j,t} = \frac{avgI_{j,t} * Days}{CGS_{j,t}} \quad (1)$$

where: $ITR_{j,t}$ - Inventory turnover ratio for firm j in period t, $avgI_{j,t}$ - Average Inventories for firm j in period t, $CGS_{j,t}$ - Cost of Goods Sold for firm j in period t

Raw material turnover ratio. Raw materials turnover ratio is velocity of which raw materials converted into goods ready for sale. If raw materials turnover ratio is high then company is efficiency converting into finished goods.

$$RMTR_{j,t} = \frac{avgRM_{j,t} * Days}{CGS_{j,t}} \quad (2)$$

where: $RMTR_{j,t}$ - Raw Material turnover ratio for firm j in period t, $avgRM_{j,t}$ - Average Raw Materials for firm j in period t, $CGS_{j,t}$ - Cost of Goods Sold for firm j in period t

Work in process turnover ratio. Work in progress turnover ratio is velocity of which WIP converted into goods ready for sale. If WIP is high then company is efficiency converting into finished goods.

$$WIPTR_{j,t} = \frac{avgWIP_{j,t} * Days}{CGS_{j,t}} \quad (3)$$

where: $WIPTR_{j,t}$ - Inventory turnover ratio for firm j in period t, $avgWIP_{j,t}$ - Average Inventories for firm j in period t, $CGS_{j,t}$ - Cost of Goods Sold for firm j in period t

Finished goods turnover ratio. Finished goods turnover ratio is velocity of which finished goods converted into sale. If finished goods turnover ratio is high then company is efficient in managing the finished goods.

$$FGTR_{j,t} = \frac{avgFG_{j,t} * Days}{CGS_{j,t}} \quad (4)$$

where: $FGTR_{j,t}$ - Inventory turnover ratio for firm j in period t, $avgFG_{j,t}$ - Average Inventories for firm j in period t, $CGS_{j,t}$ - Cost of Goods Sold for firm j in period t

Gross margin. Gross margin indicates the gross profit per union of sale.

$$GM_{j,t} = \frac{S_{j,t} - CGS_{j,t}}{CGS_{j,t}} \quad (5)$$

where: $GM_{j,t}$ - Gross Margin for firm j in period t, $S_{j,t}$ - Sales for firm j in period t

$CGS_{j,t}$ - Cost of Goods Sold for firm j in period t

Capital intensity. Capital intensity indicates the rate of long term investment made of firm.

$$CI_{j,t} = \frac{NA_{j,t}}{TA_{j,t}} \quad (6)$$

where: $CI_{j,t}$ - Capital Intensity for firm j in period t, $NA_{j,t}$ - Net fixed Assets for firm j in period t, $TA_{j,t}$ - Total Assets for firm j in period t

4. Results and Findings

Table 1 presents brief overview of the descriptive statistics of the relevant variables for three main sectors for the ten years period and for two sub-periods. For SMEs, inventories represent on average 33% of total assets and 42% of current assets. In the analysis we focus more on the medians rather than mean due to the fact that means are often influenced by the phenomena of “windows dressing”. In other words accounting data

are influenced by the tendency of accountants to try to help their clients have a good look. Since the level and value of inventories during the examined period serves as collateral for debt in Greek firms. The median of total inventory holdings periods were 82,13 days with the biggest value in manufacturing sector (102,01 days). Our financial performance measure show median Gross Margin for all period 0,23. Another variable, CI, as a measurement of the ability of a firm to use its fixed assets effectively is on average 42%.

Table 2 shows the correlation matrix of the model's variables based on Pearson correlation for total inventories and their components in all surveyed SMEs and three main sectors. The results of the correlation analysis for all sectors show that the number of days inventory turnover (total and its components) negatively relates to the dependent variable gross margin. It is also a case for manufacturing and wholesale and retail trade sector. Although there is absence of a significant relation for raw materials days turnover and work in progress. It is interesting to note a significant negative relation for finished goods in the case of construction sector. It should be noted yet that correlations of gross margin differs between three analyzed sectors. The control variables: capital intensity show a positive relation on the dependent variable. It means that managers of firms can create value by keeping the levels of inventories to a reasonable minimum. It also may imply that higher capital intensity causes greater value and reduction in inventories. In order to shed more light on the relationship between inventory management and firm's profitability, we use the following regression analysis, where we examine the endogenous variable which is gross margin against five exogenous variables.

$$GM_{j,t} = a + \beta_1 I_{j,t} + \beta_2 CI_{j,t} + \varepsilon \quad (7)$$

where: j is representing the firm and t is the year, a is the regression constant, β_1, β_2 , are the coefficients of $I_{j,t}, CI_{j,t}$, respectively. $I_{j,t}$ is the number of days inventory total or their components of firm j in the year t , $CI_{j,t}$ - capital intensity of firm j in the year t , ε indicate the error term for the observations of firm j in the year t .

This regression equation indicates that there is negative relationship between inventory management measurements and profitability, which is consistent with the view that a decrease in the inventory measurements will generate more profits for firms. This result is highly significant.

Table 1. Descriptive Statistics Analysis (5% winsorization, 6120 firms-years observations)

	Mean				Median				St.Dev.			
	Manu- facturing (C)	Whole- sale (G)	Constru- tion (F)	Total	Manu- facturing (C)	Whole- Sale (G)	Constru- ction (F)	Total	Manu- facturing (C)	Whole- sale (G)	Construc- tion (F)	Total
2002-2011												
GM	0,21	0,21	0,25	0,29	0,19	0,20	0,20	0,23	0,22	0,13	0,16	0,20
ITR	174,12	155,44	211,11	159,35	102,01	94,62	100,90	82,13	201,63	181,30	177,65	123,89
RMTR	52,77	17,20	31,55	36,84	31,40	1,12	7,99	14,79	58,53	38,19	27,89	13,43
WIP- TR	82,21	36,17	227,02	198,69	51,04	19,87	109,54	96,75	94,90	45,32	59,16	76,56
FGTR	126,23	144,87	114,78	28,80	60,39	88,86	29,43	6,60	169,16	162,92	123,65	114,76
CI	0,47	0,28	0,29	0,45	0,45	0,23	0,22	0,42	0,24	0,22	0,34	0,25

Table 2. Correlation matrix (all sectors)

	GM	ITR	RMTR	WIPTR	FGTR	CI
GM	1					
ITR	-.046**	1				
RMTR	-.024*	.521**	1			
WIPTR	-.035*	.917**	.147*	1		
FGTR	-.099**	.881**	.175**	.311	1	
CI	.160**	-.186	-.008	-.025	-.182**	1
Manufacturing(C)						
	GM	ITR	RMTR	WIPTR	FGTR	CI
GM	1					
ITR	-.360**	1				

RMTR	-.029	.525**	1			
WIPTR	-.003	.713**	.252*	1		
FGTR	-.396**	.868**	.112**	.285*	1	
CI	.183**	.190*	.006	.144*	.168**	1
Wholesale (G)						
	GM	ITR	RMTR	WIPTR	FGTR	CI
GM	1					
ITR	-.332**	1				
RMTR	-.083	.525**	1			
WIPTR	-.354	.626*		1		
FGTR	.380**	.971**	.175**	.142*	1	
CI	.040	-.003	.265**	.068*	-.024	1
Construction (F)						
	GM	ITR	RMTR	WIPTR	FGTR	CI
GM	1					
ITR	-.227*	1				
RMTR	-.228*	.424**	1			
WIPTR	-.032	.945**	.159	1		
FGTR	-.238**	.694**	.011	.311	1	
CI	.331**	.140**	.091*	.057**	.069*	1

Note: Variables are defined at the beginning of this section. For every pair of variables, the table provides the Pearson's correlation coefficient, t-Statistic (* p-value<0,1; ** p-value<0,05; *** p-value<0,01)

5. Conclusions - Directions for Further Research

This study is an attempt to investigate the inventory management of small and medium enterprises in the region of Epirus, Greece. The following measures were used in this study: (1) Inventory Turnover Ratio (2) Raw Material turnover ratio, (3) Work in process turnover ratio, (4) Finished goods turnover ratio. (5) Gross margin, (6) Capital intensity. This study was conducted on a sample of financial data for 612 firms over the ten years period. By employing correlation and regression techniques the impact of inventory management and firm's profitability was found to be significantly negative. This could lead us to the conclusion that less profitable firms have worst inventory management measures. Therefore, managers can create profits for their companies by managing efficiently the inventories and their components' measures, leading to an optimum level. The study can be extended by adding more regions or countries, more years and more variables.

Acknowledgements

This research has been co-financed by the European Union (European Social Fund – ESF) and Greek national funds through the Operational Program “Education and Lifelong Learning” of the National Strategic Reference Framework (NSRF) - Research Funding Program ARCHIMEDES III, “Investing in knowledge society through the European Social Fund”.

References

- [1] Bonney, M.C. (1994), Trends in inventory management, *International Journal of Production Economics*, Vol. 35, pp. 107-114.
- [2] Boute, N. R., Lambrecht, M.R., Lambrechts, O. and Sterckx, P. (2007), An analysis of inventory turnover in the Belgian manufacturing industry, wholesale and retail and the financial impact on inventory reduction, KBI 0725, Department of Decision Sciences and Information Management, Faculty of Economics and Applied Economics, Katholieke Universiteit Leuven, [Online], Available at: https://lirias.kuleuven.be/bitstream/123456789/175504/1/KBI_0725.pdf
- [3] Cannon, A.R. (2008), Inventory Improvement and Financial Performance, *International Journal of Production Economics*, Vol. 115, pp. 581-593.
- [4] Capkun, V., Hameri, A.-P. and Weiss, L.A. (2009), On the relationship between inventory and financial performance in manufacturing companies, *International Journal of Operations & Production Management*, Vol. 29, No. 8, pp. 789-806.
- [5] Chen, H., Frank M., and Wu, O. (2005), What actually happened to the inventories of American companies between 1981 and 2000? *Management Science*, Vol. 51, No. 7, pp. 1015-1031.
- [6] Dimelis, S.P., and Lyriotaki, M.-N. (2007), Inventory Investment and Foreign Ownership in Greek Manufacturing Firms, *Journal of Production Economics*, Vol. 108, pp. 8-14.
- [7] Gaur, V. and Kesavan, S. (2008), Retail Supply Chain Management, in N. Agrawal, S. Smith (Eds.), *The effects of Firm Size and Sales Growth Rate on Inventory Turnover Performance in U.S. Retail Services*, pp. 25-52, Springer
- [8] Gaur, V. and Kesavan, S. (2008). The Effects of Firm Size and Sales Growth Rate on Inventory Turnover Performance in the U.S. Retail Sector, in N. Agrawal and S. Smith (eds), *Retail Supply Chain Management*, pp. 25-52, Kluwer Publishers.
- [9] Gaur, V., Fisher, M. and Raman, A. (2005), An Econometric Analysis of Inventory Turnover Performance in Retail Services, *Management Science*, Vol. 51, pp. 181-194.

<https://sites.google.com/site/icqqmeas2015>

- [10] Grablowsky B. (1984), Financial management of inventory, *Journal of Small Business Management*, Vol. 122, No. 3, pp. 59-65.
- [11] Guariglia, A. and Mateut, S. (2010), Inventory investment, global engagement, and financial constraints in the UK: Evidence from micro data, *Journal of Macroeconomics*, Vol. 32, No 1, pp. 239-250.
- [12] http://ec.europa.eu/enterprise/enterprise_policy/sme_definition/index_en.htm
- [13] Hyz, A. (2006), The Development of Entrepreneurship and Small Business in Poland, *Festschrift in honour of professor Maria Negreponi – Delivani*, University of Macedonia, Economic and Social Sciences, Thessaloniki, pp. 37-61.
- [14] Kolas, G.D., Dimelis, S.P. and Filios, V.P. (2011), An Empirical Analysis of Inventory Turnover Behavior in the Greek Retail Sector: 2000-2005, *International Journal of Production Economics*, Vol. 133, No. 1, 143-153.
- [15] Koumanakos, D. (2008), The effect of inventory management on firm performance, *International Journal of Productivity and Performance Management*, Vol. 57, No. 5, pp.355 - 369.
- [16] Krishnankutty, R. (2011), Panel Data Analysis on Retail Inventory Productivity, *The Economic Research Guardian*, Vol. 1, No. 1, pp. 15-23.
- [17] Voulgari, F., Doumpos, M, and Zopounidis, C. (2000), On the evolution of Greek industrial SME's performance via multicriteria analysis of financial ratios, *Small Business Economics*, Vol. 15, pp. 127-136.

EXPLORING ENTREPRENEURIAL ATTITUDE AND PERFORMANCE AMONG GREEK ENTERPRISES: THE CASE OF EPIRUS REGION

**Grigorios Gikas¹, Konstantinos Z. Vasileiou^{2*}, Christos C. Frangos³, Constantinos C. Frangos⁴,
Ioannis Sotiropoulos⁵**

¹Department of Accounting and finance, TEI of Epirus, Greece, gikas@teiep.gr

²Department of Business Administration, TEI of Western Greece, vasileiou@teiwest.gr

³Department of Business Administration, TEI of Athens, Greece, cfragos@teiath.gr

⁴Division of Medicine, University College London, UK, constantinos.frangos.09@ucl.ac.uk

⁵Department of Accounting and finance, TEI of Epirus, Greece, sotiropoulosioan@yahoo.gr

ABSTRACT

This paper reports on a survey regarding the entrepreneurship in Greece and more specifically in the Region of Epirus. 140 questionnaires were completed by entrepreneurs from the four Regional Units, and the study sample is rather representative of the most competitive and innovative businesses in the Region of Epirus. Entrepreneurs perceive that financial factors and, in general, the unprecedented adverse economic situation that has affected the entire Greek economy, are the main constraints they face. Moreover, in order to improve their company's competitive position, they consider as top priority to enhance the satisfaction of their customers' needs and ameliorate their communication with them. The majority of the entrepreneurs states to be relatively satisfied with their business performance (i.e. profitability, growth, market share), when compared with the industry average, but a very significant proportion of them believes that is the same or lower (around 50% and 30%, respectively). The number of Small and Medium Enterprises (SMEs) is shrinking in Greece, despite the considerable public funds committed to directly support them through implementing investment plans. Thus, it is proposed to examine, in the future, whether such funds, or at least a portion of them, would be more effective in case they were disposed to increase consumers' purchasing power and reduce the levies of the SMEs to the State.

Keywords: entrepreneurship, survey, constraints, success factors, Greece, Epirus.

1. Introduction

There is a growing interest around the world for the role of entrepreneurship in addressing a series of important societal issues concerning growth, societal progress through innovation, employment generation and social empowerment (Xheneti et al, 2012; World Economic Forum, 2009). This can be due to, among other, the sharp decrease of the jobs offered in the traditional public sector in almost every country (Apergis et al, 2011). Moreover, working for established, mostly large (e.g. multinational) enterprises, is not as appealing as it used to be in the past, since little job security or reward of loyalty is currently offered (Schwarz, 2009; Lüthje and Franke, 2003). Additionally, the unemployment rates, especially in Southern Europe, are rather high for all age groups. In Greece, particularly, in 2014 (4th quarter) the unemployment rate has reached 26.1% for the whole population, while this rate is even higher for women (29.6%) and young people between 25 and 29 years old (41.1%) (EL.STAT., 2015).

Thus, it is no surprising that policy makers in almost all around the world constantly in various ways encourage, especially to young and educated people to assume innovative entrepreneurial activities in order to achieve higher levels of economic growth and innovation for their societies. Moreover, relevant academic research has concluded that there is a high positive relationship between entrepreneurial activity and economic outcomes (van Praag et al, 2007).

Given the great importance of entrepreneurship a number of studies and surveys, even recently, have been conducted in Greece (Sahinidis et al, 2013, Chletsos, 2008; Petrakis, 2008; Sarri et al, 2010; IOBE 2015; 2014; 2012, Kyritsis, C. and Chytis, E. 2013). Sahinidis and Vassiliou (2013) studied entrepreneurs' and self-employed individuals' intentions to start a new venture, using the Theory of Planned Behavior. They concluded that there is a strong link between the personal attraction and entrepreneurial intention, as well as between perceived behavioral control or self-efficacy and entrepreneurial intention. IOBE (2015; 2014; 2012) conducts since 2003 the annual survey on entrepreneurship in Greece, using of a representative sample of 2000 respondents 18-64 years, under the research program of the Global Entrepreneurship Monitor (GEM). The report for the period 2012-2013, in addition to the main business indicators analyzes the perceptions and motivations for entrepreneurship, the demographic and qualitative characteristics of business endeavors.

This study aims to contribute to the existing knowledge on the entrepreneurship in Greece, and in particular it focuses on the factors that influence the success of entrepreneurial activities. In this light, our paper proceeds as follows: In the next section we briefly describe the methodology employed and then the empirical data derived from the questionnaire survey are analyzed. Our work ends with our conclusions, recommendations and limitations that we see in our examination.

2. Approach

2.1. Method

Based on a literature review a draft questionnaire, consisting of six sections, was initially developed in order to fulfil the aim and objectives of this study. The participants' self-assessment for their business performance was explored by three statements (Abdullah et al 2009; Nybak, 2008).

Four factors were selected in order to investigate the factors that determine successful entrepreneurship, specifically:

- the factors constraining entrepreneurship (Abdullah et al 2009; Chletsos, 2008; Petrakis, 2008; Xheneti et al, 2012; Okpara, 2012),
- the factors facilitating entrepreneurship (Abdullah et al 2009; Chletsos, 2008; IOBE 2014; 2012; Sarri et al, 2010),
- the actions to improve company's competitive position (Abdullah et al 2009; Chletsos, 2008; Petrakis, 2008; Romero et al, 2012), and
- the incentives for entrepreneurship (Romero et al, 2012; IOBE 2014; 2012), and

A five point Likert Scale was used for the first five sections, where respondents were asked to report their level of agreement or disagreement with the statement from strongly disagree (1) to strongly agree (5), while (2) was appointed to rather disagree, (3) to neither agree nor disagree and (4) to rather agree. Moreover, the last section of the questionnaire included the socio-demographic characteristics of participants and their businesses (Abdullah et al 2009; Sahinidis et al, 2013; Romero et al, 2012; Okpara, 2012).

Next, the draft questionnaire was further discussed with 5 entrepreneurs and two professors of the TEI of Epirus in order to select the most important and relevant items for each construct, in an effort to end up to a

comprehensive, but as short as possible questionnaire. Finally, the questionnaire was pretested by 10 entrepreneurs in order to detect and eliminate weaknesses in functionality and comprehensibility.

2.2. Sample

A convenience sample of 140 businesses, among the most innovative and competitive, from the four Regional Units of the Epirus Region was used (Table 1). The main stratification criteria were the Regional Unit where the enterprise is located, the sector involved, the size and the share of exports to total sales. The last criterion was selected, as it is generally deemed that export companies tend to be more innovative and competitive than the rest of their sector, given the additional obstacles they usually have to overcome.

The average age of the participants is much lower than of the actual population of entrepreneurs. Moreover, the portion of the sampled companies in the form of a legal person is almost more than twice of the total population of companies. The size of the sampled enterprises, in terms of the number of employees, is clearly greater than the whole population, as the share of the very small businesses in the sample is only 76%, against 97% of the population. Moreover, the educational level of participants is much higher than the population, as the percentage of the graduates from Universities and TEIs is more than double of the population. 25% of companies in the sample are engaged in export activities, compared to 1.57% of Greek companies. Finally, a quarter of respondents reported that their enterprises applies a quality assurance system.

Table 1. Sample characteristics (% of respondents, N=140)

Respondent					
Sex		Age		Education	
Male	68,57	18-24	6,4	MSc/PhD	10,7
Female	31,43	25-34	31,4	University/ College	45,0
		35-44	29,3	High School	22,9
		45-54	17,1	Secondary School	21,4
		55-64	15,7		
Company					
Legal status		Sector		Exports (of total sales)	
Sole proprietorship	64,3	Primary	15,7	0	75,00
General partnership	15,7	Manufacturing	22,1	0,01% - 5%	14,29
Limited partnership	3,6	Commerce	32,9	5% - 10%	6,43
Ltd.	4,3	Services	20,0	11% - 25%	2,86
S.A..	8,6	Tourism	9,3	26% - 50%	0,71
Other	3,6			> 50%	0,71
Regional Unit		No of employees		Quality Assurance System	
Ioannina	42,9	1-9	75,7	Yes	26,43
Preveza	21,4	10-49	21,4	No	73,57
Arta	19,3	50-249	2,1		
Thesprotia	16,4	>250	0,7		

3. Results

The survey revealed that entrepreneurs consider that financial factors and the general unprecedented difficult economic situation, that has affected the entire Greek economy, are the most significant reasons that constrain their business performance (Table 2). More specifically, they mention that the problem of liquidity in the market, the lack of funds for new investment and the difficulty in securing loans are the key obstacles to running their business, which was largely expected. Indeed, the mean value for these factors ranged from 4.07 to 4.36 and the vast majority of the respondents strongly agreed and rather agreed.

However, in addition, to the major difficulties of economic macro-environment to be resolved, the vast majority of participants consider that the "State" is also not helping in their survival effort, as both the bureaucracy of subsidized investment programs and the bureaucracy of Public Services pose more hurdles to them. In par-

ticular, a very small percentage (6-7%) disagrees (totally or rather) in the relevant statements and the majority states that rather agrees (38% and 48%, respectively) and strongly agrees (28% and 24%, respectively).

Regarding the problems of the microenvironment, the lack of collaborative suppliers and the shortage of qualified staff are generally not considered to significantly impede entrepreneurship, given that the mean value of the relative questions were 3.29 and 3.16, respectively. However, there is considerable dispersion of views, as the standard deviation takes the largest value of (1.20 and 1.36, respectively) in comparison with other impeding factors.

Table 2. Factors constraining entrepreneurship: % of valid answers and descriptive statistics

	1	2	3	4	5	Mean	Std. dev.
The lack of funds for new investment	0.7%	7.1%	14.3%	40.0%	37.9%	4.07	0.93
The bureaucracy of the Subsidized Investment Programs	1.4%	5.0%	27.1%	38.6%	27.9%	3.86	0.93
The problem of liquidity in the market	0.7%	2.1%	7.9%	37.9%	51.4%	4.37	0.78
The difficulty in obtaining loans	2.1%	2.9%	12.1%	40.0%	42.9%	4.19	0.91
Generally the economic crisis	1.4%	5.7%	17.1%	16.4%	59.3%	4.26	1.03
The bureaucracy of Public Services	1.4%	5.0%	21.4%	47.9%	24.3%	3.89	0.88
The lack of collaborative suppliers	7.9%	20.0%	25.0%	30.0%	17.1%	3.29	1.20
The shortage of qualified staff	12.1%	25.0%	20.0%	20.0%	22.9%	3.16	1.36

According to the research results it can be concluded that all the factors of business successful development evaluated by the entrepreneurs are considered particularly important, although there is some classification (Table 3). Specifically, the effectiveness, as captured by the company's ability to produce better products for customers comparing to their competitors and the company's ability to effectively communicate with customers about their needs are considered more important factors in comparison with the efficiency, namely the company's ability to produce similar products at lower cost compared to competitors. Indeed, 85% of respondents agreed, of which 47% strongly agreed, with the relevant statement about the company's ability to produce similar products at a lower cost compared to competitors, and only 3% disagreed (rather or absolutely). Moreover, the mode of answers for the company's ability to effectively communicate with customers about their needs and the company's ability to produce similar products at lower cost compared to competitors was strongly agree (5) and the mean values were around 4.05. It is noteworthy that only 8% - 10% of entrepreneurs (rather or strongly) disagreed with these statements.

However, in order to achieve simultaneously high effectiveness and efficiency, the participants mentioned that both the employees' qualifications and skills and the harmonious collaboration with their suppliers are more important factors than the businessman's skills in decision making and risk management. In particular, the mean values for the statements regarding the employees' qualifications and skills and the harmonious collaboration with their suppliers were 4.11 and 3.98, respectively, and only around 7% of respondents (rather or strongly) disagreed. Although, the businessman's skills in decision making and risk management were considered the least important factors facilitating the company's development, yet the mean value of answers ranged from 3.78 to 3.92, and the mode was rather agree (4), while only around 9% of respondents (rather or strongly) disagreed. Consequently, the participants felt that even if they are very capable they will not achieve the expected result unless they develop and retain harmonious working relationships both in their internal and external environment.

Table 3. Factors facilitating entrepreneurship: % of valid answers and descriptive statistics

	1	2	3	4	5	Mean	Std. dev.
Entrepreneur's ability in decision making	1.4%	6.4%	21.4%	40.0%	30.7%	3.92	0.95
Entrepreneur's ability in risk management	0.7%	8.6%	26.4%	40.7%	23.6%	3.78	0.93
Company's ability to effectively communicate with customers about their needs	1.4%	8.6%	13.6%	35.7%	40.7%	4.06	1.01

Company's ability to collaborate smoothly with suppliers	2.1%	5.0%	20.7%	37.1%	35.0%	3.98	0.98
Qualifications and skills of employees	1.4%	4.3%	17.1%	36.4%	40.7%	4.11	0.93
Company's ability to produce compared to competitors similar products at a lower cost	2.1%	5.7%	22.9%	25.7%	43.6%	4.03	1.05
Company's ability to produce compared to their competitors better products for customers	1.4%	1.4%	14.3%	35.7%	47.1%	4.26	0.86

In agreement with the above the entrepreneurs that participated in the survey mentioned as priority measures in order to improve their company's competitive position a) improving the quality of products of the company, b) improving the marketing communication with customers, c) greater focus on innovation and d) improving staff training (Table 4). For these actions, the average of responses ranged from 4.04 to 4.15, while relatively little variation was observed (standard deviation ranged from 0.77 to 0.89). The mode of answers for the corresponding statements were "rather agree", while only 3% - 7% disagreed (rather or strongly) with them.

Expansion into new markets and investing in new technologies follow next, with the mean value of responses to the relevant statements being close to "4" (rather agree). Although a relatively small percentage of entrepreneurs disagree (total of 4% - 9%) with these actions, the percentage of those who agree (rather or strongly) is not exceeding 70%.

The reduction of production costs, the utilization of subsidized investment programs and improving relations with suppliers follow next in terms of the prioritization of actions that could improve the company's competitive position. The mean values of answers to these statements ranged from about 3.7 to 3.8, while the mode answer was "rather agree", and the percentage of those disagreeing is relatively low, ranging between 8% and 14%.

The action from which entrepreneurs have the least expectations for improving their company's competitive position is the reduction of their profit margins. The answers are relatively "normally" distributed with the average of responses approximating to "3" (Neither agree nor disagree), which was the prevailing (mode) response.

In conclusion, the entrepreneurs consider as top priority actions to improve the company's competitive position the improvement of the satisfaction of their customers' needs and the communication with them. In order to improve their operations effectiveness they believe that it is particularly important to focus more on innovation and to improve the education - training of their personnel so that the adoption of innovative practices has the expected results. Consistent with the above, the respondents also consider as actions of high importance the expansion into new markets and investing in new technologies, as well as reducing production costs, the utilization of subsidized investment programs and improving relations with suppliers.

Finally, the reduction of profit margins is deemed as an ultimate action to improve their competitive position and probably with relatively low expectations. This can be attributed to the fact that the Greek economy is already in five consecutive years of severe crisis and, therefore, firms' profit margins, at least of the vast majority, are already very low, thus a further reduction is very likely to jeopardize the survival of businesses.

Table 4. Actions to improve company's competitive position: % of valid answers and descriptive statistics

	1	2	3	4	5	Mean	Std. dev.
Improving marketing communication with customers	0.0%	5.7%	12.1%	49.3%	32.9%	4.09	0.82
Expansion into new markets	1.4%	2.9%	28.6%	32.9%	34.3%	3.96	0.94
Utilization of subsidized investment programs	2.1%	12.1%	21.4%	38.6%	25.7%	3.74	1.04
Reduction of production costs	2.1%	7.1%	25.7%	36.4%	28.6%	3.82	1.00
Investing in new technologies	2.1%	6.4%	22.1%	35.0%	34.3%	3.93	1.01
Greater focus on innovation	0.7%	4.3%	15.7%	45.0%	34.3%	4.08	0.86
Improving relations with suppliers	2.1%	5.7%	34.3%	37.9%	20.0%	3.68	0.93
Reduction of profit margins	6.4%	25.0%	32.1%	26.4%	10.0%	3.09	1.08
Improving product quality	0.7%	2.1%	12.1%	51.4%	33.6%	4.15	0.77
Improving staff training	0.7%	6.5%	13.7%	46.8%	32.4%	4.04	0.89

The better exploitation of their skills and knowledge, and the achievement of higher income compared with an employee are the main motives for undertaking a business activity for the participants in the survey, with

responses mean values being 4.02 and 3.92 respectively (Table 5). The prevailing answer was “strongly agree” for both relevant statements, with 70% of respondents agreeing (rather or strongly) and negative responses (strongly disagree or probably) do not exceed 10%.

Less significant incentives for entrepreneurial activity seem to be a) the fact that is the only available option for employment, b) the achievement of greater social status and c) the adjustable hours and working conditions, where the mean ranged between 3.37 and 3.53. Although, for the three relevant statements the prevailing answer is “rather agree”, there is a relatively high variance in answers, as 19% - 25% of participants disagreed (rather or strongly).

It is, therefore, evident that entrepreneurs choose to start businesses aiming principally to better utilize their skills and knowledge, with the expectation that in this way they will achieve a higher income compared with an employee. Therefore, they consider it is worthwhile to assume the risks of entrepreneurial activity, since as employees they would not have exploited to the full extent their skills and knowledge, and that a monetary reward can be attained for the additional effort they make for their business.

Although half of respondents believe that with entrepreneurship they will achieve greater social recognition and that they will adjust their working hours and conditions, around 20% of them have a contrary opinion. It is, however, worth mentioning that many of the respondents believe that they have no other available option for employment, since 25% of the sample totally agrees and 33% rather agrees.

Table 5. Incentives for entrepreneurship: % of valid answers and descriptive statistics

	1	2	3	4	5	Mean	Std. dev.
Achieving higher income compared with an employee	5.0%	5.0%	20.1%	32.4%	37.4%	3.92	1.11
Better use of skills and knowledge	1.4%	5.8%	20.1%	34.5%	38.1%	4.02	0.97
Achieving greater social status	9.4%	11.5%	26.6%	35.3%	17.3%	3.40	1.18
Adjustable hours and working conditions	8.6%	10.1%	30.2%	37.4%	13.7%	3.37	1.11
It is the only available option for employment	4.3%	21.6%	15.8%	33.1%	25.2%	3.53	1.21

The majority of entrepreneurs report to be relatively satisfied with the profitability of their business when compared with the industry average, with 45% rather agreeing (Table 6). But 32% of them neither agree nor disagree and 11% rather disagree. Relatively similar are also the views regarding the growth of their company compared to the industry average, where half the entrepreneurs agree (39% rather and 12% strongly) that their business grows faster, but 22% disagree (3% strongly and 19% rather). With regard to the market share of their business compared with the industry average, the views of participants differ significantly as 44% agree (36% rather and 9% strongly) that is greater, but 29% disagree (7% strongly and 22% rather), with the average of responses being 3.16.

Although it is rather common to observe bias in self-evaluations, it can be concluded that the unfavorable economic situation does not allow participants to state that they are very pleased with the profitability and growth of their business, even though the sample is rather representative of the most competitive enterprises the region of Epirus.

Table 6. Company’s performance assessment: % of valid answers and descriptive statistics

	1	2	3	4	5	Mean	Std. dev.
Compared with the industry average the company is more profitable	5.0%	5.0%	20.1%	32.4%	37.4%	3.92	1.11
Compared with the industry average the company has a greater market share	1.4%	5.8%	20.1%	34.5%	38.1%	4.02	0.97
Compared with the industry average the company is growing more rapidly	9.4%	11.5%	26.6%	35.3%	17.3%	3.40	1.18

4. Conclusions, Recommendations and Limitations

According to the research findings, enterprises face, beyond the major problems created by the unprecedented economic crisis, as well the lack of liquidity in the market which results to inability to secure financing from banks or other financial institutions. Inevitably, all these facts lead to the lack of funds for new investments, and thus to reduced competitiveness, openness and innovation of Greek enterprises.

The various subsidized investment programs could constitute a valuable tool for small businesses, but as long as the economic crisis is not addressed, especially in terms of supporting consumers-buyers incomes and reducing the excessive contributions (of the very small and small) enterprises in public coffers, the effectiveness and efficiency of these programs is very low. Indeed, the utilization of these programs is often in practice very low, as a small fraction of the approved investment plans are implemented. It is, therefore, proposed to take measures that have a direct impact on the purchasing behavior of consumers and to reduce the excessive contributions (of the very small and small) enterprises in public coffers.

Entrepreneurs recognize the need to continue improving the efficiency and effectiveness of their business and therefore, they consider that both the qualifications and skills of employees and the smoothing collaboration with their suppliers are cornerstones of this effort. Further enhancing the role of the highest education institutions and their cooperation with the local business community would contribute significantly to the development of the entrepreneurship with mutual benefits for both businesses and academic community.

The University and the TEI located in Epirus may further contribute to the development of qualifications and skills of young people of Epirus, reduce internal migration most potential workforce and may attract leading scientists from the rest of Greece. Therefore, everyday and strategic issues concerning business operations will be approached in a more professional, continually updated and methodical way.

The findings of our study are subject to a number of limitations, which are often common to similar studies. Exploring entrepreneurial attitudes always involve a self-assessment bias and particularly, when evaluating the business performance. Moreover, it was difficult to find large sample of entrepreneurs and to have them participate in a longitudinal study. Moreover, we should be cautious to generalize the findings of this survey, as the sample of entrepreneurs originates from a single Region in Greece and particularly, it is rather representative of the most competitive and innovative companies.

Acknowledgements

The authors would like to acknowledge the support of the Unit of Innovation and Entrepreneurship (UoIE) of the TEI of Epirus for this research under the project number OPS 304320 of the O.P. "Education and Lifelong Learning".

References

- Abdullah, F., Hamali, J., Deen, A., Saban, G. and Abdurahman, A. (2009). Developing a framework of success of Bumiputera entrepreneurs. *Journal of Enterprising Communities: People and Places in the Global Economy*. Vol. 3 No. 1. pp. 8-24
- Apergis, N., and Fafaliou, I., 2014. The determinants of business start-ups in tertiary education: evidence for Greece through a panel data approach. *Journal of Economics and Finance*. Vol. 38. pp.287-301.
- Cletsos, M. (2008). Survey of Youth Entrepreneurship in the Region of Epirus. Youth Entrepreneurship Observatory. University of Ioannina. Ioannina. Χλέτσος, Μ. (2008). Έρευνα για την Νεανική Επιχειρηματικότητα στην Περιφέρεια της Ηπείρου. Παρατηρητήριο Νεανικής Επιχειρηματικότητας. Πανεπιστήμιο Ιωαννίνων. Ιωάννινα.
- EL.STAT., 2015. Labour Force Survey – 4th Quarter 2014, Press Release. Hellenic Statistical Authority. 12th March 2015.
- IOBE (2012). The Entrepreneurship in Greece 2010-2011. The small entrepreneurship in time of crisis. Global Entrepreneurship Monitor GEM. Foundation for Economic and Industrial Research. IOBE (2012). Η Επιχειρηματικότητα στην Ελλάδα 2010-2011. Η μικρή επιχειρηματικότητα σε περίοδο κρίσης. Παγκόσμιο Παρατηρητήριο Επιχειρηματικότητας GEM. Ίδρυμα Οικονομικών και Βιομηχανικών Ερευνών. Αθήνα.
- IOBE (2014). The Entrepreneurship in Greece 2012-2013. Signs of recovery of small entrepreneurship. Global Entrepreneurship Monitor GEM. Foundation for Economic and Industrial Research. IOBE (2014). Η Επιχειρηματικότητα στην Ελλάδα 2012-2013. Ενδείξεις ανάκαμψης της μικρής επιχειρηματικότητας. Παγκόσμιο Παρατηρητήριο Επιχειρηματικότητας GEM. Ίδρυμα Οικονομικών και Βιομηχανικών Ερευνών. Αθήνα.
- IOBE (2015). The Entrepreneurship in Greece 2013-2014. The dynamics of youth entrepreneurship. Global Entrepreneurship Monitor GEM. Foundation for Economic and Industrial Research. IOBE (2015). Η Επιχειρηματικότητα στην Ελλάδα 2013-2014. Η δυναμική της νεανικής επιχειρηματικότητας. Παγκόσμιο Παρατηρητήριο Επιχειρηματικότητας GEM. Ίδρυμα Οικονομικών και Βιομηχανικών Ερευνών. Αθήνα.
- Kyritsis, C. and Chytis, E. (2013). «Simulation for the estimation of the survival probabilities of enterprises and banks within a prolonged duration if the dept crisis», 3rd International Conference on Quantitative and Qualitative Methodologies in the Economic and Administrative Sciences, T.E.I. of Athens, Greece, ISBN: 978-960-98739-4-9, pp.255-260, May, 2013
- Lüthje, C. and Franke, N., 2003. The 'making' of an entrepreneur. Testing a model of entrepreneurial intent among engineering students at MIT. *R&D Management*, Vol. 33 No. 2, pp. 135-47.
- Nybak, E. and Hansen, E. (2008). Entrepreneurial attitude, innovation and performance among Norwegian nature-based tourism enterprises. *Forest Policy and Economics*. Vol. 10. pp. 473-479.

<https://sites.google.com/site/icqqmeas> 2015

- Okpara, J. (2011). Factors constraining the growth and survival of SMEs in Nigeria Implications for poverty alleviation. *Management Research Review*. Vol. 34 No. 2, pp. 156-171.
- Petrakis, E., (2008). Survey of Trends of Youth Entrepreneurship in the Region of Crete. Youth Entrepreneurship Observatory. University of Crete.
- Πετράκης, Ε. (2008). Έρευνα Τάσεων Νεανικής Επιχειρηματικότητας στην Περιφέρεια Κρήτης. Παρατηρητήριο Νεανικής Επιχειρηματικότητας. Πανεπιστήμιο Κρήτης.
- Romero, I. and Martínez-Román, J. (2012) Self-employment and innovation. Exploring the determinants of innovative behavior in small businesses. *Research Policy*. Vol. 41. pp. 178- 189.
- Sahinidis, A. and Vassiliou, E. (2013). Intention to start a new business. Using the theory of planned behavior to predict the starting of a new venture by entrepreneurs and self-employed individuals. *Proceedings of the 3rd International Conference: Quantitative and Qualitative Methodologies in the Economics and Administrative Sciences (Q.M.A.S. 2013)* pp. 324-332
- Sarri, K., Bakouros, I. and Petridou, E. (2010). Entrepreneur training for creativity and innovation. *Journal of European Industrial Training*. Vol. 34 No. 3. pp. 270-288.
- Schwarz, E., J., Wdowiak, M., A., Almer-Jarz, D., A., and Breiteneker, R., J., 2009. The effects of attitudes and perceived environment conditions on students' entrepreneurial intent: An Austrian perspective. *Education + Training*, Vol. 51 Iss: 4, pp.272 - 291.
- van Praag, C.M., and Versloot, P.H., 2007. What Is the Value of Entrepreneurship?, S Forschungsinstitut zur Zukunft der Arbeit Institute for the Study of Labor, August.
- World Economic Forum, 2009. World Economic Forum Unlocking Entrepreneurial Capabilities to Meet the Global Challenges of the 21st Century – A Report of the Global Education Initiative. Educating the Next Wave of Entrepreneurs, April.
- Xheneti, M. and Bartlett, W. (2012). Institutional constraints and SME growth in post-communist Albania. *Journal of Small Business and Enterprise Development*. Vol. 19. No. 4. pp. 607-626

COMMUNICATING MESSAGES OF DENTAL WEBSITES IN ORADEA, ROMANIA

Androniki Kavoura^{1*}, Felicia Constantin²

¹Technological Educational Institute of Athens, Greece email: nkavoura@teiath.gr

²University of Oradea, Romania

ABSTRACT

This research employs content analysis taking dentists' websites in Oradea, Romania as a case study. The content analysis applied here establishes categories within the framework of dentists' websites in Romania, in order to determine content elements that are most commonly used and the use of websites as innovative marketing and communication tools for dentists. More specifically, according to the theoretical background of the study, particular emphasis is given to determine the existence of the general website features, able to distinguish between information or promotion. The study aims to provide a platform consisting of a set of website characteristics in order to provide a regulatory instrument to decision makers to define as clearly as possible the boundaries between information and promotion.

Keywords : information versus promotion, content analysis, dental offices and websites, Oradea, Romania

1. Introduction

If used as a marketing tool, Internet provides a way of connecting 'customers' to 'sellers' in different sectors in health-related services included (Turner, 2008). The research that has taken place in regard to the implementation of marketing activities and in particular the use of websites and social media illustrated that multiple angles that exist for marketing dental offices; the research carried out takes into consideration both dentists' and patients' perspective (Geangu et al., 2010; Romano and Baum, 2015; van de Belt, 2015). The research has shown that not all dentists pay attention to the internet as an innovative marketing tool and they use it to upload their printed material on the internet with not many adjustments to take place (Geangu et al., 2010; Romano and Baum, 2015). The Internet is an interactive medium which brings people together and may allow for communication.

This research adds to the existing literature regarding the way in which marketing activities take place to the dentists in the area of Oradea, Romania. The Internet became very accessible in this country: since 2000, there has increased of 46.13% for those individuals using the Internet in Romania (ITU Statistics, 2014). Of the 21,640,168 Romanian people, 11,178,477 are Internet users; the penetration is 40,63% of the population with the Internet in Romania based on the official statistics (<http://www.internetlivestats.com/internet-users-by-country/>).

The aim of the research is to examine the characteristics of the website which are significant to make the web page be attractive and useful to the potential patient, in compliance with ethical rules of the health profession. This research is part of a wider research which aims to illustrate the role websites may have in order to attract patients as potential customers of dental offices.

This paper examines Romanian dentists' websites adopting Constantin's model (2014), which seeks to make a comparative analysis of specialized sites simulating the behavior and the interpretation of the non-specialist users, which try to select the virtual offers on the basis of the characteristics of the websites.

This analysis is made within the framework of the elements required to exist on dentists' websites in the French environment; according to the Ordinal Charter applied to professional websites of dentists in France, the development of a website should have basic elements of information (Ordre des Chirurgiens-dentistes, 2012). The strong links established between Romanian dentists and the job offer in the French environment allows us to make inferences for the way Romanian dentists' websites are presented. Romanian doctors have chosen to work permanently or temporarily in France; with few exceptions, all of them regularly return in Oradea, in order to reunite with their family, friends and fellow of craft. Consequently, the professional and administrative information flow takes place so easily between the French and the Romanian dental environment.

The analysis of the Romanian websites through the French grid will allow us to observe the strengths and weaknesses of websites, notice the peculiarities and understand if necessary, the introduction of similar ways of communicating and promoting the profession in the Romanian environment.

2. Background of the research

The first step for an organization that wants to use the Internet is to provide a presence online. By means of sites, every company has access to millions of Internet users, who can communicate any information they want (Grossek, 2006: 205; Ortega Egea, Roman Gonzalez and Recio Menendez, 2015). In a virtual network, a company reduces its marketing costs and promotes products, facilitates its relationship with customers and suppliers, its loyal customers, enhancing in that way, its promotion; in a nutshell, the company turns this into a powerful virtual business relationship. The advantages are indisputable and have the impact of revolutionary changes. Specialists argue that «we are witnessing a revolution of mentalities and behaviors and this development makes possible a velvet revolution patterns, devices and methods of sale and communication» (Claeyssen, 2009: 15).

Medicine is a complex area, and its particular interest is that it exceeds the boundaries of commercial type business. Millions of searches are made daily on the internet about medical issues and information provided has a direct impact on health behavior Internet users. Dentists may benefit from the creation of websites that enable their prospective patients to search online about dental practice (McLeod, 2012). In particular, social media is becoming a way of communication of dental doctors with patients especially because people are using social media and the internet to find information about dental practice (Henry, Monar and Henry, 2012), in the context of an enlarged preoccupation for health.

In accordance with Woodcock and Baum (2015), marketing a medical practice has become necessary in order for practitioners and doctors to be able to inform their prospective patients via social media and internet about their services. Previous research on marketing of dental services has identified brand awareness, service

<https://sites.google.com/site/icqqmeas> 2015

information, targeting of people, feedback tools as essential items that one interested in employing internet as a way of communication, should take into consideration (Constantinescu-Dobra, 2014).

Therefore, the presence of medicine in cyberspace must be a matter of public interest. Consequently, the websites dedicated to medicine have certain peculiarities and need to satisfy a threefold objective: information, persuasion and efficiency (Jayaratne, Anderson and Zwahlen, 2014).

Our focus in this article is on dentists, especially on private dental offices and the websites where they communicate their messages to their existing and potential customers. Cooperation with customers allows companies to be successful and innovative (Koziol et al. 2014; Koziol et al., 2015) and this may be the case with dental offices as well. In order to achieve the role played by information but also the unresolved advertising, a website design must be attractive and original, simple and up to date, to be fully functional and well referenced. Dentists have understood, in part, that the presence in cyberspace is able to bring them a significant number of patients with a significantly reduced cost, as happens with any commercial firm. «Online presence is the key point in the process of communication with customers [...] Where else does the company have the opportunity to earn millions of consumers with a significantly cheaper cost than the traditional forms of advertising than online?» (Grossek, 2006: 210; Claeysen, 2009).

The systematic observation of the virtual medical field illustrates that there are several types of websites: institutional sites, sites of associations (professional or patient) or sites created by physicians individually (van de Belt et al., 2015). If we examine the case of the French space, a European country with a rigorous organizational system, even bureaucratic, we see that there are several agencies that only create websites for dentists (e.g. <http://www.land-dentiste.fr/>; <http://www.praxiskom.fr/>; webdentiste.fr; or denti-site.fr). Regarding the professional websites for dentists, there are certain requirements that must be met both in approach and content, so as to prevent and ban the advertising content that could be generated by commercials, advertising links to commercial sites or advertising.

3. Regulation of websites in the medical field

The sites of dentists - just like all medical sites in general - have primarily an informative and a strong social component. They must express an honorable exercise of the profession of dental peculiarities in accordance with the laws and regulations of the organization. Being a dentist enjoys prestige in society. Therefore, the website reflecting the cabinet work and medical practitioners is a shop window and not a trade counter. Joining the ethical obligations with the interest for a profitable business must lead to a harmonized approach of the website in different countries (Code of Ethics for Romanian dentists, 2010; Ordre des Chirurgiens-dentistes, 2012). According to Article 36 of the Code of Ethics for Romanian dentists "Dentists can provide professional information through the internet, in which must show sincerity, meaning that it meets the current provisions of the Public Health Code. The owner is obliged to notify the College website of the emergence of a new cabinet. S/he is also committed to modify fairness and dignity. When publishing a website, dentists must ensure that the content does not contain misleading or comparative nature information (Code of Ethics for Romanian dentists, 2010). All information on the website must be real, objective and easily verifiable. Any violation of these provisions constitutes misbehavior". This is, in fact, the only official paragraph related to the conception of an acceptable website in this domain. Ethical issues should be mainly taken into consideration for dental practice websites in order to be able to promote online the services they offer and at the same time, follow the regulations and guidelines (Nichols and Hassall, 2011). The influence of national culture plays a significant role in a business's behavior (Abrudan et al., 2010) and dentists are not excluded.

The Charter for designing websites developed by the Ordre des Chirurgiens-dentistes, 2012) - a country with which Romania has been recently associated in regard to dental issues- contains mandatory elements of a certified website for a dental office, the site according to any new recommendations of the Board and in accordance with the observations which would be made by official bodies. The approval of the certified site is conditioned by the College Board for signing commitments to the Chartre. Some sites owners put great emphasis on scientific guarantee professional discourse on site certified by an official body - UFSBD (The French Union for oral-dental health) or an ethics committee.

We present in the following paragraphs the items on which we base our analysis of the Romanian sites as this is presented in the literature (Constantin, 2014; Ordre des Chirurgiens-dentistes, 2012). Dentists' websites must follow in France the issues presented below. The website address should be clearly delineated: extension «chirurgiens-dentistes.fr» is a domain name reserved to the Order dentists and guarantees that s/he is enrolled in the College. Identifying the surgeon dentist holding the cabinet site: the information identifying the individual holder is mandatory. Identifying all surgeon dentists working in the office with full name and registration num-

<https://sites.google.com/site/icqqmeas2015>

ber in the College are mandatory. Titles and personal qualifications for each physician should also be presented to specialization, titles and functions recognized by the National Council of the College (possibly a link to their descriptions on the official sites of official institutions).

The information about cabinet presentation includes several compulsory elements: phone number, days and hours of consultation. All other employees - nurses, reception operator - must be clearly identified. It is also recommended to publish information on the emergency service organized by the local college and in case of absence it is recommended to indicate the one who replaces or to route to another colleague. Information on the access to the cabinet should appear. The relationship with the Health insurance companies or funds is also advisable to specify. Medical information must be correct and scientifically accurate, complete, current, reliable, pertinent, auctions, understandable, and verifiable. Information source must be specified; it may come from certified medical information sites (e.g. by an entity such as the Foundation Health on the Net), with the respect of the copyright and mention of the date. A link should also be automatically presented to direct to the page that contains the ethical rules and recommendations about new ways of information is mandatory (websites, networks, platforms) and a link to the directory prepared by the medical doctors. All commercial links are prohibited. Form or contact icon: limited to programming for a consultation where the dentist must respond with a confirmation. This form must not contain wording such as «send to friend». It is imperative that patients be advised on the right to their confidentiality. The possibility to book online dental services is another element. Finally, the existence of a newsletter must have an informative and non-advertising content.

4. Methodology - Description of the methodological procedures followed

The authors followed a conceptual research paradigm, as it is the one that presents concepts based mainly on secondary data (i.e. statistical databases, literature, personal theoretical knowledge and so on) and a theory driven approach was followed (Creswell, 1994: 146). The research employed content analysis using a case study design (Yin, 1993). Content analysis is defined as a research technique applied to nonstatistical material that allows the researcher to analyze such material in a systematic manner (Mehmetoglu and Dann, 2003; Finn et al., 2000). It establishes categories and then counts the number of related words, sentences and issues under each category. When content analysis combines both the descriptive and interpretive approaches, then it is not merely a quantification of qualitative text data (Roller, Mathes and Eckert, 1995) and this view is followed in this research.

Therefore, if we ask why they would make a dentist's office or an internet site, we can respond: to present their services and to encourage people to take care of their health, choosing to become patients in a powerful, professional and welcoming cabinet. But communication must be constantly considering specific prohibition on advertising. Where does the line between information and advertising disappear? What are the mandatory contents to meet the criterion of «information»? What are the ways to advertise without actually advertising?

To answer these questions, we thus, content analyzed the online presence of dental offices in Oradea, Bihor county town of residence, located in the northwest of Romania, on the border with Hungary. In the city of Oradea there exist officially 450 dentists in free practice, enrolled in the College of Dental Surgeons in Bihor (Colegiul Medicilor Dentisti din Bihor, 2014) and 100 a quarter of them- have asked the College to suspend their activity in order to continue it abroad, the overwhelming proportion in France. In evaluating the target sites we base our analysis on the French legal system described above in the Charter applied to French professional websites elaborated by the French College of Dental Surgeons (Ordre des Chirurgiens-dentistes, 2012).

Herring (2004) notes that in Computer mediated discourse analysis, sampling is rarely done randomly, since random sampling sacrifices context. In that way, textual analysis can take into consideration ongoing participant observation of online communication. In this particular study, research was based on the 3 sites portals that Romanian dentists use to communicate their cabinets. Based on these portals, <http://www.dentistonline.ro>; <http://www.medicistomatologi.ro>; <http://www.cliniciimplantdentar.ro> and taking into account the Google ranking algorithm for Oradea's dentists' online presences, the authors selected to content analyze those sites from the portals that were in the first 10 positions for a period of more than 5 months since December 2015 (<http://www.seomark.co.uk/how-does-google-rank-websites/>). At the time of writing this paper (May 2015) and for an ongoing period of five months, the authors observed the online presence of these sites that continue to have the same ranking as they had five months ago.

5. The implementation of content analysis –theme categories in the data

Content analysis is widely used in management research (Neuendorf, 2002; Krippendorff, 2004) as it provides rich and in-depth accounts on a wide range of topics. According to Neuman (2003: 219) “content analysis

<https://sites.google.com/site/icqqmeas2015>

is a technique for gathering and analyzing the content of text. The content refers to words, meanings, pictures, symbols, ideas, themes, or any message that can be communicated". In the specific study, the researchers sought words and phrases as they were specified from the themes associated with the Code of Ethics and the Ordinal Charter applied to professional websites of dentists.

Classical thematic analysis focuses on the content of the message and is associated with the systematic gathering and examination of material under sections with a broad theme (Neuendorf, 2002: 24). Subjective categorizations should be avoided, that is why themes are categorized based on the conceptual method, where the researchers analyzed the presence and the repetition of a theme (Bazerman and Prior, 2008). The present study examines dental cabinets in Oradea, Romania. In the specific study, the researchers sought words, phrases as they were specified from the themes or codes associated with the following themes:

- Information about the website address
- Identity of the surgeon dentist holding the cabinet site
- Identify all surgeon dentists working in the office.
- Titles and personal qualifications for each physician
- Cabinet presentation
- Medical information
- Links associated with ethical rules
- Form or contact icon
- Possibility of booking services online
- Newsletter

The content analysis took place in the so called direct way, those words or phrases that are physically present and counted rather than on the latent content which depends on the subjective judgment in order to lead to reliable results (Robson, 2010: 420-421; Leiss et al., 2008). The next section presents the results that emerged under the aforementioned broad categories.

6. Research results - bringing the categories together

The sites' address is extremely heterogeneous and, in some situations, they can induce confusion between personal or institutional sites.

b) Identifying the titular surgeon dentist and all the surgeons in the cabinet. This criterion is generally accomplished, but in some cases, the most important information is missing.

c) The analysis of the information regarding the titles and personal qualifications for each doctor is generally followed, yet, some general physicians choose to replace the presentation format with individual messages. Even if it is forbidden, the CV is sometimes presented in terms of a series of dozens of scientific papers

d) Presentation of the cabinet is one of the key points of the sites but none refers to the ways of access for disabled or if there is a parking; one of the analyzed sites mentions the means of transportation available and provide a benchmark. In terms of cabinet photos, a third of websites show some peculiarities, but others, expose a series of professional even artistic photographs which enhance the written message of the site and give greater confidence to potential patients.

e) The medical information must be correct, complete, current, reliable, pertinent, accurate, understandable and verifiable. Sites often fall into the trap of very specialized data, which shows a very high degree of difficulty for unprofessional. In general, the sites analyzed organize information on large areas of medical specialization: dentistry, orthodontics, dental implants, periodontics, pedodontics, prevention, prosthetics, cosmetic dentistry, endodontics. The sites do not propose newsletters to patients, except one which asks for the patient's email and therefore its acceptance of periodical information.

f) The problem of automatic-links to pages that contain ethical rules or the doctors Yearbook, edited by the medical-dentists is almost totally ignored.

g) In four of the ten sites analyzed, there is no online contact form. Three sites present a simple form.

h) As far as the online agenda is concerned, one site in the virtual environment offers patients the opportunity to schedule a personal agenda, by the respect of publishing rules.

It is an issue of culture in regard to the way professionals operate (Koziol et al., 2013) and improvements can take place.

7. Conclusion

This research illustrated that there is absence of data considered to be the foundation of an accurate medical information to patients without advertising valences. We found that there is space for improvements for most of the websites.

<https://sites.google.com/site/icqqmeas 2015>

The authors recommend to complete the information of official data identification of doctors, especially the registration numbers when joining the county Dental College, pictures and detailed presentation of skills and specializations. It is also required to publish the registration number of the company in the Trade Registry and the identification data of all staff. Another deficient chapter is the one referring to cabinet photographs, tools and work. Regarding medical information, it should be explicitly organized in the form of didactic sheets, available to patients who do not have specialty studies. They must be found at a distinct button and not hidden at other buttons. The cases presented should include only relevant images, clearly explained. Complicated medical situations could include a separate button, explicitly dedicated to professionals. The existence of sites that generally include facilities such as GoogleMaps or on-line Registration Form prove the orientation towards new forms of communication. The multiplication of these facilities by generalizing newsletters and online programming agendas would only confirm the understanding of the virtues of e-marketing, proven in other domains.

Beyond the creative freedom of choice to use or not to use Internet tools, the introduction of a regulatory document for the dentists' sites would help provide a basis for accurate information and limit the any slippage towards commercial advertising.

Further research needs to take place in regard to the way social media for marketing dental practices can be effective (Henry, Monar and Henry, 2012) and whether they are used by dentists in the related region. Healthcare marketing activity and internet marketing activity has become a more important strategy in the last decade for dental providers and the use of websites as an efficient marketing tool for bringing closer patients to dentists.

References

- [1] Bazerman, C. and Prior, P. (ed.) (2008). *What writing does and how it does it. An introduction to analyzing texts and textual practices.* Taylor and Francis.
- [2] Abrudan, M.M., Matei, M. C., Şchiopoiu Burlea, A., Danaiața, D., Sirbu, M. and Rosca, D. (2010). The implications of cultural dimensions on business practices and managerial behavior within the organisations of bihor country, *The USV Annals of Economics and Public Administration*, 10(3), 162-180.
- [2] Claeysen, Y. (2009). *Marketingul prin e-mail, Polirom.*
- [3] Code of Ethics for Romanian dentists (2010). Available at <http://www.cmdr.ro/download.php?id=163> (accessed 22 April 2015).
- [4] Colegiul Medicilor Dentisti din Bihor (2014). Available at <http://www.cmdbh.ro/lista-medicilor-dentisti-si-a-cabinetelor-din-bihor> (accessed 15.3.2015).
- [5] Constantin, F. (2014). Le tourisme roumain startégiquement ouvert vers l'international. L'est-il aussi vers la communication plurilingue? (II). *Annals of the University of Oradea, Economic Sciences*, Vol. XXIII, No. 2, pp. 65-75 Available at <http://anale.steconomecioradea.ro/volume/2014/AUOES-2-2014.pdf> (accessed 3.2.2015).
- [6] Constantinescu-Dobra, A. (2012). The Internet Marketing and the SMEs. A comparative Analysis of Dentistry Strategies for Online and Printed Advertising. *Marketing from Information to Decision*, Cluj-Napoca, Risoprint, pp. 75-88.
- [7] Constantinescu-Dobra, A. (2014). Content Marketing in Dentists' Websites. An empirical comparative study between Romania and the UK. In Vlad, S. Ciupa, V. (Eds.) *IFMBE Proceedings, International Conference on Advancements of Medicine and Health Care through Technology*, Vo. 44, pp. 107-112, Springer Switzerland.
- [8] Geangu, M., Orzan, G., Gardan, D., and Geangu, I. (2010). Dentists and Romanian consumers' perception regarding marketing activity for dental healthcare services. *Marketing from Information to Decision*, pp. 154-165, Cluj-Napoca, Risoprint.
- [9] Grossek, G. (2006). *Marketing si comunicare pe internet*, Ed. Lumen, Iasi.
- [10] Henry, R.K., Monar, A. and Henry, J.C. (2012). A Survey of US Dental Practices' use of Social Media. *Journal of Contemporary Dental Practice*, Vol. 13, No. 2, pp. 137-141.
- [11] Herring, S. (2004). Content Analysis for New Media: Rethinking the Paradigm, *New Research for New Media: Innovative Research Methodologies Symposium Working Papers and Readings*, pp. 47-66.
- [12] <http://www.dentistonline.ro>; (accessed 29.4.2015).
- [13] <http://www.medici-stomatologi.ro>; (accessed 29.4.2015).
- [14] <http://www.cliniciimplantdentar.ro> (accessed 29.4.2015).
- [15] <http://www.seomark.co.uk/how-does-google-rank-websites/> (accessed 29.4.2015).
- [16] <http://www.land-dentiste.fr/> (accessed 22.4.2015).
- [17] <http://www.praxiskom.fr> (accessed 22.4.2015).
- [18] <http://www.webdentiste.fr> (accessed 22.4.2015).
- [19] <http://www.denti-site.fr> (accessed 22.4.2015).
- [20] <http://www.internetlivestats.com/internet-users-by-country/> (accessed 22.4.2015).
- [21] ITU Statistics (2014). Percentage of individuals using the Internet, available at <http://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx> (accessed 22.4.2015).
- [22] Krippendorff, K. (2004). *Content analysis: an introduction to its methodology.* (2nd ed.), United States: Sage Publications.
- [23] Koziol, L., Koziol, W., Wojtowicz, A. and Pyrek, R. (2014). Relationship Marketing – A Tool for Supporting the Company's Innovation Process, *Procedia*, Vol. 148, pp.324-329.
- [24] Koziol, L., Koziol, W., Wojtowicz, A. and Pyrek, R. (2015). Cooperation with Customers as a Determinant of Capacity of Innovative Company, *Procedia*, Vol. 175, pp. 236-243.
- [25] Koziol, L., Wojtowicz, A. and Pyrek, R. (2013). Development of Pro-Innovative Culture as Self – Improvement of An Organization, 3rd International Conference on Quantitative and Qualitative Research on Administration Sciences, 23-24 May 2013.

<https://sites.google.com/site/icqqmeas2015>

- [26]Leiss, W., Kline, S., Jhally, S. and Botterill, J. (2005). *Social Communication in Advertising*. New York: Taylor and Francis.
- [27]McLeod, N. (2012). Enhancing the online presence of a dental practice. *The Journal of Prosthetic dentistry*, Vol. 107, No. 4, pp. 271-275.
- [28]Neuendorf, K. (2002) *The content analysis guidebook*. United States: Sage.
- [29]Neuman, W. (2003). *Social Research Methods: Qualitative and Quantitative Approaches*. Boston: MA.
- [30]Nichols, L.C. and Hassall, D. (2011). Quality and content of dental practice websites. *British Dental Journal*, 210, E11.
- [31] Ordre des Chirurgiens-dentistes (2012). Charte ordinale applicable aux sites internet professionnels des chirurgiens-dentistes / Ordinal Charter applied to professional websites of dentists in France, available at http://www.ordre-chirurgiens-dentistes.fr/uploads/media/Charte_Internet-08_2012.pdf (accessed 3.2.2015).
- [32]Ortega Egea, J.M., Roman Gonzalez, M.V. and Recio Menendez, M. (2015). E-health services adoption by European General Practitioners, Spotts, H. (Ed.) *Assessing the Different Roles of Marketing Theory and Practice in the Jaws of Economic Uncertainty*, pp. 205-210, Springer, Switzerland.
- [33]Robson, C. (2010). *Real world research (2nd)*. Translation Dalakou, V. and Vasilikou, K. Athens: Gutenberg (in Greek).
- [34]Romano, R. and Baum, N. (2015). The business side of developing a social media presence into your medical practice, Baum, N. et al. (Eds.) *The complete business guide for a successful medical practice*, pp. 239-248, Springer Switzerland.
- [35]Turner, L. (2008) Cross border dental care: 'dental tourism' and patient mobility. *British Dental Journal*, Vol. 204, pp. 553-554.
- [36]van de Belt, TH, Engelen, L.J., Verhoef, L.M., van der Weide, M.J., Schoonhoven, L. and Kool, R.B. (2015). Using Patient Experiences on Dutch Social Media to Supervise Health Care Services: Exploratory Study. *Journal of Medical Internet Research*, Vol. 17, No. 1, pp. :e7.
- [37]Woodcock, E. and Baum, N. (2015). Marketing: Understanding the Modern Patient and Consumer, Baum, N. et al. (Eds.) *The complete business guide for a successful medical practice*, 207-224, Springer Switzerland.
- [38]Jayaratne, Y., Anderson, N. and Zwahlen, R. (2014). Readability of websites containing information on dental implants. *Clinical Oral Implants Research*, Vol. 25, No. 12, pp. 1319-1324.

<https://sites.google.com/site/icqqmeas> 2015

WRAGNET - THE APPLICATION OF DELPHI METHOD IN BUSINESS STRATEGY DESIGN

Tuula Andersson

Tampere University of Applied Sciences, Finland

Tampere, Finland

tuula.andersson@tamk.fi

ABSTRACT

This paper introduces an application of the Delphi method, WRAGNET, in the use of business strategy design. It describes the traditional Delphi Method and some contemporary modifications which also incorporate features from the Wisdom of Crowds, and gives an example of the use of WRAGNET in a business oriented research. The research described in this paper was conducted for 'Ensimetri', which is counselling organization for new and nascent entrepreneurs, located in Tampere, Finland.

Keywords: delphi-method, entrepreneurship, business counselling

1. Introduction

The wellbeing of any society depends highly on the birth of new, innovative enterprises as well as the viability of them. The economic downturn in the EU, and especially in Finland, has brought the operational preconditions of enterprises into the forefront of recent political discussion. The increased amount of layoffs has raised, for instance, the interest towards seniors as new entrepreneurs as a research topic. A recently published research concentrated on the individuals aged from 55 to 74 years having established a new business in Finland (Tervo, 2014). However, it is especially the young, who should be given adequate knowledge and skills in order to make entrepreneurship an attractive career alternative. It is of utmost importance to be aware of their attitudes towards entrepreneurship as well as their needs and wants towards entrepreneurship education (Galloway, Kapasi and Whittam, 2015; Zhang, Wang and Owen, 2015).

Researching entrepreneurial intention, characteristics of entrepreneurs and factors advancing and hindering entrepreneurship have long been among the central themes of entrepreneurship research (Singer, Amorós and Moska, 2014). Entrepreneurship research has been dominated by the survey method. According to McDonald et al. (2015) over 50% of entrepreneurship research has been conducted using quantitative surveys and statistical analysis.

The entrepreneurship discipline has received much criticism of being too dependent on social constructions of 'the entrepreneur' (Anderson et al., 2009) and not focusing on understanding entrepreneurship and the societal preconditions of entrepreneurship. Qualitative methods would better provide the depth and richness required of studying any human condition or experience (Gartner and Birley, 2002) advancing knowledge on the development needs of enterprises and information needs of entrepreneurs.

The aim of this study is to introduce and evaluate a qualitative Delphi methodology and a business application 'WRAGNET', used in a research on the development needs of entrepreneurship counselling and education. Wragnet also incorporates elements from the Wisdom of Crowds (Surowiecki, 2005), which exploits the data obtained from large and diverse groups of people with different levels and areas of expertise.

Delphi method has, to the author's knowledge, rarely been used in the entrepreneurship discipline. Some examples can be found, however. Gartner and Birley used Delphi method in his study on defining the underlying meanings about entrepreneurship (Gartner, 1990), and Evans and Volery in researching the use of the Internet to provide business development services (Evans and Volery, 2001).

The research briefly described in this paper is an example of the use of WRAGNET in a future strategy development project of 'Ensimetri', an entrepreneurship counselling organization operating in Pirkanmaa area, which is the county region around Tampere, Finland. Pirkanmaa inhabits around 32.000 enterprises employing nearly 130.000 people. The unemployment rate is somewhat higher than in Finland in average (Statistics Finland, 2015).

2. Traditional Delphi

The Delphi Method was developed in the 50's in RAND Corporation by Olaf Helmer and Norman C. Dalkey to forecast the impact of technology on warfare (Helmer, 1968; 1983; Dalkey, 1969). Traditionally the technique aims at achieving consensus of opinions on a specific issue. Today Delphi method and its modifications are used to various other purposes, for instance generating ideas for product- and service innovation.

The core idea of Delphi is to involve a panel of experts who individually and anonymously reply to questions within their domain of expertise. Delphi method also employs multiple iterations – or rounds – designed to develop a consensus of opinion concerning the topic. Day and Bobeva (2005) divide the process into three distinctive phases: Exploration, Distillation and Utilization, which are further divided into smaller steps.

Exploratory phase

Exploratory phase consists of planning and selection of participants into the panel. Delphi planning includes the definition of the research problem, preparing the set of actual questions, determining the criteria for participant selection and deciding upon the administrative method of data collection. Delphi project is highly sensitive to design and administrative decisions like panel design and survey architecture (Cole et al, 2013).

Delphi problems are usually important questions where an unequivocal right answer cannot be found (Okoli and Pawlovski, 2004). It is also applied in situations where values, new views and ideas are needed for the basis of decision making (Linturi, 2007).

In traditional Delphi researches the amount of participants has usually been small, from ten to twenty (Okoli and Pawlovski, 2004), but also significantly bigger panels have been used. A clearly quantitative orientation can be seen in several German and Japanese studies in technology forecasting where the size of the panels can

<https://sites.google.com/site/icqqmeas 2015>

be thousands of respondents. The objective of the research as well as the need for the diversity of expertise will determine the optimal size for the panel. (Linturi, 2004.)

The criteria for participant selection have been widely discussed in the literature and a generally accepted view is that the participants must be experts in the field of inquiry, motivated and able to express their opinions clearly (see e.g. Hsu and Stanford, 2007; Day and Bobeva, 2005; Okoli and Pawlovski, 2003). The level of expertise depends on the complexity and specificity of the topic. The more ambiguous or specific the topic the deeper is the needed expertise.

On the other hand, in consumer research, one could argue that every consumer is an expert of his / hers own life. Contemporary Delphi modifications emphasize the diversity of the panel even at the cost of the level of expertise.

Distillation phase

The distillation phase is the actual iteration of survey rounds. The amount of rounds is usually 2-3. Usually the first round consists of open ended questions to collect ideas or 'soliciting specific information about a content area from the Delphi subjects' (Custer, Scarcella and Stewart, 1999 cited by Hsu & Sanford, 2007).

After the first round the researcher(s) analyze the obtained data and convert it into a structured questionnaire for evaluation on the second round. The panelists are asked, for instance, to rank-order the items by importance or interest. They are also asked to reason their rankings. As a result from the second round an initial view of the consensus with areas of agreement and disagreement can be identified.

The Delphi process can be ended after the second round. The consequent Delphi rounds, however, give the participants a possibility to revise their judgments. On the third round the participants are shown the items in question with the rankings to see if they would like to change their opinion to form a better consensus.

Utilization phase

Utilization phase consists of the analysis and use of Delphi study results. According to Day and Bobeva (2005) this stage has usually not been included in Delphi processes as an individual phase. But the efficient use of the results calls for tools to disseminate the new knowledge to the stakeholders of the study.

3. Contemporary Delphi based mixed methods

Online technologies have enhanced possibilities to use the Delphi method in many ways, for instance enabling bigger panel size and diversity, reducing administration cost and time investments, offering innovative data management and analysis tools and numerous other benefits (Cole et al., 2013 citing Donohoe and Needham, 2009).

As an example, the original developer of Delphi method, the RAND Corporation, is moving towards a new research system called 'ExpertLens'. This system is able to analyze opinions of big groups of panelists adapting online and social media technologies. RAND's expert lens incorporates elements of Delphi, but also The Nominal Group Technique and crowdsourcing (New Rand Research System Gathers, 2011; <http://www.edelphi.fi/en/>).

Recent Delphi projects focus more and more on channeling the 'Wisdom of Crowds' of large and diverse groups of people with different levels and areas of expertise (rand.org.) Most of the users of Delphi technique no longer strive for consensus but embrace a diversity of exceptional but reasoned viewpoints.

It seems that also the qualities of expertise are in transition. The expertise is becoming a quality of communities and networks instead of individuals (Linturi, 2007). The Wisdom of Crowds defined by James Surowiecki (2005) claims that "under the right circumstances, groups are remarkably intelligent, and are often smarter than the smartest people in them". The required conditions for the crowd wisdom are: diversity, independence and particular kind of decentralization.

Since the beginning of 1990's a group of researchers and users of Delphi have formed a community, which could be called the 'Finnish Delphi School'. The pioneer is Dr. Osmo Kuusi, who in has developed 'The Argument Delphi'. Kuusi (2012) emphasizes, like Turoff (1975), a qualitative and argumentative Delphi process, where consensus is secondary to the diversity of reasoned opinions. eDelfoi is an online research program based on Delphi expert method. It is developed in co-operation with Future Research Center of Turku School of Economics by Osmo Kuusi with Jari Kaivo-Oja and Hannu Linturi (<http://www.edelphi.fi>).

Today also the analysis of opinions can be at least partially automatized to speed up the process. Especially in the business environment time is of essence. Online survey programs nowadays come with a tool for classifying and categorizing open answers. These tools can be used to conduct a preliminary analysis from a bigger amount of responses than what an individual researcher manually could do in a decent time. Traditional communication research tools may be employed in the online environment as well (Kavoura, 2014).

4. Wragnet

WRAGNET is a research method developed by Shop'In Research Ltd., a Finnish research company. The name refers to a web-based dragnet aimed at fishing the best new ideas which will lead the organization to the Blue Oceans. WRAGNET is based on Delphi method and also incorporates elements from the Wisdom of Crowds.

WRAGNET was first introduced in 2006 in a zoning development project of Lempäälä city center, a neighboring municipality of Tampere. One of the aims was to involve the citizens of Lempäälä in the planning process by asking their wishes and aspirations on how the city center should look like in the future. Since then WRAGNET has been used in several strategic zoning development projects, industrial and commercial strategy development projects and in retail business to find future development needs of a hardware store chain.

WRAGNET uses two iterations. The first round aims at collecting the opinions and ideas of the panelists and the second is used for ranking the chosen ideas by importance.

The panels usually consist of both experts and users of the service in question. For instance in a development project for a city center the panelists could be municipal officials and -politicians but also entrepreneurs and private citizens living in the area.

The amount of respondents is quite big: invitations to the first round are usually sent to several hundreds of individuals. The response rates are not as high as in traditional Delphi because the panelists are not all 'hand-picked'. However, they are informed in advance about the purpose of the study as well as the process and about the importance of participation.

A significant reason for the big sample size is the aim to ensure the variety of ideas as well as different opinions of different stakeholders. For the commissioner of the research it is often more important to find out about the differences in opinions than to achieve consensus.

WRAGNET is administered by an Internet-based survey program which allows the respondents to answer whenever suitable to them. It also guarantees total anonymity and thus prevents the bandwagon effect. The first round usually has 5 to 10 open questions.

The obtained data is initially analyzed using the survey program tool. After this phase the researchers continue the analysis by manually categorizing the answers into meaningful categories. The results are presented to the customer and the items for the second round are chosen in co-operation with the customer. Sometimes also new ideas that come up in these meetings can be included to the second round for evaluation.

The second round is quantitative; the respondents rank the items using a Likert-type scale, which is presented to them visually with a 'slider' with no exact scaled values. The results are presented in a rank order from most important to least important.

5. Wragnet project Ensimetri

The commissioner of the WRAGNET research was a non-profit organization 'Ensimetri' which offers counseling mainly to start-up and nascent entrepreneurs in Pirkanmaa area, Finland.

Their services include for instance start-up counselling, coaching and education and business services for immigrants. Ensimetri customer satisfaction rates have been very high, in 2013 the overall score for consultation was 9,0 on a scale from 4 to 10 (<http://www.ensimetri.fi>).

The need for the research came up in the spring 2013. Ensimetri was founded 1993 thus celebrating its 25th operational year. Despite the good operational results a need for strategy revision or a totally new strategy was recognized. WRAGNET was initiated to facilitate the idea generation for the strategy development. The main research question was: What should the counselling services for startup entrepreneurs be like for the next 25 years from now? Should the counselling for instance move from the offices to the social media networks?

Initially three separate expert panels were established. These panels consisted of the stakeholders of Ensimetri: the personnel, the network of voluntary professional advisors and the customers. Later a fourth panel of university students was added to gain insight on their attitudes on entrepreneurship as well as their vision on the development needs of entrepreneurship education in universities.

Altogether 2.600 entrepreneurs who had had counselling from Ensimetri were invited to the first round. Also all members of the counselling network (280) as well as all employees (18) were invited. The students' invitation to the research was done via contact persons in the three universities in Tampere which have around 35 000 students altogether. The contact persons sent the invitations to the students, however, not all of them. Responses were obtained from 257 university students altogether.

The research consisted of two rounds. First round aimed at evaluating the current services of Ensimetri and generating new ideas for the future counselling services and entrepreneurship education. The results of the first round were analyzed and categorized using content analysis. The protocol of the content analysis determines

<https://sites.google.com/site/icqqmeas 2015>

the specification of categories focusing on the denotative, the one that can be seen and counted (Katsoni and Kavoura, 2013: 444).

The most often mentioned and most interesting, but not obvious or impossible suggestions were chosen for the second round for the participant evaluation. The evaluation was made by ranking by importance on a scale from 1 (not at all important) to 5 (extremely important). Thus a ranking order of the most crucial development areas in the entrepreneurship counselling and education were obtained.

Evaluation

A mixed research method with features from Delphi, wisdom of crowds, crowdsourcing etc. is a useful tool in business development. By giving up the original aim to reach consensus widens the scope of use to various areas in strategy design as well as in product or service development, and also reduces the need for sophisticated statistical methods in assessing the consensus. Especially in business context this is a cost saving factor.

However, the use of large panels of hundreds of respondents provides vast amount of qualitative data which, in turn increases the amount of analysis work. The expertise, interest and ability to produce useful information of the respondents vary, which also sets special requirements to the analysis.

References

- [1] Anderson, A., Dodd, S. and Jack, S. (2009). Aggressors: winners: Victims and Outsiders European School's Social Construction of the Entrepreneur. *International Small Business Journal*, Vol 27, No. 1, pp. 126-136.
- [2] Cole, Z., Donohoe, H. and Stellefson, M. (2013). Internet-Based Delphi Research: Case Based Discussion. *Environmental Management*, Vol. 51, pp. 511-523.
- [3] Custer, R., Scarella, J. and Stewart, B. (1999). The Modified Delphi Technique: A Rotation Modification. *Journal of Vocational and Technical Education*, Vol. 15, No. 2, pp. 1-10.
- [4] Dalkey, N. (1969). The Delphi Method: An Experimental Study of Group Opinion. www.rand.org/content/dam/rand/pubs/research_memoranda/, last accessed 12.2.2015
- [5] Day, J. and Bobeva, M. (2005). A Generic Toolkit for the Successful Management of Delphi Studies. *The Electronic Journal of Business Research Methodology*. Vol. 3, No. 2, pp. 103-116.
- [6] Donohoe, H. and Needham R. (2007). Moving Best Practice Forward: Delphi Characteristics, Advantages, Potential Problems and Solutions. *International Journal of Tourism Research*, Vol. 11, No. 5, pp. 415-437.
- [7] Evans, D. and Volery, T. (2001). Online Business Development Services for Entrepreneurs: an Exploratory Study. *Entrepreneurship & Regional Development: An International Journal*. Vol. 13, No. 4.
- [8] Galloway, L., Kapasi, I. and Whittam, G. (2015), "How not to do it!! A Salutary Lesson on Longitudinal and Qualitative Research Approaches for Entrepreneurship Researchers", *International Journal of Entrepreneurial Behavior & Research*, Vol. 21, No 3.
- [9] Gartner, W. (1990). What Are We Talking about when We Talk about Entrepreneurship?. *Journal of Business Venturing*, Vol. 5, No. 1, pp. 15-28.
- [10] Gartner, W. and Birley, S. (2002). Introduction to the Special Issue on Qualitative Methods in Entrepreneurship Research. *Journal of Business Venturing*, Vol. 17, No. 5, pp. 387-395.
- [11] <http://www.edelphi.fi> last accessed 26.4.2015.
- [12] <http://www.ensimetri.fi> last accessed 26.4.2015.
- [13] Helmer, O. (1968) *Analysis of Future: The Delphi Method. Technological Forecasting for Industry and Government*. New Jersey.
- [14] Helmer, O. (1983) *Looking Forward: A Guide to Futures Research*. Sage Publications.
- [15] Hsu, C. and Sandford, B. (2007). The Delphi Technique: Making Sense of Consensus. *Practical Assessment, Research & Evaluation*, Vol. 12, No. 10 (Aug), pp. 1-8.
- [16] Katsoni, V. and Kavoura, A. (2013). The Use of Content Analysis on Hotels' Websites as Communication Tools. Paper presented at the 3rd International Conference in Quantitative and Qualitative Methodologies in the Economic & Administrative Sciences (QMEAS 2013), pp. 443-446, Technological Educational Institute of Athens, Greece.
- [17] Kavoura, A. (2014) Social Media, online imagined communities and communication research, *Library Review*, Vol. 63, No. 6/7, pp. 490-504.
- [17] Kuusi, O. (2012). Delfoi-menetelmä – Mitä tutkimme tulevaisuutta kirjan uudistetussa laitoksessa. PowerPoint presentation in SlideShare. last accessed 25.2.2015.
- [18] Linturi, H. (2003). Delfoi-oraakkelin matkassa, Futurix. http://www.futurix.org/fi/materiaalit/metodit/2_metodit/1_delfoi?C:D, last accessed 26.4.2015.
- [19] Linturi, H. (2007). Delfoi metamorfooseja. Available at http://www.edelphi.fi/fi/content/info/method/02_delfoi, last accessed 26.4.2015
- [20] McDonald, S., Ching Gan, B., Fraser, S., Oke, A., Anderson, A., (2015). A Review of Research Methods in Entrepreneurship 1985-2013, *International Journal of Entrepreneurial Behavior & Research*, Vol. 21, No. 3.
- [21] New Rand Research System Gathers (2011). Analyzes Expert Opinions. Available at www.rand.org/news/press/2011/06/14.html, last accessed 15.4.2015
- [22] Okoli, C. and Pawlowski, S. (2004). The Delphi Method as a Research Tool: An Example, Design Considerations and Applications. *Information Management*, Vol. 42, No. 1 (Dec), pp. 15-29.
- [23] Singer, S., Amorós, J. and Moska, D. (2014). GEM 2014 Global report. <http://www.gemconsortium.org/docs/3616/gem-2014-global-report>, last accessed 10.4.2015
- [24] Surowiecki, J. (2005). *The Wisdom of Crowds*. Abacus.
- [25] Statistics Finland, Findicator, <http://www.findikaattori.fi/en/34>, last accessed 24.4.2015
- [26] Tervo, H. (2015). Starting a New Business Later in Life. *Journal of Small Business Entrepreneurship*, Vol 27, No. 2, pp. 171-190.
- [27] Turoff, M. and Linstone, H. (1975). *The Delphi Method*. Addison-Wesley. pp. 84-101.

<https://sites.google.com/site/icqqmeas> 2015

[28] Zhang, P., Wang, D. and Owen, C. (2015). A Study of Entrepreneurial Intention of University Students. *Entrepreneurial Research Journal*, Vol 5, No.1, pp. 61-82.

KNOWLEDGE MANAGEMENT AND ITS IMPACT ON THE INNOVATIVE CAPABILITY OF COMPANIES – DATA ANALYSIS

Leszek Koziol¹, Michal Koziol^{2*}

¹Malopolska School of Economics in Tarnow, Poland

²Malopolska School of Economics in Tarnow, Poland, e-mail: michal.koziol@mwse.edu.pl

ABSTRACT

The aim of the paper is to present the concept of the analysis focused on the evaluation of the affect at knowledge management to innovation capability of companies. This qualitative research examined the links between knowledge management (KM) and innovation capability as well as the links between KM to innovation performance in 166 Polish companies: manufacturing, commercial and service organizations. A review of the literature indicated the contributions of knowledge management to innovation capability and innovation performance. Using a multiple cross-case analysis methodology and applying a framework of innovation capability, in depth interviews were held with managers of the companies. It has been found that it is the knowledge management and skills of employees of organizations and cooperation between entities of the industry, effect on the level of innovation of the company

1. Introduction

Innovation, in its complexity, is often differently understood and defined. For the first time the concept of innovation was introduced to economic sciences by J.A. Schumpeter. He associated innovation with the first application of the certain solution, such as the introduction of a new product, a new method of production, launching a new market, getting a new source of raw materials or the introduction of a new industrial organization (Schumpeter, 1960).

Referring to Schumpeter's thesis, an interesting concept of innovation was introduced by C.M. Hall and A.M. Williams, conceiving it as a relational activity, within the innovation system¹, if these relationships occur between individuals, units and technology, companies and individuals, companies and other companies, research institutions, or state institutions.

The article shows that innovation is, on the assumption, beneficial, creative and original change in different areas of the organization, which brings novelty and progress in relation to the status quo, positively assessed in the light of the organization effectiveness criteria.

In contrast, the innovation is understood as both the potential for innovation companies, as well as its capability for innovation.

It should be noted that this approach to the innovation essence as well as company innovation is based on an interdisciplinary and multi-faceted approach, engaging the cause-effect impact of various phenomena and processes on innovation development.

The research on the system of organizations innovation requires a new perspective on this subject. Namely, the analysis field extension of the innovation problems, understood as the potential for innovation on the one hand and at the same time, issues of innovative activity, ie. the ability of innovation, invention and innovation diffusion, on the other hand.

The potential of innovative enterprises was defined as a set of socio-economic features, shaped during the development of the company, which are the basis for its innovative activity. In particular, these are the resources, processes, structures and factors inherent in the company. Those of them, that are regularly used effectively for the development of commercial innovation are the company's ability to innovate.

Innovative potential is also determined by the environment sector, mainly the market and therefore the company with customers, competitors, suppliers and co-operators (including in particular the relationships that link the company with its key stakeholders), because the innovations particularly appear at the market, are discovered at the interface with the market.

Finally, the mentioned above resources developed in the past (potential of innovation) decide about the effectiveness of the company in terms of innovation (innovation performance), as well as the appropriate methods, skills and abilities of their current use (innovative capacity).

While presenting the innovative capability issue, it is worth to emphasize the importance of knowledge in its creation. It is, above all, the knowledge accumulated by the company during organizational learning, the knowledge of deliberate creation which allows the effective use of innovative potential (resources) for its innovation activity, knowledge and knowledge management included in the patterns and economic pragmatism which is the major causative agent of progress and favourable changes. They all create the ability of an innovative company.

Modern organizations, however, still search for significant and lasting links between knowledge and knowledge management and innovative capability, and there are even some attempts made to identify and determine the impact of various forms of information and knowledge on a certain kind of innovation.

According to the Australian Knowledge Management Standard (Standards Australia, 2005) the management of knowledge is understood as the design, implementation and dissemination of social and technological tools, processes and relationships in order to enhance creativity, knowledge creation, sharing and use of knowledge. Referring to that, mentioned above, definition A. Van Riel, J. and H. Ouwersloot Lemmink (Van Riel, Lemmink, 2004) emphasize the importance of information diffusion within the organization and activity of the process, and primarily the development of the knowledge contained in human resources, especially for senior managers, to obtain information and knowledge from customers and technology as well as sharing of information.

¹Innovation system is organized and positioning of actors, ie. Companies and other organizations that participate in the generation, diffusion and use of new (foreground) useful and bringing economic benefits in the manufacturing process (Hall, Williams, 2008).

<https://sites.google.com/site/icqqmeas2015>

In numerous literary positions describing the nature and importance of knowledge management concept, at least three different approaches to the study of management structure are distinguished. They depend on what the author believes, contributes to the development of knowledge management, namely: IT Instruments, the organizational context (methods-processes) and human approach based on the man-culture relationship (Gloet, Berrell, 2003). Understood as “cross” management concept, is strongly linked to innovation management, human resource management, network management, relationship management, human-oriented techniques, especially IT, as well as financial management and management of material resources (Bessant, Venables 2008; Laperche, Uzunidis 2008; Quintas, Lefrere, Jones, 1997; Kavoura 2014).

Significant indications of this concept are:

- the need to create and maintain benefits from an increase in competitiveness through the use of knowledge and increasing the scope of cooperation (Darroch, 2005)
- increase the organization’s ability to reduce the complexity of the environment (Du Plessis, 2007);
- integration of internal and external sources of knowledge (Du Plessis, 2007);
- development of the organizational learning concept.

Of course, there are numerous critical opinions about the usefulness of the concept. Many of the surveyed managers, especially senior, believe that knowledge management is of no benefit and discredit it as a method, but this way of management is rather considered as a unique competence (Steward, 1997), as the pragmatics of knowledge management. The results of the study indicate a significant part of the lack of connection between knowledge management and performance of a company (business performance) (Gloet, Samson, 2013). Therefore, the managers are constantly looking for ways to develop knowledge management, and in particular the development of new forms of knowledge acquisition, how to apply that knowledge in the organization, new information management tools, the use of tacit knowledge (tacit knowledge), or knowledge based on experience.

E-Learning becomes more and more effective instrument and a method of organization’s knowledge and information. It allows to overcome collection barrier, organization, use of knowledge, storing all possible data (big data, “Information cloud”), creating a modern outsourcing of information and knowledge, is one of the most effective ways of communication with customers, audiences or stakeholders education and inspiration. The availability of digital content and services are more and more widespread. You can get an answer (response alternatives), eg. on economic indicators, and risk assessment. Without proper communication within the organization, its resources are completely useless, or used in a sufficient manner. The pragmatic knowledge management and its effectiveness are problematic and moot. Without communication network it is not possible to simply function in science or in management practice (Koziol, 2012)

Similarly, without significant capital development of relations activity and cooperation with stakeholders, the idea of knowledge management would be very difficult. That is why, it is an e-learning which increases the activity of relational and creates new relationships within the knowledge management system; through the use of e-learning has become a real knowledge management in large, geographically dispersed organizations. Hence, according to practitioners, e-learning is regarded as one of the most important and most frequently implemented knowledge management instruments.

2. Concept theses

The aim of the article is to present the concept of analysis aimed at assessing the impact of knowledge management on the innovative capability of firms (innovation capability) and the presentation of the empirical research results. The basic problem described in this paper is the recognition of knowledge management tools and evaluation of their effectiveness as a prerequisite for the development of the innovative capability of enterprises and formulation of a knowledge management model in the enterprise. An important research tool is the analysis of the relationship between the instruments (elements of) knowledge management and innovative capacity (inventiveness and innovation diffusion), which shows a causal relationship between these categories. In the thesis here presented the following concepts were adopted:

- Innovative capability is, at the same time, a function of assessing the results of the company (companies, business performance), as well as the possibility of stimulating the development of the company projection.
- Tools and knowledge management processes are important determinants of the sphere of change and development innovation capability of enterprises.
- Knowledge and knowledge management, which are the major causative agents of progress and positive changes, enable efficient use of the innovation potential (resources), constitute of innovative capability of companies.

<https://sites.google.com/site/icqqmeas2015>

- Knowledge management can be seen in the partial forms, which correspond to the size (area) of management and can be included in aggregate form for the company or the whole industry branch.

The value of the innovation capacity can be classified at the following levels of quality: low, medium and high, using for this purpose of the categorization method.

In the research procedure following steps can be differentiated:

1. Identification of the subject and scope of the analysis.
2. Formulation of dimensions (areas) knowledge management.
3. Presentation of the enterprise knowledge management model
4. Measuring of the innovative capabilities quality level:
5. Evaluation assessment
 - a) the categorization of companies,
 - b) verification.

3. Empirical research

The study involved 316 economic entities from Malopolska (Lesser Poland) Region. The study was conducted by a questionnaire. The questionnaire contained mostly multiple-choice questions on the characteristics of the business, assessments and organization innovativeness as well as the evaluation of its sector environment. The study was conducted within the years 2012-2013. Among the surveyed companies, the largest group, 48% were small enterprises employing up to 50 workers, including micro-enterprises - up to 10 employees - 15%. Approximately 31% are medium-sized companies (50-250 employees). Large companies (250-500 employees) is only 7%, and very large (over 500 employees) - 14%.

Half of the enterprises are engaged in trading and manufacturing, the remaining companies provide services. Analysing the group of companies in term of their business, one will find that almost 40% of them have limited their activities to the tested region, 33% of them work in the domestic market and 29% internationally.

(1) Defining the object and scope of the analysis

In light of the above remarks, innovation was analysed in partial and aggregate form. Aggregate innovation is a synthetic criterion of enterprise innovation (of the system) evaluation, which merges into a single formula partial innovation figures indicated in Table 1.

Among various approaches to the study of knowledge management, two of them were adopted, namely IT instrumental approach and the organizational context - with a focus on methods and processes within and beyond the organization, and staff competencies and organizational learning. The emphasis is placed mainly on "hard" forms of knowledge management to support innovation, less attention was paid to the behavioural elements of knowledge management, e.g. man-culture relations, which also stimulate innovation activity.

(2) The formulation of knowledge management (areas) dimensions

The issue of the innovative capability company development is seen in the dimension of knowledge management. The correlates of this dimension are the spheres of change and development, i.e. areas that contain a specific reference to the form of innovation and business development. Table 1. shows the areas and components of knowledge management, that can be used efficiently and effectively for creating innovation. In the area of innovation capability, innovations whose detailed figures are: the number and innovation types, e.g. product innovations, process, organizational and marketing, are a characteristic class and innovation results are achieved in the short and long term or others. The given areas and knowledge management components were isolated during the tests using for it the analysis of the influence factors. On this basis, the components that may remain and will remain in significant cause-effect relationships with innovative capability and performance of the company were indicated.

These, mentioned above, areas and components of knowledge management are the specific forms of the change and development innovation ability of enterprises spheres can also be considered as criteria for the spheres evaluation.

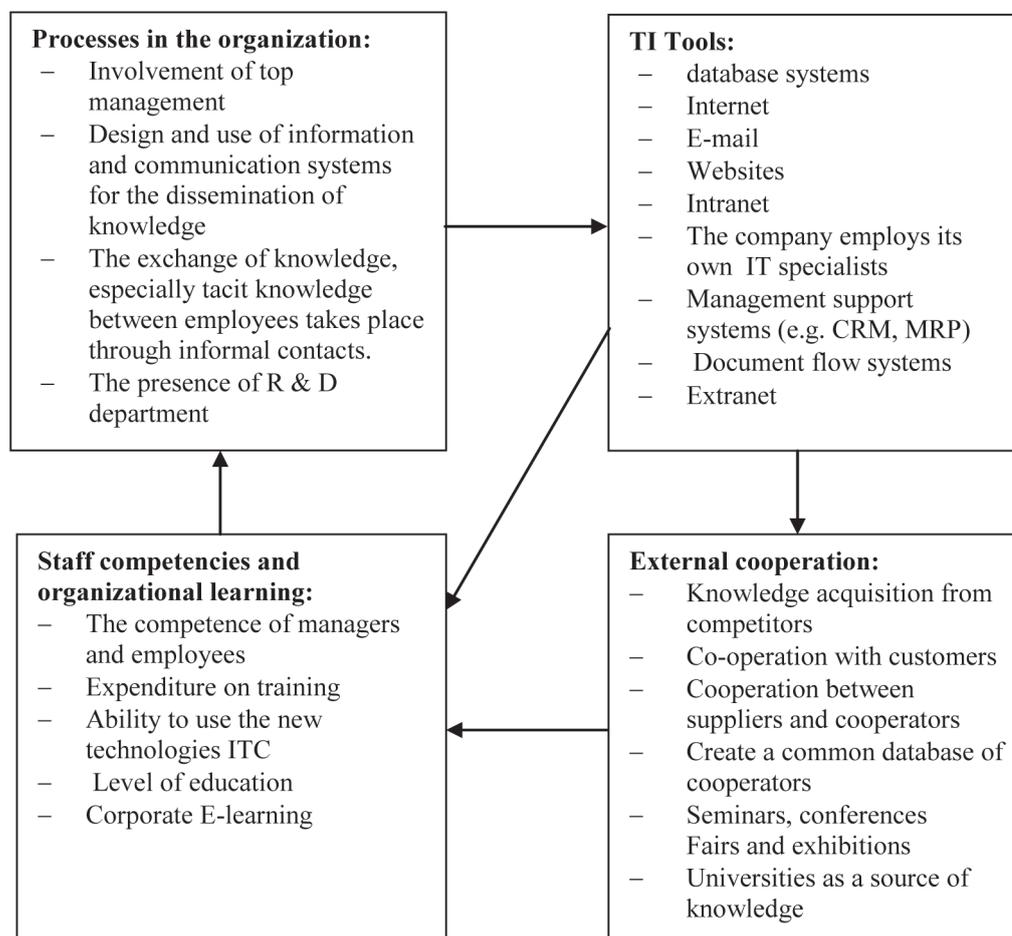
Table 1. Areas and components of enterprise knowledge management

Dimension (areas)	Components	Enterprises indications (in %)
IT Tools	The use of the IT structure	27
	The company employs its own specialists.	90
	Informatics, database systems.	47
	training and support systems to improve the competence of employees	
	workflow systems	80
	Internet	23
	Intranet	34
	E-mail	87
	Extranet.	54
	Videoconferencing.	73
Teleconference.	19	
Websites	7	
		8
		68
External cooperation	Cooperation with customers	55
	Cooperation with suppliers and co-operators	45
	Creation of common database of cooperators	30
	Knowledge acquisition from competitors	48
	Scientific institutions	7
	Universities as source of knowledge	16
	Fairs and exhibitions	38
	Seminars and conferences	40
	R & D units	5
technology transfer centers	4	
Processes in the organisation	Knowledge management is a strategic issue which is an essential part of the mission undertaken.	22
	Involvement of the top management	51
	Employed Staff are responsible or knowledge management	19
	Uses of the information and communication systems for the dissemination of knowledge.	47
	The exchange of knowledge between employees also takes place through informal contacts.	38
The presence of R & D department	24	
Staff competencies and organizational learning	Competences of managers and employees.	85
	The level of education.	42
	Expenditure on training.	83
	The time and development of training.	20
	The knowledge of foreign languages	42
	Ability to use the new technologies.	47
Corporate E-learning.	12	

(3) Presentation of the enterprise knowledge management model

In the presented model, 4 blocks (groups) of tools and knowledge management processes that determine the ability of innovative enterprises (see. Fig. 1) were included. Most of them are tools and processes moderating this ability, while those of them which belong to the group of organizational learning can be considered as mediators of innovative capability. They were determined due to the degree of significance, i.e. with the criterion of the impact on the capacity for innovation - indicated by the surveyed companies.

Figure 1. Tools and knowledge management processes that determine the capability of an innovative company.



Given configuration mechanisms and their influence on both the innovation and performance of the company depend on their characteristics and conditions of functioning (e.g. industry, company size, scope of business, etc.).

(4) Measurement of the innovative capabilities quality level

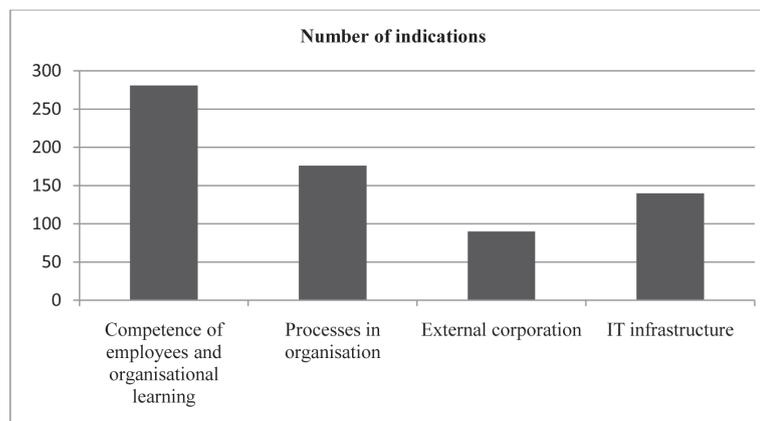
Rating of evaluation is to indicate to what extent the company meets the objectives (functions) and certain requirements. The formula of evaluation is expressed by the relation of the factual state of the enterprise (S) to the pattern (M) – model state. Defined in this way, assessment is also a tool for verifying the standardization of evaluation criteria by which the aggregate assessment is also possible. In the process of knowledge management, normalization of aggregation type was used. It was assumed that the standard score for each sub-criterion assessment (component) is 1 (positive scale) and 0 (negative scale). If the score of most sub-criteria (s) in the area of knowledge management is positive (positive scale, i.e. 1), the qualification of the area and also the determinants of innovation capacity of the company is positive. (figure 2)

The analysis of the collected data shows that all the surveyed enterprises employ properly qualified staff, but 89% of them emphasized that their staff have got special qualifications in the field of innovation (Fig. 2). As the second important determinant of innovation surveyed companies, 56%, indicated methods and processes in the organization. The fact that cooperation in knowledge management is considered as important in 28% of enterprises, while TI tools and e-learning indicated 43% of the companies.

Further analyses have established that an important differentiating factor configuration of individual determinants of innovation potential is, among others, industry, company size, operating range and others.

(5) The verification of evaluation

Figure 2. Determinants of innovative capacity



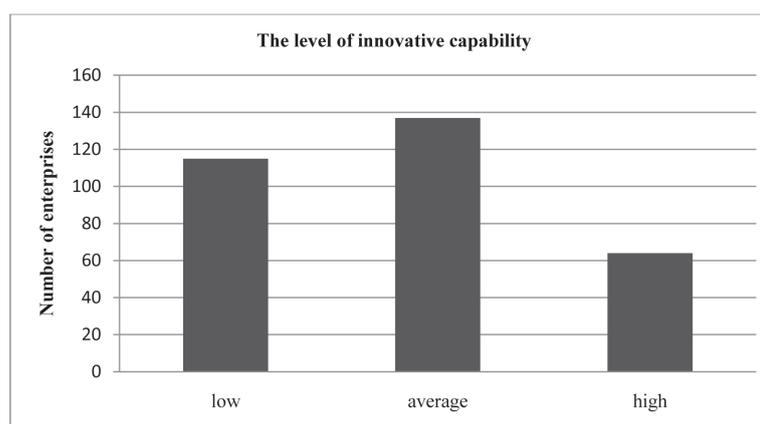
a) Categorization of enterprises

Categorization is a research procedure, which aims to establish a quality level of innovative capability of the company. In the course of further consideration, it is important to determine how the surveyed companies use their capability for innovation, whether in practice it translates into the creation of their innovation. The starting point to determine whether the surveyed companies effectively use their innovation capability is to determine their level of the population study. The collected results and analyses allowed to make the categorization of surveyed companies by the level of their innovative capacity. Three categories of companies were established:

- With the low level of innovation capability (it included those companies that meet the criteria in the range from 0 to 1 of the determinants of innovation),
- If a company uses 2 or 3 factors affecting its ability to innovate, it can be concluded that such an undertaking has the ability at the secondary level,
- The last category of companies with a high capability for innovation create entities indicating the use of 4 factors among those listed.

The obtained results confirmed the researchers' conjecture that there are no companies that would not have the innovative capability (Fig. 3).

Figure 3. Categorization of enterprises according to the level of innovative capability



Low levels of enterprises innovation ability is characteristic for 115, and the average for 137 (this is the dominant category of enterprises). The category with a high level of innovation ability was reached by 64 entities. In the process of assessing the innovative capability of Malopolska Region enterprises it has been established that any company (including those with a low level of innovation capability), is able to create and conduct innovations (Tab. 2).

b) Verification

Verification involves comparing the qualitative level the innovative capability of the company (category) with a number of innovations and their generic structure.

Table 2. Number of innovations according to the level of innovative capabilities

Type of innovations	The level of innovation capability						Total numer of innovation
	low		average		high		
	Number of innovation		Number of innovation		Number of innovation		
	Total	for 1 entity	Total	for 1 entity	Total	for 1 entity	
Product innovation	2	0,02	15	0,1	23	0,4	40
Process innovation	28	0,2	38	0,3	39	0,6	105
Organizational innovation	73	0,6	79	0,6	56	0,9	208
Marketing innovation	34	0,3	87	0,6	57	0,9	178

In terms of the number of deployed innovation, the highest efficiency on 1 company in the field of innovative activity was showed by companies with a high innovation capability, almost 3 innovation. Companies characterized by a medium level of innovation capability, put relatively more innovation (2 innovation) than companies with low innovation capability (1 innovation). Moreover, they had created a relatively more product innovation, estimated the most.

4. Final remarks and conclusions

The paper presents the concept of analysis that aims to evaluate the impact of knowledge management on the innovative capability of companies (innovation capability) and their innovativeness (innovation performance). Moreover, it describes the procedure for measuring th quality level of innovation ability of enterprises and provides steps to verify that capacity. This analysis can be used, inter alia, to test the development ability of different objects, i.e. enterprises, industry, region, or the economy.

This study, exploratory in nature, is searching proven ways of knowledge management symptoms in various organizations and which of them affect the ability of an innovative organization. A further aim of these studies is to demonstrate of these determinants impact on systematic knowledge management support through various forms of innovation in enterprises.

The study highlights the importance of knowledge in innovation leading to increased competitiveness and growth. A desideratum has been formulated at managers, for whom an important competence is to find ways to develop new forms of knowledge, the application of this knowledge in the organization, managing the flow of information and sharing his knowledge and experience.

Many managers representing the surveyed companies, pointed at the instrumental context of promoting innovation , among others, through leadership, customer focus, the use of IT tools and other resources designed to support innovation, external cooperation in the field of knowledge, development of organizational learning with particular emphasis on e-learning, as well as improving the quality of these processes.

A new concept of enterprise innovation system, whose essential elements are innovative potential and innovative capacity of organizations as determinants of invention and diffusion of innovation, was presented. This approach enables innovation ,on the one hand, the assessment of the progress in all or selected areas of innovation companies, on the other hand it allows to program and plan its dynamics and shape in accordance with the strategy and business model of the organization. Moreover, these studies describe the procedure for measuring the quality level and innovation capability of the company and the verification procedure of this ability.

<https://sites.google.com/site/icqqmeas2015>

Identified and proven, innovative abilities determinants create, together with the resources (potential for innovation), enterprise innovation system.

Current literature emphasizes the importance of innovation in the manufacturing sector, in contrast to the services sector. In these studies it is assumed that the appropriate resources stimulate innovations in both sectors in different ways, depending on the situation.

In this regard, the model of relationship between the determinants and innovation and efficiency level of the organization, i.e. the concept of mediating variables (mediators) and regulatory (moderators) was used.

In the light of presented here own, empirical results of research, as well as those of the predecessors, can be presumed that companies compete with each other for innovation, as well as innovative capability. The development of this particular capability rises to the rank of a fundamental determinant of survival and development of the company.

Bibliography

- Bessant B. J., Venables T., (2008), *Creating Wealth from Knowledge: Meeting the Innovation Challenge*, Edward Elgar Publishing, Cheltenham.
- Darroch J., (2005), Knowledge management innovation and firm performance. *Journal of Knowledge Management*, 9(3), pp. 101-115
- Du Plessis M., (2007), The role of knowledge management in innovation. *Journal of Knowledge Management*, 11(4), p. 20
- Gloet M., Barell M., (2003), The Dual Paradigm Nature of Knowledge Management: implications for achieving quality outcomes in human resources, *Journal of Knowledge Management* 7(1), pp. 87-89
- Gloet M., Samson D., (2013), Knowledge Management to Support Systematic Innovation Capability [in:] 46th Hawaii International Conference on System Sciences.
- Hall C. M., Williams A. M., (2008), *Tourism and innovation*, Routledge, New York, p. 24
- Kavoura A., (2014), Advertizing activities in social media and the creation of a community belonging in the digital era [in:] *The Małopolska School of Economics in Tarnów. Research Papers Collection. Works on management. Innovations in Modern Organizations. Economic and Social Aspects*, Małopolska School of Economics in Tarnow, vol. 2(25), p. 103
- Kozioł M., (2012), *Wykorzystanie e-learningu w procesie szkolenia pracowników małych i średnich przedsiębiorstw*, Krakow, (PhD Thesis).
- Laperchie B., Uzunidis D., (2008), *The genesis of Innovation*, Edward Elgar Publishing, Cheltenham.
- Quintas P., Lefrere P., Jones G., (1997), Knowledge Management: A strategic agenda, *Long Range Planning* 30(June), pp. 385-391
- Schumpeter J., (1960), *Teoria rozwoju gospodarczego*, PWN, Warszawa, p. 104
- Standards Australia (2005), *Australian Standard in Knowledge Management: A Guide AS 5037-2005*.
- Steward T., (1997), *Intellectual Capital: The New Wealth of Organizations*, Nicholas Brealey, London.
- Van Riel A., Lemmink J., Ouwersloot H., (2004), High-technology service innovation success: a decision-making perspective. *Journal of Product Innovation Management* 21(5), p. 348-359

THE RECEPTION OF AMERICAN THEATER IN ROMANIA. A CASE STUDY OF EUGENE O'NEILL

Anamaria-Mirabela Pop^{1*}, Monica-Ariana Sim¹

¹University of Oradea, Romania

*e-mail: mipop@uoradea.ro

ABSTRACT

The paper is part of a doctoral research entitled *The Style in the Language of Theatre : Christopher Marlowe, T.S.Eliot, Eugene O'Neill*, and concentrates on the reception of Eugene O'Neill's plays in Romania. O'Neill was one of the most intellectual and well-read of all American dramatists, and the products of his thoughts and reading found their way into his plays. After emphasising the main characteristics of Eugene O'Neill's plays from a stylistic point of view, the paper presents the marketing efforts of different Romanian bodies and institutions to bring to life these plays. The authors concentrated on the most important theatres of the country and presented information found in traditional and new media for a two month period in 2015 in regard to their communication activities. It is found that there are no signs of a particular concern of the Romanian authorities to resume the interrupted dialogue with the work of a playwright considered difficult to receive by the contemporary public sensitivity. Yet, the advantages of such a revival of interest would be multiple, especially in the area of intensifying the cultural Romanian –American exchanges. From another point of view, communication studies and marketers may create their communication messages taking into consideration stylistic elements in the production of the advertising campaigns.

Keywords: style, stylistics as methodology, theatre, marketing, art theatre

1. Introduction

In his study, *Culture and Society. 1780-1950*, Raymond Williams (1958) insisted on the need of a society to make its own cultural meanings through the creative agency of individual responses, while preventing the crisis of understanding by a commonality of effort and a respect for tradition (Williams, 1960: 63). As a consequence, the role of intellectuals (drama critics, directors, stage designers and actors) would be to commend to public attention only those facts that can be successfully grafted onto the spirit of a particular community, in order to produce significant developments through performance. The role of art in society would therefore be to communicate with the public, constituting itself into a repertoire of shared values and a platform for debate – a role which Eugene O’Neill’s plays undoubtedly played at the peak of their reception history in Romania and elsewhere and could still be able to have performances. In terms of dramatic challenge, modernist plays expose “a sense of some originary rupture as the generic source of the theatre, which could only be rectified to the extent that it was taken into account” (Blau, 1990: 9). Similarly, O’Neill’s plays can be said to expose their negativity by reflecting a broken world and attempting to understand the cause of this rupture, since “to the degree that it [the rupture] is taken into account, the world is subject to change” (Blau, 1990: 9).

According to Herbert Blau, the function of the theatre in ancient culture was coextensive with that of society, while nowadays the theatre is “a dissociated and eccentric event” (Blau, 1990: 9). According to Bulz (2013) the contemporary lack of substantial staging of O’Neill’s plays in Romania can be considered a damaging absence in the country’s cultural fabric, while the censorship to which O’Neill’s plays have been subjected along the course of history is obviously a form of ideological abuse since “making theatre without regard to a public is not only solipsistic but immoral”.

The paper concentrates on the Romanian reception of Eugene O’Neill’s plays since his playwrights are not so much represented on the Romanian stages.

The analysis of O’Neill’s art will allow us understand the strong and weak points of his plays, to see his peculiarities and understand why the Romanian public has been reluctant to receive his plays. The last part of the paper deals with the reception of O’Neill’s plays in Romania, focusing on the main representations in our theatres. We concentrated on the most important theatres in our country and presented information found in media: radio and television, spots, presentations, newspapers and magazines, local or national, banners, billboards, websites, blogs, social media.

2. Study Settings

This paper deals with cultural marketing, the authors’ intention is to research Eugene O’Neill’s presence on the Romanian stages and it starts from the premise that the American theater is and has been scarcely staged in Romania. The authors’ approach aimed to make a step from the academic research in order to see O’Neill’s reception in the Romanian society. The aim is to demonstrate that in spite of the complexity, workmanship and the realities that O’Neill’s plays captured, they do not adjust to the needs, mentality and taste of the Romanian audience, some theater people being included. To support this argument we also accessed the site of the most important theater festival in Romania – Sibiu International Theatre Festival (<http://www.sibfest.ro/sibiu-international-theatre-festival.html>), as well as the reviews of the plays brought to life at Sibiu.

We have selected the sites of the most representative theatres in Romania in the period January-March 2015; the most important theatrical magazines and journals covering the time span 1970 up to present were also considered. The selection criteria for the online research was represented by several words: “O’Neill”, “theatre”, “reception”, “Romania”. It was quite difficult to find a common thread of these sites, as the information presented was scarce supporting our hypothesis. This is partly due to the poor representation of this playwright on the Romanian stages and partly due to the fact that the majority of the websites do not have a proper and updated archive.

3. Style in Drama Description of the methodological procedures followed. Case Study: Eugene O’Neill

Style has been defined in many ways, and new definitions are constantly made. Yet, what is style? The history of the word, as found in dictionaries, will provide no answer to this question. It will, however, give some idea of the ramifications of the term: the Oxford Dictionary records it in twenty-seven different meanings. It is also significant that all these meanings have a common root. Style is primarily a quality of writing; it comes from the Latin *stilus*, the name of the writing-rod, and it is only by metaphor that it came to be applied to other activities.

<https://sites.google.com/site/icqqmeas 2015>

A glance at some of the classic definitions of style seems at first sight to make confusion worse confounded. But if one looks more closely at these conflicting and overlapping definitions, a certain pattern begins to emerge. The concept of style has many facets and can be approached from a variety of angles. Some of the definitions have little to offer to the twentieth-century reader; when, for example, Swift declares: “[P]roper words in proper places, make the true definition of a style,” (<http://www.britannica.com/EBchecked/topic/165345/Discours-sur-le-style>) he is merely echoing the ideas of traditional rhetoric.

But there are also more original conceptions which seem to foreshadow the main trends of contemporary thinking on the problem. These more modern ideas fall broadly into two groups. According to one school of thought, each writer has his own peculiar form of style which bears the stamp of his personality. Buffon had something slightly different in mind when he coined his famous formula: “Le style, c’est l’homme meme” – “Style, it is the man himself.” (Christin, 2001: 76). But he had the merit of crystallizing a view of style which, within certain limits, has proved correct and helpful. Schopenhauer went further when he defined style as “the physiognomy of the mind.” Flaubert was even more categorical: “Le style” he proclaimed, in English as well “est à lui tout seul une manière absolue de voir les choses” – “Style is in itself an absolute way of seeing things” (Bartlett, 1968: 389). These ideas were developed by Proust into an ingenious theory. In his view, whatever a great artist writes has his own unmistakable hallmark because he will extract from each object those elements which are congenial to him and have an affinity to his own mind. In this sense, style is inimitable (Ullman, 1957: 2).

The analysis of style in drama is a way of cultivating attentive reading, of increasing fidelity to the author’s intention as that is realized in the language. A play is the product of a creative mind viewing experience with the aid of a highly sensitive instrument, the dramatic form. The dramatist, in shaping his selected material into an organized entity, exploits the specific devices that characterize his medium, appropriating some that have been used before, adapting others, creating new ones. In doing so, the playwright discovers and records a meaning that did not previously exist and that exists now only in the delicate balance of his completed product.

O’Neill’s plays, with their voluminous and detailed stage directions, sometimes read like novels, yet it was his keen sense and affinity for theatrical effect and character development that made him most comfortable with the dramatic form simultaneously the most familiar and the most challenging to him. The playwright was determined to move beyond the superficialities of the American theatre of his time and to delve more deeply into the realities of human experience and consciousness.

Eugene O’Neill shaped the course of American drama in its most significant development period, from about 1915 to about 1930. Harold Bloom ended a survey of a group of distinguished critical essays on O’Neill’s *Long Day’s Journey into Night* with “the prophecy that O’Neill, and *Long Day’s Journey* in particular, need a different kind of literary criticism of drama than anything we now have, a criticism that might be able to deal more adequately with O’Neill’s eloquence of gestures and groupings, which seems to me so much more intense than his more limited rhetorical eloquence” (Bloom, 1987:vii). His theatrical innovations were admired, but their initial enthusiastic reception proved in time detrimental to his reputation. No dramatist has followed O’Neill directly in his use of such daring devices as the masks in *Long Day’s Journey into Night* or the drums in *The Emperor Jones*. In other ways, however, he has been followed. His innovative use of an exterior-interior setting for *Desire under the Elms*, a scheme for achieving an uninterrupted flow of action, is now more and more called for by playwrights. O’Neill was also a pioneer in the use of sound and light as integral parts of his plays.

Any play, formally considered, is made up of its dramatic structure or organization and its language, both stage directions and dialogue. Considered either as a dramatic architect or as a writer of dramatic prose, O’Neill is remarkable for his range, his daring, and his originality. Looked at casually, his plays seem to represent a bewildering display of artistic techniques, as he constantly varies both their form and their language. On closer inspection, however, there is going on a continuous evolution which is to culminate in plays that are remarkable for the compressed unity and explosive power of their structure and for the appropriateness and the verisimilitude of their language. The art of O’Neill’s plays lies in the playwright’s mastery of language. To fully appreciate his plays, a reader must notice the special quality of their dialogue, remembering that in the theatre the spoken and not the written word serves as a medium of exchange. O’Neill “develops an idiosyncratic language pattern for each character, thus differentiating them and giving each an identity. He then proceeds to vary and occasionally break these patterns so each speaks with several different conflicting voices. Each appears many-faceted and yet, at any given moment, still himself, distinct from any other figure on the stage” (Chothia, 1979: 146).

In *Long Day’s Journey into Night*, considered O’Neill’s masterpiece, the Tyrone’s speak precisely and yet easily, their moods modifying their syntax. When they are angry, their heated argument is expressed with force. When they relent, their words are softer. The play’s speeches consistently reveal character, define relationships, provide background information, highlight key issues and focus the dramatic moment. But in addition to performing these basic functions of realistic dialogue, O’Neill’s dramatic language for the first time extends its

<https://sites.google.com/site/icqqmeas2015>

range to include any number of memorable lines, such as: “None of us can help the things life has done to us”(p. 61) “Then Mother of God, why do you feel so lonely?” (p. 95); “I would have been much more successful as a seagull or a fish” (p.150) When creating his characters, O’Neill is conscious of the effect of their speech. In the stage directions, the playwright notes not only costume and appearance, but bearing and quality of voice. Tyrone “is sixty-five but looks ten years younger ... his bearing ... has a soldierly quality of head up, chest out, stomach in, shoulders squared ... a big, finely shaped head ... His voice is remarkably fine, resonant and flexible ... There is a lot of solid earthy peasant in him” (pp.11-2) In *Long Day’s Journey into Night* O’Neill’s reliance on the expressive power of his dialogue is great. There are only five characters in the cast, there is no chorus, nor are there any changes in the setting. There is a most effective return to the repetitive sound effect. All the four Tyrones stand out as fully individualized human beings, bound together by a common fate, by an inescapable love-hate relationship.

Communication studies and marketers are provided with another way to create their communication messages taking into consideration stylistic elements in the production of the advertising campaigns (Kobernick, 1989). Stylistic analysis is generally concerned with the features that make a text unique. Advertising is an art of language using various types of devices and, therefore, the advertisements have achieved amazing effects on persuading consumers to buy the products. At the same time, it has also formed its special style and the language used in is different from other styles. Its function is to “attract attention, arouse interest, stimulate desire, create conviction and get action” (Lunde, 1974). By the use of stylistic devices, the producer can better communicate with the consumers and make the product more popular among them in order to achieve the goal of ever-lasting purchase and popularity.

4. Marketing and Theatre. Attempts to Revive the Interest in Eugene O’Neill’s Plays

What does marketing have to do next to theatre? There is a consensus among experts about the fact that marketing belongs to economic science disciplines. But over the last decades marketing has taken off in other areas - beyond the actual border of the economic activity- such as education, health and culture. In these areas marketing has a twofold purpose: economic and social, still focusing on the social side.

Commercial theatre is prospering across Europe and Romania, too, while public theatre has suffered under changing patterns of cultural consumption as well as sharp reductions in government subsidies for the arts. Therefore, under the demands of a growing competitive market, cultural institutions need to work in order to establish a striking profile to attract possible partners, with advantages for both parts. Marketing has a crucial role in this case with specific techniques that gradually acquire critical relevance and prepare institutions to adjust and adapt to this new reality (Morais, 2012:181). According to Moldoveanu and Franc (1997: 20), cultural services are activities provided for consumers of culture, with or without their direct participation in order to fulfil certain needs and produce the expected satisfaction from them.

Cultural services are a distinct category of services and they cover a wide range of activities, classified by their content, means of expression etc. Naturally the theatre holds an important, yet interesting place among others like film, dance, art galleries and exhibitions, private collections, folk art, publishing houses, exhibitions and book fairs, public readings services, art photography etc. all falling under the same umbrella of cultural services (Moldoveanu and Franc, 1997: 50).

Still, is theatre profitable nowadays? In countries where the key words are difficulties, crises, money, you might be tempted to simply answer ‘no’. Nevertheless, it could be ‘yes’, too. In order to illustrate that, one word has the answer: Sibiu - a place where the world cultural games are made these days. Inspired marketing is ‘responsible’ for that together with determination, support, initiative and ingenuity. Sibiu is a city that has achieved a 12% budget for culture which makes it the largest budget in the world for culture.

It is a former European cultural capital city that shelters for ten days every year the gathering of the most important bands and filmmakers from all over the world. Theatre, dance, music, prose and poetry, street performances, in a word, performance. 35,000 visitors per day, 60,000 during the weekend, 66 venues, with 70 countries participating, 350 events. (<http://www.sibfest.ro/general/fact-and-figures>).

The third festival in the world after the Edinburgh, Scotland and Avignon, France rose as one day in a year. In 2015, Sibiu will witness the 18th edition of the International Festival. Constantin Chiriac is and has been from the very beginning, the person behind this cultural, social, marketing mechanism who initiated and made it grow.

How was it possible? “The important thing is to develop and create chances and opportunities and that is what we are doing” he says (<http://www.agerpres.ro/cultura/2014/12/14/gala-oamenii-timpului-interviu-constantin-chiriac-locul-in-care-m-am-nascut-centrul-lumii-pentru-mine-14-10-37>). He also appreciated that

<https://sites.google.com/site/icqqmeas2015>

Sibiu has become a cultural tourism destination while they are now trying to add the business tourism feature to this destination that will bring along a lasting and sustainable development to the city.

Changes in consumer's behaviour always connected to various devices and media channels require unprecedented changes in communication industry. Marketers now adapt to the dynamics of the messages generated by the explosion of communication channels. Online, video, mobile, social media, communities, user generated content, word of mouth, real time marketing are not some abstract concepts but realities of daily life of every marketer. This was exactly the successful recipe used by the team behind this Romanian international festival: the use of traditional and new media: radio and television interviews <http://yorick.ro/constantin-chiriac-am-castigat-un-mare-festival-m-a-costat-viata-timp/>, spots, presentations, newspapers and magazines, be they local or national, banners, billboards, websites, blogs, social media: <http://www.sibfest.ro/>, <https://www.facebook.com/FITSibiu>; <http://www.theguardian.com/stage/2014/jun/27/sibiu-international-theatre-festival-romania>; <http://www.manafu.ro/tag/teatru/>.

People understand that investing in a brand will enhance long term winning.

In what Eugene O'Neill is concerned, there are several directions of perception of this dramatist's work – by criticism, translations, performances - as different "readings" of O'Neill's work, thus emphasizing the specificity of the process of perception that determines both the critical reactions or the translation options and the approaches of directors to address a piece in a certain way. We are going to refer to the enactment of O'Neill's plays as he is the only contemporary dramatist capitalizing ancient myths to express the dramatic fact of contemporary life. Through him, the tragic vein represented by Sophocles, Aeschylus, Euripides, Shakespeare or Racine extends naturally in actuality proving the existence of modern man's tragic potential. This is why his plays managed to overcome the barriers of censorship over various Romanian ages, the continuity of O'Neill's presence in Romanian theatres demonstrating the mutual cultural Romanian-American interest.

The very first staging of O'Neill's plays in Romania was held in Cluj in 1939 with the masterpiece *Beyond the Horizon*. Then, there was the early 40's performance of *Mourning Becomes Electra* which recorded an awesome success. *Anna Christie* was staged at the Teatrul Mic (The Little Theatre) in 1943. *Desire under the Elms* followed in Bucharest at Teatrul Nostru (Our Theatre) in the same year.

After the "silence" of the fifties, the interest in the plays of O'Neill is reinforced by staging the scenic realism during the sixties and seventies, when directors such as Liviu Ciulei and Al. Fiñți (Bucharest), Soroana Coroamă (Iași) or Lily Teodorescu (Cluj) mounted excellent performances with great play by O'Neill: *Mourning Becomes Electra* and *Long Day's Journey into Night*.

There followed weak attempts at modernization in the 80's and 90's of the last century, when O'Neill's plays seem to not launch special challenges either for the directors of the former political regime or for the post-revolutionary ones. The staging after 2000 when the revival of O'Neill seemed real thanks to director Alexa Visarion's initiative to constitute a Romanian-American theatre company within the National Theatre. The Romanian-American Theatre "Eugene O'Neill" founded by the members of the Cultural Association "Dialog" at the International Symposium "Eugene O'Neill" was held at the National Theatre in Bucharest in 2003, commemorating the 50th anniversary of the playwright's death. Nevertheless, this initiative was of short duration, as the staging of *Anna Christie* and *A Touch of the Poet* did not receive the adequate support from the theatre director, Dinu Săraru. Thus, at the beginning of the new millennium, the interest in the work of this American playwright walks pretty much into obscurity. Consequently, we can say that even if there is O'Neill theatre in Bucharest not so many plays by O'Neill are staged.

Cristian Munteanu, a famous radio theatre director, staged for the radio *A Long Day's Journey into Night*, *Anna Christie*, *Mourning Becomes Electra* and *Bound East for Cardiff*. In all, the stylistic fingerprint of the director is unmistakable. It is translated into a special feeling of theatrical construction, in which the radio plays an essential part. It addresses only one sense, the hearing, recreating a whole universe. There are unwritten rules of this genre, the radio theatre, yet none of them cannot substitute the interior discipline of the artists which requires the solidity of stylistic option and thus the capacity to reinterpret a text.

5. Conclusion

For the Europeans at large, O'Neill remains the American father of modern drama, much indebted to the culture of the older continent. However, for the British at least, O'Neill's works opened up new artistic possibilities as they inspired their own playwrights to create excruciatingly sincere drama that shook the foundations of society.

The reception of Eugene O'Neill's dramatic creation in Romania was a complex phenomenon that manifested in a variety of forms: criticism-studies, articles, reviews which appeared in cultural magazines, monographs,

<https://sites.google.com/site/icqqmeas 2015>

forewords, afterwards volumes, literary dictionaries, almanacs and other valuable works of literary criticism and literary history.

The performances of his plays have achieved a remarkable record across Europe over a period of nearly six decades; there were developed numerous exhaustive anthologies which strive often manage to provide clarification on the essence of O'Neill's genius presenting this giant of contemporary theatre in a more accurate and truthful light.

There may be a revival of interest for the classic American theater, and especially for O'Neill's plays. This possible return may happen due to some independent cultural initiatives which require a sustained lobbying, individual dedication and efficient cooperation. Unfortunately, for the moment we cannot speak of a particular concern of the Romanian authorities to resume the interrupted dialogue with the work of a playwright considered difficult to receive by the contemporary public sensitivity. Yet, the advantages of such a revival of interest would be multiple, especially in the area of intensifying the cultural Romanian –American exchanges.

References

- [1] Bartlett, J. (1968). *Familiar Quotations*. New York: Little Brown and Company.
- [2] Blau, H. (1990). *The Audience*. Baltimore-London: The Johns Hopkins University Press.
- [3] Bloom, H. (ed.) (1987). Eugene O'Neill's "Long Day's Journey into Night," *Modern Critical Interpretations*. New York: Chelsea House Publishers.
- [4] Bulz, A.C. (2013) O'Neill's Long Day's Journey into Night on the Romanian Stage: Valorizing the Performance Potential in Production History, *Teste e Linguaggi*, 7, 165-177,
available <http://elea.unisa.it:8080/jspui/bitstream/10556/1135/1/Bulz,%20A.%20C.%20O%27%20Neill%27s%20Long%20Day%27s%20Journey%20into%20Night%20on%20the%20Romanian%20Stage.%20Valorizing%20the%20performance%20potential%20in%20production%20history.pdf> (last accessed 23.4.2015).
- [5] Chothia, J. (1979). *Forging a Language: A Study of the Plays of Eugene O'Neill*, New York : Cambridge University Press.
- [6] Christin, A.M. (ed.). (2001). Paris: Flammarion.
- [7] <http://elea.unisa.it:8080/jspui/bitstream/10556/1135/1/Bulz,%20A.%20C.%20O%27%20Neill%27s%20Long%20Day%27s%20Journey%20into%20Night%20on%20the%20Romanian%20Stage.%20Valorizing%20the%20performance%20potential%20in%20production%20history.pdf> (last accessed 23.4.2015).
- [8] <http://www.agerpres.ro/cultura/2014/12/14/gala-oamenii-timpului-interviu-constantin-chiriac-locul-in-care-m-am-nascut-centrul-lumii-pentru-mine-14-10-37> (last accessed 23.4.2015).
- [9] <http://www.britannica.com/EBchecked/topic/165345/Discours-sur-le-style> (last accessed 23.4.2015).
- [10] <http://yorick.ro/constantin-chiriac-am-castigat-un-mare-festival-m-a-costat-viata-timp/>
- [11] <http://www.sibfest.ro/> (last accessed 23.4.2015).
- [12] <https://www.facebook.com/FITSibiu> (last accessed 23.4.2015).
- [13] <http://www.theguardian.com/stage/2014/jun/27/sibiu-international-theatre-festival-romania> (last accessed 23.4.2015).
- [14] <http://www.manafu.ro/tag/teatru/> (accessed 23.4.2015).
- [15] <http://www.sibfest.ro/sibiu-international-theatre-festival.html> (last accessed 23.04.2015).
- [16] <http://www.sibfest.ro/general/fact-and-figures> (last accessed 17.03.2015).
- [17] Kobernick, M. (1989). *Semiotics of the drama and the style of Eugene O' Neill*. J. Benjamins.
- [18] Lunde, J.V. (1974). *News Advertising*. New York: Prentice Hall, Inc.
- [19] Moldoveanu, M. and Franc, V.J. (1997). *Marketing și cultură*. București: Expert.
- [20] Morais, I.I.R. (2012). The Role of Marketing to Cultural Sponsorship: A Case Study 'hiado' Theatre Company. *International Journal of the Arts in Society*, Vol. 6, No. 3.
- [21] O'Neill, E. (1988). *Ah, Wilderness*. Eugene O'Neill: Complete Plays, 1932-1943. New York: Library of America.
- [22] Style is the man himself (t.n.) – Buffon's discourse at the French Academy, 25 August 1753, available at <http://www.britannica.com/EBchecked/topic/165345/Discours-sur-le-style> (last accessed 21.4.2015).
- [23] Ullmann, S. (1957). *Style in the French Novel*. Cambridge: Cambridge University Press.
- [24] Williams, R. (1960). *Culture and Society: 1780–1950*. Harmondsworth: Penguin.

THE APPLICATION OF MIXED RESEARCH METHODS IN THE ANALYSIS OF THE “CHILD HELPLINE” ADVERTISING CAMPAIGN (2011-2014)

Mart Soonik^{1*}, Tiina Hiob¹

¹Institute of Communication, Tallinn University, Estonia e-mail: soonikm@tlu.ee

ABSTRACT

Advertising companies before they initiate and after they launch an advertising campaign, follow communication research approaches in order to specify people's understanding and approval/acceptance of the advertising messages and visuals. It is a good habit to develop at least focus group or in depth interviews with the representative of target group, but quite often it is only the internal discussion of the designer's own self. With the case of Child helpline launched in Estonia, the authors had a possibility to execute focus group interviews with main target groups (adults and youngsters) after every campaign was already launched (2011-2013). Sampling methods about both research methods are discussed.

Keywords: Mixed research methods, Social marketing, Social advertising, Children, Processing of advertising information, Cognitive defense, Social modeling, Social capital, Trust; Estonia

1. Introduction

Researchers focus for a one or another research method (qualitative or quantitative), but in real life we can benefit from the mixed strategy. Qualitative research may give us input for the quantitative research and after getting results, we can evaluate outcome with qualitative research again for better interpretation of quantitative numbers. Evaluation of Estonian Child Helpline advertising was such a case.

Mixed-Method studies have emerged from the paradigm wars between qualitative and quantitative research approaches to become a widely used mode of inquiry. Depending on choices made across four dimensions, mixed-methods can provide an investigator with many design choices which involve a range of sequential and concurrent strategies. Defining features of these designs are reported along with quality control methods, and ethical concerns. Useful resources and exemplary study references are shared (eg. Terrell, 2012). "Mixed-Methods Studies are studies that are products of the pragmatist paradigm and that combine the qualitative and quantitative approaches within different phases of the research process" (Tashakkori & Teddlie, 2008).

Quantitative research (i.e., a positivist paradigm) has historically been the cornerstone of social-science research. Purists call for researchers to "eliminate their biases, remain emotionally detached and uninvolved with the objects of study and test or empirically justify their stated hypotheses. Qualitative purists support a constructivist or interpretivist paradigm and "contend that multiple-constructed realities abound, that time- and context free generalizations are neither desirable nor possible, that research is value bound, that it is impossible to differentiate fully causes and effects, that logic flows from specific to general and that knower and known cannot be separated because the subjective knower is the only source of reality (eg Johnson & Onwuegbuzie, 2004). In-depth analysis may take place (Kavoura and Bitsani, 2014).

The End of the Paradigm Wars and the Emergence of Mixed Methods calls in the 80's and 90's for "a truce" between the two major paradigms. Many major authors and researchers felt that quantitative and qualitative research methodologies are compatible. Many social-scientists now believe there is no major problem area that should be studied exclusively with one research method. Quantitative tells us "If"; qualitative tells us "How or why (eg. Terrell, 2012). "Paradigm relativism – "the use of whatever philosophical and/or methodological approach (that) works for the particular research problem under study" (Tashakkori & Teddlie, 2008, p. 9).

This paper aims to examine the way both quantitative and qualitative methods can be employed before the initiation of advertising campaigns. In particular, it focuses on helpline and will present the way of outcome which help us to change the advertising language (visuals and messages) in order to be more clear and influential for an advertising agency's target group.

2. Social Marketing -definitions

Social marketing" is a process designed for those working to create social change that will improve the lives of others, or society in general. It is not a theory, but a practical approach to follow in order to create and manage needed social change. Social marketing is defined as the application of commercial marketing and communication principles to public initiatives/programs in order to achieve social goals through behavior change. The mission of social marketing programs is to benefit the consumer and or society, not the host organization (eg. Sutton, 1999). Social marketing uses same techniques/ tactical tools, but the strategy is totally different. Child helpline campaign applied more to the so called "marketing mix", where for the marketing well known 4P (Product, Place, Price, Promotion) is added fifth P- Politics (McCarthy, 1960). It means package of different political and environmental supportive activities, which help to gain strategic aim of social marketing.

"Social marketing programs will typically address at least five areas (often called the 5 P's) and only one of those areas is communication. The areas covered by social marketing include: What is being offered to the consumer (Product)? What must the consumer do to receive the offering (Price)? How will the consumer access the offering (Place)? What kind of policy environment is needed to support the effort (Politics)? What messages must reach the consumer to motivate behavior change?" (Sutton, 1999).

The main objectives of advertising campaign are: raising awareness of the Helpline and positive attitudes toward it. Social advertising is the one component of Social Marketing Mix and thus applies to a large extent in social advertising for commercial advertising tactics. Therefore, it is necessary to ask - Do we can apply all marketing tactics in the very same way and how children react on it?

How do children receive commercial advertising, have been studied much. However, there are not so many texts about receiving social advertising messages by children. It is commonly known that under age 8 years are children immature to work with advertising messages in their information processing, but from the age 8-9 will appear little sceptic, who can understand advertising techniques, influence methods and aims.

<https://sites.google.com/site/icqqmeas 2015>

The knowledge and skepticism about advertising that is typical of children eight years of age or older is often viewed as a "cognitive defense" against advertising (eg. Sutton, 1999).

The main research question in this study is associated with understanding how well started all these cognitive defense mechanism among advertising target group (12-15 years old youngsters) compared with other target group (adults/parents in middle age).

The effect of cognitive defense is possible to avoid in the information processing if advertising language (visual and verbal) is applied to the target group in the aim identification own self with campaign core message. An advertiser aims to answer questions such as did we succeed with the aim of adequate and quick information process in the children`s mind and good attitude to the core message we distributed?

"All but the newest behaviors have a pre-existing image - a set of expectations and associated feelings among consumers. Images allow consumers to economize their processing of information. They provide reassurance in a changing environment. Overall, the image of the desired action answers the consumer's implicit question: "Is this action something that I can see myself doing? Are they talking to me?" The image comes mainly from: (1) the physical properties or functional consequences of the action and (2) communications about it, such as what peers, role models, authorities, or other influencers say, do, and show. Any communication will project a particularism age of the desired action" (Sutton, 1999).

The concept of social modeling has long been understood by psychologists and by commercial marketers. In the work of Albert Bandura, for example, social modeling plays a central role in social learning and social cognition; that is, the formation of knowledge, attitudes, and beliefs (eg. Bandura, 1986).

So, we also need to ask- is this message good for a role modelling and learning (call to action)?

The important aspect in this particular advertising campaign is trust. We need to analyze it in the frame of social capital theory.

"In sociology, social capital is the expected collective or economic benefits derived from the preferential treatment and cooperation between individuals and groups. Although different social sciences emphasize different aspects of social capital, they tend to share the core idea "that social networks have value". Just as a screwdriver (physical capital) or a university education (cultural capital or human capital) can increase productivity (both individual and collective), so do social contacts affect the productivity of individuals and groups" (Putnam, 2000).

Theory of social capital helps us to understand reaction of different target groups to the state activities to establish new regulations and norms, also advertising. If social capital coherence is high then there is effective way to transfer own messages through strong social networks but if it is low then it is better to do it individual level.

Robert Putnam added value for the Bourdieu ideas. He is connecting social capital with trust. Social capital is 'trust, norms and networks' that facilitate cooperation for mutual benefit (eg. Putnam, 1995).

"Trust and context are inextricably linked. We experience trust in numerous contexts, such as within family, between and among friends, and colleagues, with organizations and institutions. Any discussion of trust must be contextualized to have meaning and relevance. Trust within the context of family differs from the trust we experience within civil society" (Qianhong Fu, 2004).

Based on that we can also ask: Is Estonian social capital and the level of trust enough for our children to target them social advertising messages? Are they accept it or not? Do they trust advertising and the service we provide (child helpline). Answers for these questions may be the outcome of surveys made by mixed methodological strategy.

3. The Estonian environment

Estonia is a country in the Baltic region of Northern Europe. The territory of Estonia covers 45,227 km², and is influenced by a humid continental climate.

According to data from Statistics Estonia, the population of Estonia is shrinking. While there are other European countries like Estonia with a birthrate that is below replacement levels, Estonia lacks immigration to compensate for the negative natural growth. In fact, the number of emigrants is larger than the number of immigrants. As such, the population is on a slow downward trend. The population increased from 1,351,640 in January 1970 to 1,570,599 in January 1990. Since 1990, Estonia lost about 15% of its population (230,000 people). The population decreased to 1,294,455 in December 2011, which is even lower than the number of people that lived in Estonia in 1970.

Although there is a downward population curve, explained by a larger death than birth rate and a larger number of emigrants than immigrants, the line graph of the natural population increase shows the rate of population decrease was slowly diminishing.

<https://sites.google.com/site/icqqmeas> 2015

Between 1970 and 1990 the age structure of Estonia was rather stable with around 22% of the population in the age group 0–14 years, 66% between 15 and 65, while 12% were 65 years or older. Due to the low birth rates after 1990, the proportion of the population 0–14 years of age dropped to 15% in 2009, while the proportion of 65 years or older gradually increased to 17% in 2009. The proportion of the age group 15–64 also slightly increased to 68% in 2009 (<http://en.wikipedia.org/wiki/Estonia#Demographics>).

4. Description of Research Methodology

In the years 2011–2013 we examined a campaign via focus group interviews. In all three years, two important target groups were in focus: parents of pre-school children and youngsters aged 12 to 15 years old.

We used the focus group interview method to find answers to questions. We strived to ensure the representative nature of the sample, primarily with regard to different opinions.

In the last two years, this research used a semantic differential on individual worksheets in order to better understand the emotions related to the advertisement.

A focus group is a form of qualitative research in which a group of people are asked about their perceptions, opinions, beliefs, and attitudes towards a product, service, concept, advertisement, idea, or packaging. Questions are asked in an interactive group setting where participants are free to talk with other group members (Kavoura and Tomaras, 2015).

A focus group could be defined as a group of interacting individuals having some common interest or characteristics, brought together by a moderator, who uses the group and its interaction as a way to gain information about a specific or focused issue.

“A focus group is typically 7–10 people who are unfamiliar with each other. These participants are selected because they have certain characteristics in common that relate to the topic of the focus group. The moderator or interviewer creates a permissive and nurturing environment that encourages different perceptions and points of view, without pressuring participants to vote, plan or reach consensus” (Krueger, 1988).

“The group discussion is conducted several times with similar types of participants to identify trends and patterns in perceptions. Careful and systematic analysis of the discussions provide clues and insights as to how a product, service, or opportunity is perceived by the group” (Marczak and Sewell, 2015). The sampling method here used convenient sampling.

The researchers did a representative survey through a web panel. Online research can take place and may be used in different sectors (Kavoura, 2014). Since the goal of the survey was to evaluate the penetration rate of the campaign among target groups, and attitude to the topic in the population, we used a nationally representative sample. This was done by constructing quotas based on age and geographic region (NUTS codes) of the actual distribution of the target group in the general population. This distribution was then scaled down to the sample size. Such an approach means the researchers have data that reflects the attitudes of the people that is representative of the population distribution in different regions of Estonia.

In addition to the representative country-data, we boosted the sample in regions that have more access to the advertising materials (big cities, especially the capital, Tallinn). The aim of such a sample boost is to provide data for more in-depth measurement of the types of advertising that are concentrated into particular areas of the country, and for which the exposure rate of national data is likely to be insufficient. Since the target groups are not very large, we estimate a 400 respondent-strong sample to be sufficient for the purposes of measurement of penetration and attitude. On top of this, a 100-respondent boost in big cities/Tallinn will allow to measure variation among the target that has seen the advertising materials, and allow for additional qualitative analysis.

The quotas in the adults' survey were calculated on the basis of the age, gender, ethnic and regional division of the population, thus ensuring the representative nature of the survey. In the case of children, the main target group was 10–15-year-olds, but children aged 8 to 10 years were also surveyed in the children's questionnaire. In addition, we conducted a pilot study among all specialists who deal with children. For that purpose, the client (Ministry of Social Affairs) provided the necessary database and recommendations for updating the questionnaire. There are many ethical issues if you're doing research among children (until 15 years). “The most fundamental consideration in undertaking research involving children is deciding whether the research actually needs to be done, if children need to be involved in it and in what capacity. Accordingly, at the very outset of the research process researchers need to engage with critical issues regarding the purpose of the research and the impact that participating in the research may have on children in terms of potential harm and possible benefits” (www.childethics.com, 2015). Child helpline doesn't have such issues, but working with children is still more difficult.

First of all you need to get permission from the parents, because in focus group interviews you will record and make transcription about everything you see and hear. So, there was a possibility for parents to come and see the interview. That was so called “survey room” where you can see and listen, but you`re not in the same room. There was a possibility for interruption via survey secretary. Representative survey was also distributed through parents to the children (below the age of 15 years old). They explained main research questions and helped with questionnaire overall.

5. Results: level of awareness of different target groups

The qualitative survey part confirmed the semantic differential results; children did not differ from adults. In this particular survey the benefit of using both methods together in mixed way (focus groups and representative web panel) was visible.

From the qualitative part, the research got not only immediate emotional and rational feedback for the visuals and messages but more or less all the possible barriers (misconceptions), different sources and channels dealing with children`s problems in general. Without it, the research couldn`t have tangible evidence of what kind of situations with children can be as triggers for helping them at all.

Possible answers for the main research questions emerged in the questionnaire such as: how high is the rate of child-related topics (including a helpline) becoming a subject of discussion and what are the behaviors and attitudes of the target group. Quantitative survey let the researchers know the exact rate of all different outcomes from the focus groups. The qualitative results brought forth the issue that awareness rate about the advertising campaigns could not be very high because the target group didn`t understand the visuals and messages before and the quantitative survey confirmed these findings.

The majority of adults did not know that the child helpline exists, while among children the percentage of those who were aware of the helpline was equal to the percentage of those who were not aware. Specialists, who due to their work are involved in helping children, are all aware of the child helpline.

Children, specialists and adults thought that it was a helpline that mainly children should call. In many open answers throughout the survey, the helpline number was found excessively to be long and difficult to memorize. Only a few representatives of all the target groups were able to spontaneously recall the helpline number.

The Estonian society is not one that cares about children`s concerns, and people are not very eager to choose children in need as a subject of discussion. Adults were confused as to the reason why one should call the child helpline. The fear that such information sharing would cause problems, primarily for the child, was ranked high in results.

Children do not know why they should call the child helpline. They were afraid that callers would be persecuted, and similarly to adults children are also afraid that the child they are sharing information about might get into trouble.

6. Conclusion

The authors conclude that more attention should be paid to the results from groups so that advertising campaigns can be more effective. Respondents can help advertisers realize people`s needs and wishes and which media they can use based on their replies in focus groups and surveys.

References

- [1]Bandura, A. (1986). *Social Foundations of Thought and Action: A Social Cognitive Theory*. Englewood Cliffs, N.J.: Prentice Hall.
- [2]Clark, V. and Creswell, J. (2008). *The mixed methods reader*. Los Angeles: SAGE.
- [3]Johnson, R. B. and Onwuegbuzie, A. J. (2004). Mixed-methods research: a research paradigm whose time has come. *Educational Researcher*, Vol. 33, No. 7, pp. 14-26.
- [4]Kavoura, A. (2014). Social Media, online imagined communities and communication research, *Library Review*, Vol. 63, No. 6/7, pp. 490-504.
- [5]Kavoura, A. and Bitsani, E. (2014). Methodological Considerations for Qualitative Communication Research. *Procedia*, Vol. 147, pp. 544-549.
- [6]Kavoura, A. and Tomaras, P. (2015). Qualitative Communication Research Methods and Techniques, In Ghorbani, A. Takhar, A (Eds.), *Market Research Methodologies: Multi-Method and Qualitative Approaches*, chapter 10, pp. 156-171, IGI Global.
- [7]Krueger, R. A. (1988). *Focus groups: A practical guide for applied research*. Newbury Park, CA: Sage Publications.
- [8]Marczak, M. and Sewell, M. (2015). Using focus groups for evaluation available at <http://ag.arizona.edu/sfcs/cyfernet/cyfar/focus.htm>
- [9]McCarthy, J. E. (1960). *Basic Marketing. A Managerial Approach*. Homewood, IL: Richard D. Irwin.
- [10] Putnam, R. (2000). *Bowling Alone: The Collapse and Revival of American Community*. Simon and Schuster.
- [11]Qianhong F. (2004). *Trust, Social Capital, and Organizational Effectiveness*.
- [12]Sutton, M. (1999). *Developing Social Marketing Messages For Covering Kids*. Unpublished Ph.D. Thesis. Sutton Social Marketing/LLC lk 1.
- [13]Tashakkori, A., and Teddlie, C. (2008). Introduction to mixed method and mixed model studies in the social and behavioral science. In V.L. Plano-Clark and J. W. Creswell (Eds.), *The mixed methods reader*, (pp. 7-26).

<https://sites.google.com/site/icqqmeas> 2015

[14]Terrell, S. (2012). Mixed-methods research methodologies. The Qualitative Report, Vol. 17, No. 1, pp. 254-280. Available at <http://www.nova.edu/ssss/QR/QR17-1/terrell.pdf>

[15]<http://en.wikipedia.org/wiki/Estonia#Demographics> last accessed 22.4.2015.

[16] www.childethics.com, 2015 last accessed 22.4.2015.

HOUSING BUBBLE AND MONETARY POLICY IN U.S.

Thanassis Kazanas and Dimitris Kallivokas

Department of Business Administration

Technological Educational Institute of Athens

e-mail: thkazanas@teiath.gr, e-mail: dimkalliv@yahoo.gr

ABSTRACT

This paper reviews the evidence of the link between monetary policy and the rapid rise in house prices that occurred in the early part of the last decade. A crucial point is the distinction between trend and cyclical movements in the housing market. Given that monetary policy have little impact on the economy over long-run, a large part of the run-up in house prices may be attributed to the slow but steady rise in the price of housing relative to that of other consumption goods. Moreover, the paper examines whether the conduct of monetary policy was appropriate through the estimation of simple monetary policy rules for the period from 1991:I to 2008:IV. Although the most rapid increases in house prices occurred when the short-term interest rates were at their lowest levels, the magnitude of house price gains seems too large to be explained by the conduct of monetary policy alone. The shifts in preferences away from consumption goods towards housing goods as well as the weak financial supervision seem to play an important role in this housing bubble.

JEL Classification: E52, C13, C30

Keywords: monetary policy, Taylor rules, house prices

1. Introduction

There is recently a growing research interest in investigating whether the monetary authorities in US have played a significant role in the housing bubble that occurred in the early part of the last decade. Understanding the relationship between monetary actions and the housing market requires in fact the understanding of the monetary actions' transmission to the real economy, namely, the way that changes in the housing market affect monetary policy actions and how the monetary policy stance affects the link between real estate and the macro-economy.

The house prices in US had amazing performance during the period from 1970 to 2005. As it is pointed out by Iacoviello (2008), although the path over time of house prices in real terms appears to have been irregular, it is clearly seen that house prices have been on an upward trend well before the boom in the mid of the last decade. A house bought in 1970 in US could have been sold at the end of 2005 for twice as much, after adjusting for inflation. Data from other countries (with the exception of Germany and Japan) confirm the previous evidence. Indeed, in most developed countries throughout the 20th century, house prices have been on a constant upward trend, both in nominal and in real terms (see, e.g., Miles, 1992). This evidence has to be kept in mind when trying to loosely connect the stance of monetary policy with long-run trends in house values.

Despite this fact, the experience of the last 10 or 15 years in many developed economies appears somewhat more puzzling. The main reason is that the growth rate of house prices has increased, despite any significant increase in the growth rate of many other macroeconomic variables. It is therefore important to understand what risks the acceleration in house price inflation poses for the macro-economy.

The paper is organized as follows. Section 2 presents the related literature. Section 3 analyzes the conduct of monetary policy and the use of simple monetary policy rules. Section 4 presents the empirical analysis. Section 5 concludes the paper.

2. Literature Review

Nowadays there has been a great come back of interest in the issue of how to conduct monetary policy. One factor of this phenomenon is the huge volume of recent working papers and conferences on the topic. Another is that over the last years specific policy rules have been proposed by many leading macroeconomists. John Taylor's (1993) recommendation of a simple interest rate rule and the recent widespread endorsement of inflation targeting (e.g., Bernanke and Mishkin, 1997) are well known examples. Especially the so called Taylor rule has received considerable attention mainly due to the fact that it's simple and describes the actual behavior of the Federal Funds rate in the United States in a meaningful way. According to Taylor rule the central bank sets its nominal interest rate using current values of inflation and current values of the deviation of real output from its target level. This rule is characterized as active when the monetary authorities respond to increases in inflation with a more than one-to-one increase in the nominal interest rate.

The literature considering how monetary policy should address the development of an asset price bubble is quite large. A number of authors have argued that a central bank could increase their official interest rates somewhat in response to asset market misalignments even if the near-term inflation and output outlook did not warrant such actions. This "leaning against the wind" strategy, proponents argue, would limit the size of the bubble, and could be seen as buying insurance against a possible bad outcome (see, e.g., Cecchetti et al. 2000, 2002; Borio and Lowe, 2002).

Meltzer (2011) and Taylor (2012) set out a distinction between a "rules-based era", from 1985 to 2003, and an "ad hoc era", from 2003 to present. Over the rules-based era, a period characterized by inflation stabilization, the Federal Reserve's policy is well described by a simple Taylor rule whereby the Federal Funds Rate is set as a linear function of inflation and the output gap with coefficients of 1.5 and 0.5, respectively. Over the ad hoc era, a period devastated by the boom and bust in the housing market, the Federal Reserve's policy deviates from the Taylor rule. In particular, from 2002 to 2006 the Federal Funds Rate was 2-3 percentage points below the path prescribed by the Taylor rule for any period since 1980s (Poole, 2007; Taylor, 2007).

Leamer (2007) and Taylor (2007, 2010, 2011) argue that such a "Great Deviation" from rules-based policy making, resulting in a too accommodating monetary stance, was a major cause of the economic and financial crisis erupted in 2007, since it triggered boom-bust dynamics in house prices. On the contrary, Brito et al. (2012) demonstrate that house price instabilities can well occur even if the central bank follows monetary policy feedback rules of the Taylor type. The same argument is shared by Bernanke (2010) who suggests that the best response to the housing bubble would have been regulatory and not monetary. According to Dokko et al. (2009), monetary policy was not a primary factor in the housing bubble and a tighter monetary policy would not have been the best response to the bubble. Moreover, monetary policy actions in response to asset price

bubbles, above and beyond the effect that such bubbles may have on price stability and full employment, should be guided by several principles (see, e.g., Kohn, 2008).

3. House Price Movements and Monetary Policy in U.S.

This section quotes a brief review of the conduct on monetary policy in U.S. and examines whether the monetary policy was responsible for the house price movements.

3.1 *The conduct of monetary policy*

The Federal Reserve has three ways to expand or contract money and credit. The primary method is called open market operations and it involves the Fed buying existing U.S. Treasury securities (or those that have been already issued and sold to private investors). Second, the Fed can also change reserve requirements, controlling a portion of deposits that banks must hold as currency or on deposit at the Fed, which affects the available liquidity within the market. Finally, the Fed permits certain depository institutions to borrow from it directly on a temporary basis. That is, these institutions can “discount” at the Fed some of their own assets to provide a temporary means for obtaining reserves. Discounts are usually on an overnight basis. For this privilege they are charged an interest rate called, appropriately, the discount rate. The discount rate is set by the Fed at a markup over the federal funds rate (see, e.g., Labonte, 2013).

Because the Fed defines monetary policy as the actions it undertakes to influence the availability and cost of money and credit, this suggests two ways to measure the stance of monetary policy. One is to look at the cost of money and credit as measured by the rate of interest relative to inflation (or inflation projections), while the other is to look at the growth of money and credit itself. Thus, one can look at either interest rates or the growth in the supply of money and credit in coming to a conclusion about the current stance of monetary policy, that is, whether it is expansionary, contractionary, or neutral. Since the great inflation of the 1970s, most central banks have preferred to formulate monetary policy more in terms of the cost of money and credit rather than on their supply. The Federal Reserve thus conducts monetary policy by focusing on the cost of money and credit as proxied by an interest rate. Until financial turmoil emerged in 2007, a consensus had emerged among economists that a relatively stable business cycle could be maintained through prudent and flexible changes to interest rates via transparently communicated and signaled open market operations. That consensus broke down as the financial crisis worsened, and the Fed took increasingly unconventional and unprecedented steps to restore financial stability (see, e.g., Labonte, 2013).

As the U.S. economy was coming out of the short and shallow 2001 recession, unemployment continued rising until mid-2003. Due to the fear that the economy would slip back into recession, the Fed kept the federal funds rate extremely low. The target federal funds rate was lowered quickly in response to the 2001 recession, from 6.5% in late 2000 to 1.75% in December 2001 and to 1% in mid-2003. As the expansion continued and prices began to rise, the target federal funds rate was slowly increased in a series of moves to 5.25% in mid-2006 (see, Bernanke, 2010).

According to some economists, the financial crisis was, at least in part, due to Federal Reserve accommodative policy for a considerable period (see, e.g., Henderson, 2009). In particular, critics now claim that the low short-term rates were kept too low for too long after the 2001 recession had ended, and this caused an increased demand for housing that resulted in a “price bubble.” The shift in financing housing from fixed to variable rate mortgages made this sector of the economy increasingly vulnerable to movements in short-term interest rates. Moreover, critics argue that one consequence of the tightening of monetary policy later in the decade was to burst this “price bubble”. On the contrary, Bernanke (2005) believes that the low mortgage rates that helped fuel the housing bubble were mainly caused by a “global savings glut” over which the Fed had little control.

The bursting of the housing bubble led to the onset of a financial crisis that affected both depository institutions and other segments of the financial sector involved with housing finance. The lack of credit soon had a negative effect on both production and aggregate demand. In December 2007, the economy entered a recession. As the spillover effects from the housing slump to the financial system, as well as its international scope, became apparent, the Fed responded by reducing the target federal funds rate and the discount rate (see, e.g., Labonte, 2013). Beginning on September 18, 2007, and ending on December 16, 2008, the target was reduced from 5.25% to a range between 0% and 0.25%, where it currently remains.

3.2 *Simple Monetary Policy Rules for U.S.*

Dokko et al. (2009), in order to gauge whether the settings of federal funds rate were “loose” or “tight”, focus on versions of Taylor rules of the following form

$$i_t^* = a + \beta(\pi_t - \pi^*) + \gamma \tilde{y}_t \quad (1)$$

where i_t^* is the nominal federal funds target rate, π_t is the inflation measured by the four-quarter growth rate of a price index, π^* is the inflation target assumed to be 2% and \tilde{y}_t is the output gap measured by a percentage deviation of real GDP from its potential level. The parameter a is the desired nominal interest rate when inflation and output are at their target values ($a = r^* + \pi^*$) with r^* being the long-run equilibrium real interest rate. Taylor showed that this rule provides a reasonable good description for the period 1987-1992 setting the following values for the parameters: $r^* = 2$, $\beta = 1.5$ and $\gamma = 0.5$.

According to this rule and measuring inflation using the consumer price index (CPI), Dokko et al. (2009) agree that monetary policy was too easy during the period 2002 to 2006 as the actual federal funds target rate is below the values implied by the Taylor rule by about 2%. But the calculations based on other measures of inflation or on real time data may differ than previous. Indeed, when they use the real-time core personal consumption expenditures (PCE) price index and the real-time output gap they found that the calculated rate is closer to the actual federal funds target rate.

Moreover, due to the fact that it is important to place the magnitude of deviations of nominal Fed funds rate from the nominal interest rate implied by simple policy rules, they calculate a set of Taylor rules taking into account alternative measures of inflation and output gap for the period 1965 to 2008. These calculations show clearly that the deviations of the nominal Fed funds rate from the range of prescriptions from these rules were significant prior to 1987 reflecting the weak policy response to the rise in inflation in the 1970s and the aggressiveness of the disinflation under the Volcker's tenure, after the third quarter of 1979. More specifically, the nominal Fed funds rate was below the nominal interest rate range implied by these policy rules. Although the deviations in the period since then have been smaller, it is worth noting that the Fed funds rate was below the implied range from 2003 to 2005.

Taking into consideration the fact that monetary policy works with a lag, the policy decisions must be forward looking (see, e.g., Bernanke, 2010; Clarida et al., 1999). This means that the policy instrument of the Fed has to react to expected deviations of inflation and output from their target levels. Using inflation forecasts over the current and subsequent three quarters, Bernanke (2010) gives evidence that this alternative Taylor rule prescribes a path for policy that is much closer to that followed throughout the past decade. So, when taking into account that monetary authorities should and do respond differently to temporary and longer-lasting changes in inflation, monetary policy following the 2001 recession appears to have been reasonably appropriate compared to a simple policy rule.

This paper extends these simple policy rules analyzing whether these rules can be augmented with a financial stress index containing information from some asset prices and financial variables (see, e.g., Castro, 2011). Namely, it examines whether the U.S. monetary authorities have followed a stabilizing policy towards to inflation, output and financial conditions of the economy. Despite the apparent risk financial stress poses to the real economy, the relationship between financial stress and economic activity is complex and not well understood (see, e.g., Davig and Hakkio, 2010). The paper assumes the following augmented version of a forward-looking Taylor rule:

where $E_t(\cdot) \equiv E(\cdot | \Omega_t)$ is the conditional on the current information set of the economy at time t , denoted as Ω_t , π_{t+n} is the rate of inflation n -periods ahead, \tilde{y}_{t+k} denotes the real output gap k -periods and \tilde{z}_{t+l} the financial stress index l -periods ahead.

Taking into account the smoothing attitude of the Fed implying that the actual level of nominal rate, denoted as i_t , is adjusted partially to its target level i_t^* as follows:¹

$$i_t = (1 - \rho)i_t^* + \rho i_{t-1} + \varepsilon_t,$$

where ε_t is an i.i.d. (independent and identically distributed) error term with zero mean and the autoregressive parameter ρ captures the degree of smoothness in interest rate process i_t . So, the monetary policy rule given by equation (2) can be written as follows:

In this form, the forward monetary policy rule implies that the CB adjusts the current level of its policy instrument i_t only by a fraction $(1 - \rho)$ of the expected deviations of inflation from its target level, expected output gap $E_t(\tilde{y}_{t+k})$ and expected deviations of the financial stress index $E_t(\tilde{z}_{t+l})$. The remaining fraction is an adjustment driven by its previous periods' policies.

¹ See, e.g., Clarida et al (1999). The tendency of central banks to smooth changes in short term interest rates stems from various reasons as the fear of instability of capital markets, the loss of credibility from sudden large policy reversals or the need for consensus building to support a policy change. Moreover, the central banks may regard interest rates smoothing as a learning device due to imperfect market information.

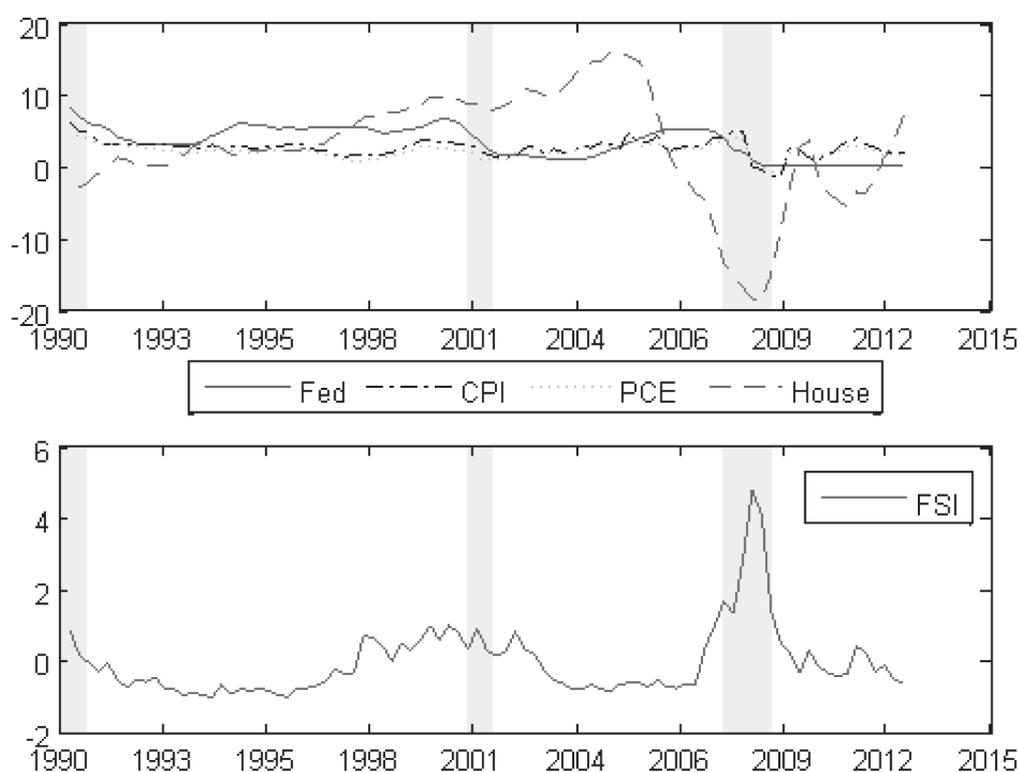
4. Empirical Analysis

This section reports estimates of alternative monetary policy models based on equation (3) for U.S. The Fed has received by government a significant degree of independence in conducting monetary policy and has announced its commitment on targeting inflation since the seventies, where the U.S. economy has started experiencing very high inflation rates (see, e.g. Clarida et al., 1999).

4.1 Data

The data set consists of quarterly observations from 1991:I to 2012:IV on the four variables of the monetary policy model, namely the short term interest rate i_t , inflation rate π_t , output gap \tilde{y}_t and financial stress index \tilde{z}_t . As short rate i_t , we consider the average Federal Funds rate in the first month of each quarter expressed at annual rates. Inflation rate π_t is measured as the annual rate of the consumer price index (CPI) or the personal consumption expenditure (PCE) index at the last month of each quarter, defined as $P_t = \frac{\text{nominal } GDP_t}{\text{real } GDP_t} \cdot 100$, i.e. $\pi_t = \frac{P_t - P_{t-4}}{P_{t-4}} \cdot 100$. The output gap \tilde{y}_t is measured as the percentage change of the real GDP with respect to potential real GDP i.e. $\tilde{y}_t = \frac{\text{real } GDP_t - \text{real potential } GDP_t}{\text{real potential } GDP_t} \cdot 100$. The real GDP and real potential GDP are expressed in annual rates with the year 2005 being the base year. Finally, financial stress is measured using the Kansas City Federal Reserve's Financial Stress Index (KCFSI) at the last month of each quarter. The KCFSI has a mean of zero and a standard deviation of one. Thus, when the KCFSI exceeds zero, financial conditions are more stressed than average. Moreover, we use national composite home price index for the U.S. All data were downloaded from the Federal Reserve Bank of St. Louis.

Figure 1: Fed funds rate, CPI inflation, PCE inflation, nominal House price inflation and Financial Stress Index.



Note: Shaded areas indicate recessions.

Figure 1 shows the annual increase in nominal house prices from 1991 to the present. After some years of slow growth, U.S. house prices began to rise more rapidly in the late 1990s. Prices grew at a 7 to 8 percent annual rate in 1998 and 1999, and in the 9 to 11 percent range from 2000 to 2003. Thus, the beginning of the run-up in housing prices predates the period of highly accommodative monetary policy. Shiller (2007) dates the beginning of the boom in 1998. On the other hand, the most rapid price gains were in 2004 and 2005, when the annual rate of house price appreciation was between 15 and 17 percent. CPI and PCE inflation movements are similar with the Fed funds rate to have an aggressive reaction to these movements. Moreover, regarding the FSI index we observe that monetary authorities loose their stance during periods of financial stress, namely when the FSI takes positive values, especially in 2000s. This means that monetary policy in U.S. takes into consideration not only the issues of price and output stability but also the issue of financial stability.

In order to give evidence to this result three alternative Taylor-type rules are estimated according to relationship (3) for the period from 1991:I to 2008:IV. The first rule (Rule I) is a backward-looking augmented Taylor rule ($n=k=l=-1$). This means that the nominal interest rate reacts to deviations of inflation, output and financial conditions from their target levels over the previous quarter. The second rule (Rule II) is a forward-looking augmented Taylor rule with $n=k=1$ and $l=0$. This means that the nominal interest rate reacts to the expected deviations of inflation and output from their target levels over a quarter ahead and to financial conditions over the current quarter. Finally, the third rule (Rule III) is the second rule without the financial stress index.

Table 1: Estimates of the alternative models

	Rule I	Rule II	Rule III
α	2.53*** (0.62) [4.09]	2.29*** (0.40) [5.67]	2.55*** (0.83) [3.08]
β	0.92** (0.44) [2.10]	2.24*** (0.33) [6.77]	2.13*** (0.72) [2.95]
γ	1.76*** (0.42) [4.18]	1.05*** (0.17) [6.27]	1.00*** (0.32) [3.16]
δ	-5.07*** (1.29) [3.92]	-1.77*** (0.2) [8.85]	
ρ	0.90*** (0.025) [35.83]	0.88*** (0.011) [78.69]	0.85*** (0.04) [20.17]
$Adj.R^2$	0.96	0.91	0.90
J-stat (p-value)		6.73 (0.82)	13.32 (0.10)
Quandt-Andrews test (Maximum LR F-statistic)	4.67*** (2001:II)		

Notes: The reported estimates in forward-looking models (II) and (III) are obtained based on the GMM estimation procedure using the Newey-West optimal weighting matrix with 4 lags. Standard errors are in parentheses and t-statistics are in brackets. J-stat stands for the over-identifying parameters test statistic. ***, **, * denote 1%, 5%, 10% significance.

The estimates of the two forward-looking rules are obtained based on the generalized method of moments (GMM) estimation procedure which considers the following moment (orthogonality) conditions:

$$E \left[i_t - (1 - \rho)(\alpha + \beta\pi_{t+n} + \gamma\tilde{y}_{t+k} + \delta\tilde{z}_{t+l}) - \rho i_{t-1} \mid \mathbf{h}_t \right] = \mathbf{0},$$

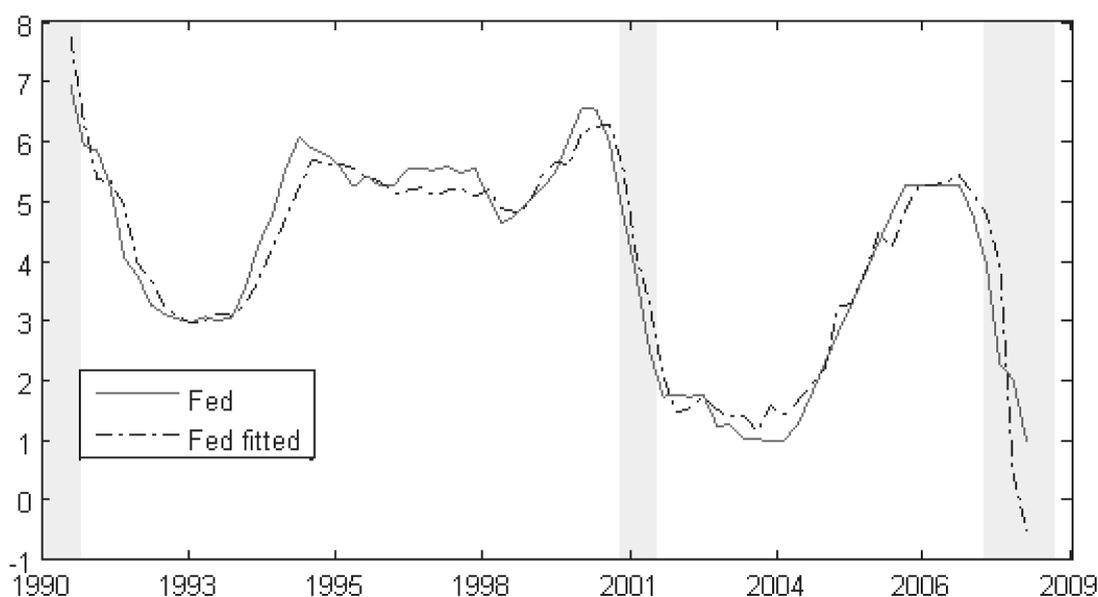
where \mathbf{h}_t is a vector of instrumental variables. In our analysis, this vector includes the constant and one up to four lagged values of the following variables: π_t , \tilde{y}_t and \tilde{z}_t . Moreover, two to four lagged values of nominal interest rate i_t are used. Instead of expected values of inflation and output their realized values are used over a quarter ahead.

Table 1 presents the estimates of the alternative Taylor rules². All estimates are statistically significant at the conventional levels. The first rule, backward-looking rule, states that the reaction of monetary authorities was passive towards to inflation as the coefficient β is less than unity and active towards to output gap and financial conditions ($\gamma > 1$ and $\delta < -1$). The Quandt-Andrews test gives evidence to a significant regime switching in the conduct of monetary policy in the second quarter of 2001 something that has to be taken into consideration in a future research (see, e.g., Kazanas et al., 2011).

The estimates of the other two forward-looking rules reveal the strong attitude of the monetary authorities to stabilize the deviations of inflation and output from their target levels ($\beta > 1$ and γ marginally higher or close to unity). The set of instruments is valid as according to the J-statistic of Hansen the null hypothesis of overidentifying restrictions is satisfied. Moreover, the $Adj.R^2$ is in favor of Rule II something that means that the financial stress index plays a significant role in the conduct of monetary policy for the period under scrutiny.

Figure 2 presents the actual values of the Fed funds rate as well as the fitted values based on Rule II. It's clearly seen that the Taylor Rule II prescribes a path for policy that is close to that followed throughout the examined period. The monetary policy becomes looser when the economy enters to recessionary conditions and seems to remain loose for a significant period after the end of recession so that the sustainability of growth to be achieved. So, the results of this study seems to confirm the Bernanke's (2010) view that the monetary authorities followed the appropriate policy taking into consideration the general macro-economic and financial conditions.

Figure 2: Actual and fitted Fed funds rate from Rule II.



Note: Shaded areas indicate recessions.

5. Conclusions

This paper reviews the evidence of the link between monetary policy and the rapid rise in house prices that occurred in the early part of the past decade. The direct linkages seem to be weak. When the policy makers take into consideration the expected changes in inflation and other economic variables and when the policy makers' responses depend on whether these changes are expected to be temporary or longer lasting the followed monetary policy seems to be appropriate. House prices began to rise in the late 1990s, and although the most rapid price increases occurred when short-term interest rates were at their lowest levels, the magnitude of house price gains seems too large to be readily explainable by the stance of monetary policy alone. Moreover, cross-country evidence shows no significant relationship between monetary policies and the pace of house price increases (see, e.g., Bernake, 2010).

²The reported estimates are based on CPI inflation. The use of PCE inflation gives similar results.

<https://sites.google.com/site/icqqmeas 2015>

The most important source of this house boom was not the level of short-term interest rates but the increasing use of more exotic types of mortgages and the associated decline of underwriting standards. So, the best response to the housing bubble would have been regulatory, not monetary. Building risk concentrations and inadequate risk-management practices could have more effectively addressed by regulators, supervisors and the private sector without any judgment about the sustainability of house prices increases to be needed. This means that financial regulation and supervision weren't ineffective for controlling emerging risks, but their execution should be better and smarter (see, e.g., Bernanke, 2010; Dokko et al., 2009)

The final conclusion is that the role of monetary policy in addressing bubbles is minor. Even if interest rate increases in 2003 or 2004 were sufficient to constrain the bubble they could have seriously weakened the economy at just the time when the recovery from the previous recession was established. The monetary policy must be used as a supplementary tool for addressing these risks and more efforts should be made to strengthen the regulatory system in order to prevent a recurrence of the crisis.

References

- Bernanke, Ben S. and Frederic Mishkin. (1997). "Inflation Targeting: A New Framework for Monetary Policy?" *Journal of Economics Perspectives*, 11(2), pp. 97-116.
- Bernanke, Ben S (2005). "The Global Savings Glut and the U.S. Current Account Deficit," speech delivered at the Sandridge Lecture, Virginia Association of Economics, Richmond, Va, March 10.
- Bernanke, Ben S (2010). "Monetary Policy and the Housing Bubble", Speech delivered at the Federal Reserve System, at the Annual Meeting of the American Economic Association, Atlanta, Georgia.
- Borio, Claudio, and Philip Lowe (2002). "Asset Prices, Financial and Monetary stability: Exploring the Nexus," Bank for International Settlements Working Paper 114, July.
- Brito, Paulo B., Marini, Giancarlo and Piergallini, Alessandro, (2012). "House Prices and Monetary Policy", CEIS Working Paper No. 250.
- Castro, V. (2011). "Can central banks' monetary policy be described by a linear (augmented) Taylor rule or by a nonlinear rule?," *Journal of Financial Stability*, Elsevier, vol. 7(4), pages 228-246.
- Cecchetti, Stephen, Hans Genberg, John Lipsky, and Sushil Wadhvani (2000). "Asset Prices and Central Bank Policy," *Geneva Reports on the World Economy*, 2, International Center for Monetary and Banking Studies and Centre for Economic Policy Research, July.
- Cecchetti, Stephen, Hans Genberg, and Sushil Wadhvani (2002). "Asset Prices in a Flexible Inflation Targeting Framework," in William C. Hunter, George G. Kaufman, and Michael Pomerleano, eds., *Asset Price Bubbles: Implications for Monetary, Regulatory, and International Policies*. Cambridge, Mass.: MIT Press, pp. 427-44.
- Clarida, R., Gali, J., and Gertler, M. (1999). "The Science of Monetary Policy: A New Keynesian Perspective", *Journal of Economic Literature*, (37), pp. 1661-1707.
- David Henderson, (2009). "Did the Fed Cause the Housing Bubble?," *Wall Street Journal*, March 27.
- Davig, Troy and Craig Hakkio (2010). "What Is the Effect of Financial Stress on Economic Activity?" *Federal Reserve Bank of Kansas City, Economic Review* 95(2), pp.: 35-62.
- Dokko, Jane, Brian Doyle, Michael T Kiley, Jinill Kim, Shane Sherlund, Jae Sim, and Skander Van den Heuvel (2009). "Monetary Policy and the Housing Bubble," *Finance and Economics Discussion Series 2009-49*. Washington: Board of Governors of the Federal System, December.
- Iacoviello, Matteo, and Stefano Neri (2008). "Housing Market Spillovers: Evidence from an Estimated DSGE Model," Working Paper (145), National Bank of Belgium.
- Kazanas, T., Philippopoulos, A. and Tzavalis, E. (2011). "Monetary Policy Rules and Business Cycles Conditions." *The Manchester School*, Vol. 79, s2, pp. 73-37.
- Kohn, Donald L. (2008). "Monetary Policy and Asset Prices Revisited," speech delivered at the Cato Institute's 26th Annual Monetary Policy Conference, Washington, DC, November 19.
- Labonte, M. (2013). "Monetary Policy and the Federal Reserve: Current Policy and Conditions", CRS Reort for Congress.
- Leamer, E. E. (2007). "Housing is the Business Cycle", *Proceedings, Federal Reserve Bank of Kansas City*, 149-233.
- Meltzer, A. H. (2011), "Federal Reserve Policy in the Great Recession", Remarks, Cato Institute Annual Monetary Conference, November.
- Miles, D., (1992). "Housing markets, consumption and financial liberalisation in the major economies", *European Economic Review*, Elsevier, vol. 36(5), pages 1093-1127.
- Poole, W. (2007), "Understanding the Fed", *Federal Reserve Bank of St. Louis Review*, January/February 89, 3-13.
- Shiller, Robert J (2007). "Understanding Recent Trends in House Prices and Homeownership," in *Proceedings of the symposium "Housing, Housing Finance, and Monetary Policy."* Kansas City: Federal Reserve Bank of Kansas City, pp 89-123.
- Taylor, J. B. (1993). "Discretion versus Policy Rules in Practice", *Carnegie-Rochester Conferences Series on Public Policy*, 39, pp. 195-214.
- Taylor, J. B. (2007), "Housing and Monetary Policy," in *Housing, Housing Finance, and Monetary Policy*, Federal Reserve Bank of Kansas City.
- Taylor, J. B. (2010), "Does the Crisis Experience Call for a New Paradigm in Monetary Policy?" *Warsaw School of Economics*, (June 23), CASE Network Studies and Analyses No. 402.
- Taylor, J. B. (2011), "Macroeconomic Lessons from the Great Deviation", in D. Acemoglu and M. Woodford, *NBER Macroeconomics Annual 2010*, 25.
- Taylor, J. B. (2012), "Monetary Policy Rules Work and Discretion Doesn't: A Tale of Two Eras", *Journal of Money Credit and Banking*, vol. 44(6), pages

<https://sites.google.com/site/icqqmeas> 2015

ΑΝΘΡΩΠΙΝΗ ΑΝΑΠΤΥΞΗ ΣΕ ΠΕΡΙΟΔΟΥΣ ΚΡΙΣΗΣ

Κέφης Βασίλειος¹, Παναγιώτα Ξανθοπούλου²

¹Αναπληρωτής Καθηγητής, Πάντειο Πανεπιστήμιο Κοινωνικών & Πολιτικών Επιστημών, Τμήμα Δημόσιας Διοίκησης

*Email: bkefis@panteion.gr

²Καθηγήτρια, ΙΕΚ ΔΕΛΤΑ, Εισηγήτρια σε Προγράμματα E-learning Πανεπιστημίου Αιγαίου, Υποψ. Διδάκτωρ Παντείου Πανεπιστημίου Κοινωνικών και Πολιτικών Επιστημών

*E-mail: pattyxanth@gmail.com

ΠΕΡΙΛΗΨΗ

Η έννοια της «κρίσης» συνιστά επαναλαμβανόμενη ονομασία για τις δυσμενείς οικονομικές συνθήκες. Έρευνα του ΟΟΣΑ έδειξε ότι στην Ελλάδα το 20% των πολιτών ηλικίας 15-29 ετών που δεν εργάζονταν, δεν είχαν την ευκαιρία να σπουδάσουν ούτε να συμμετάσχουν σε προγράμματα κατάρτισης (πρόκειται για την ομάδα των NEET - Νέοι 15-29 ετών οι οποίοι βρίσκονται εκτός δομών απασχόλησης, εκπαίδευσης ή κατάρτισης). Προκύπτει έτσι μια ακόμη κρυφή πτυχή της κρίσης, που αφορά την κρίση δεξιοτήτων, ιδιαίτερα σε χώρες όπως η Ελλάδα, όπου το 1/3 των θέσεων που ζητά η αγορά εργασίας δεν καλύπτεται από το υπάρχον δυναμικό. Αντίστοιχα, 2.194 νέοι είναι κάτοχοι μεταπτυχιακού διπλώματος, αλλά δεν εργάζονται, 58.277 απόφοιτοι ΑΕΙ διαπιστώνουν ότι το πτυχίο τους δεν έχει αντίκρισμα στην αγορά εργασίας, 22.334 απόφοιτοι των ΤΕΙ παραμένουν άνεργοι, ενώ 153.368 απόφοιτοι λυκείου δεν μπορούν επίσης να βρουν απασχόληση. Οι προαναφερθέντες αριθμοί αποδεικνύουν ότι, δεν είναι η έλλειψη τυπικών προσόντων που εμποδίζει την απασχόληση και αναδεικνύουν την ανάγκη για στενότερη και βαθύτερη σύνδεση της εκπαίδευσης με την αγορά εργασίας. Η παρούσα έρευνα, έχοντας ως αφετηρία το φαινόμενο του skills gap, επιχειρεί να διαπιστώσει τη χρησιμότητα της εξ' αποστάσεως εκπαίδευσης (ως συμπληρωματικής και καινοτόμου μεθόδου διδασκαλίας) στις ανθρωπιστικές και κοινωνικές επιστήμες. Τα αποτελέσματα έδειξαν ότι οι φοιτητές επιθυμούν να ενισχύσουν τις δεξιότητές τους και να αφιερώσουν επιπλέον χρόνο προσωπικής μελέτης προκειμένου να διαμορφωθεί ένα πρόγραμμα εξ' αποστάσεως εκπαίδευσης το οποίο θα λειτουργεί συμπληρωματικά με το ήδη υπάρχον πρόγραμμα σπουδών τους, με την παράλληλη συμβολή εισηγητών από τον χώρο των επιχειρήσεων.

Λέξεις κλειδιά: Επιχειρηματικότητα, ανεργία, ηλεκτρονική εκπαίδευση, εξ' αποστάσεως εκπαίδευση, Ανθρωπιστικές-Κοινωνικές επιστήμες

1. Η ασθένεια του διπλώματος

Το ζήτημα της σύνδεσης της εκπαίδευσης με την επαγγελματική αποκατάσταση και απόδοση έχει απασχολήσει ιδιαίτερα το Βρετανό κοινωνιολόγο και μελετητή Ronald Dore, συγγραφέα του έργου «η ασθένεια του διπλώματος» που εκδόθηκε το 1976. Ο Dore προσπαθεί να διερευνήσει το κίνητρο που οδήγησε και οδηγεί εκατομμύρια ανθρώπους παγκοσμίως να αποκτήσουν διπλώματα, πώς αυτά σχετίζονται με το επίπεδο οικονομικής ανάπτυξης μιας χώρας και ποιές είναι οι επιδράσεις της τάσης αυτής στη διαμόρφωση του περιεχομένου και της δομής των εκπαιδευτικών συστημάτων. Αναφέρει ότι «όσο περισσότερο τα διπλώματα χρησιμοποιούνται για την επιλογή σε κάποια θέση, τόσο γρηγορότερος είναι ο ρυθμός της αύξησης του πληθωρισμού των διπλωμάτων, τόσο πιο πολύ προσανατολισμένο στις εξετάσεις είναι το εκπαιδευτικό σύστημα εις βάρος της πραγματικής μόρφωσης».

Διαπίστωσε ότι η κοινωνία έχει εθιστεί να σκέφτεται ότι η κατοχή διπλώματος δεν σχετίζεται μόνο με την αυξημένη εργασιακή απόδοση, αλλά και με το ότι ο κάτοχός του είναι εξυπνότερος, έχει καλύτερους τρόπους και είναι πιο πολιτισμένος. Η συγκεκριμένη αντίληψη συνιστά μια παραμορφωμένη αναπαράσταση της πραγματικότητας. Η φοίτηση στα πανεπιστημιακά ιδρύματα δεν γίνεται, στην συντριπτική πλειοψηφία των περιπτώσεων, ούτε λόγω ενός γνήσιου επιστημονικού ενδιαφέροντος ούτε για να εκπαιδευτεί ο συμμετέχων πάνω σε ένα επαγγελματικό αντικείμενο, αλλά προκειμένου να συμπληρώσει κάποιος τα τυπικά προαπαιτούμενα ώστε να εργαστεί. Έτσι, το κοινωνικό πρόβλημα, υπό την πίεση της ανεργίας και της εργασιακής ανασφάλειας, μετατρέπεται, σε ένα παράδοξο της ανθρώπινης συνείδησης, καθώς ο άνεργος «φταίει που είναι άνεργος, γιατί δεν απέκτησε ούτε ένα πτυχίο» ενώ αυτός που απέκτησε «δε διαθέτει τις απαραίτητες δεξιότητες που αναζητά η αγορά εργασίας». Ως εκ τούτου η μάθηση υποβαθμίζεται σε προετοιμασία για τις εξετάσεις και τα πανεπιστήμια μετατρέπονται σε ένα χώρο όπου χιλιάδες άνθρωποι σπουδάζουν χωρίς πραγματικό ενδιαφέρον για αυτό που σπουδάζουν. Τα πτυχία πολλαπλασιάζονται, χάνοντας έτσι όλο και περισσότερο την όποια επαγγελματική τους αξία, με αποτέλεσμα όσο χάνεται η αξία να αυξάνονται οι πιέσεις των ανθρώπων για περισσότερα πτυχία και περισσότερα χρόνια σπουδών, τα οποία μετά τους κάνουν να αισθάνονται όλο και πιο πολύ «εξαπατημένοι». Και ο φαύλος κύκλος της «ασθένειας του διπλώματος» συνεχίζεται, με τους νέους ανθρώπους να αποζητούν όλο και περισσότερα πτυχία, καθώς δεν μπορούν να βρουν εργασία ή η εργασία που βρίσκουν ανταποκρίνεται όλο και λιγότερο σε αυτά που σπούδασαν, θυμίζοντας τους ναυαγούς της Μέδουσας στον πίνακα του Ζερικώ, που πιασμένοι από μια σχεδόν διαλυμένη σχεδία κοιτούν με άδειο και απελπισμένο βλέμμα τον ορίζοντα.

2. Η Επιχειρηματικότητα στα προγράμματα σπουδών των ελληνικών ΑΕΙ

Η Επιχειρηματικότητα σαν γνωστικό αντικείμενο εντοπίζεται κυρίως σε προγράμματα σπουδών των οικονομικών σχολών και όχι ως αυτούσιο μάθημα αλλά κυρίως ως μάθημα επιλογής. Η πρόσφατη εμπειρία των ευρωπαϊκών χωρών δείχνει ότι τα Πανεπιστήμια δεν προσφέρουν επαρκές εκπαιδευτικό περιβάλλον που να προάγει τις επιχειρηματικές δεξιότητες και να προωθή την επιχειρηματικότητα ως βιώσιμη επαγγελματική προοπτική.

Ένα επίσης σημαντικό ζήτημα όσον αφορά τη διδασκαλία της επιχειρηματικότητας είναι οι απαιτούμενες ικανότητες και γνώσεις των εκπαιδευτικών αλλά και η προθυμία τους να μεταβούν από τις συμβατικές στις καινοτόμες μεθόδους διδασκαλίας. Πέρα λοιπόν από την κλασική διδασκαλία, η «διδασκαλία» της επιχειρηματικότητας μπορεί να περιλαμβάνει τα εξής:

- Ημερίδες και στρογγυλά τραπέζια για μετάδοση εξειδικευμένων γνώσεων και εις βάθος συζητήσεις με ανθρώπους έμπειρους στο επιχειρείν.
- Μελέτες περίπτωσης.
- Εικονικές ασκήσεις για άμεση κατανόηση και αντιμετώπιση επί μέρους προβλημάτων.
- Εικονικές επιχειρήσεις για την προσομοιωτική κατανόηση της συνολικής λειτουργίας επιχειρήσεων.
- Επισκέψεις σε επιχειρήσεις (και αν είναι δυνατό πρακτική άσκηση) για τη βιωματική κατανόηση της λειτουργίας των επιχειρήσεων.
- Επεξεργασία επιχειρηματικών ιδεών (ει δυνατόν καινοτομικών) για την άσκηση στη σύλληψη ευκαιριών για νέα προϊόντα και υπηρεσίες.
- Εκπόνηση επιχειρηματικών σχεδίων από τους εκπαιδευόμενους με προσέγγιση πραγματικών συνθηκών.
- Σχήματα συμβουλευτικής καθοδήγησης (mentoring) για τη μεταφορά εμπειρίας από επιχειρηματίες.
- Συμβουλευτική καθοδήγηση για την καλύτερη κατανόηση του σχεδιασμού της επιχειρηματικής δράσης.
- Συμμετοχή σε επιχειρηματικούς διαγωνισμούς και διαγωνισμούς καινοτομίας για την απόκτηση εμπειρίας.

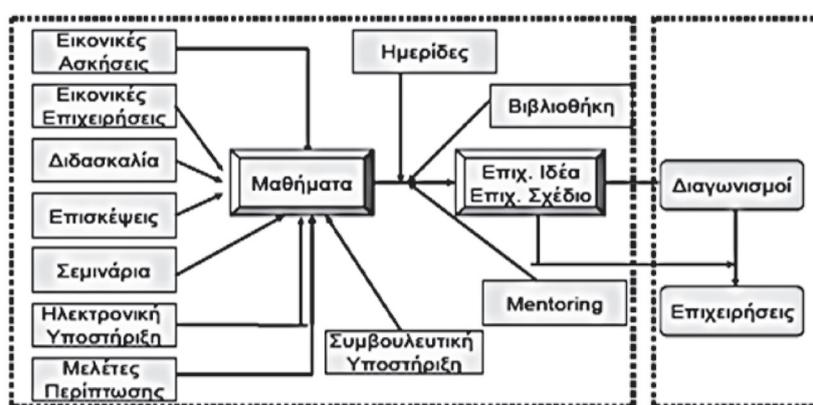
Τα παραπάνω εργαλεία θα μπορούσαν απλοποιημένα να ενταχθούν σε μια εκπαιδευτική δομή όπως φαίνεται στον κάτωθι Πίνακα (Πίνακας 1).

Πίνακας 1. Εκπαιδευτικό Matrix Επιχειρηματικότητας

	ΘΕΩΡΙΑ	ΠΡΑΓΜΑΤΙΚΟΤΗΤΑ	ΕΙΚΟΝΙΚΗ ΠΡΑΓΜΑΤΙΚΟΤΗΤΑ	ΦΑΝΤΑΣΙΑ
Διορθώσεις				Επιχειρηματική ιδέα
Μνήμη	Ημερίδες	Μελέτες περίπτωσης		
Βιωσιμότητα/ εμπειρία- παραστάσεις		Επισκέψεις	Εικονικές Επιχειρήσεις	Διαγωνισμοί
Μάθητρον	Μαθήματα, Βιβλιοθήκη	Mentoring, Σεμινάρια	Εικονικές ασκήσεις	Επιχειρηματικό σχέδιο, Συμβουλευτική υποστήριξη

ΠΗΓΗ: Σκάγιαννης, Π. (2008)

Ο Πίνακας 1 μεταφραζόμενος σε ένα εκπαιδευτικό πρόγραμμα παίρνει την ακόλουθη διάρθρωση (Διάγραμμα 1):



ΠΗΓΗ: Σκάγιαννης, Π. (2008)

3. Η Ηλεκτρονική Εκπαίδευση ως συμπληρωματική μέθοδος διδασκαλίας

Το βασίλειο της εκπαίδευσης έχει επεκταθεί σε μεγάλο βαθμό με την έλευση του Διαδικτύου και των νέων τεχνολογιών. Το Coursera, που ιδρύθηκε το 2009, έχει επαναπροσδιορίσει την εξ αποστάσεως εκπαίδευση καθώς επιτρέπει στους ανθρώπους να επιλέξουν μαθήματα από 83 κορυφαία πανεπιστήμια και ιδρύματα επαγγελματικής ανάπτυξης σε όλο τον κόσμο. Δεδομένης της συνεχούς ανάπτυξης της νεανικής επιχειρηματικότητας και του φαινομένου του skills gap, κρίνεται απαραίτητη η παράλληλη απόκτηση πρακτικών δεξιοτήτων που θα προσδώσουν ανταγωνιστικό πλεονέκτημα σε όσους επιθυμούν να εμπλακούν στον επιχειρηματικό κόσμο είτε ως εργαζόμενοι είτε ως ιδιοκτήτες. Στο σημείο αυτό τονίζεται η αναγκαιότητα της συνεργασίας του ακαδημαϊκού με τον επιχειρηματικό κόσμο, δίνοντας ιδιαίτερη έμφαση στη διδασκαλία αντικειμένων που σχετίζονται με την επιχειρηματικότητα.

Η παρούσα μελέτη διεξήχθη στο Πάντειο Πανεπιστήμιο ως πρόταση για το σχεδιασμό και την υλοποίηση ενός προγράμματος εξ' αποστάσεως εκπαίδευσης με κύρια θεματική τη «Νεανική Επιχειρηματικότητα». Τα πλεονεκτήματα της εξ' αποστάσεως εκπαίδευσης σύμφωνα με τους συμμετέχοντες στην έρευνα μπορούν να συνοψισθούν στα εξής:

- Δεν απαιτείται η φυσική παρουσία καθηγητών και φοιτητών για την ολοκλήρωση του μαθήματος.
- Εξοικονομείται χρόνος.
- Το περιεχόμενο παραμένει επίκαιρο και οι συμμετέχοντες μπορούν να το επαναχρησιμοποιήσουν.
- Οι φοιτητές συμμετέχουν στην εκπαιδευτική διαδικασία μέσω καινοτόμων μεθόδων που καθιστά πιο ευχάριστη τη διδασκαλία σύνθετων αντικειμένων.
- Οι φοιτητές αυτοαξιολογούνται, αξιολογούν και την ομάδα στην οποία ανήκουν και τις άλλες, αξιολογούν το μάθημα σαν σύνολο και τα συστατικά του. Συμμετέχουν σε όλες τις διαδικασίες αξιολόγησης.
- Ενθαρρύνει την κριτική σκέψη.
- Τυχόν λάθη δεν αποκαλύπτονται στο σύνολο της αίθουσας αλλά στον κάθε φοιτητή ατομικά.
- Ο κάθε φοιτητής μπορεί να συνεχίσει στους κύκλους μαθημάτων ή στο πρόγραμμα ανάλογα με το πόσο έχει κατανοήσει τη διδακτέα ύλη (Εξατομικευμένοι ρυθμοί εκμάθησης).

Τεράστια είναι η συμμετοχή τα τελευταία χρόνια στα προγράμματα εξ αποστάσεως εκπαίδευσης που προσφέρουν ελληνικά πανεπιστήμια προσπαθώντας εν μέσω της οικονομικής κρίσης να συνδράμουν νέους, άνεργους πτυχιούχους αλλά και επαγγελματίες στο να αποκτήσουν περισσότερα εφόδια και να αντεπεξέλθουν στον τεράστιο ανταγωνισμό του σύγχρονου επαγγελματικού στίβου. Τα προσφερόμενα προγράμματα απευθύνονται σε ένα ευρύ φάσμα της ελληνικής κοινωνίας όπως αποφοίτους λυκείου, πτυχιούχους, επαγγελματίες κ.ά. και σε αυτά διδάσκουν Έλληνες και ξένοι καθηγητές. Η θεματολογία μπορεί να καλύψει σχεδόν κάθε ενδιαφερόμενο αφού παρέχονται πάνω από 500 προγράμματα, με έμφαση στην καινοτομία και με σαφή προσανατολισμό στις επιταγές της αγοράς εργασίας.

Ωστόσο, η ηλεκτρονική μάθηση δεν είναι από όλους ευπρόσδεκτη. Πολλοί είναι αυτοί που υποστηρίζουν ότι η φυσική παρουσία του εκπαιδευτικού και των φοιτητών δεν μπορεί να αντικατασταθεί από δύο υπολογιστές. Οι υποστηρικτές αυτής της άποψης συμπληρώνουν ότι μέσω της διδασκαλίας στην αίθουσα μεταφέρονται συναισθήματα, εικόνες, προωθείται ο διάλογος και ενισχύεται η επικοινωνία- η ουσιαστική επικοινωνία- μεταξύ εκπαιδευτικών και φοιτητών. Η αλήθεια βρίσκεται κάπου στη μέση. Σαφέστατα η διαπροσωπική επικοινωνία και επαφή είναι περισσότερο ουσιαστική και «αληθινή», όταν όμως αυτή γίνεται σωστά. Η ηλεκτρονική μάθηση θα μπορούσε (και πρέπει) να λειτουργήσει και να θεωρηθεί όχι ως αντικαταστάτης / ανταγωνιστής αλλά ως «συnergάτης» / «υποστηρικτής». Παρ' όλο που τα ακαδημαϊκά ιδρύματα υποστηρίζουν ένα ευρύ φάσμα προσφερομένων υπηρεσιών ηλεκτρονικής μάθησης, στα περισσότερα από αυτά η αλματώδης ανάπτυξη των νέων τεχνολογιών δεν έχει καταφέρει να αλλάξει τη θεώρηση ότι η διδασκαλία μέσω της διαπροσωπικής επαφής παραμένει στο επίκεντρο των εκπαιδευτικών διαδικασιών. Είναι όμως εξίσου σημαντικό να γίνει αντιληπτό ότι το εκπαιδευτικό περιβάλλον αλλάζει και ενώ οι εκπαιδευτικοί μπορεί να εξακολουθούν να είναι αποτελεσματικοί χρησιμοποιώντας τον παραδοσιακό τρόπο διδασκαλίας στην αίθουσα, οι νέες τεχνολογίες δε μπορούν να χρησιμοποιηθούν αποτελεσματικά αν οι ίδιοι δεν είναι πρόθυμοι να προσαρμοστούν σε νέους τρόπους διδασκαλίας.

Από την άλλη πλευρά του οικοσυστήματος της εκπαίδευσης, αυτή των φοιτητών, η ηλεκτρονική μάθηση σε συνδυασμό με τη δια ζώσης διδασκαλία μπορεί να προσδώσει μεγάλη αξία στη μετέπειτα πορεία τους. Συγκεκριμένα, έχοντας τη δυνατότητα παρακολούθησης επιπλέον μαθημάτων της επιλογής τους μέσω μιας πλατφόρμας προσφερόμενης από το Πανεπιστήμιό τους, θα είναι σε θέση να έχουν μια πιο συγκεκριμένη εικόνα των μετέπειτα μεταπτυχιακών σπουδών αλλά και της επαγγελματικής σταδιοδρομίας που τους εκφράζει ενώ παράλληλα ενισχύουν τις δεξιότητές τους - και επομένως τις πιθανότητές - για ένταξή τους στην αγορά εργασίας. Οι απαιτήσεις της αγοράς δεν είναι, όπως λανθασμένα θεωρείται, η απόκτηση μεγάλου αριθμού πτυχίων. Αυτό που εκλείπει είναι η ουσιαστική γνώση πάνω σε καίρια ζητήματα της εκάστοτε επιστήμης.

Επιπροσθέτως, μια τέτοια κίνηση ενισχύει περαιτέρω την εξωστρέφεια των Πανεπιστημίων καθώς επιτρέπει την άμεση σύνδεση με την αγορά εργασίας αλλά και με τα σημαντικά ζητήματα που απασχολούν την σύγχρονη κοινωνία. Αυτή η συνεργασία γεννά την καινοτομία και σχηματίζει έναν κύκλο όπου από καινοτόμα και πρωτοπόρα εκπαιδευτικά ιδρύματα αποφοιτούν άτομα με εμπλουτισμένες και ουσιαστικές δεξιότητες που θα απασχοληθούν στην αγορά εργασίας και θα αποδειχθούν ικανό ανθρώπινο δυναμικό. Ο κύκλος κλείνει, εν τέλει, με την εξωστρέφεια αλλά και «υστεροφημία» του Πανεπιστημιακού Ιδρύματος από το οποίο ξεκίνησαν όλα.

Εν κατακλείδι, η ηλεκτρονική μάθηση δεν είναι νέα διδασκαλία, αλλά ένα νέο εργαλείο το οποίο, όπως και όλα τα εργαλεία, αν χρησιμοποιηθεί ορθολογικά μπορεί να οδηγήσει σε θαυμαστά αποτελέσματα. Όπως σημειώνει η έκθεση για τη στρατηγική της Λισαβόνας που δημοσιεύτηκε το 2007, η Ελλάδα είναι η μόνη χώρα όπου οι δείκτες της ανεργίας επιδεινώνονται όσο βελτιώνεται το επίπεδο της εκπαίδευσης. Το εύρημα αυτό υποδηλώνει δύο καταστάσεις: πρώτον η Ελλάδα αποδεδειγμένα έχει υψηλά ποσοστά αποφοίτων τριτοβάθμιας εκπαίδευσης που έχουν συνεχίσει τις σπουδές τους σε μεταπτυχιακό ή/ και διδακτορικό επίπεδο. Δεύτερον, τα πτυχία τους δεν αρκούν για να τους εξασφαλίσουν μια θέση εργασίας καθώς η αγορά ζητά συγκεκριμένες γνώσεις και δεξιότητες που η πλειοψηφία δεν έχει αποκτήσει (το λεγόμενο φαινόμενο του skills gap).

4. Μεθοδολογία έρευνας

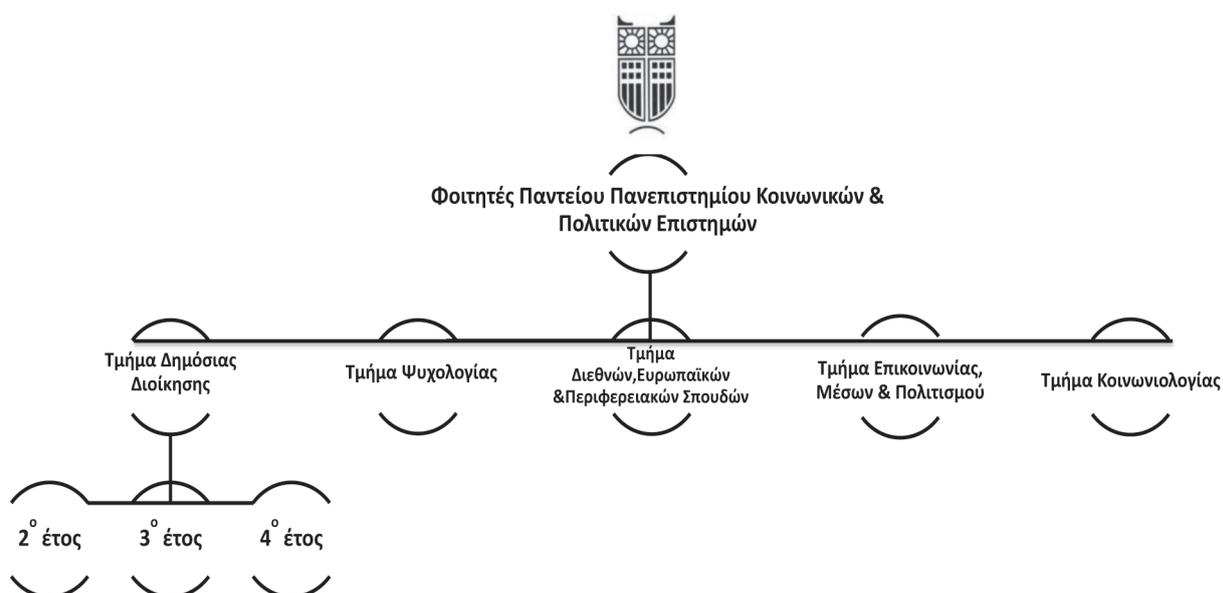
Η έρευνα διεξάγεται στα εξής τμήματα του Παντείου Πανεπιστημίου Κοινωνικών & Πολιτικών Επιστημών (επίπεδο προπτυχιακών σπουδών):

1. Ψυχολογίας
2. Δημόσιας Διοίκησης
3. Διεθνών, Ευρωπαϊκών και Περιφερειακών Σπουδών
4. Επικοινωνίας, Μέσων και Πολιτισμού
5. Κοινωνιολογίας

Το εργαλείο που χρησιμοποιήθηκε για τη διεξαγωγή της έρευνας ήταν το ερωτηματολόγιο, το οποίο φέρει τον τίτλο «Η διδασκαλία της επιχειρηματικότητας σε σχολές Κοινωνικών Επιστημών: Η συμβολή του e-learning».

Διαιρείται σε 5 ενότητες που περιλαμβάνουν: α) γενικές ερωτήσεις περί επιχειρηματικότητας, β) ερωτήσεις περί ηλεκτρονικής εκπαίδευσης, γ) ερωτήσεις περί διδασκαλίας της επιχειρηματικότητας δ) τα δημογραφικά στοιχεία και ε) μια ενότητα όπου οι συμμετέχοντες μπορούν να παραθέσουν σχετικά σχόλια. Το δείγμα της έρευνας αποτελείται από προπτυχιακούς φοιτητές των ανωτέρω Τμημάτων του Παντείου Πανεπιστημίου με ιδιαίτερη έμφαση στο Τμήμα Δημόσιας Διοίκησης όπως φαίνεται στο παρακάτω σχήμα (Σχήμα 1). Στο παρόν άρθρο παρουσιάζονται και αναλύονται οι απαντήσεις των φοιτητών του 2ου και 3ου έτους σπουδών του Τμήματος Δημόσιας Διοίκησης.

Σχήμα 1. Δείγμα έρευνας



5. Αποτελέσματα έρευνας

Η επιχειρηματικότητα ως έννοια είναι γνωστή στην πλειοψηφία των φοιτητών με το 97% να δηλώνει πως γνωρίζει την έννοια (Σχήμα 2). Ενδιαφέρον παρουσιάζουν οι λέξεις-φράσεις που χρησιμοποίησαν προκειμένου να περιγράψουν την επιχειρηματικότητα. Αυτές που συγκέντρωσαν την πλειοψηφία των απαντήσεων ήταν οι εξής (Σχήμα 3):

- Καινοτομία (36 απαντήσεις)
- Δημιουργικότητα (21 απαντήσεις)
- Ανάλυση ρίσκου (13 απαντήσεις)
- Κερδοφορία (11 απαντήσεις)
- Πρωτοβουλία (10 απαντήσεις)
- Γνώση (9 απαντήσεις)
- Συνεργασία (8 απαντήσεις)

Διαπιστώνεται η θετική προδιάθεση και η αισιοδοξία που διακατέχει τους νέους πάνω στην επιχειρηματικότητα ως εναλλακτική απασχόλησης. Παρά τις αντιξοότητες της ελληνικής οικονομίας και το πλήθος των παραγόντων που αναστέλλουν την άνθιση επιχειρηματικής πρωτοβουλίας (Σχήμα 4), το 49% των συμμετεχόντων δηλώνει την προτίμησή του να απασχοληθεί στον ιδιωτικό τομέα, ενώ το 24% επιθυμεί να αναπτύξει μελλοντικά επιχειρηματική δραστηριότητα, ιδίως στον κλάδο του εμπορίου. Παρόλο που το αναμενόμενο για ένα Τμήμα Δημόσιας Διοίκησης είναι η στροφή προς το δημόσιο τομέα, εντούτοις η εναλλακτική αυτή έρχεται τρίτη στις προτιμήσεις των φοιτητών όπως φαίνεται στο Σχήμα 4.

Εξίσου ενδιαφέρουσες ήταν οι απαντήσεις που αφορούν την εικόνα και τη τοποθέτηση των φοιτητών πάνω στο ζήτημα της ηλεκτρονικής ή εξ' αποστάσεως εκπαίδευσης. Η πλειοψηφία, και πιο συγκεκριμένα το 94%, γνωρίζει τον όρο «e-learning» (Σχήμα 5) και τον περιγράφει μέσω μιας πληθώρας λέξεων-φράσεων, με πιο συνήθεις τις εξής:

<https://sites.google.com/site/icqqmeas 2015>

- Εκπαίδευση μέσω Διαδικτύου (29 απαντήσεις)
- Προσιτή εκπαίδευση σε όλους (26 απαντήσεις)
- Διευκόλυνση (12 απαντήσεις)
- Εξοικονόμηση χρόνου/χρήματος (9 απαντήσεις)
- Καινοτομία/ πρόοδος (8 απαντήσεις)

Οι απαντήσεις δείχνουν ότι οι φοιτητές δεν αντιμετωπίζουν αρνητικά το επίπεδο γνώσεων που τους προσφέρει το Πανεπιστήμιό τους και ότι δεν επιθυμούν να το αντικαταστήσουν αλλά να το εμπλουτίσουν, να το εκσυγχρονίσουν με τη χρήση του εργαλείου e-learning ως συμπληρωματικής μεθόδου διδασκαλίας. Αναφορικά με τα αντικείμενα που θεωρούν οι συμμετέχοντες ότι συνθέτουν ένα επιτυχές πρόγραμμα εξ' αποστάσεως εκπαίδευσης, προτάθηκαν τα εξής (κατά φθίνουσα σειρά) όπως φαίνεται και στο Σχήμα 8:

- Marketing (78 απαντήσεις)
- Διοίκηση Προσωπικού (77 απαντήσεις)
- Ψυχολογία (70 απαντήσεις)
- Δημόσιες σχέσεις (61 απαντήσεις)
- Διαπραγματεύσεις (49 απαντήσεις)
- Νέες Τεχνολογίες (46 απαντήσεις)
- Λογιστική/ Χρηματοοικονομική (36 απαντήσεις)
- Πωλήσεις (32 απαντήσεις)
- Νομικά/θεσμικά (31 απαντήσεις)

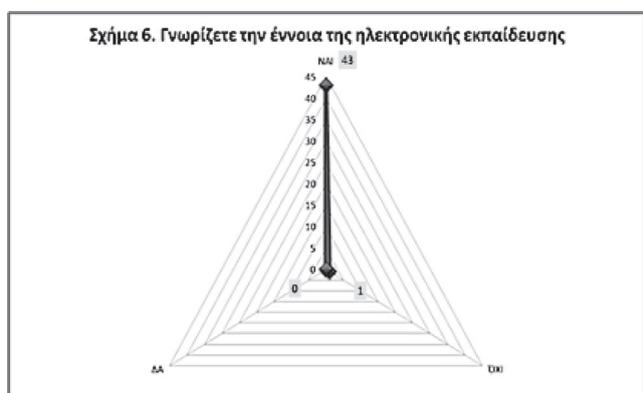
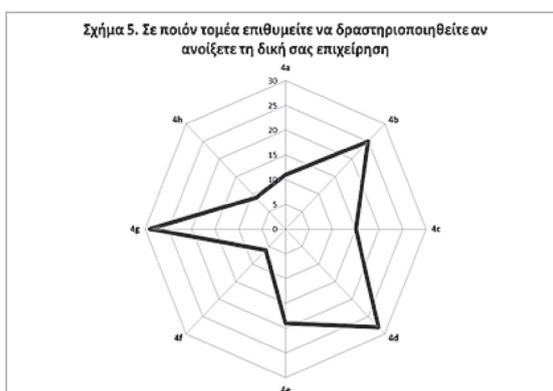
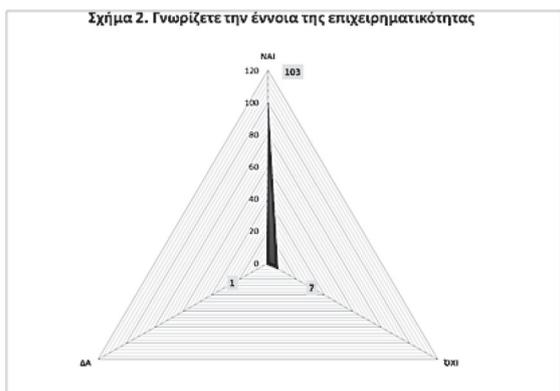
Έμφαση δόθηκε και στο κίνητρο να συμμετάσχουν οι φοιτητές σε ένα πρόγραμμα εξ' αποστάσεως εκπαίδευσης με επίκεντρο την ενίσχυση των επιχειρησιακών δεξιοτήτων (Σχήμα 7). Ανάμεσα στις εναλλακτικές που είχαν να επιλέξουν, η πλειοψηφία των απαντήσεων αντιστοιχούσε στα εξής δύο κίνητρα: την απόκτηση πιστοποιητικού (το 64% δηλώνει ότι η απόκτηση πιστοποιητικού είναι βασικός παράγοντας) και η απόκτηση επιπλέον γνώσεων/δεξιοτήτων (το 49% δήλωσε ότι είναι ο σημαντικότερος παράγοντας). Τα δύο αυτά ποσοστά, αν δούμε το ποτήρι μισογεμάτο, αναδεικνύουν μια αισιόδοξη εικόνα, αυτή της πραγματικής και εσωτερικής ανάγκης για να ενισχύσουν οι φοιτητές τις γνώσεις τους προκειμένου να ανταποκριθούν επιτυχώς στις απαιτήσεις της αγοράς εργασίας, ωστόσο μας υπενθυμίζουν την προαναφερθείσα ασθένεια του διπλώματος που έχει εντυπωθεί εμφανώς στο υποσυνείδητο της ελληνικής κοινωνίας: ένα πιστοποιητικό επιπλέον θα προσδώσει ανταγωνιστικό πλεονέκτημα και θα αυξήσει τις πιθανότητες ένταξης στην αγορά εργασίας.

Οι περισσότεροι από τους ερωτηθέντες δεν έχουν συμμετάσχει στο παρελθόν σε κάποιο πρόγραμμα e-learning κυρίως λόγω του ότι δεν είχαν ενημερωθεί επαρκώς για τα διαθέσιμα προγράμματα (59%), άλλοι γιατί δε διέθεταν τον απαραίτητο χρόνο (14%) αλλά και γιατί δεν τους ενδιέφεραν τα διαθέσιμα προγράμματα (10%). Ένα ποσοστό της τάξης του 11% των φοιτητών δήλωσε ότι δεν το εκφράζει ο συγκεκριμένος τρόπος διδασκαλίας.

Το τρίτο μέρος του ερωτηματολογίου εστίαζε στο τι θεωρούν οι φοιτητές ότι εισπράττουν από τις σπουδές τους στο Πανεπιστήμιο. Παρατηρήθηκε στο σημείο αυτό ότι όσο αυξάνονταν τα έτη φοίτησης, οι συμμετέχοντες δήλωναν πως το πρόγραμμα σπουδών τους δεν τους παρέχει το επιθυμητό επίπεδο γνώσεων πάνω σε εφαρμοσμένα θέματα της αγοράς εργασίας. Συγκεκριμένα, οι φοιτητές του δεύτερου έτους σπουδών δηλώνουν ότι αποκτούν τις γνώσεις πάνω σε πρακτικά ζητήματα της αγοράς εργασίας (52%) ενώ το 48% δηλώνει το αντίθετο. Αντίστοιχα, οι φοιτητές του τέταρτου έτους σπουδών αισθάνονται ότι δεν επιμορφώνονται επαρκώς πάνω σε πρακτικά ζητήματα της αγοράς εργασίας (52%) ενώ το 42% δηλώνει ικανοποιημένο (ένα ποσοστό του 6% δεν απάντησε στη συγκεκριμένη ερώτηση). Οι αποκλίσεις δεν είναι μεγάλες, ωστόσο η πλειοψηφία των συμμετεχόντων συγκλίνει στο ότι η διδασκαλία της επιχειρηματικότητας θα ήταν χρήσιμο να ενσωματωθεί στο πρόγραμμα σπουδών του Τμήματος καθώς βοηθά πέρα των άλλων, στον εντοπισμό του εργασιακού προσανατολισμού αλλά και των μετέπειτα σπουδών (μεταπτυχιακών κατά πλειοψηφία) που πρόκειται να ακολουθήσουν. Καθοριστικής σημασίας είναι η συνεισφορά ανθρώπων από τον κόσμο των επιχειρήσεων ως εισηγητών στο πρόγραμμα, προκειμένου να φέρουν τους συμμετέχοντες ένα βήμα πιο κοντά στις συνθήκες και τις καταστάσεις που επικρατούν σε μια επιχείρηση.

Τέλος, στην ενότητα του ερωτηματολογίου που αντιστοιχούσε στη παροχή σχολίων, οι συμμετέχοντες δηλώνουν μεταξύ άλλων ότι «η εξ' αποστάσεως εκπαίδευση είναι μια χρήσιμη πτυχή των σπουδών που μπορεί να λειτουργήσει θετικά, αρκεί να μην παραγκωνίζει την έλευση των φοιτητών στη σχολή και τη διά ζώσης διδασκαλία». Αναφέρουν επίσης ότι «απαιτείται εκσυγχρονισμός της ύλης των μαθημάτων –σχετικών με την επιχειρηματικότητα- αλλά και γενικότερα με την διοικητική επιστήμη, ώστε να ανταποκρίνονται στην ισχύουσα κατάσταση της οικονομίας-αγοράς αλλά και στη συνεχώς εξελισσόμενη θεωρία του Management». Επιθυμούν άμεση εγκατάσταση λογισμικών e-class και e-learning προκειμένου να αποκτήσουν τη δυνατότητα παρακολούθησης άτομα που διαμένουν στην περιφέρεια αλλά και άτομα που εργάζονται. Συγκεκριμένα, δηλώνουν ότι «το e-learning μπορεί να προσφέρει περαιτέρω γνώσεις και να εμβαθύνει περισσότερο σε συγκεκριμένα γνωστικά αντικείμενα. Δίνει τη

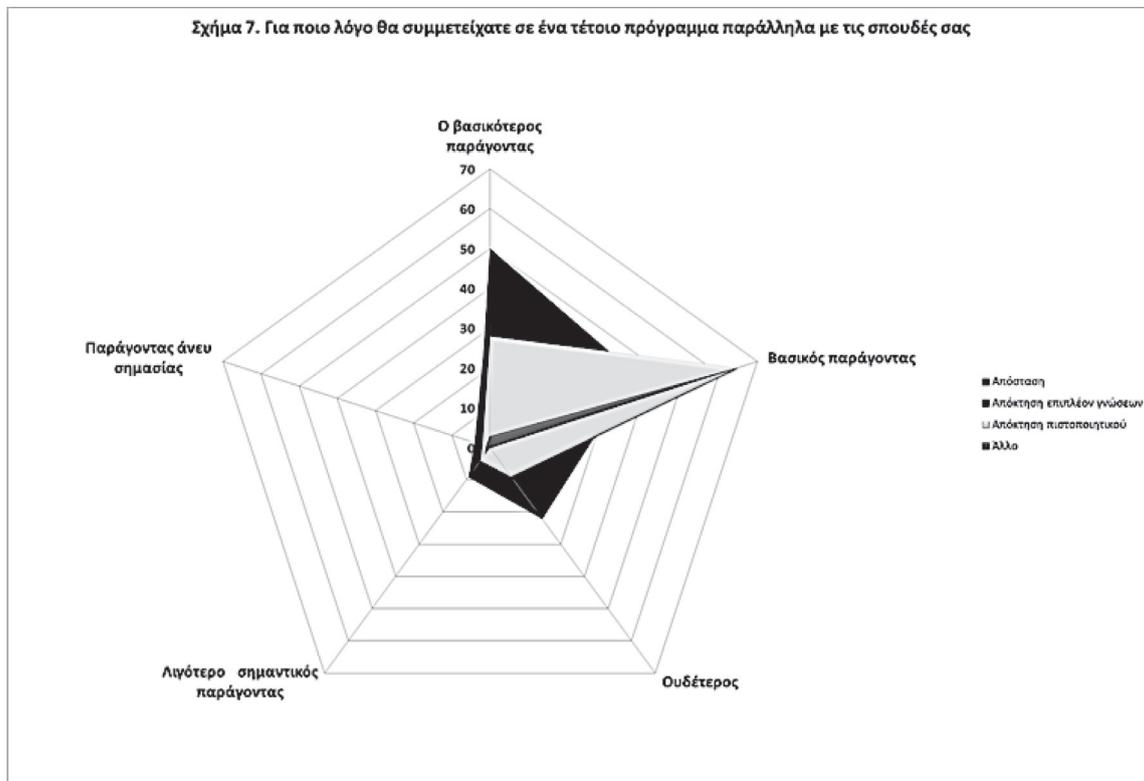
δυνατότητα παρακολούθησης στους εργαζόμενους φοιτητές, οι οποίοι επιθυμούν να προχωρήσουν/ εμβαθύνουν τις γνώσεις τους αλλά η εργασία τους δεν τους το επιτρέπει». Το e-learning κατά τους συμμετέχοντες είναι «ένα σημαντικό βήμα προς την καλύτερη εκπαίδευση όλων, αρκεί να παραμένει χαμηλό σε κόστος ώστε να απευθύνεται ισοτίμα σε όλους».



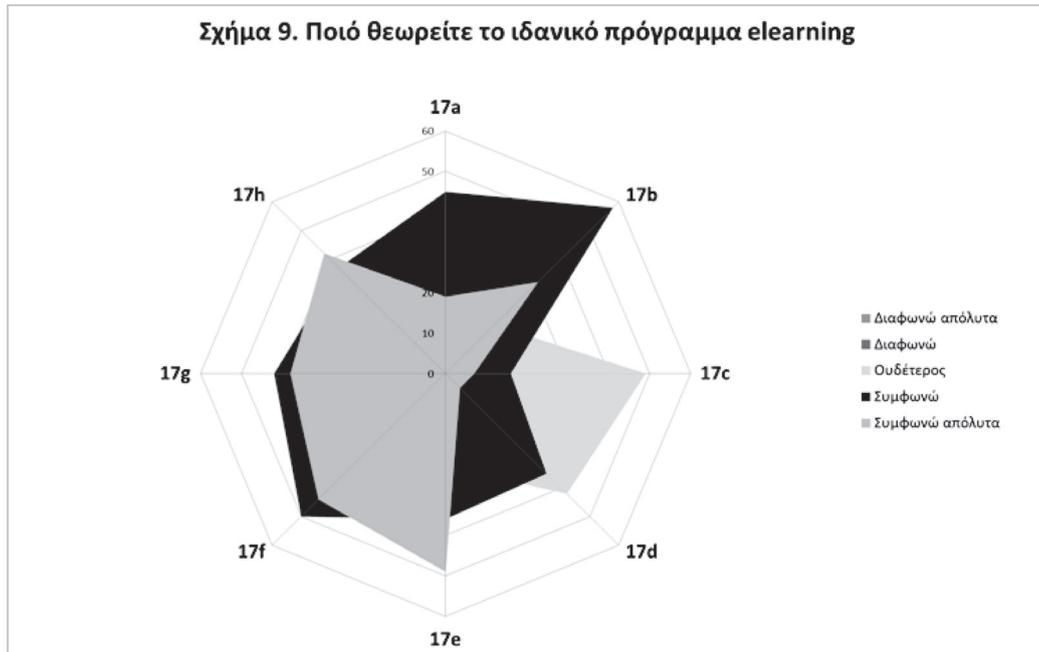
Όπου:
 2a: Έλλειψη κουλτούρας
 2b: Έλλειψη πηγών χρηματοδότησης
 2c: Έλλειψη επαρκούς εκπαίδευσης
 2d: Έλλειψη αυτοπεποίθησης
 2e: Αυξημένος ανταγωνισμός
 2f: Γραφειοκρατία
 2g: Έλλειψη οργανωμένου θεσμικού περιβάλλοντος
 2h: Άλλο/α

Όπου:
 4a: Αγροτικός τομέας – Σύγχρονες μορφές καλλιέργειών
 4b: Τουρισμός
 4c: Ναυτιλία
 4d: Κοινωνική Επιχειρηματικότητα
 4e: Τεχνολογία
 4f: Ενέργεια
 4g: Εμπόριο
 4h: Άλλο/α

<https://sites.google.com/site/icqqmeas 2015>

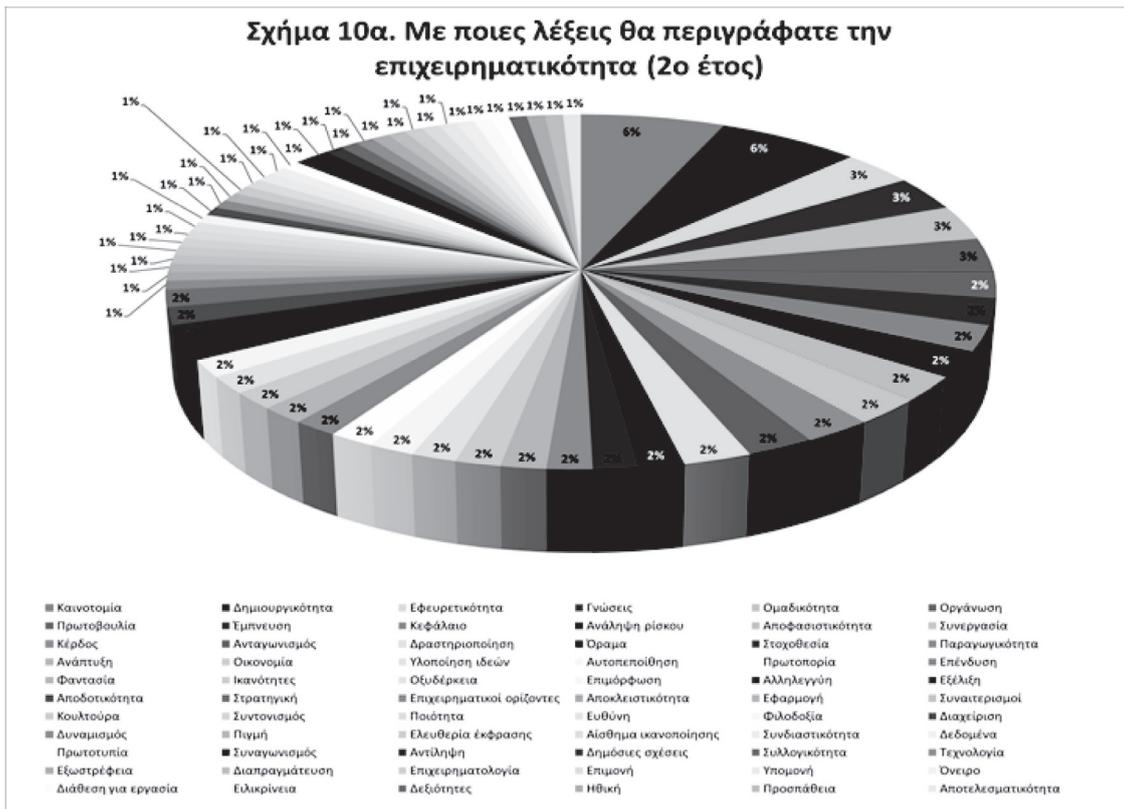


Σχήμα 9. Ποιό θεωρείτε το ιδανικό πρόγραμμα elearning



Όπου:
 17a: Προσφέρει διδασκαλία διαφορετικών αντικειμένων από αυτά που διδάσκονται στην αίθουσα.
 17b: Προσφέρει συμπληρωματική διδασκαλία αντικειμένων που διδάσκονται στην αίθουσα.
 17c: Αποτελείται αποκλειστικά από ακαδημαϊκό προσωπικό.
 17d: Αποτελείται αποκλειστικά από εισηγητές που προέρχονται από την αγορά εργασίας.
 17e: Αποτελείται από ανθρώπους της αγοράς εργασίας και ακαδημαϊκούς.
 17f: Προσφέρει διδασκαλία μιας μεγάλης ποικιλίας από τεχνικές και επιχειρηματικές ικανότητες.
 17g: Προσφέρει τη δυνατότητα επίλυσης πραγματικών προβλημάτων μιας επιχείρησης από τους συμμετέχοντες
 17h: Προσφέρει προσομοίωση της πραγματικής επιχειρησιακής ζωής κάνοντας την εκμάθηση πρωτότυπη και διαδραστική.

Σχήμα 10α. Με ποιες λέξεις θα περιγράφατε την επιχειρηματικότητα (2ο έτος)



θα την ήθελαν οι ίδιοι) μορφής, είτε για άλλους λόγους. Σημαντικό ποσοστό απάντησε ότι δεν εκφράζεται και δεν αυτοπροσδιορίζεται από τον συγκεκριμένο τρόπο διδασκαλίας.

Εν κατακλείδι, οι συμμετέχοντες στην έρευνα δηλώνουν ικανοποιημένοι από το επίπεδο των σπουδών τους, μόνο που θα επιθυμούσαν, προϊόντος του χρόνου, μεγαλύτερη «ενσωμάτωση» θεμάτων που αφορούν την αγορά εργασίας.

Η έρευνα αποδεικνύει το αυτόνοπο. Οι νέοι άνθρωποι αναζητούν την άμεση σύνδεση των πανεπιστημιακών γνώσεων με την πραγματικότητα. Δεν θα μπορούσαν να αποτελέσουν εξαίρεση οι φοιτητές ενός Τμήματος που διακονεί την διοικητική επιστήμη και τη δημόσια διοίκηση. Οι ερευνητές προτείνουν την άμεση εγκατάσταση σχετικής πλατφόρμας (έχουν εκπονηθεί τα σχετικά σχέδια, το κόστος κατασκευής, η δομή λειτουργίας και οι στόχοι της), όπου μέσω αυτής θα δίδεται εμβάθυνση στα προαναφερθέντα γνωστικά αντικείμενα, την ενημέρωση της ακαδημαϊκής κοινότητας περί του χειρίματος, την επέκταση της δράσης ακόμη και σε Σχολές-Τμήματα, όπως φιλοσοφικές, παιδαγωγικές κ.ά., την συνεισφορά έμπειρων και αναγνωρισμένων στελεχών του δημόσιου και ιδιωτικού τομέα, ώστε οι συμμετέχοντες να γίνουν κοινωνοί των νέων συνθηκών της αγοράς εργασίας, την υιοθέτηση και ανάδειξη καινοτόμων ιδεών και προτάσεων που ενδέχεται να προκύψουν από τα συγκεκριμένα προγράμματα και την συνεχή αναπροσαρμογή των προγραμμάτων ηλεκτρονικής εκπαίδευσης, ώστε να αντικατοπτρίζουν τις σύγχρονες τάσεις του «big picture».

Βιβλιογραφία

- Acosta, M., Coronado, D. & Flores, E. (2011). University spillovers and new business location in high-technology sectors: Spanish evidence. *Small Business Economics*, Vol.36, No.3, pp.365-376.
- Angrist, Joshua, Eric Bettinger, Erik Bloom, Elizabeth King, and Michael Kremer. (2001). Vouchers for Private Schooling in Colombia: Evidence from a Randomized Natural Experiment. *American Economic Review*, Vol.92, No.5, pp.1535-59.
- Audretsch, D.B. & Thurik, A.R. (2004). A model of the entrepreneurial economy. *International Journal of Entrepreneurship Education*, Vol.2, No.2, pp.143-166.
- Bowles, S. (1969). *Planning Educational Systems for Economic Growth*. Harvard University Press.
- Craincross, S. and Mannion, M. (2001). Interactive Multimedia and Learning: Realizing the Benefits, *Innovations in Education and Teaching International*, Vol.38, No.2, pp.156-164.
- Dore, R. (1985). The Diploma Disease Revisited. *Bulletin of the Institute of Development Studies, University of Sussex*, Vol.11, No.2, pp.55-61.
- Hockemeyer, C., Conlan, O., Wade, V. (2003). Applying Competence Prerequisite Structures for eLearning and Skill Management. *Journal of Universal Computer Science*, Vol.9, No.12, pp.1428-1436.
- Hutchings, G.A., Hall, W. and Colbourn, C.J. (1993). Patterns of Students' Interactions With a Hypermedia System. *Interacting With Computers*, Vol.5, No.3, pp. 295-313.
- Marengo, A., Marengo, V. (2005). Measuring the Economic Benefits of E-Learning: A Proposal for a New Index for Academic Environments. *Journal of Information Technology Education*, Vol.4, pp.330-346.
- Oosterbeek, H., Praag, M., Ijsselstein, A. (2010). The impact of entrepreneurship education on entrepreneurship skills and motivation. *European Economic Review*, Vol.54, pp. 442-454.
- Salmon, G.(2005). Flying not flapping: a strategic framework for e-learning and pedagogical innovation in higher education institutions. *ALT-J, Research in Learning Technology*, Vol.13, No.3, pp. 201-218.
- Schneller, C. & Golden, S (Eds)(2010). *The impact of the Financial Crisis to Higher Education, the 1st Asia-Europe Education Workshop, (proceedings)*.
- Snee, D.R.(2011), *Cooperation Between University and Industry Statistics*, available: www.jstor.org/action/ShowArticle/Image
- Scott, B. (2001). *Conversation Theory: A Constructivist Dialogical Approach to Educational Technology*. *Cybernetics and Human Knowing*, Vol.8, No.4, pp.1-25.
- Stamelos, G.,(2010), *University and Policies of Higher Education*, Journal (to VIMA)
- World Bank (2007). *Toward High-quality Education in Peru. Standards, Accountability and Capacity Building*. Washington DC.
- World Bank 2008a. *Aid Effectiveness in Education: Setting priorities in a time of crisis*. Prepared for the Eight Annual High-Level Group Meeting on EFA 16-18 December 2008 in Oslo, Norway. Washington DC.
- Wright, M., Clarysse, B., Mustar, P., Lockett, A. (2007). *Academic entrepreneurship in Europe*. Edward Elgar, Cheltenham UK
- Ίδρυμα Λαμπράκη (2013), «Εκπαίδευση και Καινοτομία στον 21ο αιώνα. Ανοίγοντας ορίζοντες στην αγορά εργασίας, Επισκόπηση του Συνεδρίου και Αποτίμηση της Συμβολής του στο Διάλογο για την Καινοτομία στην Ελληνική Εκπαίδευση
- Ψαχαρόπουλος, Γ. (1999). *Οικονομική της εκπαίδευσης*, εκδ. Παπαζήση

USING LOCATION BASED MARKETING TECHNOLOGIES FOR BETTER BUSINESS ANALYTICS

Dr Faidon Komisopoulos^{1*}, Mr. Spyridon Kourkoulos²

¹Dept. of Business Administration, Technological Educational Institution of Athens, fedonk@hotmail.com

²HR & Marketing Professional, skourkoulos@gmail.com

ABSTRACT

Nowadays, finding effective ways to reach consumers has become the biggest challenge that marketers face. Location has become the new currency of marketing due to increased mobility of consumers in developed countries. Companies are interested in acquiring mobile, location and social information as its quantity is increasing exponentially and tracks consumers' buying patterns which is very important for decision making from the marketing perspective. Therefore, it becomes a necessity for firms that do not have the ability to gather data, invest on information technologies based on data-driven decision making to gather and analyze incoming information to be more competitive and gain market value. The scope of this paper is to present major ways of tracking customers, mainly in big retail places, like malls, collecting data on their moves and behaviors and using those analytics for better sales performance.

Keywords: Location Based Marketing, Data Driven Decision Making, Business Analytics, Big Data, Retail, In Store Marketing, Anonymous WiFi Tracking

1. Introduction

The macro environment that firms operate has dramatically changed the last few years especially due to the advent of the economic crisis. The changes that have occurred due to technological advances and globalization had significant influences to both enterprises and consumers. These changes have led to borderless, connected knowledge economy, fragmenting and frictionless markets on the one hand and better informed and more demanding customers on the other. New technologies allow firms to get a wealth of information about current and potential customers: demographics, purchase history data, customers' lifestyles, values, needs, motivations and priorities. Therefore, it becomes a necessity for firms that do not have the ability to gather data, invest on information technologies based on (DDD), data-driven decision making to gather and analyze incoming information to be more competitive and gain market value.

2. Data driven decision making

Data-driven decision making (DDD) is the practice of basing decisions on the analysis of data rather than solely on intuition. An apt example would include a marketer who could select advertisements based exclusively on his experience in the field and his intuition. Also, he could ground his selection on the analysis of data concerning the consumers' reaction to different advertisements, or even use a combination of these approaches. It is worth mentioning that DDD is not an all-or nothing practice enabling various companies to ply DDD to greater or lesser degrees, thus creating several benefits. Recently there has been conducted a study on the ways DDD enhances a company's performance by economist Erik Brynjolfsson and his colleagues from MIT and Penn's Wharton School (Brynjolfsson E., Hitt L.M., and Kim H.H. 2011). Enterprises have been rated as to the extent they use data to decide for the firm according to a measure of DDD. The result depicts statistically clearly the fact that the more data-driven a firm is, the more productive it is. Nevertheless, the differences are not negligible, as one standard deviation higher on the DDD scale is related with a 4-6% increase in productivity.

Data science is set of elementary principles and tools that support and guide the extraction of information and knowledge from data, structured, unstructured or semi structured. Very close to that is the "data mining" meaning.

Targeted marketing, online advertising, and recommendations for cross-selling are based on the above mentioned meanings and its tools. Data science is also applied for general client relationship management to research client behavior so as to manage attrition and maximize expected client worth. Big retailers from Wal-Mart to Amazon apply information science throughout their businesses, from promotion to supply-chain management. Nevertheless, data science involves far more than simply data-mining algorithms.

Data science involves principles, processes, and techniques for understanding related or unrelated variables via the (automated) analysis of information for better decision making.

What's in there for the client

Organizations exploit the potential of computer science either to understand decisions taken by individuals outside of their organization (customers, competitors), or to facilitate decisions within their organizations:

- Anticipating decisions: Artificial intelligence that predicts human decision is analyzing patterns in outcome information, the actual decision made under certain circumstances. By analyzing massive volumes of information on human behavior, patterns are unveiled, permitting these systems to predict behavior based upon them.
- Facilitating decisions: by understanding the linear or non linear reasoning of the human mind, code will predict the information a user desires and supply relevant data and intelligence even before a user has realized this information would be available in helpful.
- Increased revenue – As internet outlets manage to guide their guests, through their offerings and supply suggestions that higher suit their visitors' preferences, they're ready to build additional sales and increase their revenue.
- Price reductions: Organizations that improve the potency of their operations (due to the use of business intelligence), will be able to offer cheaper products, thanks to cost cutting techniques supported by AI.
- Client satisfaction: quicker response and delivery times, fewer redundancies and flaws, tailored approach will innovation management techniques, such as CRM software, greatly enhance a shoppers experience once interacting with an organization and may generate customer loyalty
- Increased productivity: Business solutions that use AI are ready to make decisions in less time, make a cost estimation of applied strategies faster and may increase the extent of their proactivity.

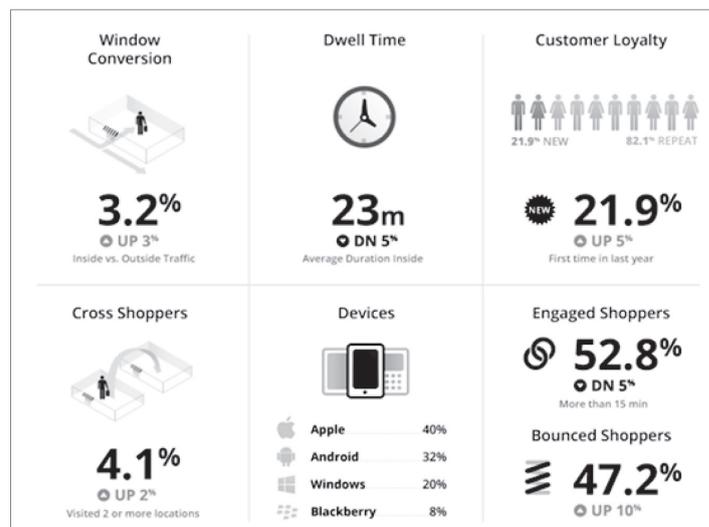
What kind of data can be gathered and how

In the market many firms especially in the USA, Canada and Asia have launched solutions that provide analytics for customer behavior. Data provided by such systems cover a range of areas such as

- Reveal walking paths, guest behavior, preferences and footfall analytics
- Identify new guests, frequent/loyal customers and dwell behavior
- Benchmark performance across regional shopping centers portfolio
- Identify under and over performing spaces
- Shopping paths at shopping stores within malls
- Monitor sales as well as performance of ad campaigns and marketing initiatives
- Insights across all shopping center spaces

Usually these solutions do not require the customer to download an application or to check in, however it is necessary customers to enable wifi at the devices. Consumer privacy was amongst the major concerns that customers arise: all firms that have launched Mobile Location Analytics claim that protecting customers' privacy is of utmost importance. Besides, all firms offer fully anonymity to consumers that enter a retail outlet.

Figure 1. Aislelabs' Flow system actionable insights across stores



When someone comes in a shop (or even passes by) with their mobile phones' Wi-Fi capability turned on, the smart-phone continuously transmits hello packets so that anybody can detect that device when it comes in the shops network. It does not have to be connected, the unique MAC address of the smart phone is already transmitted with the "hello" packet, so the shop can take advantage of the "anonymous Wi-Fi tracking" and realize for example how many times the specific Smartphone (and its owner) have been around, for how much time etc.

The same data can be represented on the stores map, in order to help retailers rearrange their shop accordingly.

By adding many points (network connectivity devices such as more Wi-Fi's and Beacons) we can have better proximity and the information required to know how many of the smart phone owners entered the shops door instead of just standing over the shop's front, and on which sections exactly did the shoppers spend their time.

On the other hand, if the Smartphone accepts the connection with the stores network, an application can be downloaded and installed on the device, so specific offers. The store management can run campaigns and get more detailed analytics.

A shops or a malls management can have all available data concerning daily activity of the customers, manage campaigns with advanced campaign management panel and decide whether launching new promotional activities.

Figure 2. On demand conversion funnels

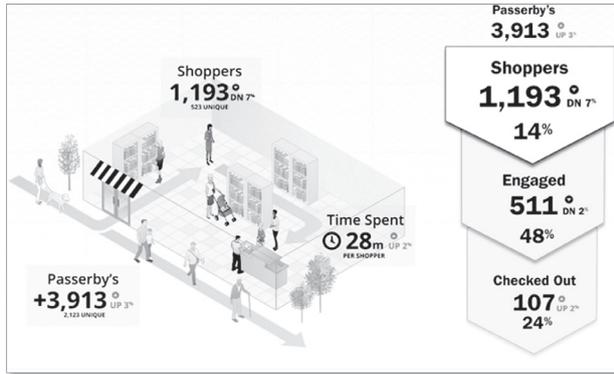


Figure 3. Flows' Heat map and Top paths screenshot

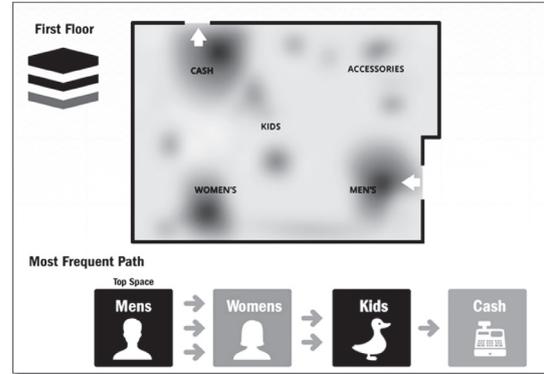


Figure 4. Spaces and drill down options

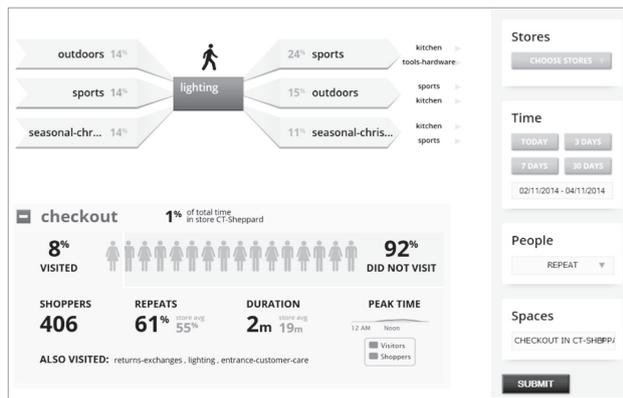
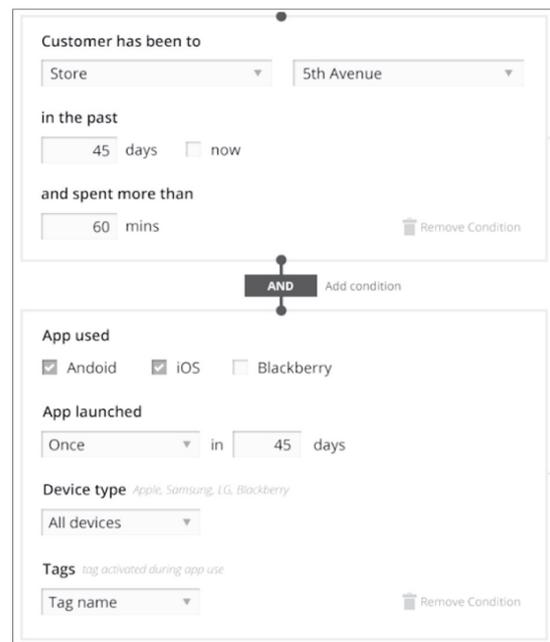


Figure 5. Aislelabs' engage feature to create segments by visits or by usage



All kind of comparisons (ex location, impressions, loyalty) provide rich insight into customer behavior as it relates to the stores business. Understanding how (loyal or not) customers shop, marketers can improve their strategy.

Once the shopper has reached the store area, there are many opportunities for engagement as shoppers can scan barcodes or QR codes, search product information or request personal shopping help. As after sales opportunity, the management can promote surveys or encourage a future visit.

3. Conclusion

As information storage, processes, methodologies and philosophy become more and more refined, available and cheap with techniques as "Software as a Service" etc, organizations around the world use, create and share large data repositories every day. Scientists estimate that the output and productivity of companies that adopt data-driven methodologies have a better return on investment (ROI) on their investments'.

These companies additionally perform higher in terms of employee satisfaction, equity and market share. Growing investments in information management and analytics reflect the increasing strategic and economic role of information.

Figure 6. Managing customers segments and starting campaigns

Segment Name	Total Users	7 Day Activity	Campaigns
Popular Segments			
Passerbys who never visited Passerbys who do not visit	1,309	22.9% used app 11% visited a location 5% connected	3 Start Campaign
Trial Room Visits Visitors who went to trial rooms	13,427	46.5% used app 29% visited a location 19.3% connected	5 Start Campaign
App Power Users Visitors who use app frequently	958	89.7% used app 13% visited a location 75% connected	2 Start Campaign
Regulars Visitors who visit frequently	9,291	46.5% used app 29% visited a location 19.3% connected	13 Start Campaign

Figure 7. Visual dashboard with to-the-minute metrics

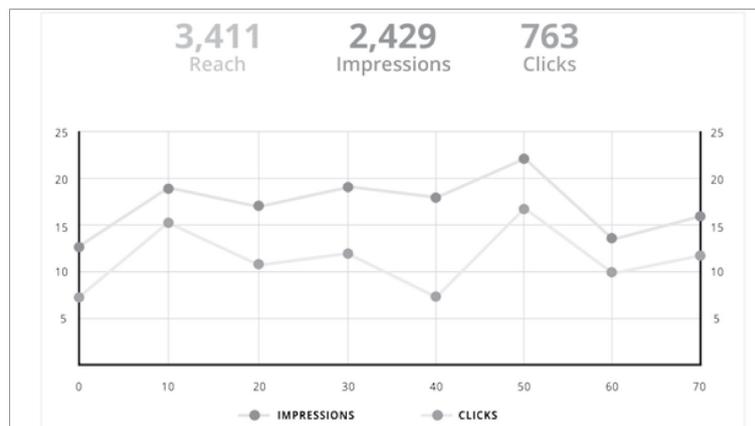
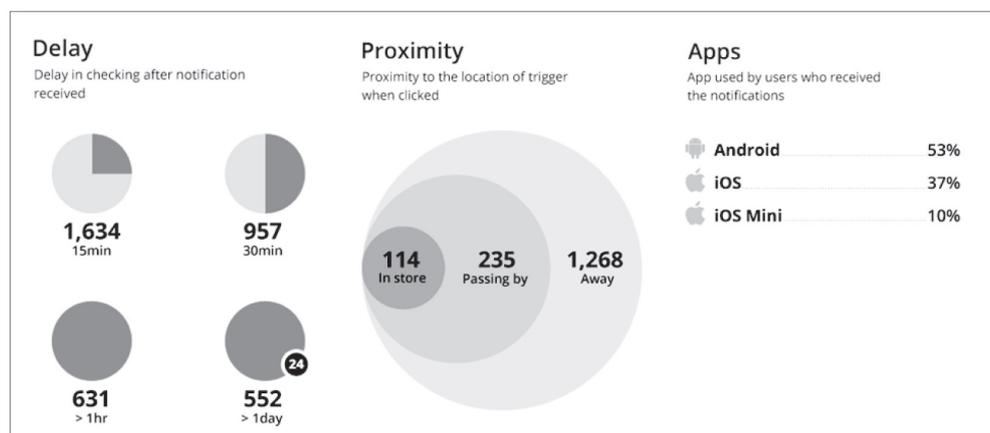


Figure 8. Detailed analytics on performance of campaigns



The amount of information concerned could take issue considerably across sectors, as some are more data-intensive than others.

Overall, the promise of the gathered “big” data lies in one or more of the below innovation-related areas:

- Use of information for the design and production of contemporary product (goods and services).
- Use of information to optimize or automate operations management
- Use of information to boost promoting, selling, cross selling and after selling.

<https://sites.google.com/site/icqqmeas2015>

- Use of information for brand new structure and management approaches (data-driven organizational innovation)
- Use of information to promote research and development.

References

- [1] Bollier, 2010: "The Promise and Peril of Big Data", The Aspen Institute.
- [2] Bughin et al.: "Clouds, big data, and smart assets: Ten tech-enabled business trends to watch", McKinsey Quarterly August 2010
- [3] Business Innovation Observatory, 2013: Kristina Dervojeda, Diederik Verzijl, Fabian Nagtegaal, Mark Lengton & Elco Rouwmaat, PwC Netherlands, (2013): "Big Data - Artificial Intelligence Case study 9", European Commission.
- [4] Cavoukian, 2014 (Information and Privacy Commissioner): Building Privacy into Mobile Location Analytics (MLA) Through Privacy by Design url: <https://www.ipc.on.ca/images/Resources/pbd-mla.pdf> (d/a: April 16th, 2015)
- [5] European Commission, Directorate-general for Enterprise, (2004): "Innovation Management and the Knowledge - Driven Economy", , Brussels-Luxemburg
- [6] Michelson M., Knoblock C., (2008): "Creating Relational Data from Unstructured and Ungrammatical Data Sources", Journal of Artificial Intelligence Research 31 (2008) 543-590
- [7] Michael Minelli, Michele Chambers, Ambiga Dhiraj (2013): "BIG DATA, BIG ANALYTICS - EMERGING BUSINESS INTELLIGENCE AND ANALYTIC TRENDS FOR TODAY'S BUSINESSES", John Wiley & Sons, Inc.
- [8] OECD (2013), "Exploring Data-Driven Innovation as a New Source of Growth: Mapping the Policy Issues Raised by "Big Data"", OECD Digital Economy Papers, No. 222, OECD Publishing.
- [9] Provost F. , Fawcett T., 2013 "DATA SCIENCE AND ITS RELATIONSHIP TO BIG DATA AND DATA-DRIVEN DECISION MAKING", MARY ANN LIEBERT, INC. _ VOL. 1 NO. 1
- [10] RÁBOVÁ I., V. KONEČNÝ, A. MATIÁŠOVÁ, (2005): " Decision making with support of artificial intelligence", Mendel University of Agriculture and Forestry, Brno, Czech Republic
- [11] Russom (2011): "TDWI BEST PRACTICES REPORT - BIG DATA ANALYTICS", TDWI RESEARCH

USING LOCATION BASED MARKETING TECHNOLOGIES FOR BETTER BUSINESS ANALYTICS

Dr Faidon Komisopoulos^{1*}, Mr. Spyridon Kourkoulos²

¹Dept. of Business Administration, Technological Educational Institution of Athens, fedonk@hotmail.com

²HR & Marketing Professional, skourkoulos@gmail.com

ABSTRACT

Nowadays, finding effective ways to reach consumers has become the biggest challenge that marketers face. Location has become the new currency of marketing due to increased mobility of consumers in developed countries. Companies are interested in acquiring mobile, location and social information as its quantity is increasing exponentially and tracks consumers' buying patterns which is very important for decision making from the marketing perspective. Therefore, it becomes a necessity for firms that do not have the ability to gather data, invest on information technologies based on data-driven decision making to gather and analyze incoming information to be more competitive and gain market value. The scope of this paper is to present major ways of tracking customers, mainly in big retail places, like malls, collecting data on their moves and behaviors and using those analytics for better sales performance.

Keywords: Location Based Marketing, Data Driven Decision Making, Business Analytics, Big Data, Retail, In Store Marketing, Anonymous WiFi Tracking

1. Introduction

The macro environment that firms operate has dramatically changed the last few years especially due to the advent of the economic crisis. The changes that have occurred due to technological advances and globalization had significant influences to both enterprises and consumers. These changes have led to borderless, connected knowledge economy, fragmenting and frictionless markets on the one hand and better informed and more demanding customers on the other. New technologies allow firms to get a wealth of information about current and potential customers: demographics, purchase history data, customers' lifestyles, values, needs, motivations and priorities. Therefore, it becomes a necessity for firms that do not have the ability to gather data, invest on information technologies based on (DDD), data-driven decision making to gather and analyze incoming information to be more competitive and gain market value.

2. Data driven decision making

Data-driven decision making (DDD) is the practice of basing decisions on the analysis of data rather than solely on intuition. An apt example would include a marketer who could select advertisements based exclusively on his experience in the field and his intuition. Also, he could ground his selection on the analysis of data concerning the consumers' reaction to different advertisements, or even use a combination of these approaches. It is worth mentioning that DDD is not an all-or nothing practice enabling various companies to ply DDD to greater or lesser degrees, thus creating several benefits. Recently there has been conducted a study on the ways DDD enhances a company's performance by economist Erik Brynjolfsson and his colleagues from MIT and Penn's Wharton School (Brynjolfsson E., Hitt L.M., and Kim H.H. 2011). Enterprises have been rated as to the extent they use data to decide for the firm according to a measure of DDD. The result depicts statistically clearly the fact that the more data-driven a firm is, the more productive it is. Nevertheless, the differences are not negligible, as one standard deviation higher on the DDD scale is related with a 4-6% increase in productivity.

Data science is set of elementary principles and tools that support and guide the extraction of information and knowledge from data, structured, unstructured or semi structured. Very close to that is the "data mining" meaning.

Targeted marketing, online advertising, and recommendations for cross-selling are based on the above mentioned meanings and its tools. Data science is also applied for general client relationship management to research client behavior so as to manage attrition and maximize expected client worth. Big retailers from Wal-Mart to Amazon apply information science throughout their businesses, from promotion to supply-chain management. Nevertheless, data science involves far more than simply data-mining algorithms.

Data science involves principles, processes, and techniques for understanding related or unrelated variables via the (automated) analysis of information for better decision making.

What's in there for the client

Organizations exploit the potential of computer science either to understand decisions taken by individuals outside of their organization (customers, competitors), or to facilitate decisions within their organizations:

- Anticipating decisions: Artificial intelligence that predicts human decision is analyzing patterns in outcome information, the actual decision made under certain circumstances. By analyzing massive volumes of information on human behavior, patterns are unveiled, permitting these systems to predict behavior based upon them.
- Facilitating decisions: by understanding the linear or non linear reasoning of the human mind, code will predict the information a user desires and supply relevant data and intelligence even before a user has realized this information would be available in helpful.
- Increased revenue – As internet outlets manage to guide their guests, through their offerings and supply suggestions that higher suit their visitors' preferences, they're ready to build additional sales and increase their revenue.
- Price reductions: Organizations that improve the potency of their operations (due to the use of business intelligence), will be able to offer cheaper products, thanks to cost cutting techniques supported by AI.
- Client satisfaction: quicker response and delivery times, fewer redundancies and flaws, tailored approach will innovation management techniques, such as CRM software, greatly enhance a shoppers experience once interacting with an organization and may generate customer loyalty
- Increased productivity: Business solutions that use AI are ready to make decisions in less time, make a cost estimation of applied strategies faster and may increase the extent of their proactivity.

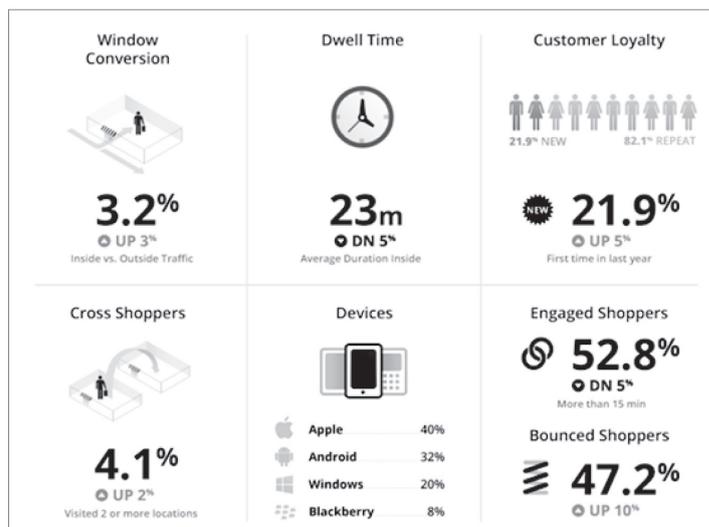
What kind of data can be gathered and how

In the market many firms especially in the USA, Canada and Asia have launched solutions that provide analytics for customer behavior. Data provided by such systems cover a range of areas such as

- Reveal walking paths, guest behavior, preferences and footfall analytics
- Identify new guests, frequent/loyal customers and dwell behavior
- Benchmark performance across regional shopping centers portfolio
- Identify under and over performing spaces
- Shopping paths at shopping stores within malls
- Monitor sales as well as performance of ad campaigns and marketing initiatives
- Insights across all shopping center spaces

Usually these solutions do not require the customer to download an application or to check in, however it is necessary customers to enable wifi at the devices. Consumer privacy was amongst the major concerns that customers arise: all firms that have launched Mobile Location Analytics claim that protecting customers' privacy is of utmost importance. Besides, all firms offer fully anonymity to consumers that enter a retail outlet.

Figure 1. Aislelabs' Flow system actionable insights across stores



When someone comes in a shop (or even passes by) with their mobile phones' Wi-Fi capability turned on, the smart-phone continuously transmits hello packets so that anybody can detect that device when it comes in the shops network. It does not have to be connected, the unique MAC address of the smart phone is already transmitted with the "hello" packet, so the shop can take advantage of the "anonymous Wi-Fi tracking" and realize for example how many times the specific Smartphone (and its owner) have been around, for how much time etc.

The same data can be represented on the stores map, in order to help retailers rearrange their shop accordingly.

By adding many points (network connectivity devices such as more Wi-Fi's and Beacons) we can have better proximity and the information required to know how many of the smart phone owners entered the shops door instead of just standing over the shop's front, and on which sections exactly did the shoppers spend their time.

On the other hand, if the Smartphone accepts the connection with the stores network, an application can be downloaded and installed on the device, so specific offers. The store management can run campaigns and get more detailed analytics.

A shops or a malls management can have all available data concerning daily activity of the customers, manage campaigns with advanced campaign management panel and decide whether launching new promotional activities.

Figure 2. On demand conversion funnels

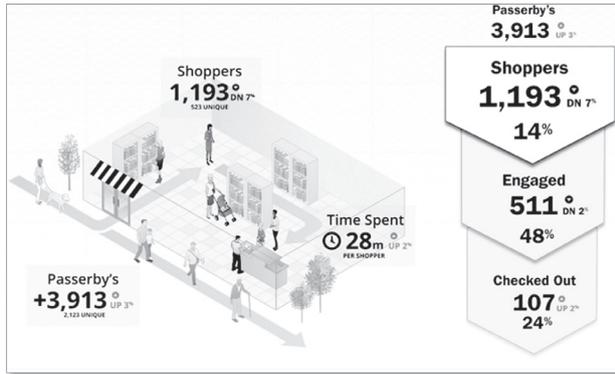


Figure 3. Flows' Heat map and Top paths screenshot

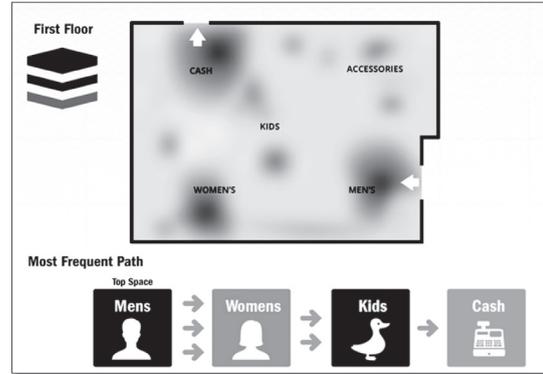


Figure 4. Spaces and drill down options

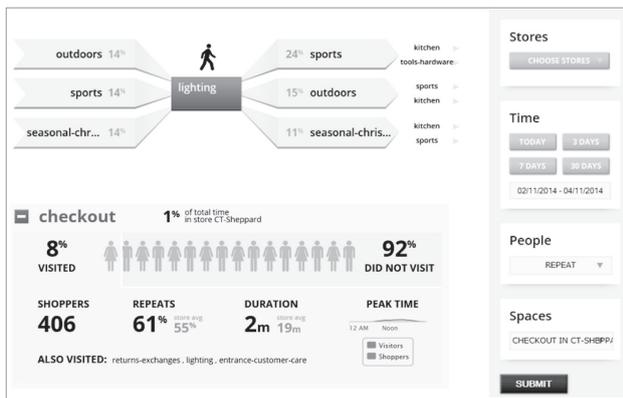
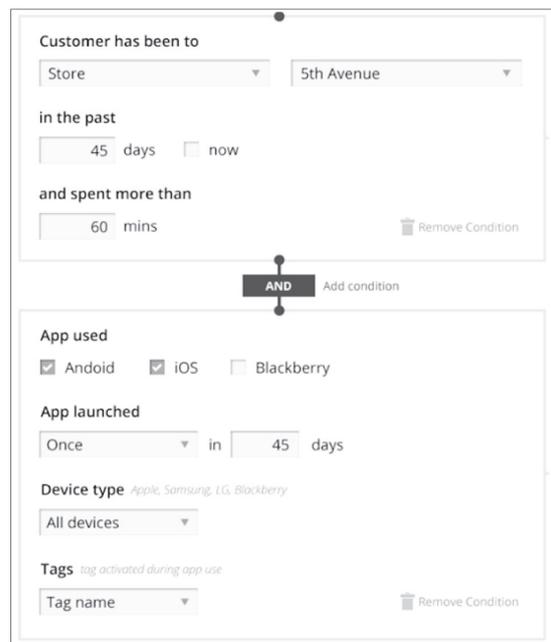


Figure 5. Aislelabs' engage feature to create segments by visits or by usage



All kind of comparisons (ex location, impressions, loyalty) provide rich insight into customer behavior as it relates to the stores business. Understanding how (loyal or not) customers shop, marketers can improve their strategy.

Once the shopper has reached the store area, there are many opportunities for engagement as shoppers can scan barcodes or QR codes, search product information or request personal shopping help. As after sales opportunity, the management can promote surveys or encourage a future visit.

3. Conclusion

As information storage, processes, methodologies and philosophy become more and more refined, available and cheap with techniques as "Software as a Service" etc, organizations around the world use, create and share large data repositories every day. Scientists estimate that the output and productivity of companies that adopt data-driven methodologies have a better return on investment (ROI) on their investments'.

These companies additionally perform higher in terms of employee satisfaction, equity and market share. Growing investments in information management and analytics reflect the increasing strategic and economic role of information.

Figure 6. Managing customers segments and starting campaigns

Segment Name	Total Users	7 Day Activity	Campaigns
Popular Segments			
Passerbys who never visited Passerbys who do not visit	1,309	22.9% used app 11% visited a location 5% connected	3 Start Campaign
Trial Room Visits Visitors who went to trial rooms	13,427	46.5% used app 29% visited a location 19.3% connected	5 Start Campaign
App Power Users Visitors who use app frequently	958	89.7% used app 13% visited a location 75% connected	2 Start Campaign
Regulars Visitors who visit frequently	9,291	46.5% used app 29% visited a location 19.3% connected	13 Start Campaign

Figure 7. Visual dashboard with to-the-minute metrics

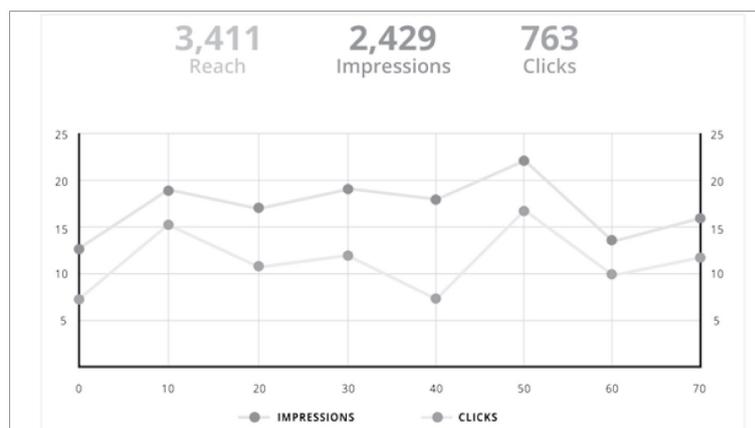
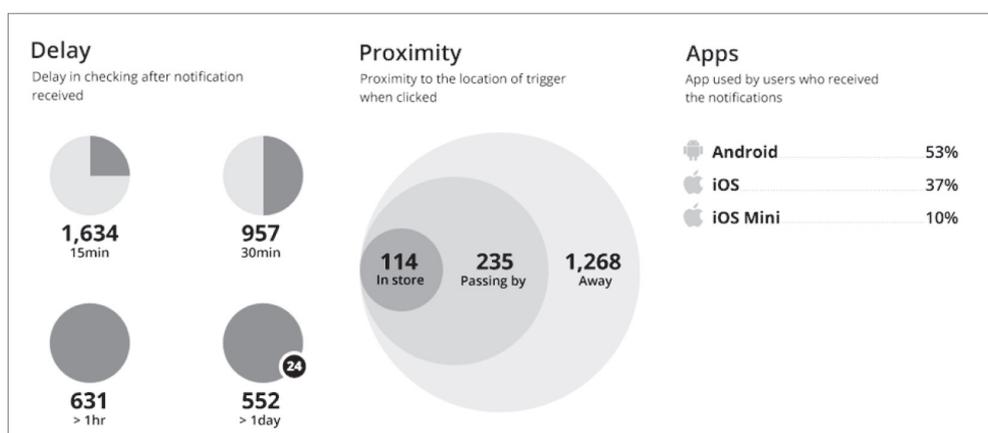


Figure 8. Detailed analytics on performance of campaigns



The amount of information concerned could take issue considerably across sectors, as some are more data-intensive than others.

Overall, the promise of the gathered “big” data lies in one or more of the below innovation-related areas:

- Use of information for the design and production of contemporary product (goods and services).
- Use of information to optimize or automate operations management
- Use of information to boost promoting, selling, cross selling and after selling.

<https://sites.google.com/site/icqqmeas 2015>

- Use of information for brand new structure and management approaches (data-driven organizational innovation)
- Use of information to promote research and development.

References

- [1] Bollier, 2010: "The Promise and Peril of Big Data", The Aspen Institute.
- [2] Bughin et al.: "Clouds, big data, and smart assets: Ten tech-enabled business trends to watch", McKinsey Quarterly August 2010
- [3] Business Innovation Observatory, 2013: Kristina Dervojeda, Diederik Verzijl, Fabian Nagtegaal, Mark Lengton & Elco Rouwmaat, PwC Netherlands, (2013): "Big Data - Artificial Intelligence Case study 9" , European Commission.
- [4] Cavoukian, 2014 (Information and Privacy Commissioner): Building Privacy into Mobile Location Analytics (MLA) Through Privacy by Design url: <https://www.ipc.on.ca/images/Resources/pbd-mla.pdf> (d/a: April 16th, 2015)
- [5] European Commission, Directorate-general for Enterprise, (2004): "Innovation Management and the Knowledge - Driven Economy", , Brussels-Luxemburg
- [6] Michelson M., Knoblock C., (2008): "Creating Relational Data from Unstructured and Ungrammatical Data Sources", Journal of Artificial Intelligence Research 31 (2008) 543-590
- [7] Michael Minelli, Michele Chambers, Ambiga Dhiraj (2013): "BIG DATA, BIG ANALYTICS - EMERGING BUSINESS INTELLIGENCE AND ANALYTIC TRENDS FOR TODAY'S BUSINESSES", John Wiley & Sons, Inc.
- [8] OECD (2013), "Exploring Data-Driven Innovation as a New Source of Growth: Mapping the Policy Issues Raised by "Big Data"", OECD Digital Economy Papers, No. 222, OECD Publishing.
- [9] Provost F. , Fawcett T., 2013 "DATA SCIENCE AND ITS RELATIONSHIP TO BIG DATA AND DATA-DRIVEN DECISION MAKING", MARY ANN LIEBERT, INC. _ VOL. 1 NO. 1
- [10] RÁBOVÁ I., V. KONEČNÝ, A. MATIÁŠOVÁ, (2005): " Decision making with support of artificial intelligence", Mendel University of Agriculture and Forestry, Brno, Czech Republic
- [11] Russom (2011): "TDWI BEST PRACTICES REPORT - BIG DATA ANALYTICS", TDWI RESEARCH

CYCLICALITY AND DETECTION OF TRADE CONVERGENCE BETWEEN FREE TRADE AGREEMENT MEMBER COUNTRIES

Konstantinos Konstantaras, Dionysis Philippas (Ass. Professor, ESSCA, Paris, France)

ABSTRACT

Proposing a new econometric procedure based on Eubank and Speckman's (Biometrika, 1990) polynomial-trigonometric regression, we test for long run convergence between trade flows in countries belonging to regional trading blocks, factoring seasonality and long term cyclical trends. Results indicate substantial cyclicity patterns missing in the existing procedures, rendering long run convergence questionable. Overall, trade block members do exhibit trade flow convergence, albeit only for specific periods. The establishment of Free Trade Areas (FTA) does not necessarily facilitate cross border trade convergence in several geographical areas, including the Mediterranean.

OCCURRENT VS CONTINUANT BUSINESS ENTERPRISE: AN ONTOLOGICAL APPROACH

Ioannis Kougias^{1*}, Lambrini Seremeti², Dimitris Kalogeras³

¹Computer and Informatics Engineering Department Technological Educational Institute of Western Greece, Greece

²Faculty of Sciences and Technology Hellenic Open University, Greece

³Secondary School Counselor of Eastern Greece, Greece

*kougias@teimes.gr

ABSTRACT

Even though business is defined as being an organization where goods and services are exchanged for making profit, there is some confusion concerning its conceptualization, for it presupposes the formulation of an abstract and simplified view of what it really means. Explicitly specifying concepts that are presumed to be of interest for some particular purpose and the relationships between them, facilitates knowledge sharing and reuse. The crucial point of this work is to explicitly and formally represent all the dimensions of a business by using the upper level ontology BFO (Basic Formal Ontology), which is widely accepted and is used as a valuable reference for many scientific fields. Numerous research groups are now utilizing BFO to assist in the organization and integration of information. In this perspective, we intend to develop an ontological framework, which will categorize business enterprises as occurrents or continuants, according to their plans, models and strategies.

Keywords: business, conceptualization, ontologies, occurrent, continuant.

JEL Classification: A12, L86

1. Introduction

Business conceptualization, on the grounds of the emerging field of Enterprise Engineering, provides a means for a shared understanding among the stakeholders with different interpretation of its meaning [3].

Traditionally, the term ontology has been defined as the philosophical study of what things exist, but in recent years, it is used as a computational artifact in any computer-based application, where knowledge representation and management are required [6], [9], [1]. In that sense, it has the meaning of a standardized terminological framework in terms of which the information is organized.

Our focus on the ontological modeling of a business emerges from the need to support reasoning in nowadays industrial environments, where information systems play a more active role in the management and operation of an enterprise [5]. Thus, there is a need for a shared semantic agreement on business terms between human and computer agents.

A business conceptualization can provide the common understanding of the organization and the operation of the business to all stakeholders, such as managers, designers, employers, employees and customers [2], [4]. Thus, business process re-design, intra- and inter- business collaboration, interoperability of information systems used, human resources and functions management will be facilitated.

This paper aims to conceptualize business either as an occurrent, that is, an entity that happens, unfolds or develops in time, or as a continuant, that is, an entity that endures through time while maintaining its identity, in order to help understand, describe and predict qualities, dispositions, roles and functions that inhere in or are born by diverse entrepreneurship environments. This important distinction provides essential dimensions that help an innovator or potential entrepreneur to make the right choices for a successful business model and strategy. More precisely, based on an ontological framework incorporating dimensions that deal with both static/spatial and dynamic/temporal features of reality [7], we propose to formalize each business using an OWL web ontology, which facilitates data integration as well as the development of e-business applications [8].

This entire paper, apart from the introductory section 1, is organized as follows: in section 2, ontologies and their various uses are briefly presented, in section 3, related works on the ontological modeling concerning enterprises are described, in section 4, the notion of BFO (Basic Formal Ontology) [10] and its use in domain ontology engineering, by making the basic distinction between the two kinds of entities, continuants or occurrents is given. In section 5, applications of the notions continuant or occurrent on business enterprises, are shown and, finally, section 6 consists of the concluding remarks of the paper.

2. Ontologies

The word ontology first appeared in Aristotle's philosophical essays, where it was used in order to describe the nature and organization of being. It has various definitions in various texts, domains and applications. In Philosophy and Linguistics, ontology is defined as "the study of existence", "a theory of what there is in the world", or "a taxonomy of the world concepts" [9]. In Information Technology and Artificial Intelligence, the most popular definition of the term ontology originates from Gruber [6]: an ontology is an explicit, formal specification of a shared conceptualization. A conceptualization being a simplified, abstract way of perceiving a segment of the world (a piece of reality), for which we agree to recognize the existence of a set of objects and their interrelations, as well as the terms we use to refer to them and their agreed meanings and properties. It is formal and explicit, that is, it is represented using a formal language i.e. a language with a machine-understandable semantics and it uses types of primitives (concepts, axioms) which are explicitly defined. It is shared, that is, it mirrors a common understanding of the modeled domain, being the result of a consensus achieved within a (potential) community of ontology users.

There are many other definitions and descriptions that expound the value of ontology development and use. In practice, ontologies consist of: (a) classes (anything that can be said about something. They represent the entities of a domain), (b) instances (concrete elements of a certain class), relations (interactions between classes), functions (relations, where an element is uniquely defined by n other elements), and axioms (used to model sentences. They represent facts that are always true in the topic area of the ontology) [12].

In general, the role of an ontology is to support knowledge sharing and reuse within and among groups of agents (people, software programs, or both). In their computational form, ontologies often comprise definitions of terms organized in a hierarchy lattice, along with a set of relationships that hold between these definitions. These constructs collectively impose a structure on the domain being represented and constrain the possible interpretations of terms. Thus, ideally, an ontology capture a shared understanding of a domain of interest and provide a formal and machine manipulable model of the domain.

The more common reasons for developing ontologies, are in order to: Share common understanding of the structure of information among people or software agents; Enable reuse of domain knowledge; Make domain assumptions explicit; Separate domain knowledge from the operational knowledge; Analyze domain knowledge; Enhance decision support systems; Provide a basis for more adaptable systems; Improve model design and adaptability; Enable integration among systems and data through semantic interoperability [13], [8]. Depending on the intended use, ontologies are engineered in order to represent aspects of reality for a particular purpose.

Ontologies may exist at many levels of abstraction and they can be grouped into three broad categories: upper level, mid-level and domain ontologies. The most rigorous and reusable ones are the upper level ontologies. They provide general concepts which are common to all domains and they also can provide a common ontological foundation for mid-level and domain ontologies. Basic Formal Ontology (BFO), Suggested Upper Merged Ontology (SUMO) and Descriptive Ontology for Linguistic and Cognitive Engineering (DOLCE) are some prominent examples of upper level ontologies [7].

3. Related work on ontological modeling of enterprise

Within the last few years, many researchers focused on the development of conceptual models named ontologies for providing a formal and explicit representation of business knowledge. These domain ontologies mainly capture in a machine-readable manner the organization-related information, such as processes that must be carried out within a business, actors involved, permitted functionality of a business, dependency with other social activities, means that are needed in order for a business to succeed, etc.

One of the most well known initiatives was the development of the TOVE Common Sense Model of Enterprise [5]. The proposed ontology has been viewing organizations as composed of agents playing roles in which they are acting to achieve specific goals according to various constraints imposed by a specific organization policy. The main drawback of adopting this ontology in applications or real life enterprise environments is the level of granularity in modeling the specific domain.

The REA enterprise ontology was another business domain ontology which was based on the Resources/Events/Agents model. Although the initial design of this ontology aimed at formally represent enterprise as a whole, at last it has been focused only on accounting information [2]. It is not widely used for enterprise applications due to its lack of clarity and inconsistency.

The 3-value ontology has been created in order to explain the basic concepts used to represent e-commerce ideas [1]. It mainly describes economic exchange among partners, as well as other organizational aspects, such as control, strategy and provided services.

The enterprise ontology proposed in [3] is defined as an understanding of an enterprise operation, which is considered completely independent of the realization of the specific enterprise. A peculiarity of this proposal is that the notion of business is defined conjunctively from the notion of enterprise as the function perspective on the enterprise.

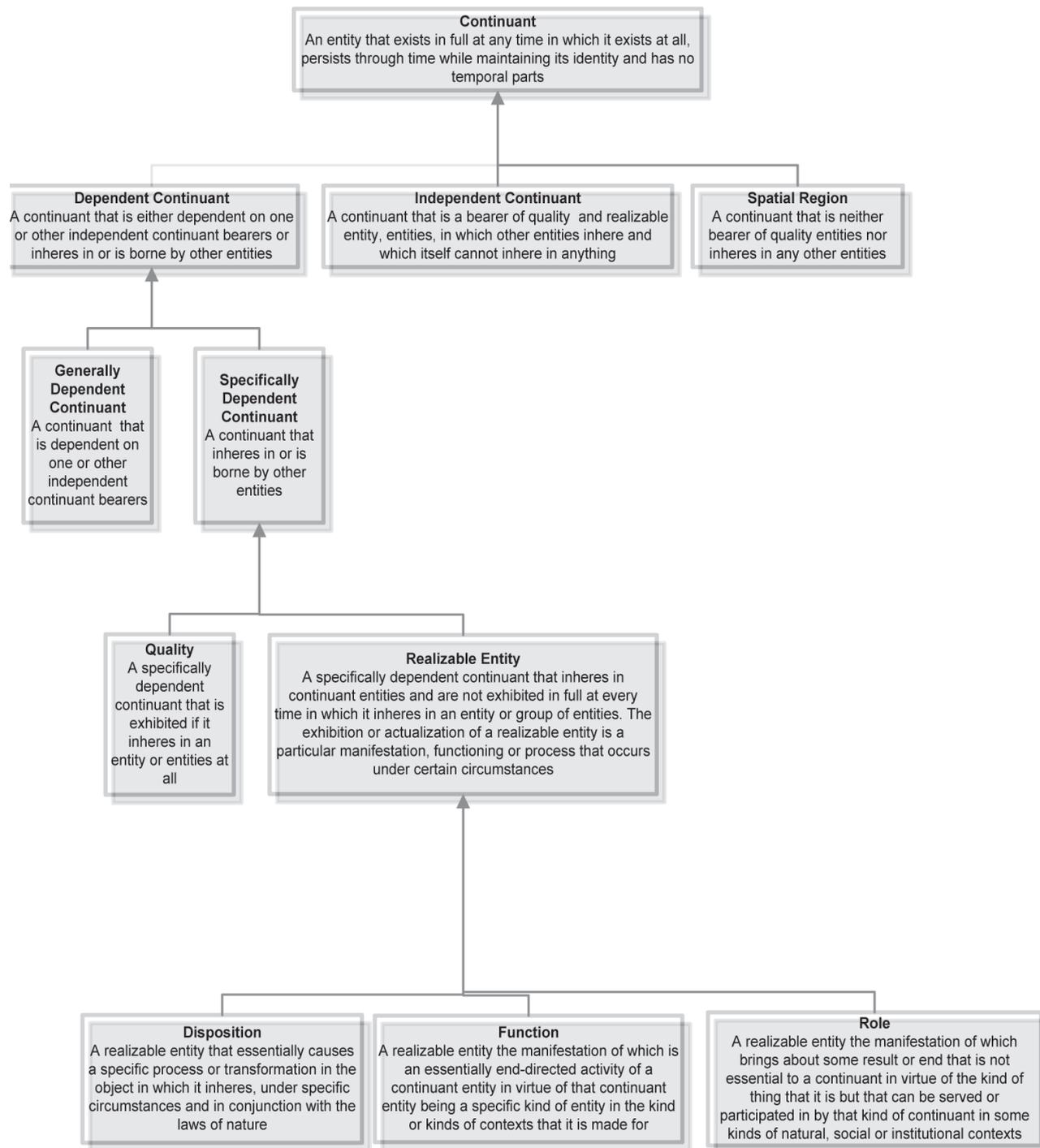
In [4], a set of organizational ontologies used in semantic representation of all the phases of business process management has been proposed. These ontologies provide a basic vocabulary and structure for describing hierarchy of a company, roles in the organization, typical units that may be found in a company, hierarchy of different functions that may be carried out within the company, resources spent when carrying out certain processes and hierarchy of business goals.

Although significant effort was already committed to the creation of business ontologies describing the static and dynamic aspects of a business structure and operation, there is no commonly accepted model that can be reused in any enterprise environment. The goal of this paper is to categorize the notion of business as occurrent or continuant, according to definitions provided by the widely accepted upper level Basic Formal Ontology.

4. Basic Formal Ontology

The Basic Formal Ontology (BFO) is a formal upper level ontology that is widely used in domain ontology engineering, thus reducing possible errors and inconsistencies during the conceptualization of the domain. It recognizes a basic distinction between two kinds of entities: substantial entities or continuants and processual entities or occurrents. Continuants represent entities that endure through time, while maintaining their identity, whereas occurrents represent entities that happen, unfold and develop in time. Both entities are extended in space and time and their distinction allows classifying real world entities, such as objects, processes, events and states.

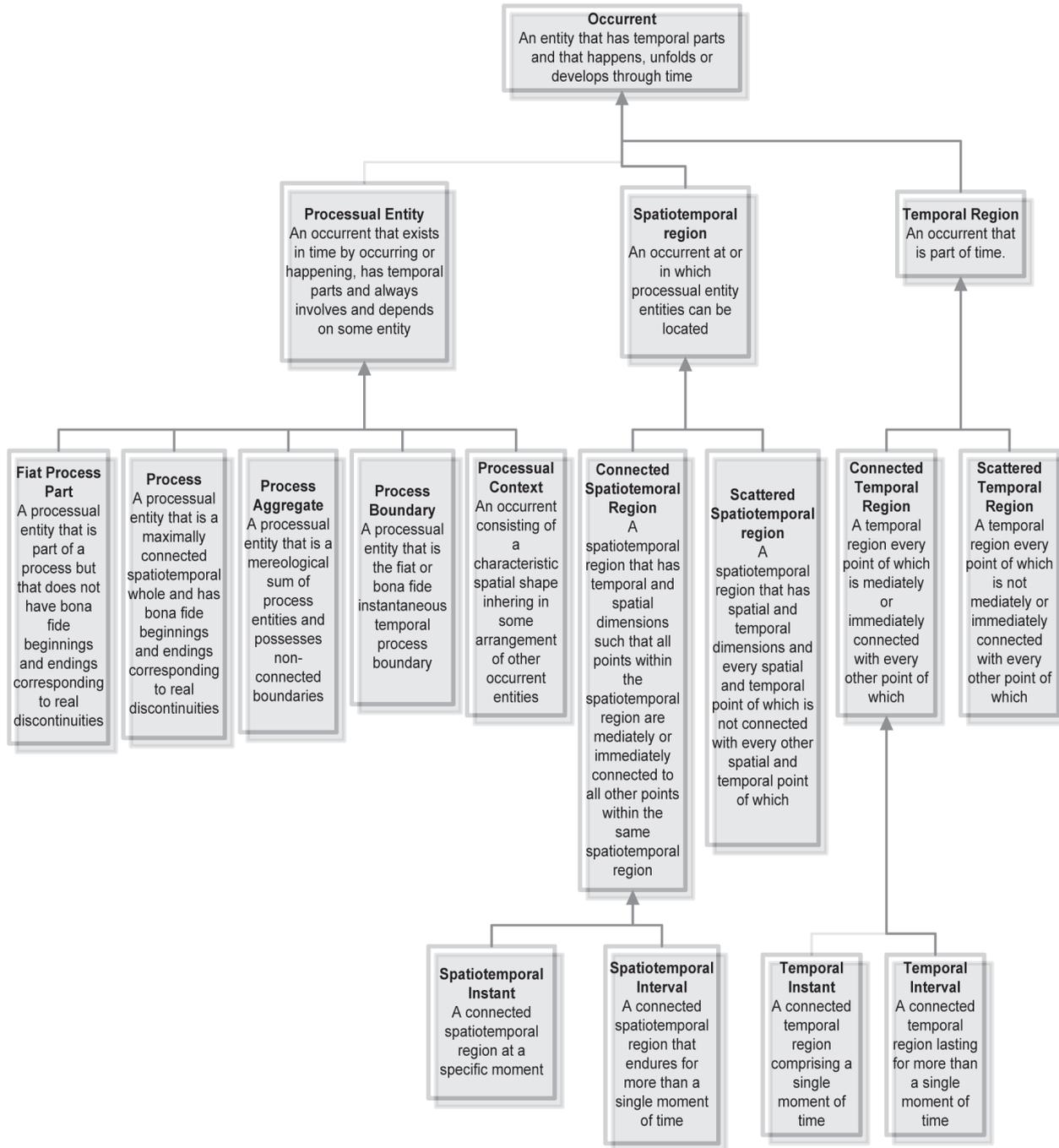
Figure 1. The structure and definition of continuant in BFO



According to the definitions that formally and explicitly describe the continuant in BFO, it is a three-dimensional entity (entity extendent in three spatial dimensions). In contrast to the conceptualization of the continuant, the definition of the occurrent in the same upper ontology (as it is depicted in figure 2) it is a four-dimensional entity (entity also extendent in the dimension of time) [10].

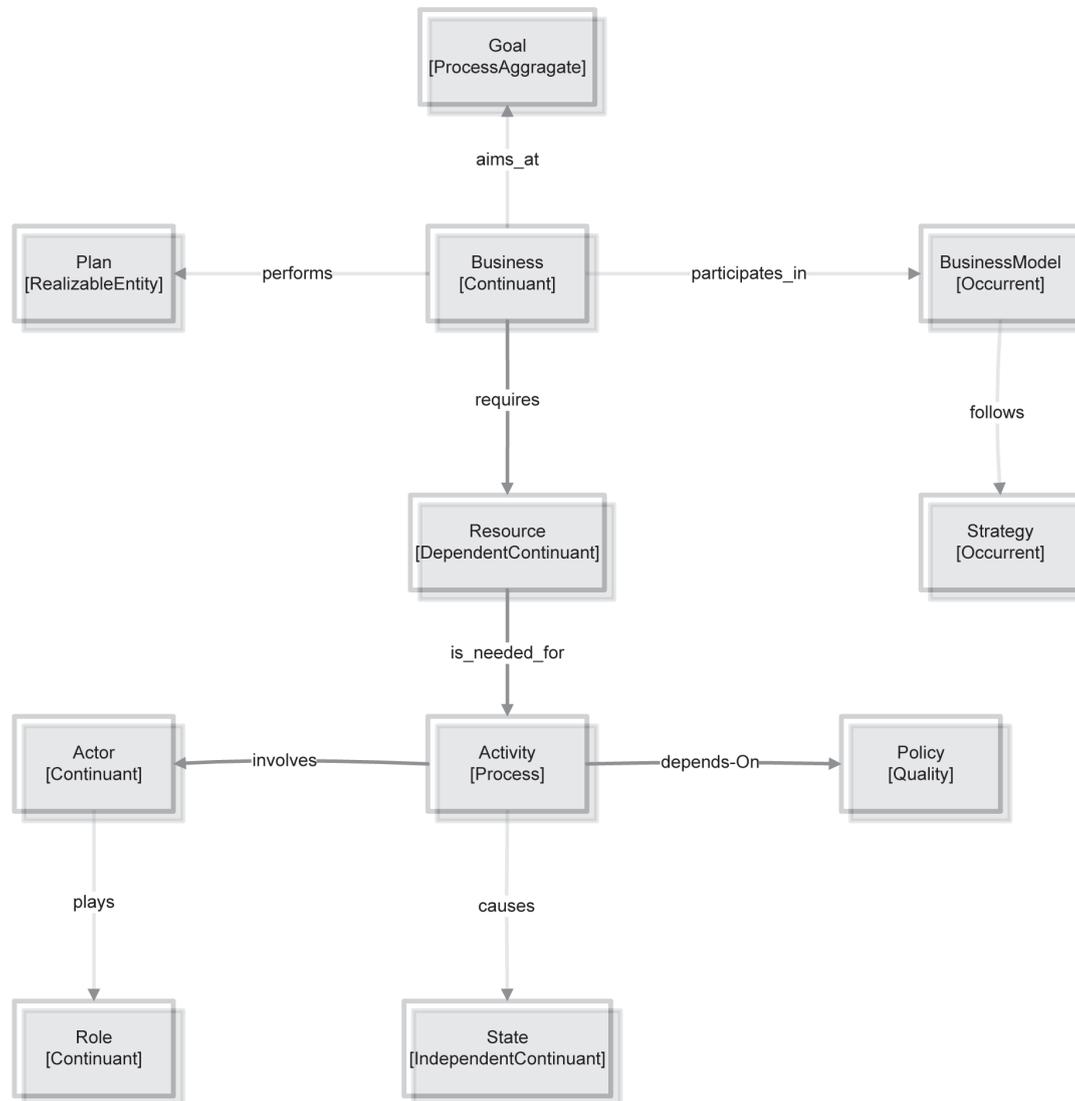
According to the ontological structure and definition of continuants and occurrents, in general, objects can be classified as continuants and are closer to independent continuants and events as occurrents. Moreover, since an event is generally considered as an instance of a process in a specific interval of time and does not change,

Figure 2. The structure and definition of occurrent in BFO



processes are modeled as occurrents. Furthermore, states can be modeled as values of dependent continuants. Except the definitions of continuants and occurrents, for ontological modeling, there is a need for several semantic relations. These are provided by the Relation Ontology (RO) [11] which is used with the BFO concepts. "A continuant participates in an occurrent", "a process is made of sub-processes", "a process is internal or external to an object", "an event causes another event", "a state allows an event", "an event initiates a state", "a state enables another state", "an object enacts an occurrent" are some of the main relations defined between the BFO concepts.

Figure 3. The ontological framework of business



5. Business: Occurent or Continuant

Based on the BFO basic concepts and their interrelations defined in RO, we propose a general ontological framework incorporating dimensions that deal with both static/spatial and dynamic/temporal entities, such as business plans, processes, functions, policy, models, activities, events, actors, roles, states, communication, goals, resources, etc. The most of these entities describing a business are modeled as occurments, since they unfold through time. But, simultaneously, each entity that maintains its identity and has no temporal parts, such as the hierarchy of actors in a business, participates in each occurrence. In that sense, a business is modeled as a continuant that participates in an occurrence.

Attempting to categorize the notion of business as continuant or occurrence, we align the mutually accepted terms, provided by BFO, with the basic notions that univocally define it. Based upon this, we describe in the proposed ontological framework of figure 3, these basic notions as well as their interrelations:

- Every Business performs a Plan. The plan of a business constitutes a RealizableEntity, since its actualization is a particular manifestation, functioning or process that occurs under certain circumstances.
- Every Business participates_in a BusinessModel, where a BusinessModel is characterized as an Occurrence, since it has temporal parts and unfolds or develops through time.
- Every Business aims at a Goal. In this ontological approach, Goal is conceptualized as ProcessAggregate, since it possesses non-connected boundaries.

<https://sites.google.com/site/icqqmeas 2015>

- Every Business requires Resource, which is characterized as DependentContinuant, for it is an entity that maintains its identity and it is either dependent on one or other independent bearers.
- Every BusinessModel follows a Strategy. The notion of Strategy is categorized as Occurant, since it unfolds or develops through time.
- Every Resource is needed for an Activity. In this statement, the Activity is considered as Process in BFO modeling, since it is an entity with temporal parts that exist in time by occurring or happening.
- Every Activity depends On Policy. The crucial notion of Policy in the business conceptualization, it is characterized as Quality, for it is an entity that exists in full at any time in which it exists at all and it is exhibited if it inheres in an entity.
- Every Activity involves Actor. Actor is a Continuant, since it is an entity that maintains its identity.
- Every Activity causes State, which is conceptualized as an IndependentContinuant, since it is an entity that is a bearer of quality.
- Every Actor plays a Role, which is a Continuant, in the sense of an entity that persists through time while maintaining its identity.

By instantiating the proposed ontological framework with a hypothetical business enterprise, we are able to answer questions, such as: What role does an actor play? What are the goals of the organization? What resources are available to achieve a particular goal? In order to perform a certain activity, which is the policy to be followed? And so on.

6. Conclusion

Within the last few years, many researchers focused on development of conceptual models for providing a formal and explicit representation of business knowledge. These models, called ontologies, mainly capture in a machine-readable manner the organization-related information, such as processes that must be carried out within a business, actors involved, permitted functionality of a business, dependency with other social activities, means that are needed in order for a business to succeed, etc.

In this paper, we propose a general ontological framework, based on the widely accepted BFO upper level ontology, aiming at categorizing the notion of business either as an occurrent or as a continuant one. The proposed framework incorporates dimensions that deal with both static/spatial and dynamic/temporal entities, such as entrepreneurial plans, processes, functions, policy, models, activities, events, actors, roles, states, communication, goals, resources, etc. Most of these entities, describing a business, are modeled as occurrents, since they unfold through time, but simultaneously, each entity that maintains its identity and has no temporal parts, such as the hierarchy of actors in a business, participates in each occurrent. In that sense, a business is modeled as a continuant that participates in an occurrent.

References

- [1] Akkermans, H., Baida, Z., J. Gordijn, J. (2004), Value webs: Ontology-based building of real-world services, *IEEE Intelligent Systems*, Vol. 19, No. 44, pp. 23-32.
- [2] Borch, S.E., Stafanson, C. (2004), Evaluating the REA enterprise ontology from an operational perspective, *Workshop on Enterprise Modelling and Ontologies for Interoperability*, Latvia, (June).
- [3] Dietz, J.L.G. (2006), *Enterprise ontology: Theory and methodology*, Springer.
- [4] Filipowska, A., Hepp, M., Kaczmarek, M., Markovic, I. (2009), Organisational ontology framework for semantic business process management, In: *Business Information Systems, Lecture Notes in Business Information Processing*, Vol. 21, pp. 1-12.
- [5] Fox, M.S., Barbuceanu, M., Gruninger, M. (1996), An organization ontology for enterprise modeling: Preliminary concepts for linking structure and behavior, *Computers in Industry*, Vol. 29, pp. 123-134, Elsevier.
- [6] Gruber, T.R. (1993), Towards principles for the design of ontologies used for knowledge sharing, In: R. Poli, N. Guarino (editors), *International Workshop on Formal Ontology*, Padova, Italy.
- [7] Hoehndorf, R. (2010), What is an upper level ontology? In: *Ontogenesis*.
- [8] Horrocks, I. (2013), What are ontologies good for? In: B.O. Küppers et al. (editors), *Evolution of Semantic Systems*, pp. 175-188, Springer-Verlag Berlin Heidelberg.
- [9] Kosman, A. (2013), *The activity of being. An essay on Aristotle's ontology*, Harvard University Press, (March).
- [10] Smith, B. (2012), On classifying material entities in Basic Formal Ontology. *Interdisciplinary Ontology. Proceedings of the Third Interdisciplinary Ontology Meeting*, Tokyo: Keio University Press, pp. 1-13.
- [11] Smith, B., Ceusters, W., Klagges, B., Köhler, J., Kumar, A., Lomax, J., Mungall, C., Neuhaus, F., Rector, A.L., Rosse, C. (2005), Relations in bio-medical ontologies, In: *genome Biology*, Vol. 6, R46.
- [12] Stevens, R., Goble, C., Becchofer, S. (2000), Ontology-based knowledge representation for bioinformatics, *Briefings in Bioinformatics*, Vol. 1, No. 4, pp. 398-414.
- [13] Uschold, M., Jasper, R. (1999), A framework for understanding and classifying ontology applications. In: V.R. Benjamins, B. Chandrasekaran, A. Gomez-Perez, N. Guarino, M. Uschold (editors), *Proceedings of the IJCAI-99 Workshop on Ontologies and Problem-Solving Methods*, Stockholm, Sweden, (August).

USE OF ANALYTIC FUNCTIONS OF PRODUCTION IN THE PROCESS OF MOTIVATION OF WAGES

Wojciech Koziol¹, Radoslaw Pyrek^{2*}

¹Malopolska School of Economics in Tarnow, Poland

²Malopolska School of Economics in Tarnow, Poland, e-mail: radoslaw.pyrek@mwse.edu.pl

ABSTRACT

This paper presents a model for determining the remuneration of the bonus, which takes into account the actual participation of the human factor in the process of product development. This model is constructed on the basis of the production function in the form of analysis. This allows to determine the level of wages - understood as an equivalent for the human capital available to the employer's time - depending on the evolution of the various economic values representing the arguments used the production function. In the second part of the article presents a practical example of the calculation of the bonus fund, which is a key element of the incentive system of the company.

Key words: function of production, motivation of wages, economics model, value of bonus fund, productivity

1. Introduction

The main objective of modern management systems is to maximize the effects of the activities and efforts to achieve sustainable economic effects, such as a strong market position, or prestige brand innovation and willingness to take on new business challenges. A key prerequisite for achieving this goal is the efficient use of existing physical and human resources in manufacturing processes. However, the basis for the due performance of economic knowledge is the nature of the product development process and, consequently, a reliable measurement of costs. On the basis of the concept of human capital, the cost can be divided into work understood as the use of human capital, manifested in labor costs and the use of physical capital (physical assets). In the case of the assets can be identified by the standards governing valuation principles wear.

These principles reflect the consensus of scientific and practical subject to regular review and updating. The other hand, is still not clearly solved the problem of fair and accurate assessment of the value of human capital and to determine the appropriate level of compensation for his release.

This article aims to provide a summary of bonus fund formation system in the enterprise. Implementation of the work involves the use of a method based on the concept of analytic functions of production. This function allows the reliable measurement of the scope of participation of employees in the organization's performance. The scope of this participation is a derivative of the level of human capital in the production process. Valuation of human capital to the company's employees used a method based on the concept of an alternative model of human capital.

Determination of the amount of the bonus fund on the basis of data from the standards of financial reporting and human capital account allows company employees primarily on procedures for inclusion in the financial planning and budgeting is also planning bonus fund. The amount of this fund achieved will depend on the size of the economy. The usefulness of the presented method of shaping the bonus fund will depend on the extent to which this method to meet the universal principles of wage motivation. Because only then the bonus system basing on the method used will be an effective incentive for employees to desired organizational behaviors and attitudes.

Modern conceptions of company illustrate the process of creating salaries as a specific system for determining remuneration teamwork for individual members, which creates and stimulates productivity. Moreover, the statement shall be as follows: if the relationship is maintained between inputs and reward the entire team productivity increases (which is, after all, it creates a "pool of remuneration"), if the relationship is casual, this team productivity decreases (Alchian, Demsetz, 1986). The use of analytic functions using the concept of the production of human capital allows to determine the appropriate relationship between effort and reward, which will ensure increased productivity leading to enlarge the already mentioned "pot salaries".

2. The production function in economics

The production process is a creative transformation of the factors of production, aimed at satisfying the needs of product performance and market requirements. For more than two centuries of development economics, numerous models illustrating the process of the use of certain factors of production to produce the product stream. These models are called the production function.

The first researchers conducting research on the issue of the production function confined themselves to take into account two factors of production: labor and land, and the land was identified with all the forces of nature. The pioneering nature of Adam Smith had a concept that has expanded set of arguments for capital production function. In his work on the wealth of nations, presented in the form of the production function: $Y = f(L, K, T)$, where Y means product, L – labor resources, K – capital i T land.

This concept depends on the increase of the product depending on the growth of the human population, capital investment, growth and productivity of the land resource. Introduction by Smith became a category of capital contribution to the discussion on the concept of capital, which in turn led to the spread of this category in the environment economists. As a result, this led to the expansion of the production function arguments about capital. At this point it is worth noting that the labor and land among the scientists are understood as clearly as opposed to the capital, which was and still is interpreted by economists in different ways. Ch. Bliss wrote that economists are able to reach agreement on any matter, if you have previously come to a consensus on the issue of capital (Dobija, D. Dobija 2003).

Breakthrough for the development of the manufacturing process modeling was to develop an econometric model of the production function in the mid-twentieth century by two researchers Cobb and Douglas. The arguments in this function are: capital understood as physical resources and the work indicating the level of employment. The form of this function is as follows: $P = L^{\alpha} \cdot K^{\beta}$ where: L – the level of employment, K – physical

capital stock, α i β – estimating subject to fit a function to empirical data (Romer, 2000).

One of the leading representatives of mainstream neoclassical growth theory R. Solow used the function of the Cobb - Douglas to describe the relationship between the change in the amount of the factors of production (capital and employment) and the volume of production. In addition, enriched Solow model parameter representing the rate of technological progress (Blaug, 2000).

3. The concept of analytic functions of production

The existing achievements in the field of modeling the production function apply only to describe the economic reality at the macroeconomic level, and then mainly the analysis of economic growth or global product. Use of classical economics on the achievements of the production function to optimize the productivity of individual companies, ie at the micro level, it is practically impossible. In modern scientific papers formulated reservations concerning the classical form of the production function, which will help eliminate consideration of their imperfections and expand the possibility of their use in the analysis of the production of individual companies (Dobija, 2004).

Firstly, the barrier to the use of classical models of product development is the valuation of the production function arguments in natural units. As it knows, the economy of commodity - money allows measurement of all factors of production using monetary units. Thus, the production volume modeling requires the presentation of the factors of production, such, for example, as labor costs and the use of materials in a quota. Another drawback of the production function developed by the followers of classical economics is not taking into account the economic nature of the production process. Production in fact results from the summation of inputs, for example, the model and the Cobb - Douglas takes the form of arguments that are multiplied.

Presented analytical production function uses a natural approach based on cost calculation. It presents the production function with seven specified arguments. The analytical form of production function divides operating costs into compensation understood as labour costs (W) and non-compensation costs (K_m) decreased by risk-related costs (K_r). This differentiation introduces the annual asset turnover rate (z), the asset impairment rate (s) and the level of pay for human capital (u). Therefore, the production function equation can be expressed in the following way (Dobija, 2004; Dobija 2012):

$$P = (W + K_m - K_r) \cdot (1 + r) \quad (1)$$

$$\frac{K_m}{A} = z \quad (2)$$

$$\frac{K_r}{A} = s \quad (3)$$

$$K_m = z \cdot A \quad K_r = s \cdot A \quad W = u \cdot H \quad (4)$$

where: K_m – costs resulting from the use of assets, K_r – risk-related costs, W – compensation (labour costs), A – value of assets, H – staff's human capital, u – level of pay for human capital, z – asset turnover to non-labour costs ratio, s – asset impairment in production processes.

The analytical production function corresponds to the actual process of developing products. It describes the composition of production factors in the production process. The market value of products, on the other hand, represents the historical cost of manufacture adjusted to the cost profitability ratio (r). As a result, the system of arguments determines all significant variables, and the basic analytical form of the function, unlike in the case of other popular models, does not require parameter estimations. According to the model, the market value of production can be presented as the function of the sum of outlays. The transformed formula and the inclusion of the company's intellectual capital (I) leads to the extended function:

$$P = (W + z \cdot A - s \cdot A) \cdot (1 + r) \cdot (1+I) \quad (5)$$

where: I – intellectual capital.

The transformed formula for presenting production effect (P) as the function of labour costs results in the following formula:

$$P = W \cdot \left[1 + \frac{A}{W} \cdot (z - s)\right] \cdot (1 + r) \cdot (1 + I) \quad (6)$$

The use of the human capital concept in the analytical production function model allows for expressing labour costs ($W = u \cdot H$) as a derivative of human capital value:

$$P = W \cdot \left[1 + \frac{A}{H} \cdot \frac{z-s}{u}\right] \cdot (1+r) \cdot (1+I) \quad (7)$$

The presented concept is a general form of the cost account and it includes the category of natural loss (s) related to any business activity. Consequently, the model reflects the actual production process, being a useful management tool.

The model facilitates calculation of the actual use of human capital in the production process and an appropriate level of compensation. As a result, the presented methodology for bonus compensation can be a basis for setting up a bonus fund based on a company's adopted bonus system. The level of pay for work (W), i.e. the level of total compensation composed of fixed and variable components, can be presented as follows (Dobija, 2011):

$$W = u H(T) = p H(T) + m H(T) \quad (8)$$

where: u – variable representing actual pay for human capital, p – 8% economic constant of potential growth, m – bonus (%).

Although the amount of a bonus fund is calculated as m -% of a company's human capital value, it is labour productivity and a company's profitability that provide that additional value. The transformation of the analytical function for the purpose of the use of the successive approximation method results in a formula which determines a variable indicating the actual pay for human capital (u) (Koziol et.al, 2014):

$$P = u \left(\frac{L}{p} + \frac{A(z-s)}{u} \right) e^r \quad (9)$$

$$u = \varphi(u) = \frac{P e^{-r}}{\frac{L}{p} + \frac{A(z-s)}{u}} \quad (10)$$

where: L – total value of fixed compensation components.

The numerical solution of the functional equation is based on the use of the iteration algorithm which assumes the existence of one point fulfilling the condition $\varphi(x) = x$. A fixed point can be determined with any small error applying the method of successive iterations and starting with any initial value u_0 . As a result, the fixed point is convergent to sequence: $u, \varphi(u), \varphi(\varphi(u)), \dots$

The use of the successive approximations method allows for estimating the value of variable (u). If the obtained value of the variable which indicates the level of pay for human capital (u) is smaller than or equal to the constant economic value (p), employees do not deserve additional compensation above their base pay. On the other hand, when the value of (u) exceeds the value of an 8% economic constant of potential growth, the amount of a bonus fund is calculated as follows:

$$F = \frac{u-p}{p} L \quad (11)$$

where: F – value of bonus fund.

Table 1 presents the results of calculations based on empirical data over a period of three years collected from Polish medium company. The results are the basis for determining the value of variable (u) as well as the amount of a bonus fund.

Table 1. Calculation results – compensation for work (in PLN thousands)

Financial data:	2006	2007	2008
Sales (P)	136 911	147 000	329 293
Value of assets (A)	68 918	148 225	245 253
Operating costs	129 022	137 400	309 998
Compensation and social benefits (L)	8 955	13 630	19 033
Loss rate (s)	0.02	0.02	0.02
Labour pay variable (u)	9.04%	9.55%	9.83%
Bonus fund (% of base compensation)	13%	19.4%	22.9%
Bonus fund (amount)	1 167	2 646	4 362

Literatures in the area of compensation suggest that a bonus should be a motivating factor, which implies that it should have a positive impact on employee attitudes and behaviours and contribute to achieving company objectives. The impact of bonus pay on employee motivation and, consequently, company performance reflects the effectiveness of the bonus system. The effectiveness of the system is affected by the following factors (Armstrong, 2007):

- results are promptly rewarded,
- systematicity,
- simplicity and transparency of motivation systems,
- close and visible relation between work and its effects.

The possibility of forecasting provided by the production function concept can increase the effectiveness of motivation systems. It facilitates analysing future financial scenarios and setting the level of bonus funds depending on the company's performance. The proper operationalization of financial targets enhances the system for effective pay-related incentives.

Bonus fund as described above should be disposals by management in accordance with the elaborated rules and best practices and reward bonus. The fact that the amount of the bonus fund depends on the developed economic values can be used at the stage of financial planning. The preparation of the financial plan for the next year also allows for the planned amount of bonus fund, which will depend on the scope of the plan. The development of such a plan should also include the expected level of management. This level reflects management variable (Z), which is expressed by the following parameters: asset turnover ratio (z), the core loss of assets (s), the level of pay for human capital (u) and an increase in the cost of the product to the market value (r). Thus, the variable Z can be summarized as follows (Dobija, 2004):

$$Z=F(s,r,z,u) \quad (12)$$

Then the production function takes the form:

$$P=W_e^{(A/H)Z} \quad (13)$$

In view of the above equations variable (Z) describes the degree of rational use of resources involved, and its value is impossible to estimate on the basis of economic data. Thus, knowledge of the management of variable size (Z), and its development over the last few periods, allows the assessment of the quality of business management. Management variable (Z) can also be calculated based on planned economic size, and so on the basis of the budget for the next period. Thus, the production function can be used to analyze future economic enterprise, depending on the level of achievement of expected economic values. For example, how will the increase in production due to the amount of the premium, assuming that the level of management (the value of the variable Z) is constant or how it should develop a management level (Z) to the level of pay bonus has not changed.

As can be seen, the concept of analytic functions of production is not only a tool for sustainable and effective management of the enterprise, but also can be a starting point for the implementation of the concept of corporate social responsibility (CSR) in the company in the area of equitable remuneration. Studies indicate that a broad implementation of CSR practices can contribute to building a long-term competitive advantage of the company (Sahinidis, Kavoura, 2014).

Table 2. (in PLN thousands)

Financial data:	2008	Budget for next year	Budget for next year	Budget for next year
Sales (P)	329 293	340 000	340 000	340 000
Value of assets (A)	245 253	250 000	250 000	250 000
Compensation and social benefits (L)	19 033	19 650	19 650	19 650
Loss rate (s)	0.02	0.02	0.02	0.02
Labour pay variable (u)	9.83%	10.2%	8.94%	8.08%
Bonus fund (% of base compensation)	22.9%	27,5 %	11,8 %	1%
Bonus fund (amount)	4 362	5 407	2 310	191
Management variable	2,57	2,57	2,7	2,8

Table 2 presents projections for the following year. They assume a slight percentage increase in production accompanied by a slight increase in costs and the absence of investments. The value of assets is close to the previous year's level. The amount of the bonus fund will depend on the extent to which the planned level of management. Management level is the result of the organizational efficiency of the board. If the management level increases, indicates a better use of existing resources, including human resources. This means the company commitment to a lower paying job. As a result, an increase in the variable management of 2.57 to 2.7 causes a decrease in the level of pay for work of 10.2% of the value of human capital to 8.94%. What in monetary terms represents a decrease of 5 407 thousand. to 2 310 thousand. PLN. Growth management variable to 2.8 in practice means no bonus fund.

4. Conclusion

As you know, the economy turn of the century is characterized by high dynamics and volatility of the economic environment. Under these conditions, survival and further development of enterprises require to ensure the highest level of efficiency and thus productivity. However, in order to have influence on the level of economic productivity, you need to understand the nature of product development. Therefore, it is necessary to use an production model, which enables it to optimize. Proposed in the article Analytical production function performs the above postulate. Allows you to analyze the many ways of achieving the economic purpose (eg. An adequate level of sales) and the selection of the best of them. An important application of the analytical production function is the ability to determine the synthetic indicator of management, representing the overall level of business management, so deciding on the level of productivity. This index is a valuable tool in the hands of executives, allowing the prediction of the future level of productivity, and therefore, premature to counteract negative trends.

Identification and improve areas of the company, which affect the reduction of productivity, requires an appropriate level of employee engagement. One of the functions of management is to motivate employees to perform the tasks of economic, by shaping the desired attitudes and behavior of employees. Analytical production function allows you to actively take into account the behavioral aspect of the management process, as it allows the company to link remuneration system with its productivity.

References:

- Alchian A., Demsetz H., (1986), Production, Information Costs, and Economic Organization [in:] The Economic Nature of the Firm, Cambridge University Press, Cambridge, pp. 111-135
- Armstrong M., (2007), A Handbook of Employee Reward Management and Practice, pp. 106 - 126
- Blaug M., (1995), Metodologia ekonomii, PWN, Warszawa, p. 459
- Danias A, Kavoura A., (2013), The role of social media as a tool of a company's innovative communication activities, The Małopolska School of Economics in Tarnow Research Papers Collection, vol. 2(23), pp. 75-83
- Dobija D, Dobija M., (2003), O naturze kapitału, Zeszyty Teoretyczne Rachunkowości, Vol. 17 (73), Stowarzyszenie Księgowych w Polsce, Rada Naukowa, Warszawa, pp. 32-41
- Dobija M., (2011), Labor Productivity vs. Minimum Wage Level, Modern Economy, Vol. 02 No. 05
- Dobija M., (2004), Analityczna funkcja produkcji, Ekonomika i Organizacja Przedsiębiorstwa. Vol. 40, vol. 11 (658), pp. 53-45
- Dobija M., (2012), Political Reforms Based on a Human Capital Research Programme, Argumenta Oeconomica Cracoviensia, vol. 8, pp. 45-60
- Kozioł L., Kozioł W., Wojtowicz A., Pyrek R., (2014), An Outline of a Compensation System Based on Human Capital Theory, Procedia-Social and Behavioral Sciences, Elsevier, vol. 148, pp. 551-558.
- Romer D., (2000), Makroekonomia dla zaawansowanych, PWE, Warszawa 2000, p. 27
- Sahinidos A.G., Kavoura A., (2014), Exploring Corporate Social Responsibility practices of Greek companies, Zeszyty Naukowe Małopolskiej Wyższej Szkoły Ekonomicznej w Tarnowie, vol. 2 (25).

A FUZZY LOGIC BASED MODEL TO CALCULATE THE RISK OF CANCELLATION OF POLICIES

Sanjeev Kumar and Anil Gupta* Department of Mathematics, (*University Computer Center)
Dr. B. R. Ambedkar, University, IBS, Khandari, Agra- 282002 U. P., (INDIA), E-mail: sanjeevibs@yahoo.co.in

ABSTRACT

The preventive avoidance of cancellation is a key problem facing insurance companies. A conversation with the client held prior to the latter's decision to cancel a contract increases the likelihood of contract continuity. So companies are in need of reliable expert system that can help them to evaluate the risk of cancellation of the policies in future. With the help of fuzzy system it is possible to identify clients who may potentially cancel and take timely measures to safeguard the portfolio. Here a model is presented, which is designed by using fuzzy mathematics and expert system to provide indicative results on the risk of cancellation of the policies in future.

Keywords: fuzzy logic, expert system, risk classification, insurance.

BANK'S BRANCHES EFFICIENCY AND PRODUCTIVITY CHARACTERISTICS: EVIDENCE FROM A GREEK BANK

Christos Lemonakis

Technological Educational Institute of Crete, Dept. of Business Administration, Ag. Nikolaos, Crete, Greece

clemonakis@hotmail.com

ABSTRACT

The paper investigates the major factors that affect efficiency and productivity of Banks on a branch level. DEA analysis is used to estimate the efficiency level of a bank's branch network. Technical and scale efficiency (SE) scores are calculated obtained through an input-oriented DEA model. For the research study, a sample of 49 branches of a Greek bank is used, operating in 4 regions of Greece over the period 2009-2011. First a classification technique is used to classify firms with common characteristics and the score of the most important variables used become subsequently inputs to DEA model to explore the efficiency and productivity of the branches. Secondly an econometric model is used to determine the impact of internal and external factors on the efficiency and productivity scores. The main contribution of this work is a better understanding of various factors that may affect a bank's branch efficiency and insolvency. This provides important implications for managers and policy makers for the better understanding of profitability and productivity issues in the Greek banking system, especially those contributing to branches viability.

Keywords: Banks' Efficiency, DEA, Econometric Analysis

1. Introduction

During financial crisis, that suppresses the banks' profitability, it is a common practice for management to aim to minimize inefficiencies in bank operations. This paper reports on an assessment of the efficiency in operations of homogenous branches of a Greek bank, over the period 2009-2011, in two different areas: their efficiency in managing the economic record of the branches and their efficiency in generating profits.

A non-parametric method of input-oriented data envelopment analysis (DEA) is used under variable returns to scale, for the different efficiency assessments. The bank of this study is a representative unit to observe with branch homogeneity which is a basic requirement of DEA in order to minimize estimation bias ([7], [8]), by selecting retail branches of the specific bank with common characteristics such as the age of branch establishment, the branch location, the number of employed personnel and similar services provided towards individuals and small enterprises. Furthermore, the data set used is unique, based on inside information derived from yearly financial statements gathering from the Management Information System of the bank of the study.

The results indicated that the average pure technical efficiency both in the two dimensions reduced during the crisis period. The differences are statistically significant in DEA VRS Model. Also, there is the scope for substantial efficiency improvements in the branch network through cost controls and credit risk management, in order to offset the negative impact on earnings caused by the crisis.

In the first part of this paper (sections 2 to 4) we describe core characteristics and calculate Technical Efficiency (TE) scores through an input-oriented DEA model for a sample of 47 branches of a Greek Bank, operating in 4 regions in Greece, over the period 2009-2011 (141 observations).

In the second part (section 5), DEA scores calculated earlier become an input to eight regression models, with Return on Assets (ROA) as dependent variable and core bank's financial characteristics as independent variables. Results and further research also described in the conclusion section.

2. Characteristics of the Research -Basics structure in DEA

In this research input-oriented Technical Efficiency (TE) is used. As Coelli et al. (1999) point out the input-oriented TE measures address the question how much can input quantities be proportionally reduced without changing the output quantities produced. -Also, Constant returns to scale (CRS) and Variable Returns to Scale (VRS) assumptions are employed in the study. More specifically:

- CRS assumption is appropriate when all firms are operating at an optimal scale. The causes in which firms are not at the optimal scale are imperfect competition, constraints on finance, etc.
- VRS specification is appropriate when not all firms are operating at the optimal scale.

In this paper the input-oriented DEA model with Variable Returns to Scale (VRS) developed by [3] is used which allows the possibility that the production technology of DMUs may exhibit increasing, constant and decreasing returns to scale. The VRS specification adds a convexity constraint to the original [6] Constant Returns to Scale (CRS) model and should be calculated as:

$$\begin{aligned} \min_{\theta, \lambda} \quad & \theta \\ \text{st} \quad & -y_i + Y\lambda \geq 0, \\ & \theta x_i - X\lambda \geq 0, \\ & N1'\lambda = 1 \\ & \lambda \geq 0, \end{aligned} \tag{1}$$

where θ is a scalar; λ is an $N \times 1$ vector of constants; and $N1'\lambda = 1$ is the convexity constraint, where $N1$ is an $N \times 1$ vector of ones. The linear programming model must be solved N times, one for each DMU in the sample. The obtained value of θ is the efficiency score for the i -th firm and it satisfies $\theta \leq 1$, with a value of 1 indicating a point on the frontier, i.e. a technically efficient bank. Scale efficiencies are measured by running the same dataset through both the CRS and VRS models. They are calculated by dividing the CRS efficiency score by the corresponding score of the VRS model and retain values between zero and one. Slack variables are also analyzed. These indicate excess input combinations in non-best practice banks relative to the benchmark efficient banks. In this paper both VRS and CRS models are used.

3. Literature Review

An abundant international literature on cost efficiency in banking and, to a lesser extent, productivity exists (see the extensive bank efficiency surveys by [4] and [13]; and the works on productivity growth by [14] and [5]). The vast majority of efficiency studies over the last decade or so have adopted frontier analysis to estimate alternative efficiency measures (e.g. X- and scale efficiencies).

More specifically, [19] integrated DEA and neural networks (NN), to examine the profit efficiency of 142 branches of a Canadian bank. By comparing the efficiency scores with DEA normal results, they found that the combined system identifies more efficient branches.

In [17] researchers assessed the transaction, production and profit efficiency of 57 branches of a Portuguese bank and identified benchmark bank branches and also problematic branches. They found positive links between production and profit efficiency and also between transaction and production efficiency.

As far as Greece is concerned, several studies explored efficiency of retail branch networks by employing DEA under different approaches.

[1], using 68 branches of a commercial bank, investigated the relationship between production efficiency and profit efficiency using a multivariate modeling technique. He found that branch location, network size, product range, personnel abilities and reliability of services have significant effect on Greek branches efficiency. [12], also, assessed the production, transaction and profit efficiency in operations of a branch network consisting of 44 branches for the financial year 2002.

The empirical results indicate that there branches with previous good profit and production efficiency seem that acted decisively after the burst of the financial crisis and gave a priority to credit risk management to offset the consequences of the crisis. Loans write – offs is an enormous burden not only for banks profitability and viability. It also increases the overall credit risk of the Bank's loans portfolio.

4. DEA-models Characteristics

In order to calculate efficiency of Bank's branches and compare branches on each dimension, an input-oriented analysis is used, following most of the recent studies ([10], [16], [12], [11], [19], [15]), to identify sources of inefficiency at the input level, which is under direct control of bank management. As [18] state, during periods of crises it is a common practice for management to aim to enhance the cost efficiency (reducing expenses without lowering the volume of output), so this gives rise to input-oriented models.

The two following DEA Models, of the Greek banking institution are used:

1. Model DEA1 based on yearly based data

Inputs

- Cost of Employees (EMPLOYEE)
- Operational Expenses (except outsourcing activities) (EXPENSES)
- Branch's Interest commission (INTEREST)

Output

Fee Income (INCOME)

2. And the Model 2, based also on yearly based data

Inputs

- Cost of Employees (EMPLOYEE)
- Operational Expenses(except outsourcing activities) (EXPENSES)
- ranch's Loans Loss Provisions (PROVISIONS)

Output

Fee Income (INCOME)

As mentioned before, Bank's Branches Technical Efficiency (TE) is estimated using both CRS and VRS DEA Model. Statistical software EMS 1.3 used to conduct DEA analysis for calculating TE.

Table 1: Descriptive efficiency results comparisons – Technical Efficiency (TA)

	2009	2010	2011
DEA1-CRS			
Average efficiency (%)	52,14%	53,31%	50,58%
% of efficient branches	42.55%	44.68%	38.29%
DEA1-VRS			
Average efficiency (%)	75,94%	76,19%	69,44%
% of efficient branches	55.32%	55.32%	48.93%
DEA2-CRS			
Average efficiency (%)	54.56%	49.63%	48.75%
% of efficient branches	39.58%	37.50%	36.17%
DEA2-VRS			
Average efficiency (%)	73.92%	71.71%	57.78%
% of efficient branches	53.19%	44.68%	38.29%

Also, an Independent Samples T-test is conducted (Table 2). Results for t-test between the two panels, DEA1 panel (with interest commissions as input) and DEA2 panel (with Loans Loss Provisions as input) indicate that the average Technical Efficiency (TE) between the two panels is statistically significant at 5% only in VRS mode.

Table 2: Independent Samples T-test

DEA	t- test for equality of means	
	F	Sig.
CRS	267.78	0.68
VRS	279.65	0.017 (significance at 5%)

We see that the Mean Value DEA1-VRS equals to 0.73, when at the same time the Mean Value DEA2-VRS equals to 0.67. It clearly shows that TE is greater in DEA1 than in DEA2 panel.

No other significance in bank's branches Technical A found between the sampling years (2009-2011), which represent the start and the running of the Greek financial crisis period.

5. Determinants of Bank Efficiency

In the second stage of this research a fixed effects regression model is set to investigate whether and to what extent among others outsourcing and interest rate spread are related to efficiency. The model can be written as follows:

$$Y = b_0 \text{DEA}_{ik} + b_2 (\text{Total Income/ Total Expenses}) + b_3 (\text{Total cost of outsourcing}) + b_4 (\text{Loans write - offs}) + b_5 (\text{Estimated Cost of Capital}) + b_6 [\text{Interest spread - yearly based (Average Loans Interest- Average Deposits Interest)}] + \varepsilon$$

Where

Y is the Dependent Variable: ROA (RETURN ON ASSETS)

and

1. DEA_{ik} is the score of DEA of the i panel (i=1 for DEA1 and i=2 for DEA2), for k returns to scale (1=for CRS an 2=for VRS)
2. Ratio Total Income/ Total Expenses per Branch per year
3. Total cost of outsourcing per Branch per year
4. Loans write - offs per Branch per year
5. Estimated Cost of Capital per Branch per year, and
6. Interest spread - yearly based (Average Loans Interest- Average Deposits Interest)] per Branch per year
7. ε is the error term

All regressions are estimated through fixed effects regression. Based on the Breusch-Pagan test ([2]), the Lagrange Multiplier (LM) statistic is calculated. Comparing the relevant statistic of each model with $X^2_{0,001,n}$ where n refers to the number of variables, the null hypothesis that the errors are homoscedastic cannot be re-

jected. Therefore, the fixed effects method used in this analysis is appropriate for all 4 regressions, i.e. with DEA1 and DEA2 models for CRS and VRS options respectively.

Also, White's transformation is used to control the cross-section heteroscedasticity of the variables. Results are shown in Tables 3 and 4.

Table 3: DEA1 Models & Results

	DEA1-crs	DEA1-vrs
C	0.247886 (0.0182)	0.161480 (0.0550)
DEA	0.063821 (0.0140)**	0.178610 (0.0003)*
EXP_INC	-0.001175 (0.4694)	-0.001147 (0.3511)
OUTSOURSING	-0.000912 (0.0000)*	-0.000785 (0.0000)*
WRITE_OFFS	-5.69E-05 (0.0022)*	-4.34E-05 (0.0008)*
COST_OF_CAP	0.000678 (0.2636)	0.000785 (0.1683)
SPREAD	-0.027699 (0.0041)*	-0.033888 (0.0000)*
R-squared	0.881723	0.884539
Durbin-Watson stat	2,0421	2,0072
Breusch-Pagan test (LM)	15,49 ($X^2_{0,001,6}=22,46$)	16,89 ($X^2_{0,001,6}=22,46$)
degrees of freedom (df)	6	6
F-statistic	12,6157	12,9647
Prob(F-statistic)	0,0000	0,0000

p is in parenthesis, (*) statistical significance at 1% and (**) statistical significance at 5%

Results show that DEA scores are statistical significant factors to ROA in all panels (DEA1 & DEA2 models) and any return to scale (CRS and VRS) and statistically significant at 1% or 5%, with positive (+) relation to ROA. Also, Total Income / Total Expenses ratio is found statistically significant at 1%, only in DEA-Panel B (with loan loss provisions), with negative relation (-) to ROA.

Moreover, the total cost of outsourcing is statistically significant at 1%, in all cases except in DEA2-VRS with negative relation (-) to ROA.

Table 4: DEA2 Models & Results

	DEA1-crs	DEA1-vrs
C	0.236079 (0.0728)	0.078213 (0.4762)
DEA	0.095538 (0.0001)*	0.326724 (0.0000)*
EXP_INC	-0.001120 (0.5044)	-0.002352 (0.0002)*
OUTSOURSING	-0.000850 (0.0000)*	-0.000274 (0.2387)
WRITE_OFFS	-5.46E-05 (0.0159)**	4.02E-06 (0.8942)
COST_OF_CAP	0.000701 (0.2439)	0.000997 (0.0925)
SPREAD	-0.029693 (0.0058)*	-0.036360 (0.0000)*
R-squared	0.882662	0.897234
Durbin-Watson stat	2,0625	2,1389
Breusch-Pagan test (LM)	16,10 ($X^2_{0,001,6}=22,46$)	20,23 ($X^2_{0,001,6}=22,46$)
degrees of freedom (df)	6	6
F-statistic	12,7302	14,775
Prob(F-statistic)	0,0000	0,0000

p is in parenthesis, (*) statistical significance at 1% and (**) statistical significance at 5%

As expected, loans write - offs are statistically significant at 1% in DEA-Panel A (with interest commission as an input), with negative relation (-) to ROA. Also, Interest spread - yearly based (Average Loans Interest- Average Deposits Interest) is statistically significant at 1%, in all cases with negative relation (-) to ROA.

5. Conclusion

Comparing the average technical efficiency of the sampling branch network with other studies for Greek retail branches, similarities with other researches, e.g. [16] and [10] are observed, where they found an average efficiency of 70% but before the year 2005. In particular, [16], calculated TE for the financial years 2000-2001, while [10], for the period 2002-2005.

DEA method should become an important factor for profitability issues in Bank's managerial policy. It gives good explanation of the results in both models (with or without the use of loans loss provisions).

Outsourcing has also negative influence to banks financial condition, due to significance in any case of our models. This means that a reengineering of the bank's operations need to be done in a sense of giving out less amount of external banking employments to third parties.

Furthermore the sample Bank's branches seem to have little effect in efficiency scores from the Greek economic crisis started out the year 2009. There is no evidence that the crisis influenced negatively the Bank's network efficiency scores in a substantial volume, which is a great managerial task on its own. In period of the financial crisis (2009 and after), branches with previous good profit and production efficiency seem that acted decisively after the burst of the financial crisis and gave a priority to credit risk management to offset the consequences of the crisis. Loans write – offs is an enormous burden not only for banks profitability and viability. It also increases the overall credit risk of the Bank's loans portfolio.

The core implication of our paper is that Bank's branches in order to avoid the realization of great loss efficiency during the crisis period ahead, should further focus on an effective proactive credit risk management in the credit sales boom period, in order to sustain their viability.

Further research can be done towards using multicriteria analysis models in conjunction with Data Envelopment Analysis to make a comparison of the results. Also, an option in using Stochastic Frontier Analysis as well as DEA to find out similarities in bank branches efficiency is critical for research. Furthermore, cluster analysis techniques can be examined in order to find specific types of branches with similar features in discrete efficiency clusters.

References

- Athanassopoulos, A., and E. Shale. (1997). Assessing the comparative efficiency of higher education institutions in the UK by means of data envelopment analysis. *Education Economics* 5: pp. 117-133.
- Baltagi, B. H. (2001). *Econometric Analysis of Panel Data*. 2d ed. New York: John Wiley & Sons.
- Banker, R.D., Charnes, A. and W.W. Cooper, (1984). Some Models for Estimating Technical and Scale Inefficiencies in Data Envelopment Analysis. *Management Science*, 30(9), pp. 1078-1092.
- Berger, A.N. and D.B. Humphrey, (1997). Efficiency of Financial Institutions: International Survey and Directions for Further Research. *European Journal of Operational Research*, 98, pp. 175-212.
- Casu, B., Girardone, C. and P. Molyneux, (2004). Productivity Change in European Banking: A Comparison of Parametric and Non-Parametric Approaches. *Journal of Banking and Finance*, 28, pp. 2521-2540.
- Charnes, A., Cooper, W.W. and E. Rhodes, (1978). Measuring the Efficiency of Decision Making Units", *European Journal of Operational Research*, 2(6), pp. 429-444.
- Chortareas, Y., Girardone, C. and A. Ventouri, (2007). Efficiency and Productivity Change in Greek Banking: Methods and Recent Evidence in P. Molyneux and E. Vallelado. *Frontiers of Banks in a Global Economy*, Palgrave Macmillan, pp. 11-233.
- Coelli, T., Prasada Rao, D.S. O' Donnell C.J. and G.E. Battese, (2005). *An Introduction to Efficiency and Productivity Analysis*. 2nd Edition, Springer, New York.
- Coelli, T., D.S., Prasada Rao D. S., G.E. Battese, G.E., (1999). *An Introduction to Efficiency and Productivity Analysis*. Kluwer Academic Publishers.
- Gaganis, C., Pasiouras, F. (2009). Efficiency in the Greek Banking Industry: A Comparison of Foreign and Domestic Banks. *International Journal of the Economics of Business*, 16, pp. 221-237.
- Giokas, D., (2008 b). Assessing the efficiency in operations of a large Greek bank branch network adopting different economic behaviours. *Economic Modelling* 25, pp. 559-574.
- Giokas, D., (2008 a). Cost efficiency impact of bank branch characteristics and location: An illustrative application to a Greek bank branches. *Managerial Finance* 34 (3), pp. 172-185.
- Goddard, J.A., Molyneux, P. and J.O.S. Wilson, (2001). *European Banking: Efficiency, Technology, and Growth*. Chichester: John Wiley.
- Grifell-Tatjé and C.A.K. Lovell, (1996). Deregulation and Productivity Decline, The Case of the Spanish Saving Banks", *Economic Letters*, 40, pp. 1281-303.
- Hartman, TE, Storbeck, JE. and P. Byrnes, (2001). Allocative efficiency in branch banking. *European Journal of Operational Research* 134, pp. 232-242.
- Noulas, A.G., Glaveli, E., Kiriakopoulos, I., (2008). Investigating Cost Efficiency in the Branch Network of a Greek Bank: An Empirical Study. *Managerial Finance*, 34(3), pp. 160-171.
- Portela, M.C.A.S., and Thanassoulis, E.(2007). Comparative Efficiency Analysis of Portuguese Bank Branches. *European Journal of Operational Research* 177, pp.1275-1288.
- Siriopoulos, C., Tziogkidis, P., (2009). How do Greek banking institutions react after significant events? A DEA approach. *Omega* 38 (2010), pp. 294-308.
- Wu W-H, Tsai H-J, Cheng K-Y and Lai M-K (2006). Assessment of intellectual capital management in Taiwanese IC design companies: Using DEA and the Malmquist productivity index. *R&D Management* 36(5), pp. 531-545.

EVOLUTIONARY OPTIMIZATION OF SIMULATION WORKFLOWS FOR PRODUCT DESIGN PROCESSES

Vassilios C. Moussas

Associate Professor, Dept. of Civil & Surveying Engineering, TEI of Athens, Greece

e-mail: vmouss@teiath.gr

ABSTRACT

Simulation workflow optimization has become an important investigation area, as it allows users to process large scale & heterogeneous problems in distributed environments in a more flexible way. The most characteristic categories of such problems come from the aerospace and the automotive industries. In this work a specially developed algorithm that is based on heuristic optimization techniques (Genetic Algorithms) is applied to deliver an optimized workflow implementation of an initial workflow schedule (PERT). In order to demonstrate its potentials, the algorithm is applied on a sample manufacturing product design problem that requires a lot of time consuming simulations & finite elements analysis under a constrained availability of computer resources.

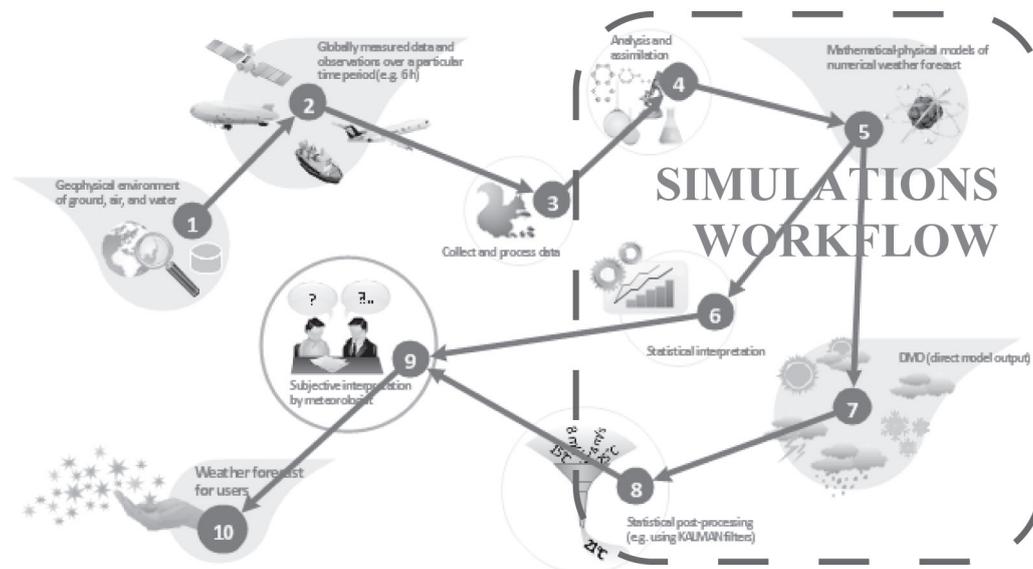
Keywords: Simulation Workflow Optimization, PERT, Genetic Algorithms, Resource Optimization

1. Introduction

Workflows have been used to model repeatable tasks or operations in a number of different industries including manufacturing and software. A workflow typically represents a schedule of the required tasks (human, physical, virtual, etc.) based on their dependencies and the associated resources. Definitions of the term “workflow” can be found in Wikipedia and the [1]. Higher level workflows contain all tasks required to accomplish a specific goal. Some of these tasks are further analyzed in lower level workflows. Computation tasks are occupying an increasing part of the Product Design Process in industry today, often using supercomputers to calculate FEM or CFD analysis, or simulate large, physically complex systems modeled by PDEs. As a result the overall (higher) workflow efficiency and optimization is highly dependent by the optimization of the included (lower) simulation workflows.

An example workflow chart is presented below, redesigned from article [2], displaying the sequence of concatenated steps for weather prediction. In this higher level workflow, steps 1 to 3 represent the data collection from various sources and the necessary pre processing actions, steps 4 to 8 is the part containing the computational analysis and simulations (simulations workflow), and, steps 9 & 10 contain the post processing actions, statistical analysis and visualization of results. The simulations workflow contains several tasks or smaller workflows that perform a number of lengthy and complicated calculations such as: data transformation to a common format (in 4), numerical weather forecast based on mathematical-physical models, environmental area discretization, numerical solution of a system of partial differential equations (in 5), statistical interpretation and forecasting (in 6), numerical results interpolation (in 7) and, statistical post-processing to remove failures of measuring devices (e.g. using KALMAN filters) (in 8).

Figure 1. Example of a weather forecast workflow [2] and its simulation workflow part.



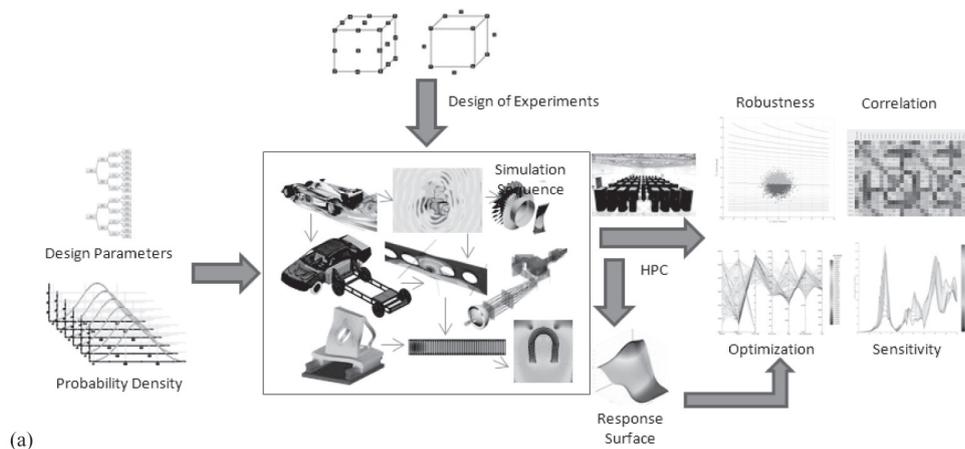
In the aerospace manufacturing industry we can find much more complex simulation workflows, as the one given in [3], where the manufacturer needs to solve a multi-disciplinary optimization problem involving several partners or subcontractors. In order to improve the design of a new cabin, a number of simulations & analysis tasks are required involving, calculations of environmental CFD models, structural FEM models, electrical/thermal control models, power plant FEM models and human response ANN models. The designer needs not only to optimize the final cabin design, but also to optimize the execution schedules of all the required computational tasks, in terms of time, cost and accuracy.

As the Product Development Processes (PDPs) become more and more decentralized and distributed, the associated optimization problems also become more complex, with multiple & contradictory objectives and they require powerful and/or specially designed optimization tools [4]. In addition, the distributed environment of large scale problems requires the software tools to be accessible from anywhere as been local. A promising simulation workflow optimization tool is proposed in [5] that is using evolutionary methods in order to optimize a heterogeneous simulation workflow containing several computational tasks that involve completely different

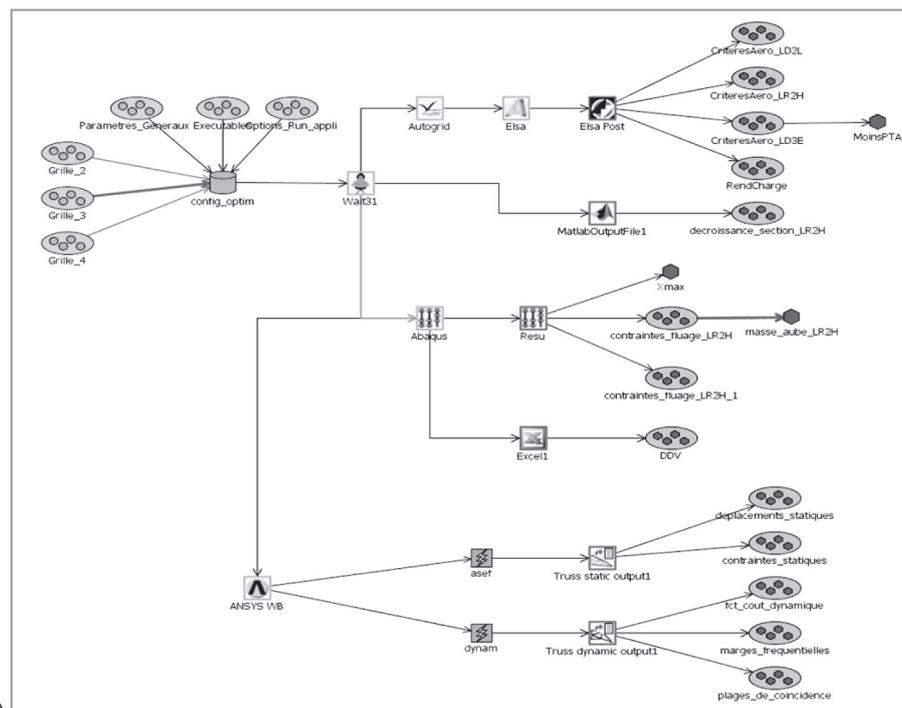
software tools, resources, requirements and often contradictory objectives. Again the application comes from the aerospace manufacturing industry and the design of an aircraft tail rudder.

A typical experimental scenario is a repetitive cycle of moving data to a supercomputer for analysis or simulation, launching the computations and managing the storage of the output results. The scenario is often repeated hundreds of times in order to find an optimal solution. Scientific workflow systems aim at automating this cycle in a way to make it easier for scientists to focus on their research and not computation management. Several tools have been developed to support simulation workflows and automate the computational work involved. For instance, Optimus® by Noesis [6] is a complete tool that permits parametric modeling and also offers optimization techniques within its tool to enable simulation process integration, and to optimize engineering design and prototyping processes. As shown in figure 2a, an automobile manufacturing case may contain a simulation workflow that is introduced to the tool in order to be executed repeatedly until an optimal solution is found (figure 2b). The role of the optimization supported by these tools is to find the best product characteristics or the best design parameters to satisfy its requirements. The sequence of the computational tasks and the simulation execution details or synchronization are in general fixed from the initial workflow setup.

Figure 2. (a) A workflow from Automotive manufacturing, and, (b) the Simulation Workflow representation on Optimus Tool [6] for simulation automation & parameter optimization.



(a)



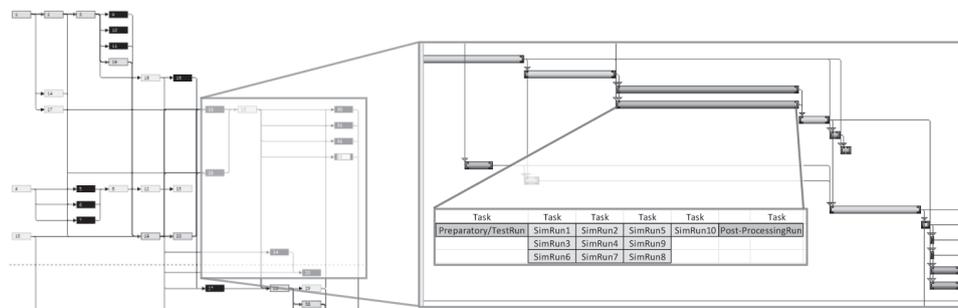
(b)

The required simulations may be executed in-house (in the same workstation, a dedicated server), or, remotely (a super computer, a cloud service, a sever farm, or another HPC web service). In the above example all runs are submitted to one resource (HPC) but the more realistic case is the availability of a set of resources with different performance, cost & utilization characteristics. The optimal scheduling of the simulation runs (on the available resources in the available time) is a completely different optimization task than the one supported by the workflow automation tools for the optimization of the product.

2. Problem Description

In the present work we will focus on the optimization of the workflow execution schedule and especially on a Resource-Constrained Optimization of a Simulation Workflow execution. More precisely, the aim is to design an optimization algorithm that provides optimal schedules for the execution of the computational tasks of a given workflow, satisfying not only the precision requirements but also time, money and resource constrains, as faced by a CAE designer (figure 3).

Figure 3. From a PERT graph of tasks (left) to the Gantt chart (right) and to the detailed Simulations Schedule (middle).



The design of a product is a process involving many tasks human, physical or simulations. A first step is to locate all the interconnected simulation/computation tasks in the higher level workflow and create the corresponding simulation workflow. A next step is to define the required tools such on hardware and software either local or remote, and, a last step is to locate the available resources, time & money that will pose several constrains on the scheduling process. Our goal is to use the lowest amount of resources, time & money without reducing the quality of the results. These objectives are contradictory and they make our scheduling problem harder to solve.

Workflow scheduling focuses on mapping and managing the execution of inter-dependent tasks on diverse utility services. For the special case of cloud-oriented workflow systems, one of the most important missions is to dispatch tasks to resources based on customer's requirements and the characteristics of cloud-oriented workflow tasks, as well as time-cost of scheduling [7].

In general, the problem of mapping tasks on distributed services belongs to a class of problems known as "NP hard problem". For such problems, no known algorithms are able to generate the optimal solution within polynomial time. Although the workflow scheduling problem can be solved by using exhaustive search, the complexity of the methods for solving it is very large [8]. For grid computing environments, scheduling decision must be produced in the shortest time possible, because there are many users compute for resources and desired time slots could be occupied by others at any time. Genetic algorithms (GAs) provide robust search techniques that allow a high-quality solution to be derived from a large search space in polynomial time, by applying the principle of evolution. A successful application of GAs for workflow optimization in the aerospace manufacturing domain is also presented in [9].

3. Evolutionary and Genetic Algorithms

The Genetic Algorithm is a class of Evolutionary Algorithms that works on the principle of survival of the fittest via natural selection [10]. It combines the exploitation of best solutions from past searches with the exploration of new regions of the solution space. Any solution in the search space of the problem is represented by a member of the population (an individual – in chromosomes). The population of individuals evolves over generations. The quality of a member of the population is a score or penalty determined by a fitness-function.

The score value indicates how good the individual is compared to others in the population.

A Genetic Algorithm performs the following steps:

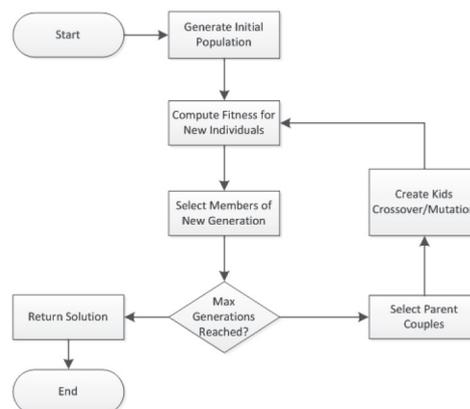
1. Generates an initial population.
2. Computes the fitness for each individual.
3. Selects the parent couples
4. Creates the kids from the parents.
5. Selects the final members of the next generation
6. Returns to step 2 until a satisfactory solution is obtained.

The GA optimizer can use various forms of selection, cross-over/ mutation (steps 3 to 5) to evolve the initial population. The important parameters of a GA are the: Population Size, Number of Generations, Crossover/ Mutation types & rates and Selection procedures, where:

- Crossover, is an exchange of substrings denoting chromosomes, for an optimization problem,
- Mutation, is the modification of bit strings in a single individual, and
- Selection is the evaluation of the fitness criterion to choose which individuals from a population will go on to reproduce.

As shown in figure 4, the GA cycle (steps 2 to 6) is repeated until a termination condition has been reached, such as: a solution that meets the criteria, the maximum number of generations, the maximum time allowed, etc. The member of the last generation with the highest score(s) is the best solution and may be accompanied by the other top candidates to create a set of best solutions proposed by the algorithm.

Figure 4. The Genetic Algorithm flowchart.



4. Simulation Workflow Optimization

During a product design & development process we need to perform numerous simulations and, proper scheduling of the simulations can save time, money, human or computer resources and provide better results. The proposed method is trying to solve the more complex and more realistic case of optimizing a set of simulation tasks over a set of heterogeneous computing resources. This is one step ahead of the widely studied case of multiple identical or uniform resources, like a cloud or grid computing infrastructure. In our case, the designer needs to execute a series of computational tasks, in order to investigate as many as possible solutions before concluding to the final design. Submitting all computational tasks to only one resource (e.g., grid computing) is an easy and trivial case where no optimization is required by the designer, and where the grid provider may perform a local optimization of its processors, only to improve the grid efficiency.

In this work we face the common and realistic case where the designer has a number of different computing resources available, and, he is also responsible to optimize their use. The available infrastructure may be local computing resources such as: a workstation, a dedicated server, or a server farm, or, they may be remote and rented on demand such as: a super computer, a cloud service, or a specific high performance computing (HPC) web service. Moreover the designer needs to simulate & analyze several product models using different software tools that may or may not run on each available resource.

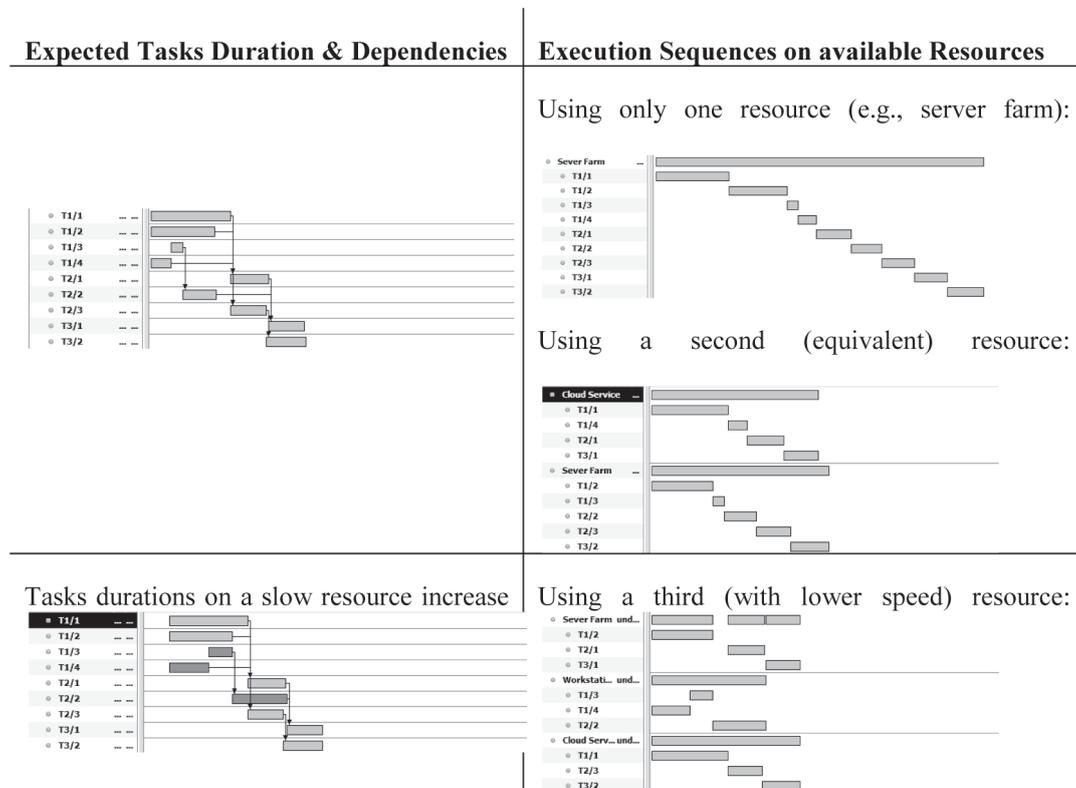
Figure 5. Sample lists of (a) Computational Tasks, and, (b) Available Resources

TASK category	Task type (SW)	Duration(h)	Runs	Task Instances	SW Required	Precedence
T1/1 - FEM	Linear Finite Element Analysis	2	50	T1/1 (1 ... 20)	1	-
T1/2 - FEM	Non-Linear Finite Element Analysis	8	10	T1/2 (1 ... 10)	2	-
T1/3 - FEM	Stress Analysis	3	5	T1/3 (1 ... 5)	1;2	-
T1/4 - FEM	Deformation/Displacement Calc.	5	5	T1/4 (1 ... 5)	1;2	-
T2/1 - CFD	Comp. Fluid Dynamics Analysis	12	4	T2/1 (1 ... 4)	3	T1/1 & T1/2
T2/2 - CFD	Air Flow Simulations	14	3	T2/2 (1 ... 3)	3	T1/3
T2/3 - CFD	Noise & Pressure Calc.	15	3	T2/3 (1 ... 3)	3	T1/1 & T1/4
T3/1 - CATIA	CATIA DMU Analysis	9	5	T3/1 (1 ... 5)	4	T2/1 & T2/2
T3/2 - CATIA	CATIA Ergonomics Analysis	10	5	T3/2 (1 ... 5)	4	T2/3

Comp.Resource	Availability	Speed	Cost	Operator
Work-Station1	100	1	1	1
Local Server1	50	3	2	1
Server farm	50	10	5	0
Super-Computer	10	20	20	0
Cloud Computing	100	10	10	1

The proposed method solves the problem by optimizing the schedule of an intermediate simulation workflow (at a lower, but not the lowest – grid – level). This workflow contains all computational tasks or subtasks and their dependencies in detail. All costs and constraints associated with simulations are also considered as variable, enabling further optimization. Also simulation criteria such as accuracy can be varied to investigate for the optimal balance between e.g. acceptable accuracy, computational cost and simulation duration that fit the higher-level schedule. This is achieved by utilizing semantic annotations of each model and simulation task. The relationships, requirements, costs and constraints of the required simulations and the overall optimization loop are examined in detail by accessing and assessing the information available (figure 5) from the semantic annotations of each model.

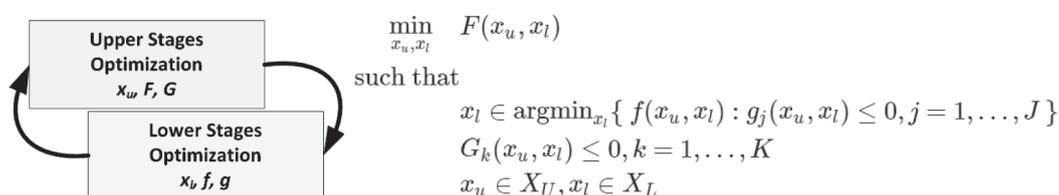
Figure 6. Simulation workflow execution time optimization using heterogeneous computational resources



When the optimization process is invoked, the Genetic Algorithm starts with an initial population of solutions which are members of the search space. The search space contains all possible combinations of task assignments on the available resources (figure 6). Each solution (schedule) is evaluated, and an overall score/penalty is assigned. Constraints violations are excluded or penalized by a quadratic function depending the severity. Schedules are sorted by their efficiency and the fittest of the last generation is considered as the best solution.

The advantage of the method is that it is situated between two other optimization stages: the optimization of the entire process higher level workflow (containing all human, physical and computational tasks) and the lowest local resource optimization level performed by the service provider. The various workflow levels create a multi-level hierarchical system and a bi-level optimization may be applied until equilibrium is reached. The simulation workflow optimization method updates the computational tasks details and informs the higher level optimization tool in order to produce an updated solution. The new task constraints are again fed into the simulation workflow optimization to re-evaluate the optimal schedule and resubmit the results (figure 7).

Figure 7. Bi-level optimization for a multi-level hierarchical system



Another advantage of the method is its capability for on-line optimization. Whenever a change is observed on a resource characteristic, such as: availability, speed, cost, etc., the optimization algorithm is executed again either automatically or on a user demand. The revised schedule is optimal and may replace the original but suboptimal (currently) schedule. The revision, if significant enough, may also trigger a new global optimization on a higher level.

Example Use Case

The above described method has been applied for the optimization of a product development process in the aerospace manufacturing domain. Developing an aircraft part is a multiphase process starting with a proposal phase and followed by a preliminary and a detailed design phase. In each phase models are used with different level of fidelity. The challenge in each of these phases is the iterative nature between design, stress analysis, sizing and performance analysis. After a design is made, linear and non-linear stress analysis is performed on the design to check if stress limits are not exceeded. Based on that analysis the structural elements are sized in order to stay within limits. Based on the sizing a performance analysis can be made with respect to weight and cost. Another challenge lies in the use of a common geometric model of the aircraft part, usually by means of a CAD model. This CAD model is used for Finite Element Analyses and also provides information for the recurring and non-recurring cost estimations. It is extremely important that all disciplines use the same basis. Currently the design of a rudder is time-consuming and costly. It requires a lead time in the order of several months. Also time and resource constraints do not allow for many design iterations, such that a feasible but sub-optimal design is usually achieved. The proposed method for simulation workflow optimization was able to improve the search for an optimal rudder design, through investigation of multiple repeated simulations of varying configurations, while trying to satisfy conflicting requirements such as: customer satisfaction, weight minimization, manufacturing cost minimization. By optimizing each simulation workflow, a significant amount of time could be saved, or alternatively, a larger set of product variations could be tested, both resulting to increased customer satisfaction [11].

5. Conclusion

In this work an evolutionary method was presented for optimizing the execution of simulation workflows. The method is based on a heuristic optimization technique (Genetic Algorithms) that is applied to deliver an optimized workflow implementation of an initial workflow schedule. The method can be used on-line and in conjunction with a global optimization technique to continuously update the execution schedules of the computational tasks of any complex process. The proposed method demonstrates its potentials when the product

<https://sites.google.com/site/icqqmeas2015>

design problem requires a lot of time consuming simulations or finite elements analysis under a constrained availability of computer resources.

References

- [1] webmaster@ftb.ca.gov (27 October 2009). "Business Process Management Center of Excellence Glossary" (PDF). Retrieved 31 March 2015.
- [2] Simtech Cluster of Excellence, University of Stuttgart, <http://www.iaas.uni-stuttgart.de/forschung/projects/simtech/sim-workflows.php>
- [3] Tsahalidis, J., Tsahalidis, H.-T., Moussas, V.C. (2012) "Modeling the Comfort of Aircraft Passengers as part of the Passenger Cabin Environmental Control System (ECS)", Proceedings of the 5th IC-SCCE, Athens, 4-7 July, 2012.
- [4] Lee H. and Kim S.-S. (2001), "Integration of Process Planning and Scheduling Using Simulation Based Genetic Algorithms". *Int J Adv Manuf Technol* 18:586-590, 2001.
- [5] Tsahalidis, J., Moussas, V.C., Tsahalidis, H.-T. (2014) "An Algorithm for Distributed Heterogeneous Simulation Workflow Optimization", Proceedings of the 6th IC-SCCE, Athens, 9-12 July, 2014.
- [6] Optimus®, Process Optimization, Noesis Solutions <http://www.noesisolutions.com/Noesis/>. Retrieved 31 March 2015.
- [7] Chunlai Chai, (2013). "Modeling Resource-Constrained Project Scheduling Problem and its Solution by Genetic Algorithm". *Journal of Digital Information Management*, 11(2), 2013, pp.87-92.
- [8] Jia Yu and Rajkumar Buyya, (2006) "A Budget Constrained Scheduling of Workflow Applications on Utility Grids using Genetic Algorithms" Workshop on Workflows in Support of Large-Scale Science, Proceedings of the 15th IEEE International Symposium on High Performance Distributed Computing (HPDC).
- [9] Tsahalidis, J., Tsahalidis, H.-T., Moussas, V.C. (2013) "Optimization of a Heterogeneous Simulations Workflow", Proceedings of the 5th IC-EpsMsO, Athens, 3-6 July, 2013
- [10] Whitley L. Darrell (Ed) (1993), "Foundations of Genetic Algorithms", MorganKauffmann 1993.
- [11] Moussas, V.C., Tsahalidis, J., Tsahalidis, H.-T. (2014) "Simulation Workflow Optimization Application in Aerospace Manufacturing", Proceedings of the 6th IC-SCCE, Athens, 9-12 July, 2014.

EVOLUTIONARY OPTIMIZATION OF SIMULATION WORKFLOWS FOR PRODUCT DESIGN PROCESSES

Vassilios C. Moussas

Associate Professor, Dept. of Civil & Surveying Engineering, TEI of Athens, Greece

e-mail: vmouss@teiath.gr

ABSTRACT

Simulation workflow optimization has become an important investigation area, as it allows users to process large scale & heterogeneous problems in distributed environments in a more flexible way. The most characteristic categories of such problems come from the aerospace and the automotive industries. In this work a specially developed algorithm that is based on heuristic optimization techniques (Genetic Algorithms) is applied to deliver an optimized workflow implementation of an initial workflow schedule (PERT). In order to demonstrate its potentials, the algorithm is applied on a sample manufacturing product design problem that requires a lot of time consuming simulations & finite elements analysis under a constrained availability of computer resources.

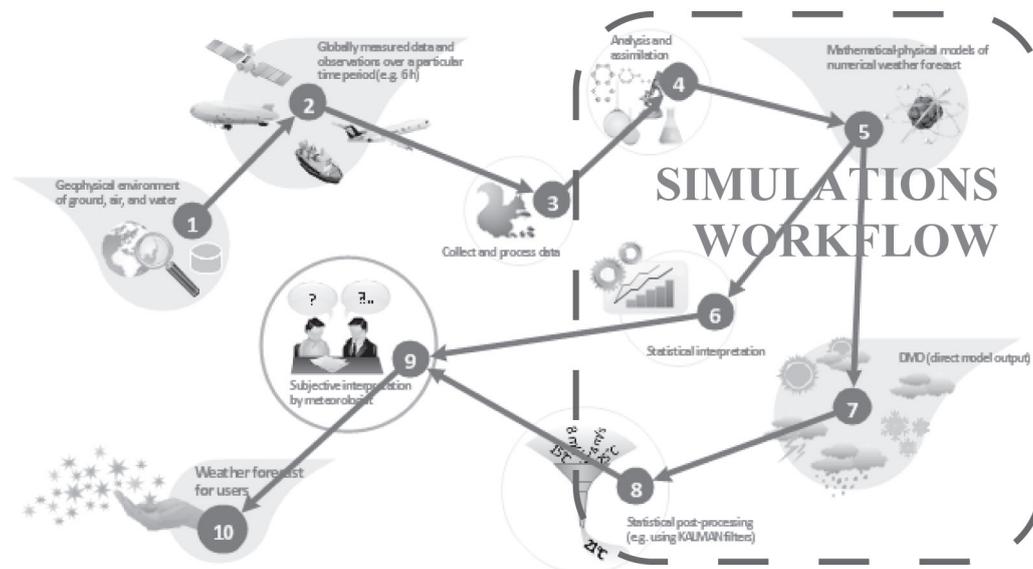
Keywords: Simulation Workflow Optimization, PERT, Genetic Algorithms, Resource Optimization

1. Introduction

Workflows have been used to model repeatable tasks or operations in a number of different industries including manufacturing and software. A workflow typically represents a schedule of the required tasks (human, physical, virtual, etc.) based on their dependencies and the associated resources. Definitions of the term “workflow” can be found in Wikipedia and the [1]. Higher level workflows contain all tasks required to accomplish a specific goal. Some of these tasks are further analyzed in lower level workflows. Computation tasks are occupying an increasing part of the Product Design Process in industry today, often using supercomputers to calculate FEM or CFD analysis, or simulate large, physically complex systems modeled by PDEs. As a result the overall (higher) workflow efficiency and optimization is highly dependent by the optimization of the included (lower) simulation workflows.

An example workflow chart is presented below, redesigned from article [2], displaying the sequence of concatenated steps for weather prediction. In this higher level workflow, steps 1 to 3 represent the data collection from various sources and the necessary pre processing actions, steps 4 to 8 is the part containing the computational analysis and simulations (simulations workflow), and, steps 9 & 10 contain the post processing actions, statistical analysis and visualization of results. The simulations workflow contains several tasks or smaller workflows that perform a number of lengthy and complicated calculations such as: data transformation to a common format (in 4), numerical weather forecast based on mathematical-physical models, environmental area discretization, numerical solution of a system of partial differential equations (in 5), statistical interpretation and forecasting (in 6), numerical results interpolation (in 7) and, statistical post-processing to remove failures of measuring devices (e.g. using KALMAN filters) (in 8).

Figure 1. Example of a weather forecast workflow [2] and its simulation workflow part.



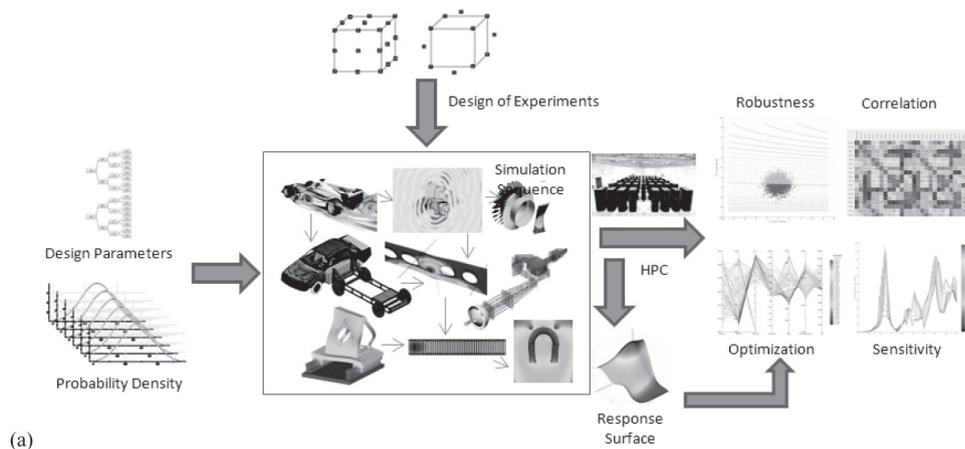
In the aerospace manufacturing industry we can find much more complex simulation workflows, as the one given in [3], where the manufacturer needs to solve a multi-disciplinary optimization problem involving several partners or subcontractors. In order to improve the design of a new cabin, a number of simulations & analysis tasks are required involving, calculations of environmental CFD models, structural FEM models, electrical/thermal control models, power plant FEM models and human response ANN models. The designer needs not only to optimize the final cabin design, but also to optimize the execution schedules of all the required computational tasks, in terms of time, cost and accuracy.

As the Product Development Processes (PDPs) become more and more decentralized and distributed, the associated optimization problems also become more complex, with multiple & contradictory objectives and they require powerful and/or specially designed optimization tools [4]. In addition, the distributed environment of large scale problems requires the software tools to be accessible from anywhere as been local. A promising simulation workflow optimization tool is proposed in [5] that is using evolutionary methods in order to optimize a heterogeneous simulation workflow containing several computational tasks that involve completely different

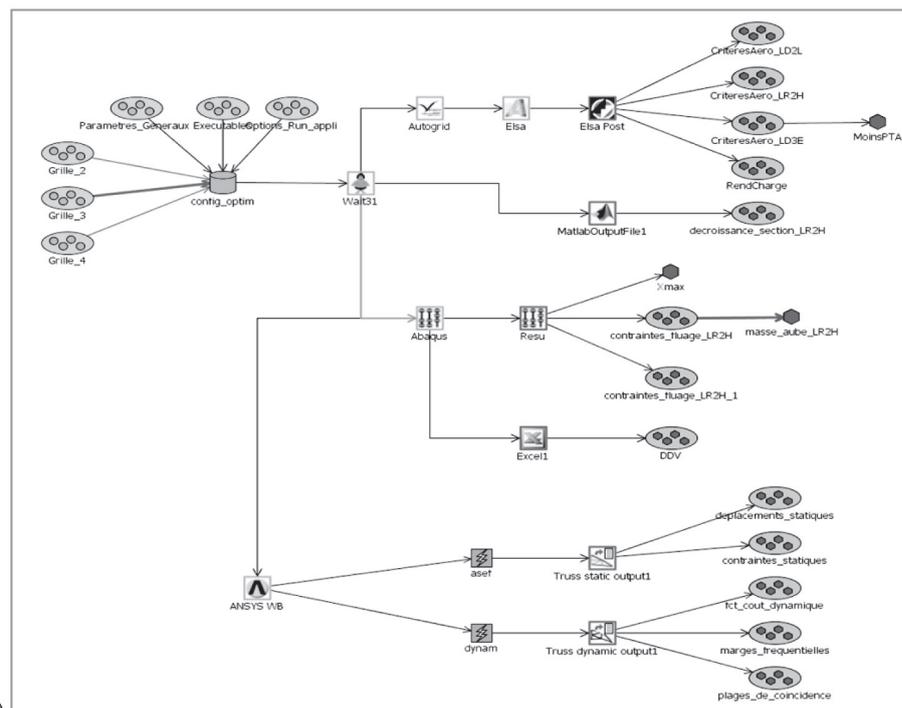
software tools, resources, requirements and often contradictory objectives. Again the application comes from the aerospace manufacturing industry and the design of an aircraft tail rudder.

A typical experimental scenario is a repetitive cycle of moving data to a supercomputer for analysis or simulation, launching the computations and managing the storage of the output results. The scenario is often repeated hundreds of times in order to find an optimal solution. Scientific workflow systems aim at automating this cycle in a way to make it easier for scientists to focus on their research and not computation management. Several tools have been developed to support simulation workflows and automate the computational work involved. For instance, Optimus® by Noesis [6] is a complete tool that permits parametric modeling and also offers optimization techniques within its tool to enable simulation process integration, and to optimize engineering design and prototyping processes. As shown in figure 2a, an automobile manufacturing case may contain a simulation workflow that is introduced to the tool in order to be executed repeatedly until an optimal solution is found (figure 2b). The role of the optimization supported by these tools is to find the best product characteristics or the best design parameters to satisfy its requirements. The sequence of the computational tasks and the simulation execution details or synchronization are in general fixed from the initial workflow setup.

Figure 2. (a) A workflow from Automotive manufacturing, and, (b) the Simulation Workflow representation on Optimus Tool [6] for simulation automation & parameter optimization.



(a)



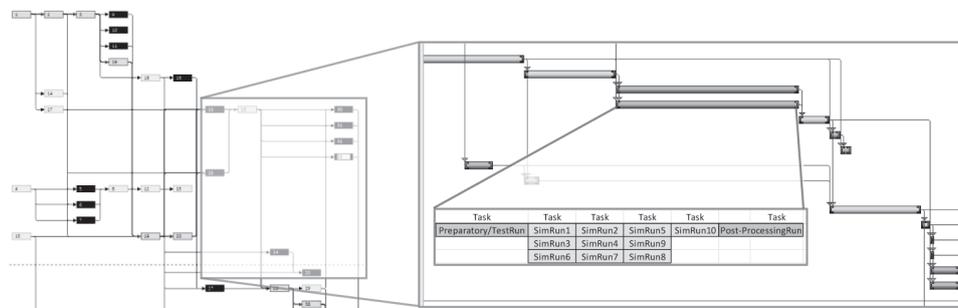
(b)

The required simulations may be executed in-house (in the same workstation, a dedicated server), or, remotely (a super computer, a cloud service, a sever farm, or another HPC web service). In the above example all runs are submitted to one resource (HPC) but the more realistic case is the availability of a set of resources with different performance, cost & utilization characteristics. The optimal scheduling of the simulation runs (on the available resources in the available time) is a completely different optimization task than the one supported by the workflow automation tools for the optimization of the product.

2. Problem Description

In the present work we will focus on the optimization of the workflow execution schedule and especially on a Resource-Constrained Optimization of a Simulation Workflow execution. More precisely, the aim is to design an optimization algorithm that provides optimal schedules for the execution of the computational tasks of a given workflow, satisfying not only the precision requirements but also time, money and resource constrains, as faced by a CAE designer (figure 3).

Figure 3. From a PERT graph of tasks (left) to the Gantt chart (right) and to the detailed Simulations Schedule (middle).



The design of a product is a process involving many tasks human, physical or simulations. A first step is to locate all the interconnected simulation/computation tasks in the higher level workflow and create the corresponding simulation workflow. A next step is to define the required tools such on hardware and software either local or remote, and, a last step is to locate the available resources, time & money that will pose several constrains on the scheduling process. Our goal is to use the lowest amount of resources, time & money without reducing the quality of the results. These objectives are contradictory and they make our scheduling problem harder to solve.

Workflow scheduling focuses on mapping and managing the execution of inter-dependent tasks on diverse utility services. For the special case of cloud-oriented workflow systems, one of the most important missions is to dispatch tasks to resources based on customer's requirements and the characteristics of cloud-oriented workflow tasks, as well as time-cost of scheduling [7].

In general, the problem of mapping tasks on distributed services belongs to a class of problems known as "NP hard problem". For such problems, no known algorithms are able to generate the optimal solution within polynomial time. Although the workflow scheduling problem can be solved by using exhaustive search, the complexity of the methods for solving it is very large [8]. For grid computing environments, scheduling decision must be produced in the shortest time possible, because there are many users compute for resources and desired time slots could be occupied by others at any time. Genetic algorithms (GAs) provide robust search techniques that allow a high-quality solution to be derived from a large search space in polynomial time, by applying the principle of evolution. A successful application of GAs for workflow optimization in the aerospace manufacturing domain is also presented in [9].

3. Evolutionary and Genetic Algorithms

The Genetic Algorithm is a class of Evolutionary Algorithms that works on the principle of survival of the fittest via natural selection [10]. It combines the exploitation of best solutions from past searches with the exploration of new regions of the solution space. Any solution in the search space of the problem is represented by a member of the population (an individual – in chromosomes). The population of individuals evolves over generations. The quality of a member of the population is a score or penalty determined by a fitness-function.

The score value indicates how good the individual is compared to others in the population.

A Genetic Algorithm performs the following steps:

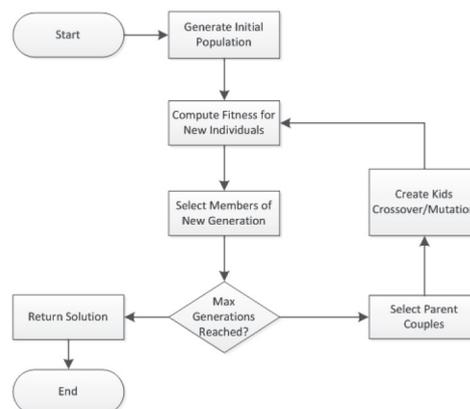
1. Generates an initial population.
2. Computes the fitness for each individual.
3. Selects the parent couples
4. Creates the kids from the parents.
5. Selects the final members of the next generation
6. Returns to step 2 until a satisfactory solution is obtained.

The GA optimizer can use various forms of selection, cross-over/ mutation (steps 3 to 5) to evolve the initial population. The important parameters of a GA are the: Population Size, Number of Generations, Crossover/ Mutation types & rates and Selection procedures, where:

- Crossover, is an exchange of substrings denoting chromosomes, for an optimization problem,
- Mutation, is the modification of bit strings in a single individual, and
- Selection is the evaluation of the fitness criterion to choose which individuals from a population will go on to reproduce.

As shown in figure 4, the GA cycle (steps 2 to 6) is repeated until a termination condition has been reached, such as: a solution that meets the criteria, the maximum number of generations, the maximum time allowed, etc. The member of the last generation with the highest score(s) is the best solution and may be accompanied by the other top candidates to create a set of best solutions proposed by the algorithm.

Figure 4. The Genetic Algorithm flowchart.



4. Simulation Workflow Optimization

During a product design & development process we need to perform numerous simulations and, proper scheduling of the simulations can save time, money, human or computer resources and provide better results. The proposed method is trying to solve the more complex and more realistic case of optimizing a set of simulation tasks over a set of heterogeneous computing resources. This is one step ahead of the widely studied case of multiple identical or uniform resources, like a cloud or grid computing infrastructure. In our case, the designer needs to execute a series of computational tasks, in order to investigate as many as possible solutions before concluding to the final design. Submitting all computational tasks to only one resource (e.g., grid computing) is an easy and trivial case where no optimization is required by the designer, and where the grid provider may perform a local optimization of its processors, only to improve the grid efficiency.

In this work we face the common and realistic case where the designer has a number of different computing resources available, and, he is also responsible to optimize their use. The available infrastructure may be local computing resources such as: a workstation, a dedicated server, or a server farm, or, they may be remote and rented on demand such as: a super computer, a cloud service, or a specific high performance computing (HPC) web service. Moreover the designer needs to simulate & analyze several product models using different software tools that may or may not run on each available resource.

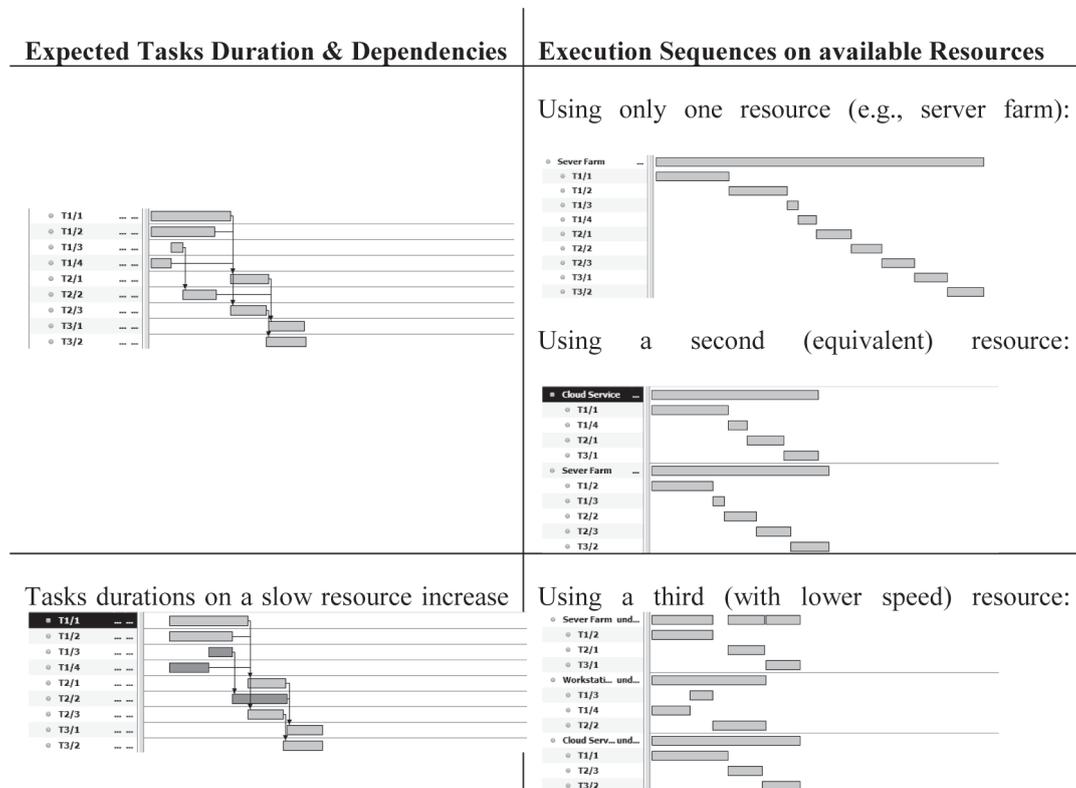
Figure 5. Sample lists of (a) Computational Tasks, and, (b) Available Resources

TASK category	Task type (SW)	Duration(h)	Runs	Task Instances	SW Required	Precedence
T1/1 - FEM	Linear Finite Element Analysis	2	50	T1/1 (1 ... 20)	1	-
T1/2 - FEM	Non-Linear Finite Element Analysis	8	10	T1/2 (1 ... 10)	2	-
T1/3 - FEM	Stress Analysis	3	5	T1/3 (1 ... 5)	1;2	-
T1/4 - FEM	Deformation/Displacement Calc.	5	5	T1/4 (1 ... 5)	1;2	-
T2/1 - CFD	Comp. Fluid Dynamics Analysis	12	4	T2/1 (1 ... 4)	3	T1/1 & T1/2
T2/2 - CFD	Air Flow Simulations	14	3	T2/2 (1 ... 3)	3	T1/3
T2/3 - CFD	Noise & Pressure Calc.	15	3	T2/3 (1 ... 3)	3	T1/1 & T1/4
T3/1 - CATIA	CATIA DMU Analysis	9	5	T3/1 (1 ... 5)	4	T2/1 & T2/2
T3/2 - CATIA	CATIA Ergonomics Analysis	10	5	T3/2 (1 ... 5)	4	T2/3

Comp.Resource	Availability	Speed	Cost	Operator
Work-Station1	100	1	1	1
Local Server1	50	3	2	1
Server farm	50	10	5	0
Super-Computer	10	20	20	0
Cloud Computing	100	10	10	1

The proposed method solves the problem by optimizing the schedule of an intermediate simulation workflow (at a lower, but not the lowest – grid – level). This workflow contains all computational tasks or subtasks and their dependencies in detail. All costs and constraints associated with simulations are also considered as variable, enabling further optimization. Also simulation criteria such as accuracy can be varied to investigate for the optimal balance between e.g. acceptable accuracy, computational cost and simulation duration that fit the higher-level schedule. This is achieved by utilizing semantic annotations of each model and simulation task. The relationships, requirements, costs and constraints of the required simulations and the overall optimization loop are examined in detail by accessing and assessing the information available (figure 5) from the semantic annotations of each model.

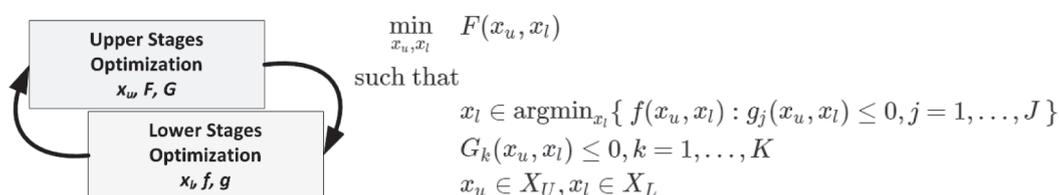
Figure 6. Simulation workflow execution time optimization using heterogeneous computational resources



When the optimization process is invoked, the Genetic Algorithm starts with an initial population of solutions which are members of the search space. The search space contains all possible combinations of task assignments on the available resources (figure 6). Each solution (schedule) is evaluated, and an overall score/penalty is assigned. Constraints violations are excluded or penalized by a quadratic function depending the severity. Schedules are sorted by their efficiency and the fittest of the last generation is considered as the best solution.

The advantage of the method is that it is situated between two other optimization stages: the optimization of the entire process higher level workflow (containing all human, physical and computational tasks) and the lowest local resource optimization level performed by the service provider. The various workflow levels create a multi-level hierarchical system and a bi-level optimization may be applied until equilibrium is reached. The simulation workflow optimization method updates the computational tasks details and informs the higher level optimization tool in order to produce an updated solution. The new task constraints are again fed into the simulation workflow optimization to re-evaluate the optimal schedule and resubmit the results (figure 7).

Figure 7. Bi-level optimization for a multi-level hierarchical system



Another advantage of the method is its capability for on-line optimization. Whenever a change is observed on a resource characteristic, such as: availability, speed, cost, etc., the optimization algorithm is executed again either automatically or on a user demand. The revised schedule is optimal and may replace the original but suboptimal (currently) schedule. The revision, if significant enough, may also trigger a new global optimization on a higher level.

Example Use Case

The above described method has been applied for the optimization of a product development process in the aerospace manufacturing domain. Developing an aircraft part is a multiphase process starting with a proposal phase and followed by a preliminary and a detailed design phase. In each phase models are used with different level of fidelity. The challenge in each of these phases is the iterative nature between design, stress analysis, sizing and performance analysis. After a design is made, linear and non-linear stress analysis is performed on the design to check if stress limits are not exceeded. Based on that analysis the structural elements are sized in order to stay within limits. Based on the sizing a performance analysis can be made with respect to weight and cost. Another challenge lies in the use of a common geometric model of the aircraft part, usually by means of a CAD model. This CAD model is used for Finite Element Analyses and also provides information for the recurring and non-recurring cost estimations. It is extremely important that all disciplines use the same basis. Currently the design of a rudder is time-consuming and costly. It requires a lead time in the order of several months. Also time and resource constraints do not allow for many design iterations, such that a feasible but sub-optimal design is usually achieved. The proposed method for simulation workflow optimization was able to improve the search for an optimal rudder design, through investigation of multiple repeated simulations of varying configurations, while trying to satisfy conflicting requirements such as: customer satisfaction, weight minimization, manufacturing cost minimization. By optimizing each simulation workflow, a significant amount of time could be saved, or alternatively, a larger set of product variations could be tested, both resulting to increased customer satisfaction [11].

5. Conclusion

In this work an evolutionary method was presented for optimizing the execution of simulation workflows. The method is based on a heuristic optimization technique (Genetic Algorithms) that is applied to deliver an optimized workflow implementation of an initial workflow schedule. The method can be used on-line and in conjunction with a global optimization technique to continuously update the execution schedules of the computational tasks of any complex process. The proposed method demonstrates its potentials when the product

design problem requires a lot of time consuming simulations or finite elements analysis under a constrained availability of computer resources.

References

- [1] webmaster@ftb.ca.gov (27 October 2009). "Business Process Management Center of Excellence Glossary" (PDF). Retrieved 31 March 2015.
- [2] Simtech Cluster of Excellence, University of Stuttgart, <http://www.iaas.uni-stuttgart.de/forschung/projects/simtech/sim-workflows.php>
- [3] Tsahalidis, J., Tsahalidis, H.-T., Moussas, V.C. (2012) "Modeling the Comfort of Aircraft Passengers as part of the Passenger Cabin Environmental Control System (ECS)", Proceedings of the 5th IC-SCCE, Athens, 4-7 July, 2012.
- [4] Lee H. and Kim S.-S. (2001), "Integration of Process Planning and Scheduling Using Simulation Based Genetic Algorithms". *Int J Adv Manuf Technol* 18:586-590, 2001.
- [5] Tsahalidis, J., Moussas, V.C., Tsahalidis, H.-T. (2014) "An Algorithm for Distributed Heterogeneous Simulation Workflow Optimization", Proceedings of the 6th IC-SCCE, Athens, 9-12 July, 2014.
- [6] Optimus®, Process Optimization, Noesis Solutions <http://www.noesisolutions.com/Noesis/>. Retrieved 31 March 2015.
- [7] Chunlai Chai, (2013). "Modeling Resource-Constrained Project Scheduling Problem and its Solution by Genetic Algorithm". *Journal of Digital Information Management*, 11(2), 2013, pp.87-92.
- [8] Jia Yu and Rajkumar Buyya, (2006) "A Budget Constrained Scheduling of Workflow Applications on Utility Grids using Genetic Algorithms" Workshop on Workflows in Support of Large-Scale Science, Proceedings of the 15th IEEE International Symposium on High Performance Distributed Computing (HPDC).
- [9] Tsahalidis, J., Tsahalidis, H.-T., Moussas, V.C. (2013) "Optimization of a Heterogeneous Simulations Workflow", Proceedings of the 5th IC-EpsMsO, Athens, 3-6 July, 2013
- [10] Whitley L. Darrell (Ed) (1993), "Foundations of Genetic Algorithms", MorganKauffmann 1993.
- [11] Moussas, V.C., Tsahalidis, J., Tsahalidis, H.-T. (2014) "Simulation Workflow Optimization Application in Aerospace Manufacturing", Proceedings of the 6th IC-SCCE, Athens, 9-12 July, 2014.

HUMAN SOCIAL SENSORS: DELAY-DRIVEN DETECTION OF EVENTS IN SOCIAL MEDIA FOR ADVERTISING APPLICATIONS

Klimis Ntalianis^{1*}, Maria Tsirintani¹ and Spyridon Binioris¹

¹Athens University of Applied Sciences, Faculty of Management and Economics

28, Agiou Spyridonos str., Egaleo 12210, Athens, Greece

*e-mail: kntal@teiath.gr

ABSTRACT

Humans can be regarded as geographically distributed, multimodal sensors, who publish what they see and feel through blogs, forums, product reviews, and several available social networking sites. In this direction, Facebook or Twitter have short delays in reflecting what their users perceive, compared to other venues such as blogs and product reviews, which usually have much longer delays. And the question are: how good are the large social networks at near real-time sensing ? What are the lowest time limits of detecting a new event ? Towards this target, we devise efficient data collection and event recognition solutions over the most famous social networks (like Facebook, Twitter etc), so that content is rapidly extracted. These new capabilities are very useful not only e.g. for creating program guides for live broadcasting, but also for providing a better, more effective pricing mechanism for selling advertisement slots, typically by sensing instantaneous popularity of a segment. Preliminary experimental results over real data illustrate the promising performance of the proposed scheme.

Keywords: Social Media, Social Computing, Segment Popularity, Social Latent Semantic Analysis, Advertisement Slots.

JEL Classification: M37

1. Introduction

Publications (posts, tweets etc.) in social media can be considered as the “readings” of human sensors that contain information about the physical world that we sense. In this direction, social networks have expanded rapidly during the last decade and till now their content has already been used in a variety of applications such as: (a) for ranking news stories (based on the interest they attract), (b) for building profiles of user preferences (based on implicit/explicit interactions), (c) even for products’ recommendations (based on recorded activity). However this type of conversational, user-generated content found in social networks, might add great value and open amazing new horizons to marketing.

In this direction, Facebook or Twitter are considered to be the fastest to reflect what their users perceive. While many have demonstrated Twitter can provide insights into major social and physical events like earthquakes, celebrity deaths and presidential elections, in this work, we focus on the problem of near real-time sensing, for less significant but more frequent events such as sport games. Towards this target, we devise efficient data collection and event recognition solutions also over rule-stringent social networks (like Facebook), so that content is automatically annotated. These capabilities are very useful not only for creating program guides for live broadcasting, but also for providing a better pricing mechanism for selling advertisement slots, typically by sensing instantaneous popularity of a segment.

Here it should be mentioned that there are multiple challenges toward game event recognition using e.g. Facebook, Twitter or other social media. Firstly, posts should be detected and separated. Secondly, we should be able to distinguish which game a post is referencing to, when many games are played simultaneously. Finally, this analysis should be done in near real-time, having as short delays as possible. For example, to be useful for advanced advertising auctions, the event has to be recognized within seconds in order to auction and consequently display a customized advertisement. Otherwise, the information is meaningless when people are no longer interested in the event. In our case, two sources contribute to the delay: users and the proposed algorithm. More specifically, between perceiving an event and posting it, a fraction of time passes. This human delay is mainly determined by how fast social media users perceive the event, how fast they react to it, and how fast they type the post. Additionally, our data collection and analysis also introduces delays. To efficiently tackle this challenge, we incorporate a fast filtering method that discards content when it is out of time and incorporate a simple lexicon-based method. Preliminary experimental results illustrate the promising performance of the proposed scheme.

2. Related Work

Social media have been used to detect different social and physical events. Sakaki et al [1] and Qu et al [2] investigated the earthquakes detection. Vieweg et al [3] studied the grassfire and floods, on microblogs. TwitterStand [4] identifies current news topics and clusters the corresponding tweets into news stories. Hannon et al [5] used post rate of tweets to produce video highlights of the World Cup off-line. They did not recognize game events nor did they produce highlights in real-time. Chakrabarti and Punera [6] assumed that a game event is already recognized and focused on describing the event using Hidden Markov Models trained with tweets collected from events happened in the past. Ekin et al [7] employed visual features analysis to summarize soccer videos. Petridis et al [8] used MPEG-7 and webcast text to extract sports events.

On the other hand, latest works include [9]-[14]. In [9] a social software platform is proposed to detect a number of meaningful events from information diffusion patterns on social network services. The platform has been applied to fetch and cluster tweets from Twitter into relevant categories to reveal hot topics. In [10] the problems of identifying key trends via social media sources and of verifying the stories that emerge this way have been examined. Four key needs have been identified: (a) journalists require the ability to search for stories across multiple social networks in order to filter and spot key trends, (b) it is increasingly important that they find relevant video content and pictures as well as text-based material, (c) they should be able to customize the data in order to make it relevant to their own concerns and (d) they require help with verification (this includes identifying who is a reliable source, filtering out fake pictures and video content, and using geo-location to cross-check where individuals actually are). In [11] real-time and deferred interactions with video content are incorporated as rich vocabulary. In [12] the case that Twitter is a particularly promising sensor for TV is considered, while it is noted that TV watching and tweeting cuts across genres, but is particularly intense in sports. In [13] four questions are addressed: (a) can the event lexicon of a sport be detected with the speed and accuracy required for a real-time TV experience from the Twitter? (b) how can the most capable Human Sensors be identified for a particular event in the event lexicon? (c) how is the total effort reduced in aggregating the optimal set of Human Sensors and (d) what is the quality of sensing (per event and in aggregate) that can

be expected? Finally in [14] the spatial and temporal characteristics of the twitter feed activity responding to a 5.8 magnitude earthquake is analyzed. In this framework, it is argued that these feeds represent a hybrid form of a sensor system that allows for the identification and localization of the impact area of the event and the potential of the use of harvested social media content for event monitoring is assessed.

3. Delay Issues

Delay is very important for any sensing framework. Many applications require game events and game popularity information to be detected in real-time, so that end users (e.g. advertisers) have all information on time. Otherwise, the information is meaningless when people are no longer interested in the event. For example, the Electronic Program Guide (EPG) needs the game information in real time.

In open social media that provide a communication API, three sources contribute to the delay: (a) the delay introduced by users (time between perceiving an event and writing a post), (b) delay in receiving content through the communication API (this delay is generally affected by the workload of the site, the index mechanism etc.) and (c) delay to perform data analysis. On the other hand in rule-stringent social media, there is also a delay for content wrapping, since data are not provided through a communication API.

3.1 Delay Introduced by the Users

Human delay expresses the interval between an event (e.g. as it happens on our TV) and the time stamp that is associated to a post referring to this event. It was found in [15] that the shortest human delay is about 13 seconds for non-mobile devices, while the longest is 27 seconds, with an average of 17 seconds. Interestingly, touchdowns saw shorter human delays than other less significant ones, indicating that users post faster for more significant events.

It should also be noted that there is a short delay in broadcasting live materials used to prevent profanity, bloopers, violence, or other undesirable material from making it to air. This delay may vary in different locations and is approximately 7 to 12 seconds. As a result, tweets by game watchers who are in the stadium could be posted earlier than those from homes. However, location analysis is not among the objectives of this paper and should be further investigated in future experiments.

Additionally even though it may be expected posts from mobile devices to present shorter delays (mainly due to the fact that the effort to switch from game watching to tweeting seems to be lower on mobile devices than on PC or laptops), this is not the case. Relevant results show the opposite: by examining the source clients, it was observed that nearly 40% of game-related posts were from clients on recognizable mobile devices, i.e. iPhone, BlackBerry, Android, txt, mobile, HTC, MOTO, and iPad. Furthermore non-mobile users react 3 to 5 seconds faster in several different events. The possible reasons may have to do with typing speed (since most users write much faster on a PC keyboard than on a mobile device, either with a small or with a virtual keyboard). Furthermore usually PCs are more powerful in performing computations than mobile devices. Finally network delay (in case of protocols supporting reliable, ordered, and error-checked delivery of information) has to do with signal quality. In case of mobile devices, wireless transmission is considered, which is more error prone than wired transmissions. Thus the signal may be transmitted two or more times in order to be successfully decoded at the receiver.

3.2 Delay Introduced by the Communication API

A characteristic example of communication API is the Twitter Streaming API, which allows keyword-based retrieval in real time. In this case the delay can be defined as the difference between the Twitter timestamp of a tweet and the time the same tweet has been obtained from Twitter. The delay has been calculated to about 30 seconds for tweets that only contain custom, random keywords and about 1 second for tweets with "Twitter promoted", e.g., Twitter promoted #sb45 during the 2011 Super Bowl. Second, the delay seems fairly independent of the post rate. However it is surprising that the choice of keywords makes such a huge difference in Twitter delay: 30 seconds vs. 1 second! This may be explained by taking into consideration that Twitter maintains its Streaming API results quality by applying the status quality metrics, in some instances, in combination with other metrics, to filter the tweets [16]. The goal is to eliminate spams, inappropriate, or repetitious tweets. Therefore, tweets that contain rarely used keywords may take longer to pass the process. In addition, developers in the Twitter development talk, an online forum in Google groups [17], mentioned that Twitter may index interesting tweets to improve the search speed. Since the Streaming API with filter predicates, i.e., follow, track, or locations, involves search, it may be speculated that such indexing helps significantly reducing the Twitter delay for Twitter promoted keywords and popular keywords such as team names [18]-[19]. It was also observed that the post rate does not impact the Twitter delay noticeably.

3.3 Delay Introduced by the Analysis Module

The analysis module to recognize events, also introduces a delay. We have implemented an intelligent content wrapping and analysis architecture so that this kind of delay is kept at a minimum level. In Section 4, details of this architecture are provided. Here we report the introduced delay. According to our estimations, the overall analysis takes less than 9 seconds on average. Among them, wrapping and token segmentation needs about 3 seconds, while analysis (including all computation tasks) takes about 6 seconds on average. As it can be observed, the longest delay is introduced by the communication API and for tweets that only contain custom, random keywords (~ 30 seconds). Thus the usual shortest delay can be about 23 seconds while the usual longest can reach 66 seconds. Here it should be mentioned that the ESPN web page has 90 seconds lag in updating the latest score changes. It should also be mentioned that 23 seconds may be tolerable for the advertising industry (since about 40 - 60 seconds are needed for the replay and fans jubilation), but after 66 seconds it may be too late.

4. Intelligent Wrapping and Content Analysis for Delay Reduction

As it was previously mentioned, 66 seconds is a long time for events detection e.g. in a sports game, when there is not a “Twitter promoted” tag. In this case, the Twitter’s communication API cannot be effectively incorporated and other faster solutions should be proposed. In this paper an intelligent wrapping submodule is incorporated, which segments a Twitter web page and gathers content much faster compared to the communication API. In particular the proposed wrapper exploits the format of social media web sites to discover the underlying structure in order to finally infer and extract posts and corresponding associated information from the web pages. The system first identifies the section of the web page that contains the post to be extracted and then extracts it by using clustering techniques and other tools of statistical origin.

The proposed system is based on STAVIES [20] and comprises of two modules: namely the transformation and the extraction module. These modules are further subdivided into components, each one responsible for a different task. The overall system architecture, which extracts the information from the data source is composed of three distinct phases: Preparation phase, Segmentation phase and Information Retrieval phase (see Figure 1).

During the first phase the web document is prepared for the extraction that will follow. This is done by inserting the HTML document into the Transformation module. This module parses the HTML document and transforms it into well-formed XHTML, correcting any existing irregularities that would misguide the extraction process. Then the produced XHTML document is used to generate a tree representation of the initial web page (see Figure 2).

Figure 1: Overall architecture of the intelligent wrapper

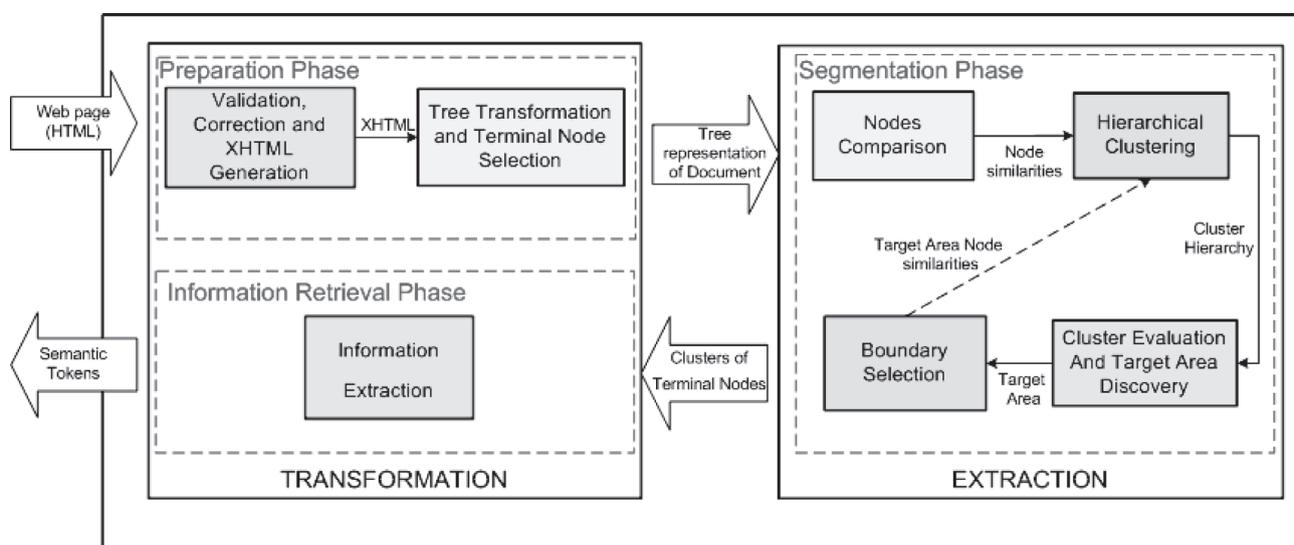
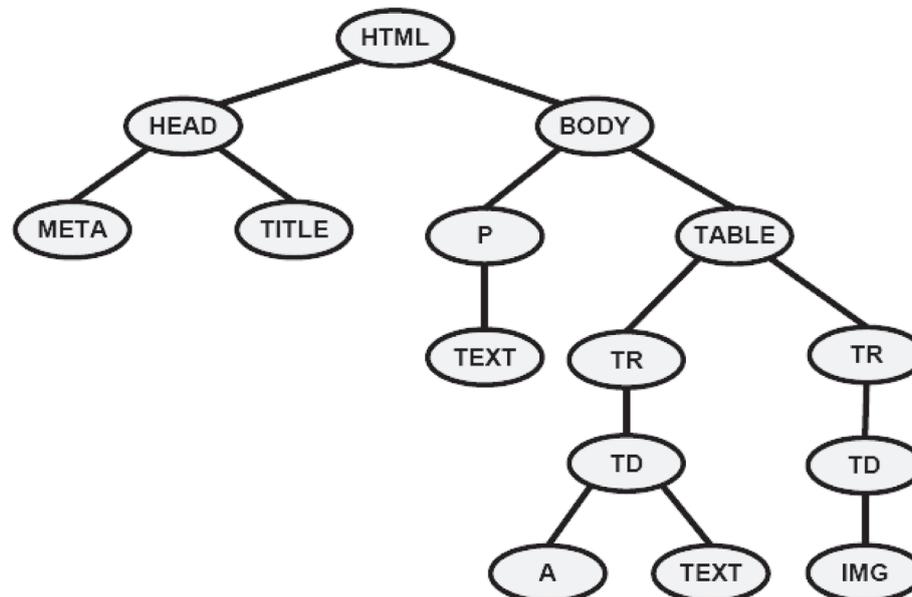


Figure 2: Tree representation of a web page, produced by an XHTML document

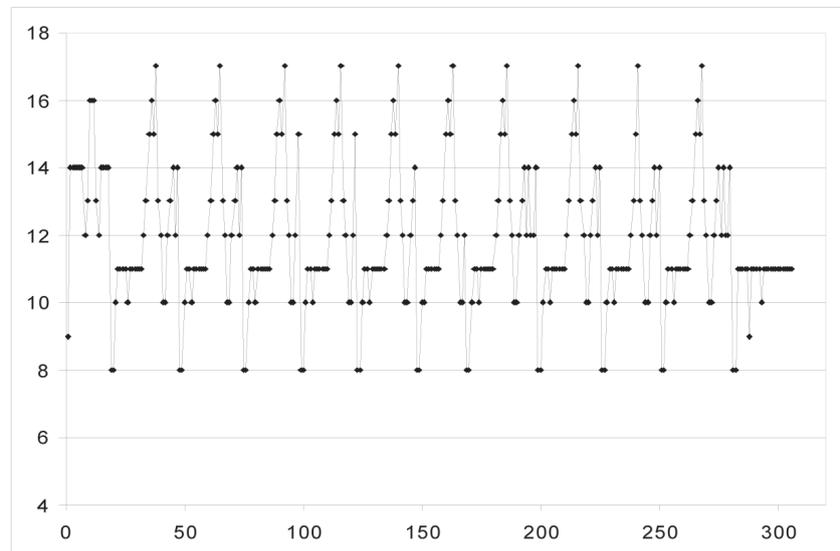


The terminal nodes of this tree correspond to elements of the web page among (namely images, links and text) where the useful information resides, while the intermediate nodes correspond to layout descriptive elements. Therefore the terminal nodes are the ones needed during the extraction process. At this point it is also important to note that the selection of the terminal nodes is performed in a way that preserves their ordering in the web page. The ordering of the terminal nodes is critical because it constitutes one of the criteria used to infer the semantic relationships between elements of the HTML page, since lack of locality in the ordering of these elements is translated into semantic irrelevance. Once the terminal nodes have been selected, the second phase (Segmentation phase) performs a clustering to identify the terminal nodes of interest and segment them into appropriate subsets. Finally the last phase concludes the operation by mapping the generated terminal node clusters to elements in the initial HTML web document. This task is straightforward, since there is one-to-one relationship between the terminal nodes of the tree and the elements of the initial web document. In this way the desired information is identified and can be retrieved.

4.1 Preparation Phase

The first component acting during this phase is the “Validation, Correction and XHTML Generation Component”. Given a web document, like those shown in Figure 1, this component performs a syntactical correction to the source’s HTML by transforming it into XHTML. This is necessary because, due to the leniency in HTML parsing by modern web browsers, a major portion of the web page is not well-formed. Data sources often either contain invalid tags or their tags are placed in a wrong manner. These irregularities could cause problems in the tree representation of the web page or, even worse, misguide the extraction process. Therefore this component’s usage for cleaning and normalizing the HTML page is imperative. The cleaned and normalized page is then fed into the “Tree Transformation and Terminal Node Selection Component”, which generates a tree representation of the page. The root of this tree corresponds to the whole document. The intermediate nodes represent HTML tags (e.g. <table>, , <tr>, <p>, etc) that determine the layout of the page. Finally, the terminal nodes (leaf nodes) correspond to visual elements on the web page, namely images, links and/or text. Once the tree construction is completed, the terminal nodes are selected. We only select the terminal nodes for further processing since they represent the elements of the page among which the useful information resides. The non-terminal nodes are not in our interest, since they represent layout descriptive elements, in other words the way the information is displayed in a web browser. We must note here that the selection of the terminal nodes happens in a way that preserves their ordering in the web page. The ordering of the terminal nodes is critical in our application. It is one of the criteria we use to infer the semantic relationships between elements of the HTML page since lack of locality in the ordering of these elements is translated into semantic irrelevance.

Figure 3: A plot of the “target area” for a sample web page. Each “semantic token” represents a multimedia file



4.2 Segmentation Phase

First the sections in the input page are identified and one of them is characterized as the target area, i.e. the area of the input page where the semantic tokens reside (post area). In this way, irrelevant elements in the page e.g. logos, advertisements etc. are eliminated. The second step is to further segment the target area, thus extracting the semantic tokens. The segmentation phase is performed in two different steps: the “Target Area Discovery” and the “Target Area Segmentation” step.

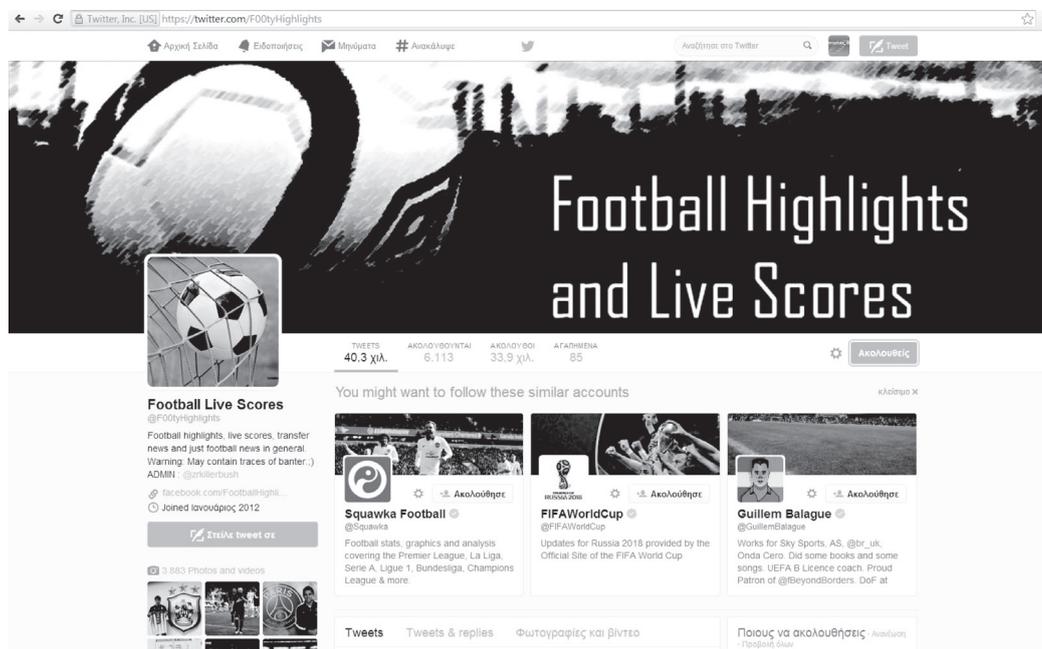
Given the list of terminal nodes n_1, n_2, \dots, n_N , the “Target Area Discovery” process aims at selecting a subset of these nodes corresponding to the elements belonging to the target area. This is achieved by applying hierarchical clustering. The outcome of the hierarchical clustering will reveal the region in the web document that contains the semantic tokens.

In the “Target Area Segmentation” step, a segmentation of the target area into further segments that represent the semantic tokens, is performed by locating a “cut-off” level. Once the cut-off level is located, the system performs a clustering similar to the one performed before. Each output cluster now represents a semantic token. A characteristic example of a target area is presented in Figure 3, where clusters (semantic tokens) corresponding to different information objects can be easily observed. Finally the text of each extracted token (text of a specific post) is analyzed using the sports dictionary of <http://www.sportsdefinitions.com/>, so that events are detected.

5. Experimental Results

We have implemented a prototype system to extract information from a variety of social networks using Java 8 and third-party libraries, like Tidy [21] for web page normalization (in phase one). For testing purposes we implemented a complementary component, which we call “Remote Page Fetching and Next Link Following Component”. This component feeds the system with web pages in an uninterrupted way. It accepts a URL, issues an HTTP request to the remote web data source and fetches the corresponding web page containing the results. Each result is a structural token and has to be extracted. In most cases the results spread into more than one pages with every page containing a link to the next page. This component passes pages to the system by following through the chain of links.

Figure 4: The Twitter page of Football Live Scores (@F00tyHighlights).



Next and in order to evaluate our system's performance in real-life scenarios, we have tested the proposed architecture on several popular social networks such as Facebook, Twitter, LinkedIn etc. For presentation reasons and since we are interested in live games, only results from Twitter are presented.

In particular in Figure 4 the page Football Live Scores (@F00tyHighlights) of twitter.com is depicted, which was followed for a period of one month (1st of March till 31st of March 2015). During this period, the content of the page was gathered and analyzed in offline mode, once a day. This is justified, since the offline performance is not different to the online performance for our scheme. In particular, the delays introduced by users and the communication API do not play any role in our experiments. Furthermore the delay introduced by the analysis module is the same both in online and offline mode. Additionally we aimed at minimizing the time of automatically recognizing an event, so that auctions for advertisement slots are more effective. This is useful especially in cases of web transmission of non-famous games, since in traditional transmissions (e.g. DVB-T) and for important games, the event is manually recognized by human advertisers with almost no delay. However these non-famous games may attract several people to a website and banners may change based on auction procedures.

Now regarding the proposed content gathering mechanism, in total 1,611 twits have been gathered, a characteristic one of which can be seen in Figure 5 (retrieved on the 31st of March). In this twit, the second goal of Japan vs Uzbekistan at the 54th minute of the game is reported. The wrapper has segmented this twit into tokens and extracted the following information: "Football Live Scores", "@F00tyHighlights", "Japan 2 – 0 Uzbekistan. 54' Shinji Okazaki scores for Japan!", "RETWEETS 4", "FAVORITES 2", "5.04 π.μ. – 31 Μαρ 2015". Based on the sports dictionary, the word "scores" is mapped to the word "goal", which is recognized as an important event by the proposed algorithm.

Here it should be mentioned that in order to keep to a minimum the wrap time, only twits of the current day were gathered and analyzed (by checking the post date of each twit). The average time to wrap a twitter page (current day) with our system was less than 0.5 second in a machine with typical configuration (Core i5 5200U 2.2 GHz, PC with 4GB RAM), while tokens segmentation took about 2.5 seconds on average. Furthermore, a major advantage of the algorithm is its tolerance to the dissimilarities among the structural tokens, especially since these dissimilarities occur very often in these types of web pages. For example in the typical case of a social media site where the structural tokens are the posts contained in the web page, different numbers of comments, contained links etc exist.

Finally, in order to estimate the down limit of our scheme we have calculated the delay between events and their automatic detection by the proposed scheme. Towards this direction we have manually assigned to 300

out of the 1,611 tweets the exact time instances they have occurred and compared them to the time assigned to each respective tweet by the intelligent analysis mechanism. There were twitter pages that posted events very fast (less than 10 seconds), but there were also other pages with much larger delays (more than one minute). Thus our scheme achieved shortest delay of 18.51 seconds. However, very short delays, which are the desirable ones, depend on following proper sites and this is a major problem that should be investigated in future research.

Figure 5: A characteristic post from Football Live Scores (@F00tyHighlights).



6. Conclusion

A novel fully automated data collection and event recognition scheme over the most famous social networks (like Facebook and Twitter) has been presented. The scheme provides new capabilities to the advertisements industry since it supports better pricing for selling advertisement slots. Additionally it can also support several other applications such as creation of program guides for live broadcasting. Preliminary experimental results over real data illustrate the promising performance of the proposed scheme, which achieves a shortest delay of about 18 seconds. In the future, social media pages with the shortest delays should be found, followed and analyzed. Additionally, ways of finding percentages and demographics of fans for each specific game should be examined.

Acknowledgements

The authors would like to thank very much all members of the Online Computing Group for participating in the scientific experiments of this paper. Especially Mr. Georgios Nikopoulos and Mr. Nikolaos Manolis for their advices and support.

References

- T. Sakaki, M. Okazaki, and Y. Matsuo, "Earthquake shakes Twitter users: real-time event detection by social sensors," in Proc. ACM WWW, 2010.
- Y. Qu, C. Huang, P. Zhang, and J. Zhang, "Microblogging after a major disaster in China: a case study of the 2010 Yushu earthquake," in Proc. ACM 2011 conference on Computer supported cooperative work.
- S. Vieweg, A. L. Hughes, K. Starbird, and L. Palen, "Microblogging during two natural hazards events: what twitter may contribute to situational awareness," in Proc. ACM CHI, 2010.
- J. Sankaranarayanan, H. Samet, B. E. Teitler, M. D. Lieberman, and J. Sperling, "TwitterStand: news in tweets," in Proc. ACM SIGSPATIAL, 2009.
- J. Hannon, K. McCarthy, J. Lynch, and B. Smyth, "Personalized and automatic social summarization of events in video," in Proc. ACM IUI, 2011.
- D. Chakrabarti and K. Punera, "Event Summarization using Tweets," in Proc. AAAI ICWSM, 2011.
- A. Ekin, A. M. Tekalp, and R. Mehrotra, "Automatic soccer video analysis and summarization," Image Processing, IEEE Transactions on, vol. 12, pp. 796-807, 2003.
- K. Petridis, S. Bloehdorn, C. Saathoff, N. Simou, S. Dasiopoulou, V. Tzouvaras, S. Handschuh, Y. Avrithis, Y. Kompatsiaris, and S. Staab, "Knowledge representation and semantic annotation of multimedia content," Vision, Image and Signal Processing, IEE Proceedings -, vol. 153, pp. 255-262, 2006.
- D. T. Nguyen and J. E. Jung, "Privacy-Preserving Discovery of Topic-Based Events from Social Sensor Signals: An Experimental Study on Twitter," The Scientific World Journal, Hindawi Publishing Corporation, Vol. 2014, Article ID 204785, Apr. 2014.

<https://sites.google.com/site/icqqmeas2015>

S. Schifferes, N. Newman, N. Thurman, D. Corney, A.S. Goker, and C. Martin, C., "Identifying and verifying news through social media: Developing a User-Centred Tool for Professional Journalists," *Digital Journalism*, 2014.

David A. Shamma, Lyndon Kennedy, and Elizabeth F. Churchill. 2012. Watching and talking: media content as social nexus. In *Proceedings of the 2nd ACM International Conference on Multimedia Retrieval (ICMR '12)*. ACM, New York, NY, USA, , Article 12 , 8 pages.

Arkaitz Zubiaga, Damiano Spina, Enrique Amigó, and Julio Gonzalo. 2012. Towards real-time summarization of scheduled events from twitter streams. In *Proceedings of the 23rd ACM conference on Hypertext and social media (HT '12)*. ACM, New York, NY, USA, 319-320.

Venu Vasudevan, Jehan Wickramasuriya, Siqi Zhao, Lin Zhong "Is Twitter a Good Enough Social Sensor for Sports TV?," *Workshop on Pervasive Collaboration and Social Networking*, San Diego, March 2013.

A. Crooks, A. Croitoru, A. Stefanidis and J. Radzikowski, " #Earthquake: Twitter as a Distributed Sensor System," *Transactions in GIS*, Vol. 17, No. 1, p.p. 124-147, 2013.

S. Zhao, L. Zhong, J. Wickramasuriya and V. Vasudevan, "Human as real-time sensors of social and physical events: A case study of Twitter and sports games," *Rice University Technical Report No. TR0620*, Houston, TX, 2011.

Twitter API Documentation, "Streaming API Concept, http://dev.twitter.com/pages/streaming_api_methods."

"Twitter Development Talk, <http://groups.google.com/group/twitter-development-talk>."

Twitter, "Twitter Search Best Practices, <http://support.twitter.com/groups/32-something-s-not-working/topics/118-search-problems/articles/42646-twitter-search-best-practices>."

Twitter Development Talk, "Rate limit for streaming API, <http://groups.google.com/group/twitter-development-talk>," 2010.

N. K. Papadakis, D. Skoutas, K. Raftopoulos, and T. A. Varvarigou, "STAVIES: A System for Information Extraction from Unknown Web Data Sources through Automatic Web Wrapper Generation Using Clustering Techniques," *IEEE Trans. on Knowledge and Data Engineering*, Vol. 17, No. 12, Dec. 2005.

Tidy, <http://tidy.sourceforge.net/>

ENERGY CONSUMPTION AND CO₂ EMISSIONS ON A GLOBAL LEVEL

Ntanos S.^{1*}, Arabatzis G.², Milioris K.³, Chalikias M.^{4**}, Lalou P.⁵

^{1,2}Democritus University of Thrace, Department of Forestry and Management of the Environment and Natural Resources,
Orestiada, 68200, Greece

³University of Piraeus, Department of Informatics, 18534, Piraeus, Greece

^{4,5}Technological Educational Institute of Piraeus, Department of Business Administration,
Aigaleo, 122 44, Greece *sdanos@mycosmos.gr, **mchalik@teipir.gr

ABSTRACT

Analysis of the relation between economic development, energy consumption and carbon dioxide emissions is considered to be important for environmental planning on a national and international level. Several studies have focused on this issue and the results lead to a positive relation between these variables. For the purpose of this study, a database was created including variables such as gross domestic product (GDP), population, total primary energy supply and carbon dioxide emissions per energy sector. Data derives for the International Energy Agency including over 140 countries. The purpose of this study is to test the hypothesis that there is a statistical correlation between economic growth and a) energy consumption, b) carbon emissions from each energy sector. Countries classification according to GDP per capita is performed and then the One-way ANOVA command is used to test the hypotheses. The results verify existence of relation between GDP and energy consumption and also between GDP and carbon emissions from the electricity sector and the transportation sector. These results are compatible with other studies reviewed in this article.

Keywords: Primary energy supply, income levels, one-way ANOVA, carbon dioxide.

1. Introduction

Scientists dealing with climate change, observed that concentrations of carbon dioxide in the atmosphere (hereinafter CO₂) have increased considerably over the last century, compared to the rather stable level of the pre - industrial era. In recent decades, global economic growth has caused various side effects including climate change due to global warming. Accordingly, international interest in carbon dioxide increases. Since the late 1970s there are a number of scientific publications concerning controlling of CO₂ emissions in the atmosphere.

Dyson calculated that fossil fuel combustion adds an annually of 5x10⁹ tons of CO₂ of which approximately half remains in the atmosphere. As a way of resolving, he proposes, the implementation of afforestation programs and energy crops that are able to save carbon dioxide. The need for a shift from fossil fuels to other more environmentally friendly fuel forms is emphasized, with fuels including the nuclear energy [6].

Bach notes that increasing population rate, energy consumption and economic development contribute to climate change. He estimates a temperature increase of around 1.5 °C to 3 °C by 2050 due to an increase of anthropogenic CO₂ emissions. Among the possible solutions he proposes an energy mix based on new carbon based technologies (gasification and liquefaction), nuclear energy, solar energy and also refers to an implementation of a global agreement to control the rate of energy use in combination with energy saving measures [3]. According to Garret, global temperature will rise by an average of 2 °C (optimistic scenario) to 4°C (pessimistic scenario) by the year 2100 compared to the average temperature of the Industrial Revolution era, referring to estimates by the IPCC Working Group 1 [7].

In 1997, the United Nations Convention on Climate Change (UNFCCC) adopted the Kyoto Protocol and countries have committed in an effort to reduce carbon emissions.

During 2013, the concentration of CO₂ (396 parts per million by volume ppmv) was approximately 40% higher than in mid-1800 (around 280 ppmv), with an average increase of 2 ppmv / year for the last ten years [9].

Anthropogenic CO₂ emissions result from the combustion of fossil fuels as a result of energy production and fuel consumption. The main areas where fossil fuels are used are the following:

- Electricity
- Industry
- Transport
- Agricultural sector
- The residential sector
- Tertiary sector

It must be noted that carbon emissions data are estimates, as there is no way for real measurement to all emission sources. Total energy consumption is allocated to sectors and then carbon emissions are calculated indirectly by using the revised emission factors according to the Intergovernmental Panel Guidelines on Climate Change [12]. Emission factors indicate carbon content per unit of energy produced or consumed. The International Energy Agency (IEA), records energy consumption on a global scale. The calculation of carbon emissions is done with two different approaches. The first approach (Reference method) refers to a uniform emission factor applied after the conversion of the total energy consumed in tonnes of oil equivalent (hereinafter TOE). The second approach calculates CO₂ emissions per energy sector, using different emission factors. IEA provides calculated carbon emissions at a global and country level [10].

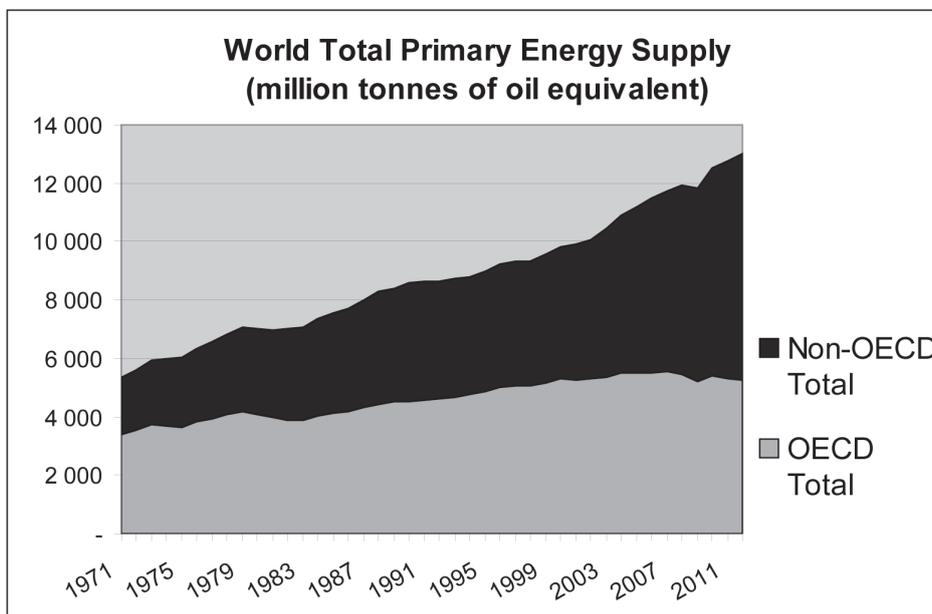
For cross-countries energy comparisons, the index of total primary energy supply (hereinafter TPES) is used:

TPES = energy production + imports - exports - international marine bunkers - International Aviation stock changes.

According to IEA estimates [11], global primary energy consumption rose from 5.5 GTOE in 1971 to 13.3 for 2012, an increase of 140%, as can be seen in Figure 1.

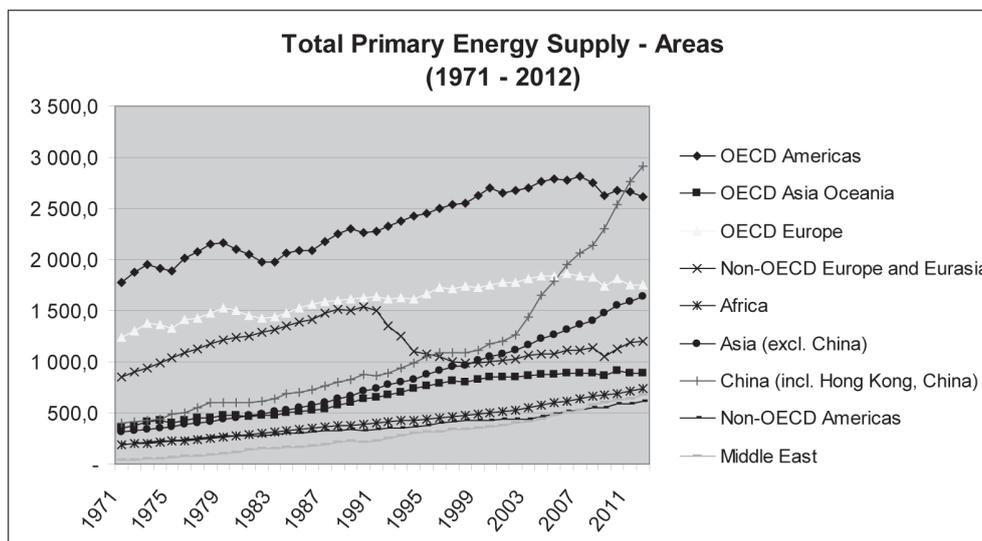
Analyzing further in OECD and non-OECD countries, we observe the following: OECD Countries, consumed 3.4 GTOE in 1971 and 5.2 in 2012, with an overall increase in energy consumption by 54%. The non-OECD countries demanded 2 GTOE in 1971 and 7.8 in 2012, which is 4 times more energy. We must note that energy consumption represents OECD countries after the 2000 consolidation, and is between 5-5,5 GTOE while energy consumption of non-OECD countries experienced rapid growth rate of about 300 MTOE per year for the past 10 years.

Figure 1: TPES, historical trend for OECD countries and Non-OECD countries



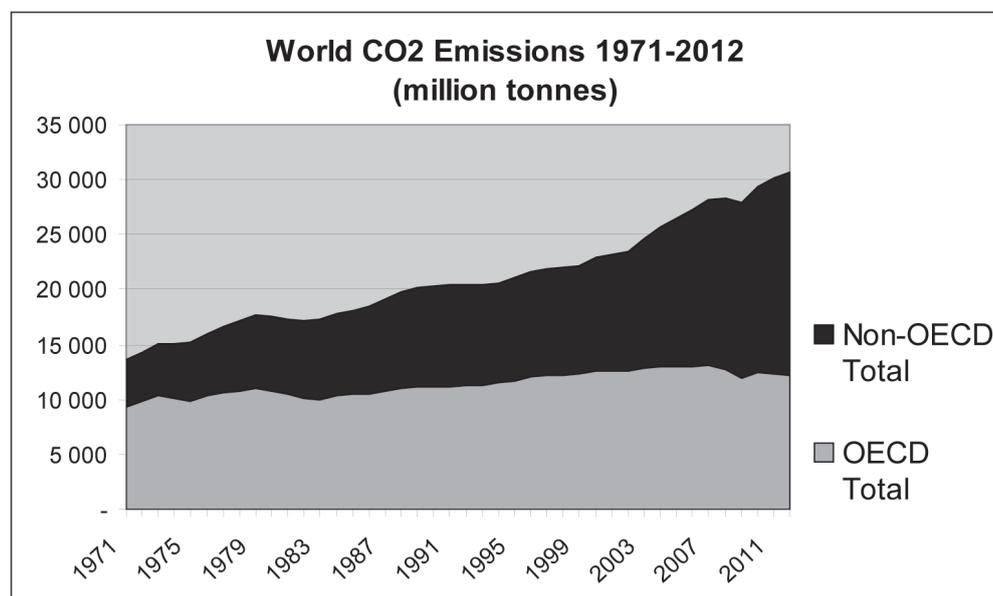
By looking at the historical trend of the annual per capita energy consumption (Figure 2), significant differences are observed between different geographical areas.

Figure 2: TPES, historical trend for World regions



During 2012, North America used about 6.8 toe / person, the EU 3.46 toe / person, while in non-OECD countries energy consumption is calculated to 1.34 toe / person. These important differences confirm that the level of prosperity of the countries associated with energy consumption. A higher standard of living means more energy consumption and hence more CO₂ emissions. For the European Union, energy consumption in 1997 was estimated at 3.74 toe / person while in 2012 was 3.46, which equates to a reduction of 8% (due to environmental stabilization trend of Kyoto Protocol commitments). China on the other hand shows an impressive TPES increase, due to intense industrialization.

Figure 3: CO₂ emissions, historical trend for OECD countries and Non-OECD countries



Based on IEA estimates, CO₂ emissions reached 31734 million tons in 2012, from 14085 in 1971, which means increase 125%. Analyzing further in OECD and Non-OECD countries, we deduce that emissions increase in Non-OECD countries is significant higher. Specifically, in OECD countries we have a 30% CO₂ emissions increase between 1971 and 2012 (from 9370 million tons to 12146), while increase in Non-OECD countries is 340% (from 4202 million tons to 18508 million tons).

2. Literature Review

The relation between energy consumption and GDP growth is considered to be of high importance for rationing energy consumption and controlling carbon dioxide emissions. Knowledge of the above relationship together with the knowledge of specific economy characteristics and inefficiencies allows improvement of the energy security of a country and control of carbon emissions into the atmosphere. According to literature, energy is important for motivating productivity, especially for the case of developing countries [2],[15],[16],[17]. Chontanawat provides causality tests between energy consumption and Gross Domestic Product (GDP) for over 100 countries [5]. Martínez and Moranco investigated the emissions and income relationship in 22 OECD countries [13]. Using data for six Central American states, Apergis and Payne investigated the relation between economic growth, energy consumption and emissions. Their findings showed that short run unidirectional causality runs from economic growth and energy use to emissions and in long run, bidirectional causality exists between energy consumption and emissions [1]. Similar results were found by Soytaş et al. stating that energy consumption had a long run causal relationship with emission in the United States [19]. In Greece, Hatzigeorgiou et al. found that GDP per capita, energy intensity had a positive causal relationship with CO₂ emissions [8].

In a comprehensive review about the relation between energy intensity and GDP growth, four scenarios were formed according to relevant literature. First, the growth hypothesis where energy saving policies may have an adverse impact on real GDP was examined, since the economic growth is very energy dependent. Second, the conservation hypothesis suggests that energy consumption can decrease without necessarily a negative effect on economic growth. Third, the neutrality hypothesis suggests that energy consumption has little or no impact on g. Fourth, the feedback hypothesis suggests that energy consumption and real GDP are interrelated, because there is bi-directional causality and hence they complement to each other [14].

The relation between GDP, electricity energy consumption and CO₂ emissions by using data for 22 OECD countries was examined by Bella et al. [4]. Three clusters were formed, showing different patterns. For countries belonging to the first cluster it was found that increase in the per capita income over the point of around 20,000 USD (in 2000 prices) leads to gradual reduction of per capita CO₂ emissions and per capita electricity consumption (Austria, Belgium, Denmark, Finland, Greece, Italy, Japan, Norway, Sweden and Turkey). For countries belonging to the second cluster it was found that growing GDP lead to an increase in per capital

electricity consumption with a parallel decrease in per capita CO₂ emissions. It is not surprising to find heavily nuclear energy countries in this group, where it appears reasonable to expect that an increasing-in-GDP energy consumption goes along with decreasing patterns of per capita CO₂ emissions (France, Portugal, Spain and Switzerland). For countries belonging to the third cluster we note that with growing GDP there is a decrease in per capita electricity consumption with a parallel increase in per capita CO₂ emissions. There may be several reasons why electricity consumption does not cause CO₂ emissions in the long-run. As confirmed by the international statistics, the most extant one can be referred to the fact that, in this group of countries, CO₂ emissions are largely misaligned from electrical consumption, because of the heavy role of other emitting sectors, among which transportation is the leading source (Australia, Canada, Ireland, the Netherlands, New Zealand, UK and USA).

In an interesting study on capital formation, energy consumption and real GDP in G7 countries, cointegration was found. In the long-run, capital formation and energy consumption had a positive effect on real GDP in the G7 countries. The results in this study are consistent with the energy-dependent hypothesis, suggesting that energy consumption is a major factor influencing economic growth. The findings suggest that cutting carbon dioxide emissions under the Kyoto Protocol will have a negative effect on economic growth for the G7 economies under a holistic perspective [15].

During a comparative work concerning the relation between (1) economic growth, fossil fuel consumption, renewable energy consumption and real output, and (2) economic growth, fossil fuel and renewable energy for 20 OECD countries from 1980 to 2010, it was found that fossil fuels are a key factor in driving economic growth and also renewable energy consumption. Also R&D was found to have a crucial role in promoting economic growth. The effects of renewable energy consumption on economic growth were considered sizable and significant specifically to countries without oil reserves. In addition it was found that countries without oil reserves, as compared to countries with oil reserves, tend to have their real output to be responsive to renewable energy consumption [18].

In a study examining the impact of nuclear energy consumption on GDP growth and CO₂ emission in 30 developed and developing countries for the time period 1990-2010, the results demonstrated that fossil fuel energy production is more significant in increasing GDP growth than nuclear energy production. In addition, GDP growth and fossil fuel energy consumption are mentioned as major sources of CO₂ emission while nuclear energy consumption and urbanization are not. Moreover and most important findings were that a) there is a bi-directional negative short run causal relationship between fossil fuel and nuclear energy consumption b) nuclear energy consumption has a negative short run causal relationship with CO₂ emission while fossil fuel energy consumption has a positive short run causal relationship with CO₂ emissions [20].

There is a wide spread assumption among a growing literature that examines the relation between energy consumption and real GDP. This assumption is that the relation between energy consumption and real GDP is positive in testing for causality. In a comparative review, the main goal was to verify the truth of the above assumption for 93 countries and seven panels (Western Europe, Asia, Latin America, Middle East, Africa, and globally). It has been found that the assumption is only partially true. From the results it occurs a) that in around 59% of the countries, energy consumption had a statistically significant positive effect on real GDP in the long-run and b) on the other hand in around 61% of the countries, real GDP had a statistically significant positive effect on energy consumption in the long-run [15].

In a study examining the causal relation between GDP, energy intensity (EI) and CO₂ emissions in Greece, for the time period 1977-2007, the results show that there is a unidirectional causality between GDP, EI, GDP and CO₂, running from GDP to EI and to from GDP to CO₂ emissions, as well as a bi-directional relationship between CO₂ emissions and EI. So it can be understood that the possibility of separating CO₂ emissions and economic growth in Greek economy seems to be extremely questionable. Regarding the bi-directional causal relationship between CO₂ emissions and energy intensity, this signifies an obvious connection, meaning that a more efficient energy system structure will result to reduced emissions [8].

3. Methodology

The purpose of this study is to verify the relation between energy consumption, economic growth and carbon dioxide emissions. By using data from IEA (2014), we created a database including data for 140 countries concerning the year 2012. The database includes variables for each country, such as population, gross domestic product (GDP), total primary energy supply (TPES) and total CO₂ emissions in detail for each energy sector. By calculating GDP per capita, we created an income classification variable for the 140 countries involved (categorical). For the purpose of this analysis, according to the World Bank Atlas method, as low income countries

are classified those of \$1,045 or less in 2012; middle-income economies are those with a GDP per capita of more than \$1,045 but less than \$12,746; high-income economies are those with a GDP per capita of \$12,746 or more. Lower-middle-income and upper-middle-income economies are separated at a GDP per capita of \$4,125 (see table 1).

The correlation between energy consumption per capita and income per capita is then tested by using one way ANOVA.

4. Results

The 140 countries used in this study, were classified according to income per capita by using the method presented in the methodology section.

Table 1: CO₂ emissions and TPES per capita in 2012, shown per country income level

Calculated CO ₂ Emissions, Energy Consumption and GDP (2012)				
COUNTRIES CLASSIFICATION (WORLD BANK)		CO ₂ emissions per capita (in kgr)	Total Primary Energy Supply per capita (in Toe)	GDP per capita (in USD - 2010 fixed)
LOW INCOME	(3)	289,00	,48	517,19
LOW-MIDDLE INCOME	(25)	559,40	,45	2.380,51
HIGH-MIDDLE INCOME	(47)	3.421,70	1,48	8.315,28
HIGH INCOME	(65)	9.313,75	4,45	30078,88
TOTAL	(140)	5.579,04	2,65	17.192,92

Figures 5 and 6 represent carbon emissions and TPES per capita for different incomes per capita and reveal a positive relation between GDP, energy consumption and CO₂ emissions, respectively. Fig 5 reveals that level of carbon emissions increases with a rise in per capita GDP. We can observe that this positive relation is non-linear. In high incomes, energy consumption and CO₂ emissions presents rapid growth rate.

Figure 5: Change in CO₂ emissions / capita by GDP / capita

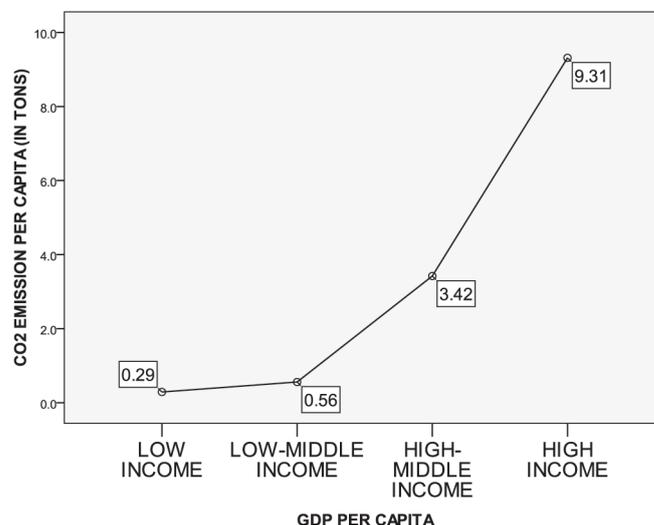


Figure 6: Change in TPES / capita by GDP / capita

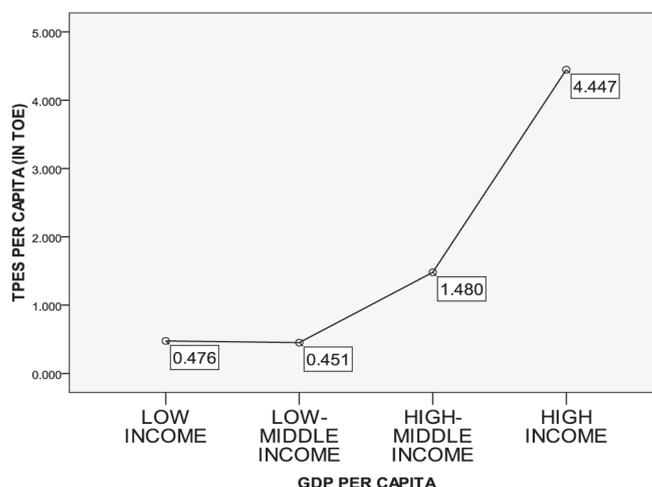


Table 2: Highest and lowest values on CO₂ emissions and Energy consumption per capita for every income level

Highest and lowest values on CO ₂ emissions and Energy consumption per capita	LOW INCOME		LOW-MIDDLE INCOME		HIGH-MIDDLE INCOME		HIGH INCOME	
	lowest	highest	lowest	highest	lowest	highest	lowest	highest
CO ₂ per cap	Dem. Rep. of Congo	Zimbabwe	Ethiopia	Republic of Moldova	Nigeria	Netherlands Antilles	Gabon	Qatar
			Eritrea	Syrian Arab Republic	Congo	Turkmenistan	Botswana	Kuwait
			Nepal	Kyrgyzstan	Guatemala	South Africa	Uruguay	Trinidad and Tobago
			United Rep. of Tanzania	Honduras	Paraguay	Libya	Panama	Bahrain
			Haiti	Yemen	Sri Lanka	Ukraine	Mauritius	Oman
Energy per cap	Dem. Rep. of Congo	Zimbabwe	Eritrea	Republic of Moldova	Congo	Netherlands Antilles	Mauritius	Iceland
			Bangladesh	Kyrgyzstan	Philippines	Turkmenistan	Botswana	Qatar
			Tajikistan	Syrian Arab Republic	Sri Lanka	Libya	Panama	Trinidad and Tobago
			Yemen	Honduras	DPR of Korea	Ukraine	Uruguay	Kuwait
			Myanmar	Zambia	Morocco	South Africa	Gabon	Brunei Darussalam

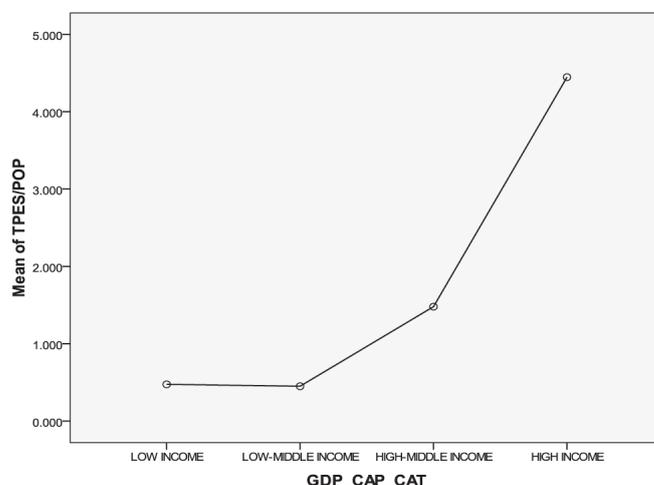
Table 3 includes the results of the one-way ANOVA between income and energy supply and indicates (by looking at the sig.) that there is a correlation between energy consumption per capita and GDP per capita.

Economical growth leads to an increase of TPES per capita. Figure 8 describes how the mean of TPES is affected by income increase.

Table 3: Results of ANOVA Test between variables TPES /cap and GDP /cap

ANOVA					
Mean energy supply cap and GDP/cap					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	409.184	3	136.395	19.215	.000
Within Groups	965.378	136	7.098		
Total	1374.563	139			

Figure 8: Change in TPES /capita by GDP /capita



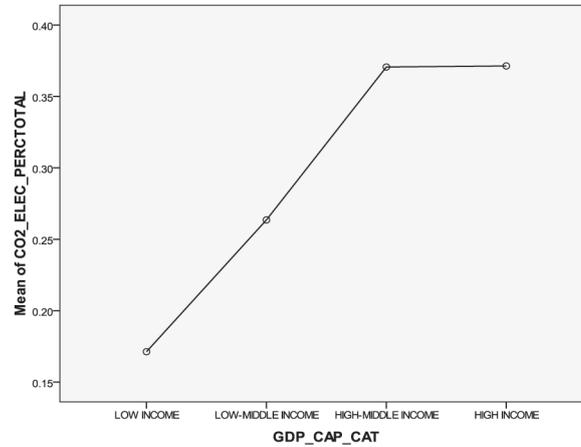
As shown in table 4, according to one-way ANOVA test, there is a correlation between GDP and CO₂ emissions as a result of energy production and consumption in the areas: Electricity and Transport. Economical growth, mainly in developing countries, allows increasing energy productivity; therefore we have CO₂ emissions increase. On the other hand, the results (look .sig) show that there is no correlation between GDP and CO₂ emissions deriving from residential and industrial sectors. An interpretation of this result is the Kyoto Protocol's commitment of industrialized countries, to reduce emissions from fossil fuel combustion that has lead to energy saving measures for home and industrial applications.

Table 4: Results of one-way ANOVA Test between variable GDP/cap and variables CO₂ emissions from electricity sector, transportation sector, residential sector, industrial sector and other sectors (in% of total emissions)

		ANOVA				
		Sum of Squares	df	Mean Square	F	Sig.
CO2_ELEC_PERCTOTAL	Between Groups	.284	3	.095	3.040	.031
	Within Groups	4.085	131	.031		
	Total	4.370	134			
CO2_TRANS_PERCTOTAL	Between Groups	.609	3	.203	7.975	.000
	Within Groups	3.461	136	.025		
	Total	4.070	139			
CO2_RESIDENCE_PERCTOTAL	Between Groups	.012	3	.004	1.381	.252
	Within Groups	.392	130	.003		
	Total	.404	133			
CO2_INDUSTRY_PERCTOTAL	Between Groups	.006	3	.002	.196	.899
	Within Groups	1.453	135	.011		
	Total	1.460	138			
CO2_OTHER_PERCTOTAL	Between Groups	.083	3	.028	5.022	.003
	Within Groups	.694	126	.006		
	Total	.777	129			

According to Figure 10, there is a positive relation between GDP and carbon emissions from the Electricity sector. We observe that in low and middle incomes, this relation is almost linear. In high incomes, emissions are stabilized and are not affected by the income increase. This can be explained by the rapid expansion of Renewable energy sources for electricity in the case of developed, high income countries.

Figure 10: Change in CO₂ emissions from Electricity by GDP / capita



As we see in the following Figures 11 and 12, there is a negative relation between GDP and CO₂ emissions by Transport. It seems that economic growth is associated with reduction in levels of CO₂ emissions per capita for the transportation sector, implying a shift to “cleaner” transportation means. The graph shows that transportation emissions are only a small percentage of the total per capita emissions in the case of developed countries while in low income and low-middle income countries this percentage is 60% and 40% respectively

Figure 11: Change in CO₂ emissions from transport by GDP / capita

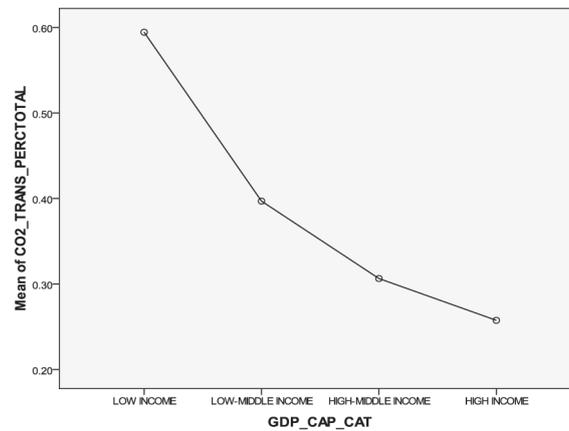
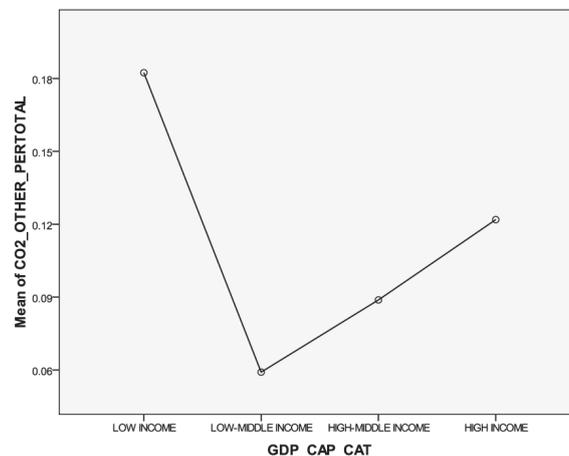


Figure 12: Change in CO₂ emissions from other energy use, GDP / capita



5. Conclusions

By using data covering 140 countries for the year 2012, this work investigates the relation between GDP, energy consumption and CO₂ emissions. Using one-way analysis of variance (abbreviated one-way ANOVA), we indicate that there is a connection between GDP, per capita and energy consumption. Furthermore we found that GDP per capita had a positive causal relationship to CO₂ emissions. Particularly, we investigated the correlation between energy sectors, CO₂ emissions and GDP per capita. Our results indicate that there is correlation between GDP and CO₂ emissions from electricity and transform, but there is no correlation between GDP and CO₂ emissions from industry and residence. These results are compatible with results from various reviewed studies concerning the causal relationship between energy consumption and economic growth.

Finally, as further research, it is interesting to study the case of Greece, and more specific the variation of energy consumption and CO₂ emissions for different regions of the country.

References

- [1] Apergis N., Payne, J.E. (2009). CO₂ emissions, energy usage, and output in Central America, *Energy Policy*, Vol. 37, pp. 3282–3286.
- [2] Apergis N., Tang C.F. (2013). Is the energy-led growth hypothesis valid? New evidence from a sample of 85 countries, *Energy Econ*, Vol. 38, pp. 24–31
- [3] Bach W. (1979). Impact of increasing atmospheric CO₂ concentrations on global climate: Potential consequences and corrective measures, *Environment International*, Vol. 2, Issues 4–6, pp. 215–228.
- [4] Bella G., Massidda C., Mattana P. (2014). The relationship among CO₂ emissions, electricity power consumption and GDP in OECD countries, *Journal of Policy Modeling*, Vol. 36, pp. 970–985.
- [5] Chontanawat J., Hunt L., Pierse R. (2008). Does energy consumption cause economic growth: evidence from a systematic study of over 100 countries, *Journal of Policy Model*, Vol.30, pp. 209–220.
- [6] Dyson F. (1976). Can we Control the Carbon Dioxide in the Atmosphere?, *Energy*, vol 2, pp. 217–291.
- [7] Garrett C.W. (1992). On global climate change, carbon dioxide, and fossil fuel combustion, *Progress in Energy and Combustion Science*, Vol. 18, Issue 5, pp. 369–407.
- [8] Hatzigeorgiou E., Polatidis H., Haralambopoulos D. (2011). CO₂ emissions, GDP and energy intensity: a multivariate cointegration and causality analysis for Greece, 1977–2007. *Applied Energy*, Vol. 88, pp. 1377–1385.
- [9] Howell D. (2002). *Statistical Methods for Psychology*. Duxbury, pp. 324–325. ISBN 0-534-37770-X.
- [10] IEA. (2014a). CO₂ Emissions From Fuel Combustion Highlights 2014, [internet], <http://www.iea.org/publications/freepublications/publication/CO2EmissionsFromFuelCombustionHighlights2014.pdf>
- [11] IEA. (2014b). International Energy Agency, Data on CO₂ emissions and Energy Consumption in .xls form, [internet].
- [12] IPCC. (2007). Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories (1996 IPCC Guidelines), IPCC, Bracknell, UK.
- [13] Martinez Z., I., Bengochea M. A. (2004). Pooled mean group estimation of an environmental Kuznets curve for CO₂. *Econ. Lett.* Vol. 82, pp. 121–126.
- [14] Menegaki A. (2014). On energy consumption and GDP studies; A meta-analysis of the last two decades, *Renewable and Sustainable Energy Reviews*, Vol. 29, pp. 31–36.
- [15] Odhiambo N.M. (2010). Energy consumption, prices and economic growth in three SSA countries: a comparative study, *Energy Policy*, Vol. 38 pp. 2463–2469.
- [16] Rufael W.Y. (2009). Re-examining the financial development and economic growth nexus in Kenya, *Econ Model*, Vol. 26, pp. 1140–1146.
- [17] Sadorsky P. (2010). The impact of financial development on energy consumption in emerging economies, *Energy Policy*, Vol. 38, pp. 2528–2535
- [18] Siang W., Youngho C., Wai-Mun C. (2013). Energy consumption, energy R&D and real GDP in OECD countries with and without oil reserves, *Energy Economics*, Vol. 40, pp. 51–60
- [19] Soyta U, Sari R, Ewing B. (2006). Energy consumption, income, and carbon emissions in the United States. *Ecological Economics*, Vol. 62, pp. 482–89.
- [20] Usama Al. (2014). Progress in Nuclear Energy, *Progress in Nuclear Energy*, Vol. 73, pp. 172–178.

DATA ANALYSIS ON MARITIME ACCIDENTS OVER 1000 GRT: THE CASE OF GREECE

Ntanos S.^{1*}, Chalikias M.^{2}, Milioris K.³, Sidiropoulos G.⁴**

¹Democritus University of Thrace, Department of Forestry and Management of the Environment and Natural Resources,
Orestiada, 68200, Greece

^{2,4}Technological educational institute of Piraeus, Department of Business Administration, Aigaleo, 122 44, Greece

³University of Piraeus, Department of Informatics, Piraeus, 18534, Greece

*sdanos@mycosmos.gr, ** mchalik@teipir.gr

ABSTRACT

According to several studies, the quantification of risk existing in maritime transportation can be estimated by using accident statistics. Analysis of accident statistics can reveal how different types of ships are susceptible to different kind of casualties. In the current paper an analysis on ship accidents is performed by using a database created from data of Ministry of Shipping and the Aegean, Directorate of Ship Safety. The database includes over 1000 recorded accident cases in ships under Greek flag, with size over 1000 grt, covering a period from 1974 to 2010. We use descriptive statistics to have an overview on main accident data. We then perform a hypothesis test to investigate the relation between the ship type variable and a) accident responsibility, b) accident outcome c) accident area. Moreover we test the relation of ship age and a total loss event. The analysis of main maritime accident variables can assist decision making and promote maritime safety.

Keywords: Greek fleet, ship accidents, total loss

Introduction

According to IMO, "Shipping is perhaps the most internationalized of Worlds' great industries and one of the most dangerous." [1]. During the last decades, ships have greatly increased in size and numbers [2]. There are several studies that for maritime safety which in some cases analyze specific ship accidents worldwide. Nowadays, maritime accidents are an important research theme.

According to Toffoli et al. by using the Lloyds world casualty statistics, the following accident categories are used :

- Grounding
- Fire/explosion
- Collision
- Wrecked/stranded
- Contact
- Hull/machinery

In the previous study, the Lloyd's Marine Information Service (LMIS) was used to create a ship casualty accident database in which 650 incidents were covered during the period from January 1995 to April 1999. The data set classified all reported accidents including total losses to all propelled sea-going merchant ships in the world for 100 gross tonnages and above. A synthesis of the main total loss causes according to frequency is given in Table 1 [3].

Table 1. Classification of ship accidents

Class	
a) Foundered	36%
b) Water ingress	25%
c) Severe hull damage	16%
d) Capsize of intact ship	8%
e) Others	15%

Information referred to the research of A. Toffoli, J.M. Lefevre, E. Bitner-Gregersen, J. Monbaliu [Towards the identification of warning criteria: Analysis of a ship accident database] and collected from the Lloyd's Marine Information Service (period from January 1995 to April 1999).

Casualty records provided from NMD divide the recorded accidents into the categories of fire/explosion, grounding, heavy weather, capsizing, collision, contact, leakage, pollution/environmental damage, personnel, related, missing and other reasons [4]. The casualty records from the LRF accident database (February 1997 to February 2007) suggested that accidents may be divided into the categories of foundered, wrecked/stranded, contact, collision, fire and explosion, missing, war loss/damage during hostilities, hull/machinery damage and miscellaneous [5].

In the current paper an analysis on ship accidents is performed using a database created from data by the Ministry of Shipping and the Aegean, Directorate of Ship Safety. This research study will try to demonstrate the differentiation of safety in respect to variables such as ship type, ship sizes, ages with a comprehensive review of this literature to aggregate different accidents factors. The used database includes 1089 recorded accident cases in ships under Greek flag. Moreover, the analysis of accident statistics shows how different ships types are susceptible to different kind of casualties. This paper will also try to record the most important initial cause of the accident, how human error is correlated to different accident types and how total loss is correlated to variables such as ship age.

2. Literature Review

According to Faulkner, there are two main sources causing ship loss and damage. About 60% of the accidents are due to operational causes (e.g. fire, collision, machinery damage), while the remaining 40% are characterized by design and maintenance causes (i.e. water ingress, hull breaking in two, and capsizing) [2]. While many incidents may be related to human errors, a number of accidents still occur due to unexpected events and dangerous sea states, which can result to an inability in keeping the ship under proper control [6]. The UK Marine Accident Investigation Branch (MAIB) states that "the factor that dominates the majority of maritime accidents is human error" [7]. Data from New Zealand are congruent with the above fact: 49% of shipping incidents cited human factors as a cause, while only 35% cite technical factors and 16% environmental factors [8].

<https://sites.google.com/site/icqqmeas 2015>

Hetherington et al. report that the most common human causes were judgment errors and improper lookout, followed by failure to comply with regulations. The 'human element' as it is often termed in the shipping literature has frequently been cited as a cause of these costly incidents [9]. A study based on a U.S. Coast Guard report, states that between 75–96% of marine casualties are caused by some form of human error. This study mentions that 43% of accidents cite human error as the primary cause. They conclude that the actual figure of incidents involving human error may be as high as 80% [10].

During an analysis of accidents cases between 1982 and 1985, there were 2,250 cited causes, 345 of which were human error (15%) [11]. According to Heea et al. 80% or more of major marine accidents were human and organization caused. While the initial events for the majority of accident are attributed to individuals (operating personnel), the contributing causes (again more than 80%) can be attributed to the organization that influences the individual [12].

In an interesting study for the period from 1992 to 2005, 74 marine accidents of passenger ships took place in Greek waters: it is derived that about 65% of them are caused by human inadequacy. Some of the most important conclusions of this thesis are: Greek passenger ships' marine accidents covered 13% of all marine accidents of Greek flagged ships, in the period 1992 – 2005. The age of a passenger ship is not linked with the cause of a marine accident. The size of a passenger ship can be linked to the cause of a marine accident. In particular, smaller ships seem to be prone to have an accident by the inadequacy of human factor. It must be noted that 14 out of 15 passenger ships' marine accidents that had collision as first event were attributed to human factor. This is an important finding, as collision accidents were responsible for 80 deaths and 3 injuries out of 95 deaths and 78 injuries overall, in the period 1992 – 2005. Around 65% of accidents involving passenger ships in the period 1992 to 2005 were attributed to human factor. Ships aged between 21-25 years have the highest accident frequency, while an interesting observation is the reduction of the frequency of accidents for vessels of over 25 years. The age of the passenger ship is not correlated with the reason of an accident. Accidents decreased for vessels 1-10 years. The size of a passenger ships can be associated with the cause of the accident. It turns out the general trend of lower tonnage (100- 5000 GRT) to be prone to accidents involving human factors. This trend is abated gradually with the increase of the size and attains for passenger ships over 10000 GRT to be reversed, since for these ships the accident from other causes seem more likely [13].

Tzannatos analyzed the significance of the human element in accidents involving Greek-flagged ships, during 1993–2006, worldwide. It was found that 57.1% of all accidents were attributed to the human element, whereas 75.8% of the latter were detected onboard and 80.4% of the onboard human-induced accidents were linked to errors and violations of the ship's master [14]. According to the International Maritime Organization (IMO) "the human element is a complex multi-dimensional issue that affects maritime safety and marine environmental protection". According to this analysis of shipping accidents, Tzannatos found that the most frequent type of accident was that of groundings (49.6%), followed by technical failures with a significant difference of occurrence (28.7%). The other accident types (fire/explosion, collision, flooding etc) accounted for 21.6% in total and were all individually under 10%. Bulk carriers suffered most accidents (33.2%), whereas general cargo carriers, tankers and Ro-Pax entered into the accident record at around 20%.

In terms of age, the older (>27 years) and mid-aged (9–22 years) ships were involved in most accidents with 38.8% and 31.3%, respectively. The younger vessels (<9 years) suffered the least accidents (9.7%). Further analysis into the accident record revealed that although all vessel types suffered primarily from groundings, technical failures and further down fires/ explosions followed with particular significance in the case of tankers and Ro-Pax vessels. Also, the dominance of groundings was found to be irrespective of vessel age, whereas technical failures were more profound in the higher age group. These findings are related to the extent and complexity of the technologies as well as cargo/ passenger vulnerabilities present in the above mentioned vessel types, in conjunction with their increasing significance with vessel age, hence ageing failures of structure and equipment. On average, during the period 1993 to 2006, 57.1% of the investigated accidents were attributed to Human Factor, whereas Random Events, Unidentified Causes and Acts of God accounted for 31.1%, 7.9% and 3.9%, respectively. Furthermore, a significant share (78.5%) of the human element as a cause of accidents was detected onboard, whereas human causes ashore, as well as onboard and ashore (combined) covered 12.6% and 8.9%, respectively, of all the human-caused accidents.

According to these findings, both the overall and the onboard presence of the human element as a cause of shipping accidents is lower than the widely acknowledged statistics of 80% and 65%, respectively. The analysis of Greek shipping accidents during the period 1993–2006, revealed that grounding followed by technical failures dominated safety records, whereas older vessels suffered most accidents. Furthermore, despite the significant reduction of human causes after the ISM Code implementation in mid-1998, human element remains the main cause of accidents [14].

<https://sites.google.com/site/icqqmeas2015>

In their findings, Zobair Ibn Awal et al. proved that the leading causes of accidents were collision between ships and 80% involve cargo vehicles hitting other vehicles. It is observed from the analysis of 442 accident cases that 44% of all the accidents take place due to adverse weather condition coupled with overloading and stability problems of the vessels. It is the collision accident type that has been noted as a serious problem for Bangladesh with a very high rate of occurrence of 39% of all the accidents. Collision between ships, boats and trawlers commence from errors that originates due to both human errors and machinery faults. The predominant types of accidents in the water ways of Bangladesh are accident due to adverse weather and accident due to collision. Cargo vessels and passenger share 75% of all vehicles in collision [15].

Uğurlua et al. mentioned that tanker is a ship designed to carry liquid petroleum cargo in bulk, including a combination carrier when being used for this purpose (ICS 2006). Oil tanker means a vessel built or adopted in cargo compartments, for the purpose of transporting petroleum products, and it contains combined carriers as well. Also, chemical tankers defined in Annex-II of the MARPOL 73/78 convention are defined as oil tankers to the extent that they carry petroleum in bulk with partial or full load. The three accidents most encountered in oil tankers are, respectively, collision, grounding, and fire. The total number of collision and grounding accidents is 202. It is reported that 120 of these accidents are collisions and 82 are groundings. According to the information in the GISIS database, in 94% of the collision and grounding accidents occurring in oil tankers, the ship is lost in whole or becomes unseaworthy.

This puts forth the importance of marine accidents examined in the study. The main factor in the occurrence of collision and grounding accidents is human error. Around 77% of collision accidents and 81% of grounding accidents arise from human error [16].

Psarros et al. report that collisions, contacts, and groundings were the most frequent accidents reported in the Baltic Sea, accounting for more than half (54%) of the total number. These accidents are largely due to weather and navigation hazards as well as dense vessel traffic in the region. In addition, as mentioned earlier, many accident studies have stated that the human factor is responsible for approximately 80% of accidents, which means the other factors combined should account for 20% [17].

Goulielmos marks that out of 3,973 tanker marine accidents (1994), 248 were caused by fire and only 50,3% happened in ports or at anchor, and in ships 11-20 years of age [18]. The crucial point is that 47% of fires happened in sea areas near Europe (Northwest seas, the Baltic and the Mediterranean) and that pollution from fire is only 4 per cent [19].

A database at the University of Piraeus marked that 59,4% of accidents to Greek passenger ships occurred in ports during 1993-1997 and the main reason was contact (31,5 %) [20].

The bad years for Europe were 1988 and 1991 concerning ships total loss. Sunken ships were five to ten years of age and lost mainly by fires and explosions [21].

3. Methodology

We use a database of 1089 ship accidents between the years 1978-2010, for ships under greek flag created from data coming from the Ministry of Shipping and the Aegean, Directorate of Ship Safety. We created variables concerning ship type, ship age, accident type, accident responsibility, area of the accident and total loss-sinking.

We first use the database to have an overview of the incidents by using descriptive statistics.

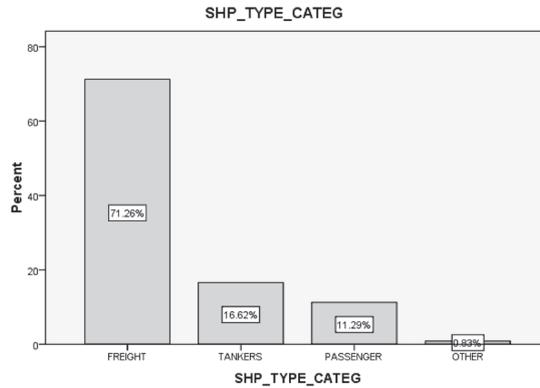
We then test the null hypotheses that: a) ship type is not related to the accident responsibility b) ship type is not related to accident outcome c) ship type is not related to area of the accident and d) ship age is not related to total loss-sinking of the ship. The hypothesis tests are performed by the pearson chi-square test and the crosstab command in SPSS.

4. Results

Descriptives

We firstly use descriptive statistics to have a complete overview of the Greek fleet accident situation. The graphs provide information for 1084 accidents between the years 1974 to 2010, for ships over 1000 gross registered tonnage (hence after GRT). Accidents are presented in bar charts (each bar represents percentage of total accidents) according to ship type, ship size, ship age, area of the accident, accident outcome and accident responsibility.

Figure 1. Greek maritime accidents classified per ship type (1974-2010)



Based on figure 1 which categorizes accidents by ship type, we observe that 71.6% of accidents are associated to freight ships, 16.62% are associated to tankers, 11,29% are passenger ships and a rate of 0,83% includes other ship types. This is consistent with the synthesis of the Greek fleet.

Figure 2. Greek maritime accidents classified per ship size

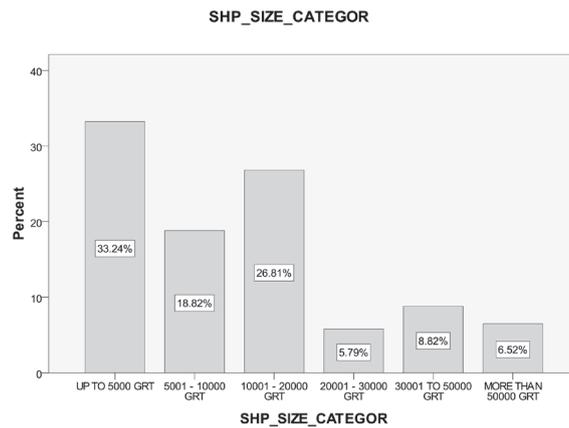


Figure 2 shows accidents classification according to vessels size (in gross registered tonnage). Specifically, we observe that 33.24% refers to accidents for ships that are up to 5000 GRT, 18.82% of ships size 5001-10000 GRT, 26,81% are between 10001-20000 GRT and 5.79% are 20001-30000 GRT while the other 8.82% includes vessels between 30001-50000 GRT. Finally a rate of 6,52% is attributed to ships with size more than 50000 GRT.

Figure 3. Greek maritime accidents classified per ship age

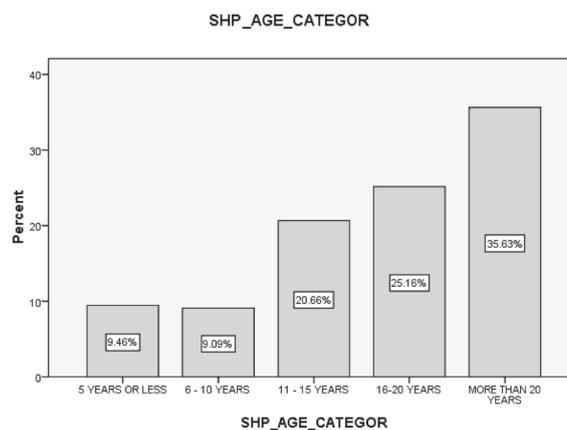


Figure 3 indicates the age of the ships that are recorded with respect to accident frequency. We observe an almost linear association between ship age and accident frequency. In particular, we note that the highest percentage of 35.63% includes vessels with age more than 20 years, while ships between 16-20 years have a percentage of 25.16%. Accordingly 20.66% is for vessels 11-15 years, 9.09% is for 6-10 years and finally a rate of 9.46% represents ships of 5 years or less.

Figure 4. Greek maritime accidents classified per accident outcome

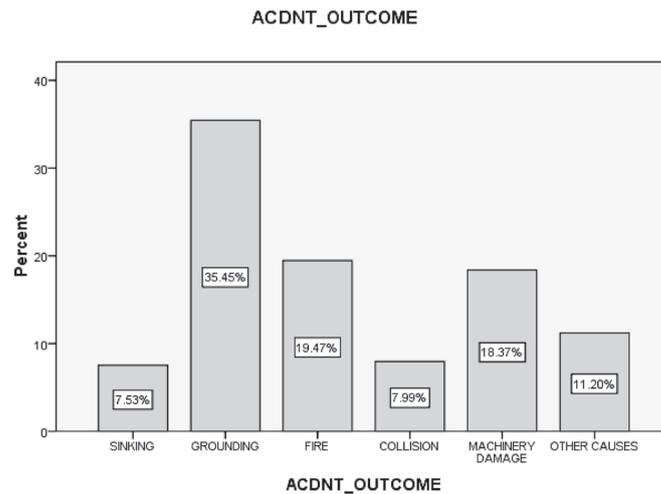


Diagram 4 shows the results for the accident outcome. Starting from lowest, first accident outcome is sinking by 7.53%, collision distracts 7.99%, other causes 11,20%, machinery damage owns a rate of 18.37%, accidents caused from fire 19,47% and finally grounding distracts 35.45%. As we can see by the percentages presented, grounding is responsible for the largest proportion of accidents while fire and machinery damages are equally responsible with significant percentages.

Figure 5. Greek maritime accidents classified per accident area

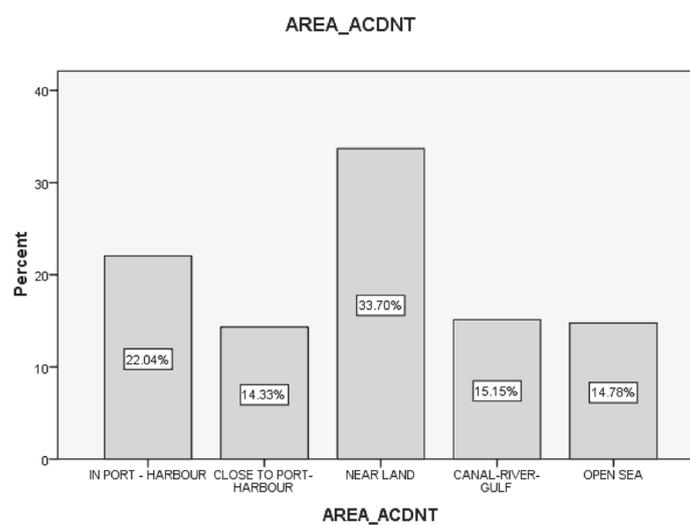
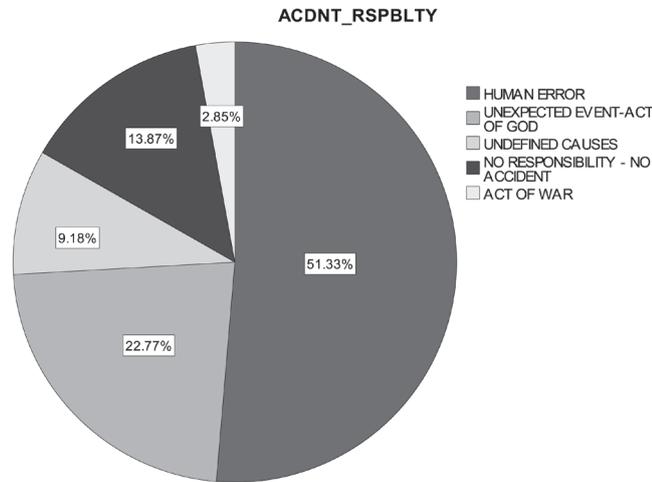


Figure 5 refers to the areas where accidents took place. Starting with the area that possess the highest rate, near land accidents have 33.70%, port-harbour include 22,04%, close to port-harbour have 14.33%, canal-river-gulf with 15.15% and finally the open sea with 14.78%.

Figure 6. Accident responsibility



In the last figure, categories refer to accident responsibility. As we observe human error has the highest percentage (51.33%) and is the main reason for accidents that occurring to ships. Including 22.77% is the unexpected event-act of God, 13,87% is the no responsibility-no accident, fourth with a smaller percentage is undefined causes with 9.18% and fifth with even smaller percentage is act of war with 2.85%.

Hypothesis tests

We will use our database to test the null hypothesis that ship type is not related to accident responsibility. The relation between ship type and accident responsibility is shown in table 2.

Table 2. Crosstabulation between ship type category and accident responsibility

SHP_TYPE_CATEG * ACDNT_RSPBLTY Crosstabulation

			ACDNT_RSPBLTY					Total
			HUMAN ERROR	UNEXPECTED EVENT-ACT OF GOD	UNDEFINED CAUSES	NO RESPONSIBILITY - NO ACCIDENT	ACT OF WAR	
SHP_TYPE_CATEG	FREIGHT	Count	392	185	71	116	12	776
		Expected Count	398.3	176.7	71.3	107.6	22.1	776.0
	TANKERS	Count	94	33	13	23	18	181
		Expected Count	92.9	41.2	16.6	25.1	5.2	181.0
	PASSENGER	Count	68	29	14	12	0	123
		Expected Count	63.1	28.0	11.3	17.1	3.5	123.0
	OTHER	Count	5	1	2	0	1	9
		Expected Count	4.6	2.0	.8	1.2	.3	9.0
Total		Count	559	248	100	151	31	1089
		Expected Count	559.0	248.0	100.0	151.0	31.0	1089.0

Table 3. Chi-Square Test between Ship type category and accident responsibility

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	52.105 ^a	12	.000
Likelihood Ratio	44.094	12	.000
Linear-by-Linear Association	.257	1	.612
N of Valid Cases	1089		

a. 6 cells (30.0%) have expected count less than 5. The minimum expected count is .26.

By looking at the Pearson chi-square index on table 3 ($p=0.00<0.05$), the null hypothesis is rejected meaning that the variables of accident type and ship type are related. This means that different ship types are more susceptible to specific accident reasons. If we look at the cross tabulation table we notice that for the “human error”, the observed count is more than expected for tankers and passenger ships, meaning that this attribute is more likely for those two types. On the other hand human error is less that expected for freight ships. For freight ships the “act of god event” category has showed up more times than expected, if the variables were not correlated. In the case of tankers the “act of war” observed count is more that expected, meaning that this category of ships is more susceptible to accidents due to war acts.

We continue our analysis by checking the null hypothesis that accident outcome is not related to ship type. Accident classification according to ship type and accident outcome is presented in table 4.

Table 4. Crosstabulation between ship type category and accident outcome

SHP_TYPE_CATEG * ACDNT_OUTCOME Crosstabulation

			ACDNT_OUTCOME						Total
			SINKING	GROUNDING	FIRE	COLLISION	MACHINERY DAMAGE	OTHER CAUSES	
SHP_TYPE_CATEG	FREIGHT	Count	68	277	143	55	170	63	776
		Expected Count	58.4	275.1	151.1	62.0	142.5	86.9	776.0
	TANKERS	Count	4	68	37	11	20	41	181
		Expected Count	13.6	64.2	35.2	14.5	33.2	20.3	181.0
	PASSENGER	Count	10	39	29	20	9	16	123
		Expected Count	9.3	43.6	23.9	9.8	22.6	13.8	123.0
	OTHER	Count	0	2	3	1	1	2	9
		Expected Count	.7	3.2	1.8	.7	1.7	1.0	9.0
Total		Count	82	386	212	87	200	122	1089
		Expected Count	82.0	386.0	212.0	87.0	200.0	122.0	1089.0

Table 5. Chi-Square Test between ship type category and accident outcome

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	73.123 ^a	15	.000
Likelihood Ratio	72.506	15	.000
Linear-by-Linear Association	1.606	1	.205
N of Valid Cases	1089		

a. 6 cells (25.0%) have expected count less than 5. The minimum expected count is .68.

As we observe from the chi-square test of table 5, the null hypothesis is rejected meaning that different ship types are more susceptible to certain accident types. By looking at table 4 we notice that freight ships have more counts that expected for the categories of sinking and machinery damage. Tankers on the other hand are less susceptible to sinking than expected but are prone to groundings and other events. Passenger ships are prone to fire and collisions, compared to other ship types.

In order to test the relation between ship type and accident area, we test the null hypothesis that ship type is not related to accident area.

Table 6. Crosstabulation between ship type category and area accident

SHP_TYPE_CATEG * AREA_ACDNT Crosstabulation

			AREA_ACDNT					Total
			IN PORT - HARBOUR	CLOSE TO PORT - HARBOUR	NEAR LAND	CANAL - RIVER - GULF	OPEN SEA	
SHP_TYPE_CATEG	FREIGHT	Count	159	106	270	131	110	776
		Expected Count	171.0	111.2	261.5	117.6	114.7	776.0
	TANKERS	Count	39	34	54	20	34	181
		Expected Count	39.9	25.9	61.0	27.4	26.8	181.0
	PASSENGER	Count	40	15	40	13	15	123
		Expected Count	27.1	17.6	41.5	18.6	18.2	123.0
	OTHER	Count	2	1	3	1	2	9
		Expected Count	2.0	1.3	3.0	1.4	1.3	9.0
Total		Count	240	156	367	165	161	1089
		Expected Count	240.0	156.0	367.0	165.0	161.0	1089.0

Table 7. Chi-Square Test between variables ship type and accident area

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	19.725 ^a	12	.072
Likelihood Ratio	18.995	12	.089
Linear-by-Linear Association	4.391	1	.036
N of Valid Cases	1089		

a. 5 cells (25.0%) have expected count less than 5. The minimum expected count is 1.29.

By looking at the chi-square on table 7 we see that the null hypothesis is rejected at the 90% level, meaning that certain ship types have more accidents in certain areas. For the case of passenger ships, we counted 40 accidents inside a port-harbour while the expected count is 27, meaning that those ships have more accidents inside a harbour. The opposite stands for the other ship types, especially freight ships which have fewer accidents inside harbours than expected but have more accidents near land and in gulf, canals and rivers. Tankers on the other hand have more accidents than expected in the open sea.

Finally we seek if age of the ship is related to a total loss (sink) incident. The results of table 8 reveal that ships between 16-20 years old are more susceptible to sinking than other ship types. This can be verified by the Pearson Chi-Square test on table 9 which verifies the relation of the two variables, total loss and ship age.

Table 8. Crosstabulation between ship age category and total loss

SHP_AGE_CATEGOR * TOT_LOSS Crosstabulation

			TOT_LOSS		Total
			NO TOTAL LOSS	TOTAL LOSS	
SHP_AGE_CATEGOR	5 YEARS OR LESS	Count	99	4	103
		Expected Count	94.6	8.4	103.0
	6 - 10 YEARS	Count	96	3	99
		Expected Count	90.9	8.1	99.0
	11 - 15 YEARS	Count	206	19	225
		Expected Count	206.6	18.4	225.0
	16-20 YEARS	Count	243	31	274
		Expected Count	251.6	22.4	274.0
	MORE THAN 20 YEARS	Count	356	32	388
		Expected Count	356.3	31.7	388.0
Total		Count	1000	89	1089
		Expected Count	1000.0	89.0	1089.0

Table 9. Chi-Square Test between variables ship age category and total loss

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	9.641 ^a	4	.047
Likelihood Ratio	10.869	4	.028
Linear-by-Linear Association	3.892	1	.049
N of Valid Cases	1089		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 8.09.

Conclusions

An analysis of 1089 Greek maritime accident cases was performed, by using data for the period 1974 -2010. The main findings of this study are the following: Ships of capacity under 5000 grt are more prone to accidents since they consist 1/3 of total accident events. We recorded a positive linear relation between ship age and accident frequency. Around 35% of total incidents happened to ships aging over 20 years. Concerning accident outcome, the most usual accident event is grounding, recorded in 35% of total accidents, followed by fire and machinery damage. About accident area it was found that 33% of total accident occurred near land and around 22% inside harbours. Only around 15% of total accidents happened in open sea. Concerning accident responsibility, around half of the accidents involved human error while only 23% were attributed to unexpected events. Hypothesis test between the variables of ship type and accident responsibility revealed a relation between the two variables. By using the chi square index and comparing observed and expected count on the crosstabulation tables, it was found that human error happens more than expected for passenger ships and tanker ships. On the other hand, unexpected events occur more than expected in freight ships. Concerning the relation of ship type and accident outcome, we noticed that passenger ships are prone to fire and collisions, freight ships are prone to sinking and machinery damage and tankers are less prone to sinking but more prone to groundings. Concerning the accident area, passenger ships were found to have more accidents inside ports while freight ships have more accidents near land or inside rivers and canals. It was found that tankers have more accidents in open sea. Concerning the event of a total loss of a ship, hypothesis test shows a relation to ship age. Specifically ships between 16-20 years were found to have more ship losses than expected. Younger ships at the other have less losses than expected. Our results are consistent with papers reviewed in this article. As further research we believe that a binary logistic regression model for the estimation of a total loss event, would lead to a further understanding of the contribution of specific database variables to the accident event. Accident analysis can assist maritime community to address the most important factors contributing to accidents and promote maritime safety.

References

- [1] International Maritime Organisation [IMO]. (2002). Introduction to IMO.
- [2] Faulkner D. (2003). Shipping safety. *Ingenia*;13.
- [3] Toffoli, Lef`evre J.M., Bitner-Gregersen E. and Monbaliu J. (2005). Towards the identification of warning criteria: Analysis of a ship accident database. *Applied Ocean Research* 27, pp. 281-291.
- [4] NMD (2007). Accident Database. February version.
- [5] LRF (2008). Lloyd's Register FairPlay Casualty Database (March version).
- [6] Gaarder S., Rongstad K. and Olofsson M. (1997). Impact of human elements in marine risk management. In: Guedes Soares C., editor. *Advances in safety and reliability*. Pergamon; pp. 857-98.
- [7] MAIB (2000). Annual report 1999. London: Department of the Environment Transport and Regions.
- [8] Maritime Safety Authority of New Zealand (1995-1996). *Maritime accidents*.
- [9] O'Neil, W. A. (2003). The human element in shipping. *World Maritime University Journal of Maritime Affairs*, 2, pp. 95-97.
- [10] Esbensen, P., Johnson, R. E., and Kayten, P. (1985). The importance of crew training and standard operating procedures in commercial vessel accident prevention. Paper presented at the Tenth ship technology and research (STAR) symposium, Norfolk.
- [11] Wagenaar, W. A., and Groeneweg, J. (1987). Accidents at sea: Multiple causes and impossible consequences. *International Journal of Man-Machine Studies*, 27, pp. 587-598.
- [12] Heea D.D., Pickrell B.D., Beac R.G., Robertsd K.H. and Williamsone R.B. (1998). Safety Management Assessment System (SMAS): a process for identifying and evaluating human and organization factors in marine system operations with field test results.
- [13] Gemelos J. (2006). Human Factors and participation in maritime accidents Challenge for Passenger Ships in the Hellenic Marine Area - Statistical Models and Approach to Human Error Probability.
- [14] Tzannatos E. (2010). Human Element and Accidents in Greek Shipping. *The Journal Of Navigation* 63, pp. 119-127.
- [15] Zobair Ibn Awal M. Rafiqul Islam Md Mazharul Hoque (2010). «Collision of marine vehicles in Bangladesh: a study on accident characteristics», *Disaster Prevention and Management: An International Journal*, Vol. 19 Iss 5 pp. 582 - 595.
- [16] Uğurlua O., Köseb E., Umut Yildirima and Ercan Yükyildiza (2013). Marine accident analysis for collision and grounding in oil tanker using FTA method.
- [17] Psarros G., Skjong R., Strandmyr Eide M. (2010). *Accident Analysis and Prevention* 42, pp. 619-625. Under-reporting of maritime accidents.
- [18] Goulielmos A. M. (2001). *Disaster Prevention and Management: An International Journal*, Vol. 10 Iss 4 pp. 278-285. Maritime safety: facts and proposals for the European OPA.
- [19] Kokotos, D. (2000). "A statistical data analysis of accidental pollution", in Giziakis, K. (Ed.), *Proceedings of the 1st Conference in Piraeus for Maritime Safety*, 1998.
- [20] Giziakis, K. and Pardali, A. (2000). "Accidents of passenger ships in ports: the Greek case", in Giziakis, K. (Ed.), *Proceedings of the 1st Conference in Piraeus for Maritime Safety*, 1998.
- [21] Goulielmos, A., Giziakis, K. and Giziaki, E. (1997). "Analysis of total Losses of ships 1985-1993 and the role of the Paris MOU", in Goulielmos, A.M. (Ed.), *Papers in Memory of Prof. B. Metaxas*.

ΤΑ ΧΑΡΑΚΤΗΡΙΣΤΙΚΑ ΤΗΣ ΤΟΥΡΙΣΤΙΚΗΣ ΚΙΝΗΣΗΣ ΣΤΗΝ ΑΘΗΝΑ ΚΑΙ ΟΙ ΕΠΙΠΤΩΣΕΙΣ ΤΗΣ ΟΙΚΟΝΟΜΙΚΗΣ ΚΡΙΣΗΣ ΣΕ ΑΥΤΗΝ

Δρ. Ορφανός Βασίλειος, Δρ. Ευριπιώτης Μιχαήλ

ΠΕΡΙΛΗΨΗ

Η εμπειρική μας μελέτη έχει σαν στόχο τη διερεύνηση συγκεκριμένων χαρακτηριστικών της τουριστικής κίνησης στην Αθήνα καθώς και την εκτίμηση των επιπτώσεων της οικονομικής κρίσης σε αυτά τα χαρακτηριστικά.

Δεδομένου ότι η ελληνική οικονομία χρειάζεται περισσότερο ανταγωνισμό και εξωστρέφεια, ενώ ο τουρισμός θεωρείται πάντα ένας βασικός πυλώνας ανάπτυξης για την ελληνική οικονομία, το ελληνικό τουριστικό προϊόν είναι κατατημημένο με τέτοιο τρόπο ώστε να διασπείρει οικονομικό και κοινωνικό όφελος σε όλη την Ελλάδα και να ακολουθεί τις επιταγές της παγκοσμιοποιημένης αγοράς. Μέσα σε αυτό το γενικό πλαίσιο, η τουριστική κίνηση της Αθήνας έχει ορισμένα ιδιαίτερα χαρακτηριστικά που αξίζει να μελετηθούν ώστε να δοθεί η δυνατότητα να υποβληθούν συγκεκριμένες προτάσεις για περαιτέρω ανάπτυξή της σε όλη τη διάρκεια του χρόνου και για την όσο το δυνατόν καλύτερη εκμετάλλευση των ιδιαίτερων δυνατοτήτων που έχει η πρωτεύουσα της Ελλάδος από τουριστικής άποψης.

Η μέθοδος που σκοπεύουμε να χρησιμοποιήσουμε είναι η μέθοδος της διανομής συγκεκριμένου ερωτηματολογίου σε ένα συγκεκριμένο αντιπροσωπευτικό δείγμα ξενοδοχείων της περιοχής (ευρύτερης περιφέρειας) της Αθήνας. Το ερωτηματολόγιο θα μοιραστεί στον Οικονομικό ή Εμπορικό Διευθυντή της κάθε ξενοδοχειακής μονάδας, στον οποίο θα δοθεί άνετος χρόνος (τουλάχιστον μιας εβδομάδας) ώστε να απαντήσει γραπτώς στις ερωτήσεις. Τα στοιχεία που θα προκύψουν από τις απαντήσεις, μετά την συμπλήρωση και συγκέντρωση των ερωτηματολογίων, θα επεξεργασθούν και θα αναλυθούν με την χρήση του στατιστικού πακέτου SPSS 19.0.

Οι μεταβλητές (τα χαρακτηριστικά δηλαδή που εξετάζουμε αναφορικά με τον πληθυσμό μας) της μελέτης μας είναι τόσο ποιοτικές (κυρίως) όσο και ποσοτικές. Οι ποιοτικές μεταβλητές είναι κυρίως ονομαστικού χαρακτήρα, ενώ οι ποσοτικές είναι τόσο συνεχούς όσο και διακριτού χαρακτήρα.

Τελικός στόχος της εργασίας μας θα είναι η υποβολή συγκεκριμένων προτάσεων για μεγαλύτερη ανάπτυξη, με την κατά το δυνατόν μεγαλύτερη κοινωνική ωφέλεια, της τουριστικής κίνησης στην Αθήνα.

FINANCIAL EFFECTIVENESS OF GREEK MUNICIPALITIES. AN EMPIRICAL INVESTIGATION

Author¹: Dr. Christos L. Pallis

PhD, Department of Public Management, Panteion University

E-mail: pallis@apopsi.gr

Co-Author: Drs. Petros L. Pallis

Phd Candidate, University of Piraeus - Researcher

E-mail: ppallis@unipi.gr

ABSTRACT

Municipalities are autonomous economic and administrative entities, with common actions and responsibilities. On the other hand, all municipalities are quite different considering specific characteristics, such as geographic, demographic and economic.

The aim of this research is to separate the entire sample of municipalities in Greece into categories, based on the effectiveness of financial management and financial performance into effective and ineffective ones.

For the separation of the sample into groups, cluster analysis was preferred. For this reason, three variables were used: the lending capacity of the municipality, flexibility in making non-investment costs, and flexibility in investment spending. These three variables were considered to be the key dimensions of effectiveness in financial management and therefore their use, representatively describes the effectiveness or not of Greek municipalities.

In this study, we investigated the views of Mayors in the two categories of Municipalities (effective and non effective financial management and financial performance) as regards: (a) the biggest problems faced by the citizens in their Municipality, and (b) the biggest personnel problems faced by their Municipality.

Keywords: Greek Municipalities, Local Development, Financial Performance, Financial Management, Empirical Investigation

¹Correspondent Author: Christos L. Pallis, pallis@apopsi.gr

1. Introduction

Municipalities are autonomous economic and administrative entities, with common actions and responsibilities. However, not all municipalities are the same when considering specific geographic, demographic, economic and other characteristics. (Pallis, 2011)

The aim of this research is to divide the entire sample of municipalities in Greece into categories, based on the efficiency of financial management: efficient and inefficient municipalities. Cluster analysis was used to separate the sample in groups. Three variables were used to create the clusters in this research: a municipality's borrowing capacity, flexibility in non-investing costs, and flexibility in investing costs. These three variables were considered to be the key dimensions of efficiency in financial management; therefore, their use is illustrative of the efficiency or inefficiency of Greek municipalities. (Pallis and Pallis, 2014)

In this research we identified differences between the characteristics of the two categories, as regards: (a) the biggest problems faced by the citizens in their Municipality, and (b) the biggest personnel problems faced by their Municipality.

The following chapter will present the methodology used, including a description of the sampling and data collection process, determination of the population, specification of the scope of the sample, definition of the sampling unit, etc. The third chapter will present the results of the methodology used, and the fourth will present the results of data analysis. Finally, the fifth chapter will set out the overall conclusions of the research.

2. Methodology

2.1 General

This chapter presents the research methodology adopted in conducting this empirical project. More specifically, it includes: (a) the definition of population and the study sample, (b) the data collecting method, (c) the response to the survey and the characteristics of Municipalities participating, and (d) the process whereby the research tool used to collect data was created (structured questionnaire) and its analytical presentation.

2.2 Sampling and Data Collection Process

The process of choosing the sample and collecting data is complex and includes six stages (Stathakopoulos, 2001): Definition of population, Determination of the sampling frame, Definition of sampling unit, Determination of sample size, Implementation. From this process the total number of respondents that will participate in the survey emerges.

2.3 Definition of Population

The first and most important step in the primary data collection process is to define characteristics on the basis of which the population to be examined will be defined (Churchill and Iacobucci, 2002). The full definition of the population requires the inclusion of four basic parameters: the item, the sampling unit, the extent of the sampling and the time (Parasuraman et al., 2004). The item and sampling unit in this survey are defined as the Municipalities of Greece, the extent of sampling concerned the whole of the Greek state and the time it was conducted was from 10 June 2010 up to 30 September 2010. Communities in Greece were excluded from the population in the survey due to their small size and different needs in relation to the Municipalities. So in the end, the survey population was defined as being the 914 Greek Municipalities throughout the state, as recorded in the inventory of the National Statistical Service (2001).

2.4 Determination of the Sampling Frame

The next step, after defining the population to be examined, is to locate a sampling frame which must be composed of the fullest and most accurate inventory possible of members of the population to be examined (Churchill and Iacobucci, 2002). The sampling frame used in this survey was the most recent inventory of the National Statistical Service (2001) which includes the census of the population of Greece based on geographical Districts, Prefectures, Municipalities and Communities.

2.5 Definition of the Sampling Unit

The sampling units were defined as being the Greek Municipalities. As regards the respondents from whom survey data was collected, the «key informant method» was used, meaning the person in the survey unit (Municipality of Greece) who had the greatest knowledge of the subject of the survey. This method reduces to a satisfactory degree any concerns regarding the reliability of answers given by respondents, as the respondent

chosen in each unit is the best available person with knowledge of the data that must be collected through the survey (Phillips, 1981), (Kumar, Stern and Anderson, 1993). In this survey the key informant was chosen to be the Mayor in each Municipality examined.

2.6 Choice of Sampling Method

Sampling methods considerably affect the possibility of generalizing the results. In order that the results emerging in the sample might be generalized throughout the total population, a probability sample must be used (Kinnear and Taylor, 1987) in which each unit in the sample has an equal chance of being selected from the population. The safest way of producing a probability sample is the population census and the definition of the total census as a sample in the survey (Stathakopoulos, 2001). This method was followed in this survey, ensuring the generalization of results.

2.7 Determination of Sample Size

As a result of the census method, the size of the sample coincides with the size of the population in the 914 municipalities recorded in the inventory of the National Statistical Service (2001).

2.8 Implementation

With reference to conducting the survey, the two following sub-paragraphs explain the method of contact with the respondents and the reasons they were finally chosen, as well as the results of the method.

2.9 Method of Contact

Completion and collection of questionnaires was carried out during the period from 10 June 2010 to 30 September 2010 in one phase with the use of self-completion questionnaires. The sample in the survey (which coincides with the population in the survey) is characterized by considerable heterogeneity, as it has been specified that it will be all the Municipalities in Greece. The choice of such a kind of sample contributes to the chance of generalizing the results of the survey, as in order for the results of a survey to be generally applicable, heterogeneous samples are preferred (Hooley, Lynch and Shephard, 1990, Kohli and Jaworski, 1990, Narver and Slater 1990, Ruekert, 1992).

Sampling units were approached by mail. This took the form of the delivery of the questionnaire along with an accompanying letter to each Municipality, for the attention of the Mayor, by mail, email or fax, which explained to the recipient the purpose of the survey. This was preceded by telephone contact regarding the dates the questionnaire would be delivered and handed back. This method obliges the respondent to respond within a fixed time (Stathakopoulos, 2001). Respondents returned the completed questionnaires using the same method, via mail, email or fax, on the dates specified. The choice of only one respondent from each sampling unit (key-informant) involves the risk of collecting information that bears no relation to reality, but reflects his personal views. However, the achievement of research objectives required that the respondent be the Mayor in each Municipality so he was in a position to speak about them accurately and in detail.

1. Research Results

The method of collecting data that was used, in the end brought about the collection of questionnaires from 299 Municipalities out of the total of 914 that had been specified as the sample population. This result provides a response percentage of 33% which is considered quite satisfactory, on the basis of the method adopted (Kinnear and Taylor, 1987). As described in table 1, the 299 Municipalities that responded to the survey represent the total population as there was good stratification and representation from all Prefectures in Greece with fairly satisfactory response percentages in each Prefecture. The Greek Municipalities that finally answered the questionnaire represent all the Municipalities in Greece as there was no Prefecture in which the individual response percentage was not satisfactory. Out of the 299 questionnaires collected, 41 were excluded from the analyses due to a large number of answers to questions that would have reduced the statistical reliability of the findings. Additionally in these 41 excluded questionnaires, cases were observed in which the respondents misinterpreted the hierarchical questions. In the end out of the 299 questionnaires 258 exploitable ones were taken into account in the survey (87%), a number which is statistically acceptable (eg. Hooley, Lynch and Shephard, 1990, Kohli and Jaworski, 1990, Narver and Slater 1990, Ruekert, 1992).

Table 1. Respondents per Prefecture

Geographical Districts	Prefectures	Municipalities Participation (number)	Total Number of Municipalities	Response	Municipalities Participation (population)	Total Population of Municipalities	Response	
Attica	Athens	24	48	50%	1.111.093	2.664.776	42%	
	Eastern Attica	9	26	35%	212.327	365.731	58%	
	Western Attica	5	12	42%	115.702	150.847	77%	
	Piraeus	9	16	56%	319.164	540.540	59%	
Subtotal		47	102	46,07%	1.758.286	3.721.894	47,24%	
Rest of Central Greece and Euboea	Etoloakarnania	7	29	24%	75.881	224.429	33,81%	
	Boeotia	7	18	39%	68.524	125.681	54,52%	
	Euboea	9	25	36%	31.968	212.993	15,01%	
	Evrytania	5	11	45%	12.542	32.053	39,13%	
	Fthiotida	9	23	39%	42.466	177.631	23,91%	
	Fokida	4	12	33%	15.190	48.284	31,46%	
	Subtotal		41	118	34,74%	246.571	821.071	30,03%
	Peloponnese	Argolida	6	14	43%	52.326	104.323	50,16%
Arcadia		7	22	32%	28.055	101.444	27,66%	
Achaia		7	21	33%	27.611	321.389	8,59%	
Ilia		5	22	23%	7.849	193.288	4,06%	
Corinthia		6	15	40%	87.142	154.624	56,36%	
Laconia		9	20	45%	32.404	97.966	33,08%	
Messinia		6	29	21%	72.767	175.213	41,53%	
Subtotal			46	143	32,16%	308.154	1.148.247	26,84%
Ionian Islands	Zakynthos	2	6	33%	16.475	39.015	42,23%	
	Corfu	4	13	31%	18.279	110.317	16,57%	
	Cefalonia	4	8	50%	14.448	38.435	37,59%	
	Lefkada	2	6	33%	4.444	21.843	20,35%	
Subtotal		12	33	36,36%	53.646	209.610	25,59%	
Epirus	Arta	2	13	15%	9.126	75.634	12,07%	
	Thesprotia	2	8	25%	9.527	43.071	22,12%	
	Ioannina	10	28	36%	25.967	165.500	15,69%	
	Preveza	2	8	25%	14.385	58.304	24,67%	
Subtotal		16	57	28,07%	59.005	342.509	17,23%	
Thessaly	Karditsa	6	20	30%	32.286	127.774	25,27%	
	Larissa	9	28	32%	173.782	272.966	63,66%	
	Magnesia	8	22	36%	22.214	202.632	10,96%	
	Trikala	7	23	30%	64.352	134.963	47,68%	
Subtotal		30	93	32,25%	292.634	738.335	39,63%	
Macedonia	Grevena	4	8	50%	17.273	35.255	48,99%	
	Drama	2	8	25%	11.215	103.545	10,83%	

	Imathia	4	12	33%	52.620	143.618	36,64%
	Thessaloniki	14	45	31%	263.496	1.057.825	24,91%
	Kavala	4	11	36%	89.436	145.054	61,66%
	Kastoria	2	12	17%	6.117	52.063	11,75%
	Kilkis	4	11	36%	35.481	88.654	40,02%
	Kozani	6	16	38%	75.182	152.138	49,42%
	Pella	3	11	27%	51.276	145.797	35,17%
	Pieria	3	13	23%	21.074	129.846	16,23%
	Serres	5	22	23%	88.768	197.774	44,88%
	Florina	2	8	25%	17.267	51.770	33,35%
	Chalkidiki	3	14	21%	14.166	104.894	13,51%
	Subtotal	56	191	29,31%	743.371	2.408.233	30,87%
Thrace	Evros	4	13	31%	26.207	149.354	17,55%
	Xanthi	2	7	29%	52.270	97.525	53,60%
	Rodopi	4	9	44%	62.770	104.854	59,86%
	Subtotal	10	29	34,48%	141.247	351.733	40,16%
Aegean	Dodecanese	7	25	28%	89.869	189.152	47,51%
	Cyclades	8	20	40%	35.824	106.836	33,53%
	Lesvos	4	17	24%	23.231	108.747	21,36%
	Samos	2	8	25%	14.622	43.595	33,54%
	Chios	2	10	20%	2.920	53.408	5,47%
	Subtotal	23	80	28,75%	166.466	501.738	33,18%
Crete	Iraklio	7	26	27%	171.971	292.489	58,80%
	Lassithi	3	8	38%	45.683	74.613	61,23%
	Rethymnon	4	11	36%	10.456	82.956	12,60%
	Chania	4	23	17%	22.400	149.703	14,96%
	Subtotal	18	68	26,47%	250.510	599.761	41,77%
	Total	299	914	32,71%	4.019.890	10.843.131	37,07%

4. Data analysis

4.1. Division of sample into categories depending on financial performance

This section of analysis aims to divide the entire sample into categories, based on financial management efficiency (efficient - inefficient municipalities). There are two reasons for this analysis: first because of the interest that the in-depth observation of the current situation demonstrates relating to the abilities of municipalities in financial management, and second because of how crucial it is to look into the differences in other characteristics between efficient and inefficient municipalities. Cluster analysis was used to separate the sample in groups. (Pallis and Pallis, 2014)

In this research, three variables were used for the creation of clusters, whose descriptive details were analysed in the previous section, and which are: a municipality's borrowing capacity, flexibility in non-investing costs, and flexibility in investment costs. These three variables were considered to be the key dimensions of efficiency in financial management; therefore, their use is illustrative of efficiency. The method used for the division into clusters is the K-Means partitioning method. This method predetermines the number of clusters into which the sample is divided. In this research, the number of clusters was set at two because (a) theoreti-

cally, dividing municipalities into efficient and inefficient makes more sense, and (b) this number is considered to be most appropriate when the variables used for division are more than two (Kinnear and Taylor, 2004). The results of cluster analysis are shown in the following tables.

Table 2. Cluster centers for the three questions

Final Cluster Centers		
	Cluster	
	Cluster1	Cluster 2
Municipality's borrowing capacity	3	2
Municipality's flexibility in non-investing costs	3	2
Municipality's flexibility in investment costs	3	2

Table 3. Number of answers in each cluster

Number of Cases in each Cluster		
Cluster	1	2
	110	146

As shown in the cluster analysis tables, the observations that resulted from sampling can indeed be divided into two groups on the basis of the three questions above. The first cluster includes 110 municipalities, while the second one includes 146 municipalities. The value for the first cluster centres (central observation) was 3 for all three variables, while the value for the second cluster centres was 2 for all three variables. Considering that the potential answers to the questions used ranged from 1: very good to 4: poor, the first cluster can be named "Municipalities with inefficient financial management" and the second cluster can be named "Municipalities with efficient financial management". A cross-tabulation analysis was used to identify whether the answers to the three questions were different for the two clusters. The results of this analysis and of the relevant x² (Chi-Square) test are shown in the following tables:

Table 4. Cross-tabulation results

Crosstab							
		Municipality's borrowing capacity					
			VERY GOOD	SATISFACTORY	MEDIUM	NOT GOOD	Total
Cluster Number of Case	1	Count	8	26	58	18	110
		% within Cluster Number of Case	7,3%	23,6%	52,7%	16,4%	100,0%
		% within Municipality's borrowing capacity	9,2%	31,0%	89,2%	90,0%	43,0%
		% of Total	3,1%	10,2%	22,7%	7,0%	43,0%
	2	Count	79	58	7	2	146
		% within Cluster Number of Case	54,1%	39,7%	4,8%	1,4%	100,0%
		% within Municipality's flexibility in non-investing costs	90,8%	69,0%	10,8%	10,0%	57,0%
		% of Total	30,9%	22,7%	2,7%	,8%	57,0%
	Total	Count	87	84	65	20	256
		% within Cluster Number of Case	34,0%	32,8%	25,4%	7,8%	100,0%
		% within Municipality's flexibility in investment costs	100,0%	100,0%	100,0%	100,0%	100,0%
		% of Total	34,0%	32,8%	25,4%	7,8%	100,0%

Table 5. Chi-Square test results

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	90,371a	3	,000
Likelihood Ratio	107,058	3	,000
Linear-by-Linear Association	83,496	1	,000
N of Valid Cases	256		

According to the Chi-Square test results, the answers to the three questions were different for the two clusters of municipalities, considering that the observed significance levels were very low (close to zero). Cross tabulation shows that the frequency of the answers is very different between the two clusters and demonstrates efficient performance in financial management for the second cluster and less efficient performance for the first cluster. All the above shown that the division of the sample in two categories of groups is actually useful. In other words, there are two types of municipalities in Greece in relation to the ability to manage financial resources: efficient and inefficient. (Pallis and Pallis, 2014)

4.2. Descriptive measures of variables for Municipalities with ineffective financial management

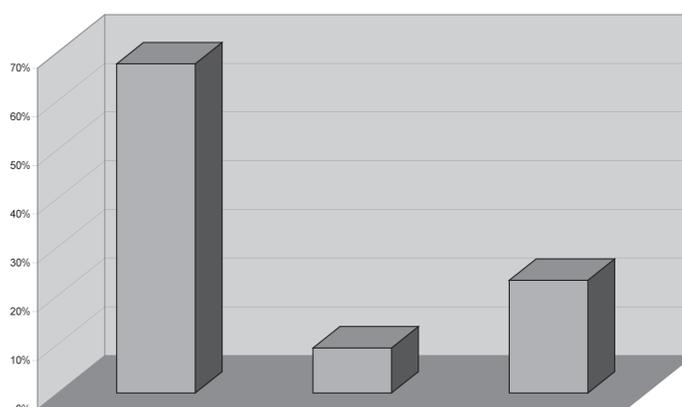
This section presents an analysis of descriptive measures for the presenting variables also used to analyze the first group of municipalities (municipalities with ineffective financial management). The objective is to explore the situation with respect to the administration of municipalities in the group with lowest financial performance, and to compare it with those in the group with the highest performance. In particular, the presenting variables describe: primary problems of municipal residents, primary administrative problems, staffing issues.

As already mentioned in previous sections, these variables were measured using a structured ranking questionnaire. That is, participants were asked to rank possible responses to each question on the basis of specific criteria (importance, frequency, etc.). In this section, for each possible response to each question, the number of mayors who rated it as having primary importance was calculated. Next, a table was prepared indicating frequencies and relative frequencies for each variable. Corresponding bar charts were also prepared. These are presented below.

Table 6. Biggest Problem faced by Citizens - Municipalities with ineffective financial management

Citizens' Problems	Frequency	Percentage %
Lack of Infrastructure	73	68
Inadequate Services for Households	10	9
Inadequate Services for Businesses	25	23
Total	108	100

Figure 1. Biggest Problem faced by Citizens - Municipalities with ineffective financial management

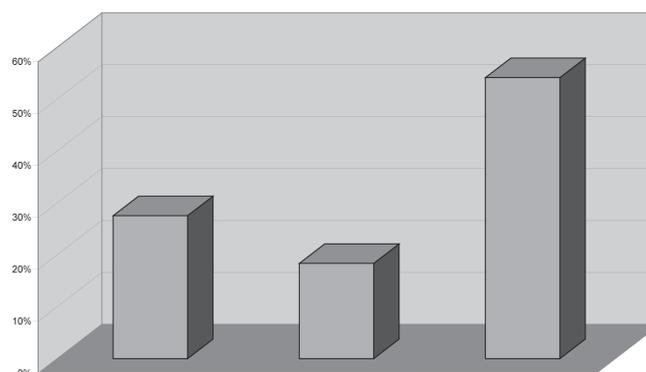


As it is evident from the results, the vast majority of mayors (68%) whose municipalities belong to the group with least effective financial management, consider that the most important problem facing their residents is a lack of infrastructure. A much lower percentage (23%) refers to inadequate services for business enterprises, and only 9% to inadequate services for households. These percentages clearly demonstrate the primary importance of the lack of infrastructure that mayors of municipalities falling with this category are facing. The differences observed in the relative frequencies in relation to the overall sample are very small to non-existent, signifying that the factor ‘financial capability’ does not significantly affect participant responses.

Table 7. Biggest Problems faced by Municipalities in Personnel Management - Municipalities with ineffective financial management

Municipalities' Problems	Frequency	Percentage %
Inefficient Administrative Structure	30	28
Inadequate Number of Personnel	20	18
Lack of Specialized Personnel	59	54
Total	109	100

Figure 2. Biggest Problems faced by Municipalities in Personnel Management - Municipalities with ineffective financial management



According to descriptive data on the second variable, the majority (54%) of respondents whose municipalities suffer from ineffective financial management consider that a lack of specialised staff is the most important problem in their municipality. A much smaller percentage of participants considers that an ineffective organisational structure is the most important problem (28% of the sample), whereas a minority of the respondents (18%) ranks an inadequate number of staff as the primary problem. The results of analysis are almost identical across the overall sample, indicating that this variable is not affected by the financial capabilities of the municipalities either.

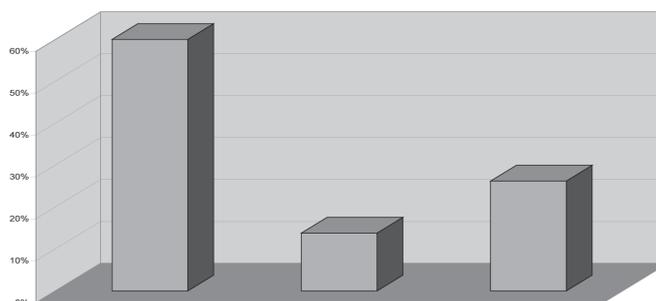
4.3. Descriptive measures of variables for Municipalities with effective financial management

The last section of the analysis presents the descriptive measures of the 8 variables examined in the previous paragraph, this time for that group of municipalities with effective financial administrations, to which the municipalities with good financial performance belong. With regard to these municipalities, as in the previous sections, for each possible response to each question of the field survey, the number of mayors giving it a first place ranking was recorded, either according to importance or any other criterion as referred to in the wording of the questions. In the next subparagraphs the table of frequencies and relevant frequencies as well as the corresponding bar chart are listed for every variable.

Table 8. Biggest Problem faced by Citizens - Municipalities with effective financial management

Citizens' Problems	Frequency	Percentage %
Lack of Infrastructure	87	60
Inadequate Services for Households	20	14
Inadequate Services for Businesses	38	26
Total	145	100

Figure 3. Biggest Problem faced by Citizens - Municipalities with effective financial management

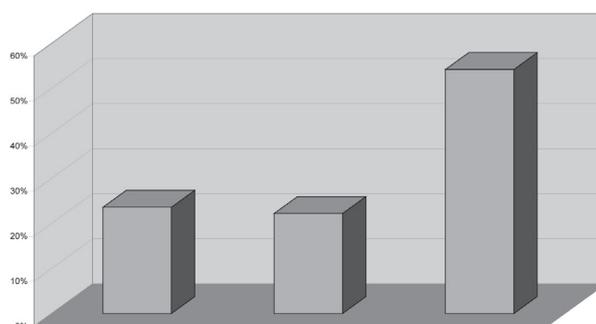


According to the responses of mayors of municipalities with effective financial management, the most important problem facing their residents is inadequate infrastructure. Unsatisfactory services provided to business enterprises are ranked as the second most important problem, and unsatisfactory services provided to households as the third. The prioritization of problems is the same for the group of municipalities which do not have sound financial administrations. The frequency of responses differs slightly in this case, but differences are not so large that financial performance can be considered to affect respondents' opinions.

Table 9. Biggest Problems faced by Municipalities in Personnel Management - Municipalities with effective financial management

Municipalities' Problems	Frequency	Percentage %
Inefficient Administrative Structure	34	24
Inadequate Number of Personnel	32	22
Lack of Specialized Personnel	78	54
Total	144	100

Figure 4. Biggest Problems faced by Municipalities in Personnel Management - Municipalities with effective financial management



With regard to staff shortages, the majority of mayors (54%) of municipalities with effective financial management consider the shortage of specialised staff to be the most important problem in their municipality. Approximately the same number of respondents evaluated ineffective administrative structure (24%), and

<https://sites.google.com/site/icqqmeas 2015>

inadequate staff numbers (22%) as being the most important problem. The results vary, not only from those observed in the overall sample, but also from those observed in municipalities with ineffective financial management, since in the latter inadequate staff complements are regarded as the most important problem by most mayors, and ineffective administrative structures less so. This result is to be expected, given that it is reasonable that municipalities with better financial management performance should also have a more effective administrative structure.

5. Conclusions

This research attempted to divide the entire sample into categories, based on the efficiency of financial management (efficient - inefficient municipalities). There are two reasons for this analysis: first because of the interest that the in-depth observation of the current situation demonstrates relating to the abilities of municipalities in financial management, and second because of how crucial it is to look into the differences in other characteristics between efficient and inefficient municipalities. Cluster analysis was used to separate the sample in groups. Three variables were used to create the clusters in this research: a municipality's borrowing capacity, flexibility in non-investing costs, and flexibility in investing costs. These three variables were considered to be the key dimensions of efficiency in financial management; therefore, their use is illustrative of efficiency. As shown from the analysis, the municipalities were divided into two clusters, based on the three questions above. The first cluster includes 110 municipalities (Municipalities with inefficient financial management) and the second cluster includes 146 (Municipalities with efficient financial management).

The prioritization of problems is the same for both groups of municipalities. The frequency of responses differs slightly, but differences are not so large that financial performance can be considered to affect respondents' opinions.

For the second parameter, the results vary, not only from those observed in the overall sample, but also from those observed in municipalities with ineffective financial management, since in the latter inadequate staff complements are regarded as the most important problem by most mayors, and ineffective administrative structures less so. This result is to be expected, given that it is reasonable that municipalities with better financial management performance should also have a more effective administrative structure.

References

- Brown, M. (1965), "Use of a postcard query in mail surveys", *Public Opinion Quarterly* vol. 29, winter, pp. 635-647
- Brunner, Al., and Caroll, St. (1969), "The effect of prior notification on the refusal rate in fixed address surveys", *Journal of Advertising Research*, vol.9, March, pp. 42-49
- Bachrach, St. and Scoble, H. (1968), "Mail questionnaire efficiency: Controled reduction of non-response", *Public Opinion Quarterly*, vol.31, summer, pp 265-71
- Clausen, J. and Ford, R. (1947). "Controlling Bias in mail questionnaires", *Journal of the American Statistical Association*, vol.42, sept. pp.99-114
- Dillman, D. (1978). "Mail and telephone surveys: The total design method", John Wiley&Sons, N. York
- Ferris, A. (1951). "A note on stimulating response to questionnaires", *American Sociology Review*, vol.16, April, pp: 247-9
- Hooley, G., Lynch, J. and Shepherd, J. (1990). "The marketing concept: putting the theory into practice", *European Journal of Marketing*, Vol. 24 No. 9, pp: 7-25
- Jolson, M. (1977). "How to double or triple mail-survey response rates", *Journal of Marketing*, vol.41, October, pp:78-81
- Kephart, W. and Bressler, I. (1968). "Increasing the responses to mail questionnaires", *Public Opinion Quarterly*, vol.32, summer, pp:123-32
- Kinnear, T., and Taylor J., (1996). *Marketing Research, an applied approach*, McGraw and Hill, Inc
- Kohli, A. and Jaworski, B. (1990). "Market Orientation: The Construct, Research Propositions and Managerial Implications", *Marketing Science Institute*, Report no. 90-113, Cambridge, Massachusetts
- Mason, Dressel, and Brain, R. (1961). "An experimental study of factors affecting response to a mail survey of beginning teachers", *Public Opinion Quarterly*, vol.25, summer, pp:291-4
- Myers, J. and Haug, A. (1969). "How a preliminary letter affects mail surveys returns and costs", *Journal of Advertising Research*, vol.9, sept. pp:37-9
- Narver, J., C., and Slater, S., F. (1990). "The effect of a market orientation on business profitability", *Journal of Marketing*, Vol. 54, October, pp: 20-35
- Pallis, L., C., and Pallis, L., P. (2014). *Separating Municipalities regarding their Financial Performance & Financial Management: An Empirical Investigation of the municipalities in Greece*. International Scientific Conference eRA - 9, Athens, Greece
- Pallis, L., C. (2011). "The Institutional Framework of Local Government Finance – Analysis and Perspectives". Phd Thesis submitted to Panteion University of Political and Social Sciences, Athens, Greece (In Greek)
- Roscoe, A.M., Lang, D. and Sheth, J.N. (1975). "Follow-up methods, questionnaire length and market differences in mail surveys", *Journal of Marketing*, vol.39, April, pp: 20-7
- Ruekert, R., W. (1992). "Developing a market orientation: An organizational strategy perspective", *International Journal of Research in Marketing*, vol.9 pp: 225-25
- Stathakopoulos, B. (2001). *Market Research Methodologies*. Mpenou Publications, Athens, Greece (In Greek)
- Watson, J. (1965). "Improving the response rate on mail research", *Journal of Advertising Research*, vol.5, pp: 45-50

<https://sites.google.com/site/icqqmeas> 2015

FORECASTING THE CAC-40 STOCK INDEX AND ITS RETURNS: EMPIRICAL EVIDENCE FROM GLOBAL AND LOCAL MODELING

Stelios E. Papadakis^{1*} and Christos Floros^{2,3}

¹Dept. of Business Administration, T.E.I. of Crete, Lakonia, Aghios Nikolaos, Crete, Greece

²Dept. of Accounting and Finance, T.E.I. of Crete, Estavromenos, Heraklion, Crete, Greece

³School of Social Sciences, Hellenic Open University, Patras, Greece

*Corresponding author: spap@staff.teicrete.gr

ABSTRACT

In this paper, we use global and local models to predict the price and returns of CAC-40 stock index (an international stock index). We experimentally show that predicting the stock index, itself, in terms of low absolute percentage error (APE) is feasible but impractical for forecasting the returns. We build a global model based on support vector machines, which achieves forecasting Mean absolute percentage error (MAPE) less than 1%. However, the forecasting of returns for the same period (using the same approach) is about 50%; this implies a “toss a coin to predict the result”. We formulate the claim that a global model cannot guarantee adequate forecasts of the returns. We propose an algorithm to identify those regions of the input space which are “predictable”. For each predictable region, we build a local model by using the data of the respective region. The forecasting of a new, unknown target, is feasible only if the new target belongs to a predictable region- and infeasible otherwise. The final output of our approach has three states a) sell, b) buy, d) hold (no suggestion). Experimental results on CAC-40 index shows that our model can be used as an effective decision support tool for financial analysis and trading.

Keywords: Local Modelling; Forecasting; CAC-40; Returns; Financial trading.

1. Introduction

Several stylized facts about financial markets include heavy tails in asset return distributions, absence of autocorrelations of asset returns, volatility clustering and asymmetry between rises and falls [13]. Further, stock markets are affected by a variety of factors (e.g. economic conditions, psychological factors of investors, company's policies, political events etc.), see [6]. There have been many approaches for modeling and forecasting financial prices due to the complexity and uncertainty of the financial markets. Researchers used linear and non-linear methods including ARIMA and GARCH models under low and high frequency datasets. These models provide several advantages (e.g. capturing volatility clustering) and disadvantages on the assumption that stock prices are noisy and non-stationary.

Furthermore, there have been impressive advances in the area of forecasting financial prices using methods from computational intelligence [1]. Artificial neural networks [5], neurofuzzy systems [8], and support vector machines [7] etc., have been successfully used as universal, model free approximators. These non-parametric models are able to capture the input-output relation of a physical system to a desired degree of accuracy from a finite set of observational input-output data. Usually, these models achieve the modeling process by minimizing the empirical risk (e.g. Mean Square Error) between the actual output of the system and the output of the model being used. However, the minimization of empirical risk on the given training set does not necessarily guarantee adequate generalization performance on an unknown set of "unseen" data (testing set).

In contrast, Support Vector Machines (SVM) are models, build on the principle of Structural Risk Minimization instead of the principle of Empirical Risk minimization (SRM). Given a finite set of training data, Vapnik and Chernovenkis introduced the well-known "VC dimension" by providing bounds on the expected generalization error. The minimization of these bounds forms the principle of Structural risk minimization. Support vector machines, introduced by [10], [14], [15], are models build on the principle of SRM. The basic advantage of SVM is the avoiding of over fitting even for a small number of training samples [2]. Moreover, the construction of a SVM model (training) is the result of a convex, quadratic constraint optimization problem and thus it is relatively fast when compared to alternative training algorithms (e.g. gradient based methods).

Despite the capacity of these models to capture the input-output relation, several studies used Machine Learning models (MLM) for predicting stock prices, while other researches used Neural Network Models (NNM). These methods have been extended to large scale machine learning methods which are able to predict financial prices and volatility. However, due to the complexity of these approaches, many studies recently used Artificial Neural Network (ANN) models and show a good generalization (prediction) performance. They argue that ANN outperforms traditional parametric statistical models; however, ANN suffers from the risk of over fitting, while their training algorithm (usually gradient based Empirical risk minimization) suffers from 'local minimum traps and difficulty in determining the structure of the model (e.g. hidden layer neurons, number of layers) and gradient optimization parameters (e.g. learning rate) as well as the hidden larger size' [17].

An improved approach to the above methodology is called Support Vector Regression (SVR)- under Support Vector Machine (SVM)- which 'has a global optimum and exhibits better prediction accuracy...' (see [17]). SVM successfully provides solutions to regression and classification clustering problems by mapping the low dimensional input space to a high dimensional Hilbert space.

SVM's solution is unique and globally optimal, unlike neural networks training which requires nonlinear optimization with the danger of getting stuck at local minima [6]. Further, the major issue here is overfitting due to risk factors.

Previous studies on the application of SVM in finance include [4],[6],[12], and [7]. In [6], a comparison of SVM's performance with those of Linear Discriminant Analysis, Quadratic Discriminant Analysis and Elman Backpropagation Neural Networks. The experiment results show that SVM outperforms the other methods. In [4] a comparison of SVM performance and back propagation neural networks in forecasting the six major Asian stock markets, while in [7] SVM to KOSPI index in forecasting Korean stock markets, is adopted. They both reported significant accuracy with SVM. Recently, [11] examines the forecasting trends of high-frequency KOSPI20 index data using learning classifiers. They find that KOSPI 1-min time series of spot index is well predicted than the futures index.

Stock prices are essentially dynamic, non-linear, nonparametric, and chaotic in nature [16]. Since 2008 financial crisis, there is a need for accurate forecasting techniques of stock prices and indices. Hence, forecasting stock price movement accurately is of great interest to financial analysts, researchers and investors. In this paper, we use global and local models to predict the price and returns of CAC-40 stock index. The CAC-40 is a benchmark French stock market index which represents a capitalization-weighted measure of the 40 most significant values among the 100 highest market caps on the Euronext Paris stock exchange.

The current study contributes to the existing literature on the empirical analysis and forecasting CAC-40 stock index price and returns. Most studies on the forecasting financial prices using the above approaches have considered standard global modeling under SVM to empirically examine the forecasting accuracy.

The contribution of this paper is twofold: (1) we examine and discuss the CAC-40 stock index prediction problem using widely used techniques (SVM), and (2) we apply a recent method introduced by [9] on local modeling to predict the sign of CAC-40 returns. This is the first study which applies the approach developed by [9] in the area of finance.

The results from a global model show that we are able to identify those regions of the input space which are “predictable”. For each predictable region, we build a local model by using the data of the respective region. The experimental results on CAC-40 index show that our proposed model can be used as an effective decision support tool for financial analysis and trading.

The rest of this paper is organized as follows. Section 2 focuses on the stock index and returns prediction with SVM. Section 3 presents a new approach based on local modeling technique to predict stock index returns.. Section 4 concludes the paper.

2. Problem formulation

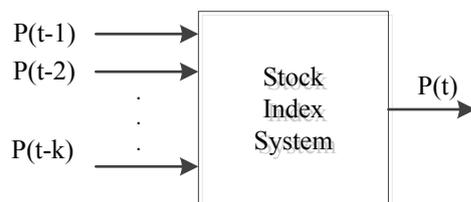
2.1 Stock index prediction

Typically, the stock index is a time series $P(t), t = 1, 2, \dots, N$ of the close value $P(t)$ of stock index at the end of day t . We take consider daily data from the CAC40 stock index for the period 1/7/2003 ($t=1$) to 1/10/2010 ($t=N$); the source of our data is *Datastream*. This period includes $N=1863$ trading days. For each time step t we formulate an input-output datum \mathbf{D}_t as a vector of the form:

$$\mathbf{D}_t = [\mathbf{x}_t, y_t] = [P(t-k), \dots, P(t-1), P(t)], t = k+1, \dots, N \quad (1)$$

By using $k > 1$ lagged values of the index. The last column of the vector is the closing value of the CAC-40 index at time t while the rest k values represents the k previous values of the index. The stock index can be considered as a physical system (Fig. 1) which has k inputs $\mathbf{x}_t = [P(t-k), \dots, P(t-1)]$ and one output $y_t = P(t)$.

Fig. 1: Stock index as a system



Each datum is an instance of previous $P(t-k)$ and current $P(t)$ stock index values. $N-k$ Instances as input-output observational data can be created. Based on the set of input output observational data, a regression model can be constructed to learn the relation of input output instances. If such a relation exists and the model is correctly structured then the model can abstractly learn the internal behavior of the system from the input-output data (excitation-response) observations, given. Then the model replaces the physical system and it is able to calculate the output for an unseen input (generalization). In that respect, we have a mathematical model (model) acting as a predictor which receives the previous values of the stock index (as inputs) and produces the future (currently unknown) value of the stock index. This approach is the typical modeling approach. Actually, the model is a tunable function $f(\mathbf{w}, \mathbf{x})$, which maps an input \mathbf{x} to an output y ($\mathbf{x} \mapsto y$). The system identification process is the calculation of the values of the tunable parameters \mathbf{w} , such that a norm between the real output and the model output is minimized for the given input-output instances. A complex model's structure (large cardinality of \mathbf{w}) might overfit the data. That is, the model produces a very small value of error norm for the given data but a large value for any new, unseen data. The risk of overfitting is high for learning algorithms based on the minimization of error norm. Relaxation techniques establish a practical application of Occam's razor principle by pursuing the better approximation with the simplest model's structure the possible. SVM incorporates relaxation through the principle of structural risk minimization, promising adequate generalization performance [2] despite the fact that some criticism on the theoretical guarantee of the generalization performance of SVMs, exists [3].

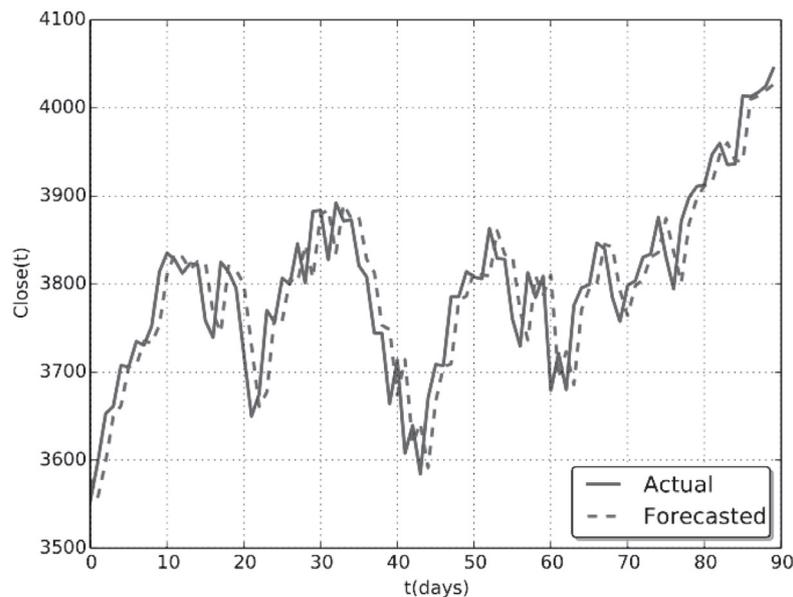
We adopt SVMs to model the stock price system in this paper, because of the abovementioned reasons. We also use the mean absolute percentage error (MAPE) as a model evaluation criterion, because it is an informative error measure. Given N input output samples $[x_i, y_i], i = 1, \dots, N$ and a model with a transfer function $\hat{y}_i = f(\mathbf{w}, \mathbf{x}_i)$, the mean absolute percentage error between actual and model's output on the N samples is given by:

$$MAPE = \frac{100}{N} \cdot \sum_{i=1}^N \frac{|\hat{y}_i - y_i|}{|y_i|} \% \quad (2)$$

We split the dataset of the N observational samples (trading days) into two subsets. The first subset includes the first N_T samples and it is used as the training set for the construction of the SVM model. The second subset includes the rest $N_c = N - N_T$ samples. It is the testing set and is only used for evaluating the generalization performance of the model. In our experiments we used $k = 3$ lagged values. We have to underline that deciding the optimal set of lagged inputs is a crucial step. More than the previous three lagged inputs appeared statistically uncorrelated in terms of Pearson's R /Spearman's ρ , correlation coefficients. However, input selection task is out of the scope of this paper. Selecting three lagged inputs we created $N = 1860$ samples in the form of Eq. . The first $N_T = 1770$ samples were used for training and the rest $N_c = 90$ for testing. A support vector regression machine (SVR) with Gaussian kernel was used. SVRs have three parameters, namely, hyper-parameters [10]: a) parameter γ which regulates the width of the Gaussian kernel and b) parameter C which defines the trade of between approximation performance and function's smoothing. After grid search and cross validation on the training set we decided $\gamma = 0.3, C = 1.0$.

The training $MAPE$ was 0.57% while the testing set $MAPE$ was 0.93%, which is extremely low in terms of $MAPE$. This result (i.e. low $MAPE$) is extremely helpful for predicting daily stock indices, but this doesn't imply the same conclusion for the stock index returns. Most traders and investors would like to know whether to sell or buy an asset (i.e. the prediction of sign of returns). Therefore, we continue our analysis with the prediction of returns, given that most finance studies focus on modeling and forecasting returns which is an important issue for financial analysts and researchers. In other words, due to the stylized facts of financial markets (as given in the Introduction), modeling and forecasting financial returns accurately help financial managers in decision making.

Fig. 2: The prediction (dashed line) vs the actual (solid line) of the stock index for a period of 90 trading days of CAC-40. The MAPE error was 0.93%.



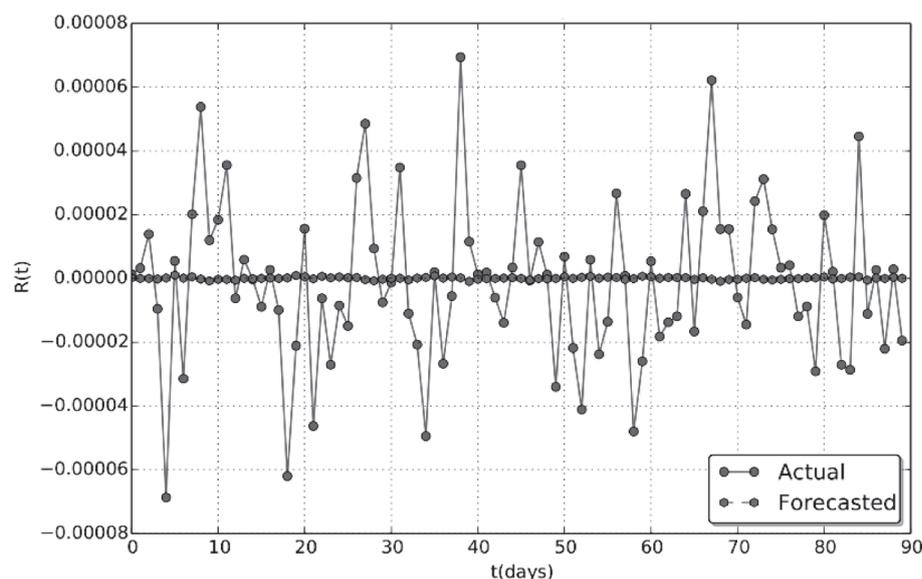
2.2 Predicting the returns

The underline importance of predicting the stock index is the prediction of returns. Returns are a time series $R(t)$ created by the time series of the stock index as:

$$R(t) = \log(P(t-2)) - \log(P(t-1)) \quad (3)$$

Where $\log(\cdot)$ is the physical logarithm. $R(t)$ denotes the change in the trend of stock index along the time. A positive return value means that the index increases, while a negative value means that the index decreases. The prediction of $R(t)$ sign is important since it motivates investors to sell or buy. Predicting the sign of returns from empirical data by using a systemic approach (Fig. 1) can be formulated as a classification problem where the inputs for each datum are the previous values $\mathbf{D}_i = [R(t-3), R(t-2), R(t-1), \text{sign}(R(t))]$ where $\text{sign}(R(t))$ is the output of the system. The last 90 samples (trading days) were used for classification while the rest for training a two class SVM classifier. The success classification performance on the testing set of 90 samples was 50%, which is equivalent to “toss for to guess the result”.

Fig 3.: The prediction vs. the actual return value by using a SVR model. The MAPE was 99.8%. The respective success classification rate when predicting the sign of the returns was 50%. The SVM global model failed to predict the returns despite the fact that it predicted the index with low MAPE.



3. The proposed approach for predicting the return

The global SVM model of the §2.2 failed to predict the sign of stock index, besides the fact that SVR successfully predicted the stock index itself, successfully. We claim that a global model is not able to predict the changes of the daily stock index. However our proposed methodology is based on the assumption that, maybe, there exist some regions of the input space which are predictable. That is, a local model, created from the data of the region, exists which is able to provide a success classification rate greater than 50%. We give the following definition of a predictable region:

Definition 1: A region of the input space is predictable at level $\ell \in (0,1]$ by a model M if the average ten-fold cross-validation classification rate of the model M on the data belonging to the region is at least $\ell \cdot 100\%$.

If a new target datum arrives then we dynamically identify its neighbors in time $O(\log n)$ following the methodology in [9]. Then, a ten-fold cross-validation is performed by using a SVM which is built from the data of the specific region. If the average success classification rate of the ten-fold cross-validation is greater than ℓ then the region is considered as predictable and the prediction of the datum is realized by the model. Otherwise, no decision is feasible for the specific target.

We applied that approach by defining $\ell = 0.65$ and $\delta = 0.1$. For the definition of δ see [9]. We experimentally found that the 9.75% of the input data belong to predictable regions, in the sense of definition 1. For the rest 90.25% of the input data any prediction is doubtful. Regarding the predictable targets, the average success classification rate of the respective local models was 60.1%, which is far away from “toss for to guess the result”.

4. Conclusion

The financial variable prediction has been an important topic targeted by many researchers since successful prediction helps to make profits as well as avoid risks [11]. This paper extends the existing literature by using global and local models to predict the closing prices and returns of CAC-40 stock index. We experimentally show that predicting the stock index, itself, in terms of low absolute percentage error (APE), is feasible but impractical for forecasting the returns. Using a recent method proposed by [9], we argue that a global model cannot guarantee adequate forecasts of the returns. In other words, we identify those regions of the input space which are “predictable”. For each predictable region, we build a local model by using the data of the respective region. The experimental results on CAC-40 stock index returns show that our proposed model can be used as an effective decision support tool for financial analysis and trading. Future research should consider other advanced methods including the PSO algorithm for predicting daily and intraday returns of European and US stock indices.

References

- [1] G. S. Atsalakis and K. P. Valavanis, “Surveying stock market forecasting techniques—Part II: Soft computing methods,” *Expert Syst. Appl.*, vol. 36, no. 3, pp. 5932–5941, 2009.
- [2] P. Bartlett and J. Shawe-Taylor, “Generalization performance of support vector machines and other pattern classifiers,” *Adv. Kernel Methods—Support Vector Learn.*, pp. 43–54, 1999.
- [3] C. J. Burges, “A tutorial on support vector machines for pattern recognition,” *Data Min. Knowl. Discov.*, vol. 2, no. 2, pp. 121–167, 1998.
- [4] W.-H. Chen, J.-Y. Shih, and S. Wu, “Comparison of support-vector machines and back propagation neural networks in forecasting the six major Asian stock markets,” *Int. J. Electron. Finance*, vol. 1, no. 1, pp. 49–67, 2006.
- [5] E. Guresen, G. Kayakutlu, and T. U. Daim, “Using artificial neural network models in stock market index prediction,” *Expert Syst. Appl.*, vol. 38, no. 8, pp. 10389–10397, 2011.
- [6] W. Huang, Y. Nakamori, and S.-Y. Wang, “Forecasting stock market movement direction with support vector machine,” *Comput. Oper. Res.*, vol. 32, no. 10, pp. 2513–2522, 2005.
- [7] K. Kim, “Financial time series forecasting using support vector machines,” *Neurocomputing*, vol. 55, no. 1, pp. 307–319, 2003.
- [8] R. Kuo, “A sales forecasting system based on fuzzy neural network with initial weights generated by genetic algorithm,” *Eur. J. Oper. Res.*, vol. 129, no. 3, pp. 496–517, 2001.
- [9] S. E. Papadakis, V. A. Stykas, G. Mastorakis, and C. X. Mavromoustakis, “A hyper-box approach using relational databases for large scale machine learning,” in *2014 International Conference on Telecommunications and Multimedia, TEMU 2014*, 2014, pp. 69–73.
- [10] A. J. Smola and B. Schölkopf, *Learning with kernels*. Citeseer, 1998.
- [11] Y. Son, D. Noh, and J. Lee, “Forecasting trends of high-frequency KOSPI200 index data using learning classifiers,” *Expert Syst. Appl.*, vol. 39, no. 14, pp. 11607–11615, 2012.
- [12] F. E. Tay and L. Cao, “Application of support vector machines in financial time series forecasting,” *Omega*, vol. 29, no. 4, pp. 309–317, 2001.
- [13] J.-J. Tseng and S.-P. Li, “Asset returns and volatility clustering in financial time series,” *Phys. Stat. Mech. Its Appl.*, vol. 390, no. 7, pp. 1300–1314, 2011.
- [14] V. Vapnik, “Principles of risk minimization for learning theory,” in *Advances in neural information processing systems*, 1992, pp. 831–838.
- [15] V. Vapnik, *The nature of statistical learning theory*. Springer Science & Business Media, 2000.
- [16] J.-Z. Wang, J.-J. Wang, Z.-G. Zhang, and S.-P. Guo, “Forecasting stock indices with back propagation neural network,” *Expert Syst. Appl.*, vol. 38, no. 11, pp. 14346–14355, 2011.
- [17] C.-Y. Yeh, C.-W. Huang, and S.-J. Lee, “A multiple-kernel support vector regression approach for stock market price forecasting,” *Expert Syst. Appl.*, vol. 38, no. 3, pp. 2177–2186, 2011.

EVALUATION OF EMPIRICAL ATTRIBUTES FOR CREDIT RISK FORECASTING FROM NUMERICAL DATA

Stelios E. Papadakis^{1*} and Christos Lemonakis²

^{1,2}Dept. of Business Administration, T.E.I. of Crete, Lakonia, Aghios Nikolaos, Crete, Greece

*e-mail: spap@staff.teicrete.gr

ABSTRACT

In this paper, we evaluate 35 features which are empirically utilized for forecasting the credit behavior of the borrowers of a Greek Bank. These features are initially selected according to universally accepted criteria. A data set of historical data (observations) was collected from the database of a Greek bank. Based on those data, we performed extensive data analysis by using non parametric models. Our data analysis revealed that building a simplified model by using only 3 out of the 35 initially selected features can achieve the same or slightly better forecasting accuracy when compared to the forecasting accuracy achieved by a model which uses all the 35 features. Extensive interpretation of the results is provided and the experimentally verified claim that universally accepted criteria can't be globally used to achieve optimal results is discussed.

Keywords: Credit Risk, Computational intelligence.

1. Introduction

Banking activity is exposed to various risks. Understanding and quantifying these risks is crucial for bank management, as well as, for the stability of the whole economy [14]. Banks tend to lend to firms with high credit quality and not to lend to low credit quality firms. So the most important factor in determining lending practices is credit risk [6], [11].

According to [8], research considering credit risk has been one of the most active areas of recent financial research, with significant efforts deployed to analyze the meaning, role, and influence of credit ratings. Credit risk analysis has attracted much attention from financial institutions due to the recent financial crises and regulatory concerns of Basel II [19]. Furthermore, business competition for obtaining more market share and profit become more and more aggressive in recent years, some institutions take more risks to achieve competitive advantage in the market. Consequently, many financial institutions suffered a great loss from a steady increase of defaults and bad loans from their counterparties. However, more and more adult population use credit products, such as mortgages, car and house loan, credit card, etc., from banks or other financial institutions. Therefore, an effective credit risk analysis model has been a crucial factor for describing thoroughly the real credit risks of the selected a bank's loans portfolio.

Generally, the procedures for customer credit risk analysis can be simply viewed as two stages. First, when applicants apply for credit, the lenders must make a decision whether or not to grant the credit and how much to grant. The traditional method of making such decisions is based on experience of previous lending decision. However, with the increase of the number of applicants and the intense competition in credit industry, this traditional method cannot meet the demands of both economic and efficiency aspects for financial institutions.

Nowadays, credit scoring is a widely used technique that helps the lenders to make such credit granting decisions. Its main idea is to evaluate the probability that how likely the applicant will default according to the characters recorded in the application form with a quantitative model based on information of the past applicants, and the accept and reject decision is taken by comparing the estimated default probability with a proper threshold. In the second stage, the lenders need to make the decisions how to deal with the existing customers. When and how to increase and reduce the customers' credit? If the customer starts to fall behind in his repayments (i.e. overdue debts), when and what actions should be taken? How the customer should be treated with regard to retain debt's viability? Techniques that help with these decisions are called as behavior scoring.

The principle of this approach is exactly the same as credit scoring but using more information which describes the customer's performance during some previous observation periods.

The paper is organized as follows. In Section 2, the framework of key steps in a Bank's loan decision making process is described as well as best lending practices to highlight risks undertaken in a loan's evaluation stage. In Section 3, areas of business analysis are set out, to find out customers' financial position and their «particular» operational characteristics. In Section 4, the data sample is described, with the variables used and their specific attributes. In Section 5, the selection of significant inputs is set, as well as the implementation of various selected attributes approaches made, i.e. Pearson's r , Spearman's ρ , Kendall's τ , PCA-SPPS and PCA-[16] and multivariate attributes evaluation. Also, discussion and interpretation of the results are presented. Finally, in Section 6, conclusions are presented as well as further research.

2. Lending decisions based on best-practice

Borrowers such as Small Business Enterprises (SMEs), on a basic model of rating, are divided into two general categories: I) the consistent and II) the borrowers with overdue and problems in repaying their loan obligations. The adoption of this approach, which is consistent with the principles of Basel II, the Standardized Approach and the Internal Ratings Approach for the measurement of credit risk, places emphasis towards the calculation of the expected probability of default (Probability of Default-PD) for each of the categories of loans, taking into account customers' historical default data. The main point, however, for each bank is to find out the right lending decision in evaluation of credit provided to legal persons. The loan evaluation process is a common process, regardless of the bank organization. However, nowadays, due to the economic crisis, further clarifications of individual characteristics are set in identifying those elements that require further evaluation.

Table 1 describes some basic steps of the lending decision procedure, taking into account best practices in the banking industry worldwide. Each bank, initially receives (Step 1) customer's loan application describing the purpose of lending and its characteristics, namely the repayment rate, collaterals provided, etc.

Table 1: Key steps in a Bank's loan decision - best practices

Steps- Procedures	Description	Potential Risks
Step 1 Select the appropriate loan product	Choosing an appropriate loan product that meets customer requirements	Incorrect loan product that does not cover the actual customer needs. Wrong product pricing and increased probability of default
Step 2 Customer's Rating	The bank carries out an initial assessment of the of the borrower's creditworthiness.	Failure to take the real customer's financial status. It results in overestimation or underestimation of the customer's economic capacity.
Step 3A Positive lending decision (+)	The bank decides to provide credit to customer, based on the evaluation of its overall financial status	Possible failure to take adequate guarantees The bank incorrectly determines the individual loan's characteristics, such as the interest rate, the repayment period, etc.
Step 3B Negative lending decision (-) Reassessment	The bank re-evaluates the second stage due to low credit borrower's quality, inappropriate or little collaterals, etc.	Underestimation of the borrower's real financial status.
Step 4A positive lending decision (+) collaterals' strengthening	Conduct borrower's reassessment in the second stage, with a requirement for collaterals' strengthening	Select loan volume, taking into account the personal and collateral guarantees and not the primary ability to repay the loan.
Step 4B Negative Judgment (-)	Reject loan's request	Rejection of a good loan's request, which would have been paid without problems. Loss of bank's profits and adverse consequences for the borrower himself.

Table 1 highlights the risks undertaken by the bank in the evaluation stage, since the repayment of the credit is purely a quantitative-financial, as well as, a qualitative customer's analysis issue (eg.: solvency, borrower's market position, other loans' quality characteristics, etc.) The final credit decision must be varied in acceptable limits carefully defined per bank for each category of loan product. The described framework decision on a bank's loan, which takes into account the best global practice, is for the bank to adopt a flexible strategy that provides adequate and comprehensive information for customer's credit, minimizing credit risk.

3. Customers' financial status analysis

The preparation of information for the decision of credit undertaking is probably the most expensive part of the process of the credit. Table 2 shows the results of assessing the customer's creditworthiness that determines the level of the credit risk undertaken by the bank. The main issue for the credit decision is to determine the client's financial position.

The use of the standard assessment model, depicted in table 2, has common features with the systems operating in banks nowadays. For example, to determine the position of an SME there is a need for using various characteristics (factors), which show its financial position and its «particular» operational characteristics. These factors are grouped in a practical way in nine areas of the baseline analysis (Table 2), i.e. four quantitative and five qualitative characteristics.

Table 2: Areas of business analysis

Number	Quantitative Factors	Qualitative Factors
1	Profitability	Firm's position in the market (in case of business loans)
2	Financial liquidity	Management Quality
3	Business activity	Reliability of businessmen
4	Level of Sort and long term debt	Nature of Business
5	-	Historical customer's credit data

The quantitative characteristics using only financial data for calculating relevant financial indicators of profitability, liquidity, activity and customer's bank lending. On the other hand, qualitative factors analysis is called assessment of objective factors. These qualities do not show causal relationships; these factors are measured only in a subjective manner, based on solid criteria.

4. Problem definition

A Greek bank provides loans as products to borrowers. The bank keeps historical records of the behavior of past borrowers. Each record corresponds to a specific borrower and includes a number of measured attributes of him and the payoff status of the loan he received. These attributes, namely candidate attributes or candidate inputs are in advanced decided by an expert in the field of application. This decision is based either on expert's experience and/or his intuition and involves the factors affecting the output of the system according to his intuition/experience. In our case, the predetermined attributes are listed in Table 3.

4.1 Sample and core characteristics

We use quantitative and qualitative data from 150 borrowers of a Greek banking institution in Retail and Corporate Banking. The data used include in particular:

- **The Credit Risk Rate (CRR)** that takes values 0 for low, 1 for acceptable, 2 for acceptable with caution, and 3 for high credit risk.
- **The Exposure at Default (EAD)** and is defined as the gross exposure upon default of an obligor
- **Probability of default (PD)** describing the likelihood of a default over a particular time horizon. It is the likelihood that a borrower will be unable to meet its debt obligations.
- **Expected Loss (EL)** is the average credit loss that a bank would expect from an exposure or a portfolio over a given period of time. Expected Loss (EL) is estimated as the product of Exposure at Default (EAD), Probability of default (PD) and Loss Given Default (LGD). Herein we take a regulatory estimate for LGD equals to 45% under the Basel Committee (2006) requirements.
- **Variables x_5 - x_{24}** are financial accounts and indicators (quantitative variables), taken out from borrowers' financial statements.
- **Qualitative data**, a binary variable that takes value 1 for satisfactory and 0 for non-satisfactory qualitative characteristics
- **Customer's Characterization**, a variable that takes discrete values 1 for very credible, 2 for credible, 3 for satisfactory, 4 for adequate, and 5 for inadequate customers.
- **The weighted average of annual interest rate**
- **Collaterals** taken for loans' guarantees in euros
- **The Loan to Value Ratio (LTV)** is used by banks to express the ratio of a loan to the value of an asset purchased
- **Obligor type**, that takes the value of 0 for Retail, and 1 for Corporate Borrower
- **Collateral type** that takes the values of 1 for urban property, 2 for commercial property, 3 for other property, and 4 for None
- **Loans' Maturity** that takes the values of 0 for short-term, 1 for mixed term and 2 for long term debt
- **Firms' Exporting Activity**, that takes the value 0 for domestic activity, and 1 for domestic and exported activity
- **Firms' Sectors** that take the values 1 for Agricultural, 2 for Constructions, 3 for Hotels & Tourism, 4 for Manufacture, 5 for Other Industries, 6 for Retail Commerce, 7 for Services, and 8 for Wholesale.
- **Firm's Legal Form**, that takes the values 1 for Sole Proprietorship, 2 for Cooperative, 3 for Municipal Public Companies, 4 for Private Limited Company, 5 for Limited Partnership, 6 for Limited Liability, and 7 for Unlimited Companies.

Table 3: Description of the measured attributes

Attribute	Description
x_1	Credit Risk Rate (CRR), 0=low, 1=acceptable, 2=acceptable with caution, 3=high.
x_2	Exposure at Default (EAD).
x_3	Probability of Default (PD).
x_4	Expected Loss $EL = EAD \cdot PD \cdot LGD$ regulatory estimate for $LGD = 45\%$ Basel Committee (2006) [1]
x_5	Fixed Assets (FA).

x_6	Equity Capital (EQU).
x_7	Bank Loans (BLs).
x_8	Total Sales (TS).
x_9	Cash Deposits (CD).
x_{10}	Gross Profit Margin (GPM).
x_{11}	Net Profit Margin (NPM).
x_{12}	Return on Total Assets (ROA).
x_{13}	Return on Equity (ROE).
x_{14}	Asset Turnover Ratio (ATR).
x_{15}	Sales to Equity Ratio (SER).
x_{16}	Fixed-Asset Turnover Ratio (FATR).
x_{17}	Debt-to-Equity Ratio (DER).
x_{18}	Liquidity Ratio (LR).
x_{19}	Acid Liquidity Ratio (ALR).
x_{20}	Inventory Turnover (IT).
x_{21}	Working Capital Turnover Ratio (WCTR).
x_{22}	Debt-to-Equity Ratio (DER).
x_{23}	Debt Ratio (DR).
x_{24}	Debt to Capital Ratio (DCR).
x_{25}	Qualitative elements (1=satisfactory qualitative and 0=non-satisfactory qualitative).
x_{26}	Customer's Characterization (1=very credible customer, 2=credible, 3=satisfactory, 4=adequate, 5=inadequate).
x_{27}	Average rate of interest.
x_{28}	Collaterals (in euros).
x_{29}	The Loan-to-Value (LTV) Ratio
x_{30}	Obligor type, 0=Retail, 1=Corporate.
x_{31}	Collateral_type (1=urban property, 2= commercial property, 3= other property, 4=None).
x_{32}	Loans' Maturity (0=short-term, 1=mixed term 2=long term).
x_{33}	0=domestic activity, 1=domestic and exported activity.
x_{34}	Sectors: 1=Agricultural, 2=Constructions, 3=Hotels \& Tourism, 4=Manufacture, 5=Other Industries, 6=Retail Commerce, 7=Services, 8=Wholesale.
x_{35}	Firm's Legal Form, 1=Sole Proprietorship, 2=Cooperative, 3=Municipal Public Companies, 4=Private Limited Company, 5=Limited Partnership, 6=Limited Liability, 7=Unlimited Company.

The aforementioned attributes are summarized in Table 3. The sample consists of 150 borrowers, solely firms that keep “C” category accounting books (in the Greek National Accounting System) and categorized based on Basel II criteria, as exposures to retail or corporate banking; in that case such loans are covered by mortgages on commercial or residential property and cash collaterals. The CRR is the result of calculating the degree of credit risk using a commercial software and takes values between 0.07 (AA +) and 1 (CCC) of Standard &

Poor's rating scale. These values correspond to the respective levels of credit risk assessment classification ranging from «Minimum» to «High» credit risk respectively. Regarding the used financial ratios and variables taken into account the average values as derived from firms' published financial statements for the three consecutive years 2009-2011.

Regarding the qualitative customer data (QUAL), exported from the total «financial» status of the borrower. We enter the value 1 for the category "Satisfactory Quality Data" when all firms' qualitative data are positively evaluated (eg: quality of cooperation, professionalism, successors continuity, market position, etc.) and account for more than 60% of the total information taken and we put the value 0 where customer's quality data range in less than 60% of the total information.

Also, regarding the due borrowers we take into account debts during the last year (2011) of the study in relation to the reference period (01/01/2009 - 12/31/2011). We enter a value of 1 for non-existence of a customer's overdue debt as well as other information taken from the Tiresias system, the main Greek Default Financial Obligations & Mortgages and Prenotations to Mortgages System that contains data concerning bounced checks, unpaid bills of exchange, mortgages and prenotations to mortgages. In contrast, we enter 0, where borrowers show due debt greater than 90 days or unfavorable data in Tiresias system.

Finally, with respect to the variable associated with the «maturity» in firms' loans we take into account the repayment period and a customers' separation in those with short-term, mixed term and long term lending. Thus, loans with annual recycling capital and interest (e.g. credit limits using overdrafts) are accounted for as short-term lending and we enter the value 0. Where borrowers receive long-term funding (usually more than two years), we enter the value 2 and in intermediate cases, where borrowers have and short and long-term debt, we enter the value 1. Long-term loans are considered as the highest ones in terms of credit risk by the bank, due to time horizon of repayment that may be changed significantly during the years to come.

The usefulness of economic fundamentals and financial indicators of a company as explanatory variables for the assessment of credit risk has been shown in various studies, including [7],[2],[9] among others. The choice of these variables was based on this literature and the validity of those financial indicators. The methodological framework for the variables draws evidence from both the hybrid creditworthiness model of [2] and from key characteristics of Risk Calc and KMV EDF Risk Calc (v.3,1) Software of [13].

4.2 Mathematical formulation

The Bank aims to predict the payoff status of a future borrower, provided that his attributes are given. This problem can be formulated as a classification problem. Each past borrower is an instance consisting of an input vector of his attributes and a label $\{\pm 1\}$ which denotes that the borrower was trustworthy (+1) or not (-1). A function that assigns a label to an input vector can be constructed from the given database, by computational intelligence techniques. From that point of view the prediction of the behavior of a new customer can be formulated as a typical classification problem according to the following mathematical formulation.

Let $\mathbf{X} \subseteq \mathbb{R}^m$ be the set of ordered vectors $\mathbf{x}_i = [x_{i,1}, x_{i,2}, \dots, x_{i,m}]$ $i = 1, 2, \dots, n$. Each vector corresponds to a particular borrower, encoding his measured attributes as real numbers. If n borrowers are available and m attributes per borrower are recorded, then the dimensions of each vector equals m and the cardinality of \mathbf{X} equals n . Let $\mathbf{L} = \{\pm 1\}$ the set of labels that encodes the behavior of the customers. We assume that a label +1 denotes a trustworthy borrower, which in turn means that the borrower fully repaid the entire amount, timely. Contrastingly, a label -1 denotes that the respective borrower was inconsistent in repaying the loan. The modeling process aims to build a function $f: \mathbf{X} \rightarrow \mathbf{L}$, which assigns a label $\ell \in \{\pm 1\}$ to a given input datum $\mathbf{x} \in \mathbf{X}$. In matrix notation a two dimensional $n \times m$ matrix \mathbf{X} stores the attribute values of historic customers, while an $n \times 1$ matrix \mathbf{L} stores the respective labels. The whole historic data set can be stored in a matrix $\mathbf{D} = [\mathbf{X} | \mathbf{L}]$ consisting of the attributes matrix \mathbf{X} augmented by \mathbf{L} . Each row of \mathbf{D} corresponds to a specific borrower encoding both his attributes and his behavior. In terms of computational intelligence a model, considered as black-box can be used to implement the function f as its transfer function. The model accepts an input datum \mathbf{x}_i and produces an output value $\tilde{y}_i \in \{\pm 1\}$.

The aim of the modeling is $\tilde{y}_i = \ell_i \in \{\pm 1\} \forall i$. In that respect the model reliably identifies the input-output relation of the given dataset. As a result, we can make the assumption that the model can be used to predict the label (output value) of a new unseen datum (input vector), correctly.

5. Attribute evaluation

5.1 Data pre-processing

A meaningful pre-processing step is the normalization of the given dataset. The Normalization ensures that the contribution of each input to the computation of metrics is irrespective of its actual range; it might be useful both in the data analysis and in the modeling performance [15]. In general, data normalization is an affine transformation (a linear combination plus a constant term) of each attribute value $x_{i,j}$ from its actual range $[x_j^+, x_j^-]$ into $[0,1]$. If the domain of normalization is the range $[0,1]$, then the transformation can be computed by Eq. (1)

$$\hat{x}_{i,j} = \frac{x_{i,j} - x_j^-}{x_j^+ - x_j^-} \in [0,1] \quad (1)$$

In order to simplify the mathematical notation we will use the symbol $x_{i,j}$ instead of $\hat{x}_{i,j}$ to denote the normalized value of the respective attribute for the rest of the paper.

After normalizing the data, the evaluation of candidate attributes which will be used as inputs to the model, follows. Since the initial set of attributes (i.e. candidate inputs) is intuitively/empirically selected by a human expert, the possibility of wrong decisions always exists. A human expert may select inputs which are either redundant or mutually dependent on one another.

5.2 Feature evaluation approaches

The input selection task involves the selection of those of the candidate inputs which significantly affect the output of the system. The selection of significant inputs is based on the collected observational data and it is usually carried out by statistical processing (filter based input selection) or by non-parametric models employed as wrappers. Moreover, a third category of input selection approaches is the embedded approaches where the identification of significant inputs follows from the model's construction process.

It is empirically recognized [10],[12] that the wrapper based methods provide more exact solutions than the filter based ones. However, wrapper based methods are model depended and their results depend on the particular model, applied as the wrapper. If a specific feature doesn't significantly affects the performance of the selected wrapper, then this feature is considered as meaningless and is eliminated. However, this assumption implies that the wrapper adequately identifies the dataset, which is not always true. Another drawback of wrapper methods is the lack of interpretation of why a particular feature is rejected or not. This drawback is more intense if the input output relation is non-linear for a particular input. Filter based methods are considered as less accurate, but they have the advantage of providing model independent and easily interpretative results. This aspect is important in financial applications where the results of any processing should be explanatory.

5.3 Filter based attribute evaluation

5.3.1 Pearson's correlation Coefficients

A widely used filter based method is the calculation of Pearson's coefficients. A Pearson's coefficient captures the linear correlation between two random variables. Although a Pearson's coefficient is limited to the calculation of the linear correlation between two random variables, it releases the advantage of straightforward and easily interpretative results, even for people who are not experts in the particular domain of application. We compute the Pearson's coefficient r_j for each attribute x_j by Eq. (2)

$$r_j = \frac{\sum_{i=1}^N (x_{i,j} - \bar{f}_j)(\ell_i - \bar{\ell})}{\sqrt{\sum_{i=1}^N (x_{i,j} - \bar{f}_j)^2 \cdot (\ell_i - \bar{\ell})^2}}, r_j \in [-1,1] \subseteq \square \quad (2)$$

Where \bar{f}_j is the mean value of the j^{th} feature (i.e. the j^{th} column of \mathbf{D}); $\ell_i \in \{\pm 1\}$ is the label of instance i ; and $\bar{\ell}$ is the mean value of labels (i.e. the last column of \mathbf{D}). A value of r_j around ± 1 denotes a strong linear interdependence between the attribute x_j and the output. Controversially, a value around zero denotes linear independence. The sign of r_j denotes whether the linear relation is ascending or descending, respectively. Since we are only interested in the magnitude of the dependence the sign in Eq. (2) can be omitted by taking the

absolute value $|r_j|$ of r_j . The set of the candidate attributes includes thirty five attributes Table 3, intuitively selected by banking experts.

Pearson's approach requires that the data are normally distributed, besides the assumption of an existing linear relation between the random variables being probed. We use the normality test introduced in [5],[3] to test the null hypothesis: $H_0 = \{\text{The sample comes from a normal distribution}\}$. The p -value, which express a two-sided chi squared probability for the hypothesis test, is computed for each attribute (random variable). The p value was less than 0.05 for all attributes except from $x_{32}, x_{27}, x_3, x_{30}$ for which the P value was 0.96, 0.96, 0.78 0.07, respectively. The null hypothesis was rejected for most of the attributes and hence, Pearson's approach should not be directly used to decide the significance of attributes.

5.3.2 Spearman's rank correlation coefficients

An alternative non-parametric statistic is the Spearman's ρ rank-ordered correlation statistic [4], which measures the monotonic relationship between two random variables. Although, the existence of a monotonic relation between the random variables is an underlined assumption of Spearman's approach, however, this approach is less strict than Pearson's correlation coefficients.

When no duplicate values exist between the random variable x_j and the labels L , then Spearman's ρ can be computed by the following Equation.

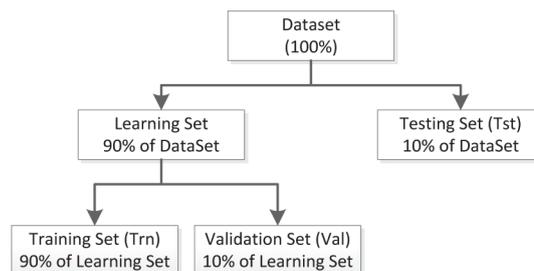
$$\rho_j = \frac{6 \sum_{i=1}^n [R_x(x_{i,j}) - R_L(\ell_i)]^2}{n(n^2 - 1)} \quad (3)$$

Where n is the number of instances; j denotes the j^{th} attribute; $R_x(x_{ij})$ denotes the rank of attribute value x_{ij} when sorted in ascending order; and $R_L(\ell_i)$ denotes the rank of ℓ_i when sorted in ascending order after the sorting of x_{ij} . If duplicate values exist, then the Eq. should be used on the ranked values of $x_{i,j}, \ell_i$, instead of Eq. for computing ρ_j [4].

The next issue is to decide a threshold of significance, below which an attribute is rejected as meaningless and above which the attribute is selected as significant. We follow two approaches to decide on the significance of an attribute. The first approach ignores the assumptions of Pearson's and Spearman's approaches and is based on the well-known student's statistical test to check the null hypothesis: $H_0 = \{\text{The probed random variables are by chance correlated}\}$. We check for two levels of significance: for $\alpha = 0.05$ and for $\alpha = 0.01$. Each attribute is evaluated according to its p -value, which roughly indicates the probability that an uncorrelated system produces datasets, which have a correlation at least as extreme as the one computed from the given data sets. The attributes with $p \leq \alpha$ are selected as important ones because the null hypothesis is rejected with high probability for them. Next, the selected attributes are ranked in descending order according to their $|\rho|$ value.

In the second approach we use the above mentioned statistical methods only as a ranking tool because of their implied assumptions. The second approach exploits the ranking which the statistical tests provide, but employs a non-parametric, non-linear model to evaluate the significant attributes. Tenfold cross-validation of the model is performed as follows: The initial data set is divided into a learning set, including the 90 percent of initial data, and a testing set, including the rest 10%. Next, the learning set is subdivided into the training set, including the 90 percent of the learning set and the validation set including the rest 10% of the learning set (Fig. 1).

Fig. 1: Tenfold cross-validation



The attributes are sorted in descending order according to their correlation to the output and then they are progressively inserted to a support vector machine model, as inputs. A tenfold cross validation is performed on the learning set for each new attribute and the average success classification rate on the validation set is monitored.

Table 4: The selected attributes presented in descending order according to their $|r|$ value when using Pearson's coefficients; Spearman's $|\rho|$ correlation coefficients; and Kendall's $|\tau|$. In every case a student's t-test was performed to check the null hypothesis for significance levels $p=0.05$ and $p=0.01$. Additionally, a selection based on tenfold cross validation on the learning set was performed. The average tenfold success classification rate on the testing set is given in the last column of every case. It is clear that the cross validation based selection delivered more representative attributes.

α	Selected Attributes	Average Tenfold Tst Success Rate
Pearson's r		
0.05	$x_{26}, x_{33}, x_{25}, x_{23}, x_5$	67.33%
0.01	x_{26}, x_{33}	70.00%
Cross-validation	x_{26}, x_{33}, x_{25}	71.33%
Spearman's ρ		
0.05	$x_{26}, x_{33}, x_{25}, x_{23}, x_{22}, x_3$	65.33%
0.01	x_{26}, x_{33}	70.00%
Cross-validation	x_{26}, x_{33}, x_{25}	71.33%
Kendall's τ		
0.05	$x_{26}, x_{33}, x_{25}, x_{23}, x_{22}, x_3$	65.33%
0.01	x_{26}, x_{33}	70.00%
Cross-validation	x_{26}, x_{33}, x_{25}	71.33%
PCA-SPPS		
$\Lambda=0.72$	$x_2, x_5, x_4, x_7, x_6, x_{19}, x_3, x_{18}, x_{28}, x_1, x_{13}, x_{14}$	62.00%
Cross-validation	$x_2, x_5, x_4, x_7, x_6, x_{19}, x_3, x_{18}, x_{28}$	70.00%
PCA-[16]		
$\Lambda=0.72$	$x_{25}, x_{32}, x_{26}, x_{10}, x_{15}, x_{14}, x_{35}, x_{27}, x_8, x_7, x_{16}, x_{12}$	68.00%
Cross-validation	$x_{25}, x_{32}, x_{26}, x_{10}, x_{15}, x_{14}, x_{35}, x_{27}$	70.00%
All Attributes		68.66%

The subset of attributes which provides the maximum average success classification rate on the ten validation sets is selected. Finally, a tenfold cross-validation is performed on the initial data set and the average success classification rate on the testing set is used as the final criterion for the selection. We highlight that the data of the testing set (Tst) were neither used in the construction of the svm [18], [17] model nor in the statistical tests, applied.

5.4 Multivariate attribute evaluation

Principal components analysis (PCA) in SPSS software is a variable-reduction technique that shares many similarities to exploratory factor analysis. Its aim is to reduce a larger set of variables-attributes into a smaller set of 'artificial' variables, called 'principal components', which account for most of the variance in the original

variables. PCA is predominantly used in an exploratory way. If one is interested in reducing the observed variables down to their principal components while maximizing the variance accounted for in the variables by the components, then he should be using PCA.

Except from the assumptions that specific filter based approaches requires, these approaches have the additional drawback that the attributes are evaluated one by one. It includes the risk of sub-optimal solutions because one attribute itself may be characterized as non important when evaluated alone but it might be important when evaluated with another one, jointly. On the contrary, an attribute when evaluated alone may be important while the same attribute might be not important in conjunction with another one. For that reason multivariate statistics exist in the field of multivariate analysis. Factor analysis is a method based on Principal components analysis (PCA). PCA projects the original input space to a new space of orthogonal variables which conveys the same information as the original ones. Factor analysis extracts a subset of specific variables (usually fewer), from the original set. The eigenvalues of the covariance matrix of the original data are computed at first. Next, the eigenvalues are sorted in descending order and are normalized such that their sum equals 1. The normalized eigenvalues are named latent variables. Consider m eigenvalues $\lambda_1, \lambda_2, \dots, \lambda_m$, sorted in descending order ($\lambda_i > \lambda_j \quad \forall i > j$). The criterion for selecting the q most important variables is that the cumulative sum of the selected eigenvalues is up to a predefined threshold $\Lambda \in [0,1]$. That is, select the first q eigenvalues such that:

$$\frac{\sum_{i=1}^q \lambda_i}{\sum_{j=1}^m \lambda_j} \leq \Lambda \quad (4)$$

Which means that the total variance the selected variables express is up to $\Lambda \cdot 100\%$ of the total variance the original variables explain. Selecting the q most important eigenvalues which satisfy Eq. (4), does not provides direct information on which of the original values are important. In order to identify the q most important original variables we examine the absolute values of the coefficients of the respective q eigenvectors as in [16]. For $\Lambda = 0.95$, we got $q = 17$. Actually, PCA computes new features q by rotating the original axis, thus transforming the original space to a new orthogonal feature space, linearly. If the q most important eigenvectors are stored into an $m \times q$ matrix V , the transformation of the original $n \times m$ input space X is calculated by, which is an $n \times q$ matrix. Each original datum stored in row X_i in the original m -dimensional space is linearly mapped to row \tilde{X}_i in the new q -dimensional feature space where $q < m$. We performed tenfold cross-validation by using a svm model on \tilde{X} . The model had q inputs, while the label of each datum was preserved.

The average success classification rate on the rotated testing data was 68.66% for $q = 17$, which was the same as the one achieved when included all the m variables. We conclude that although in our problem linear PCA (and subsequently factor analysis) performed significant dimensionality reduction ($\approx 50\%$); however, it failed to identify the best attributes. It failed both quantitatively, in terms of average success classification rate, and qualitatively in terms of which of the original variables were exactly the most important ones.

5.5 Discussion and interpretation of the results

The average tenfold cross-validation success classification rate and the respective attribute for $\alpha = 0.05$ and $\alpha = 0.01$ are summarized in Table 4. The selection based on the statistical test is computationally more efficient and more intuitive. However, it is based on assumptions that we don't priory know whether they are satisfied or not. Moreover, the α value affects the final outcome and it is an extra parameter being decided. Cross-validation is more computationally expensive but provides more accurate results since it is independent from the assumptions of the statistical tests.

It is obvious that results are very promising regarding credit analysis perspectives and key variables' selection, that remain important for a credit officer's thorough decision whether one can proceed to customer's lending or not. First of all, we see that Pearson's r is surprisingly good, nearly optimal results when compared to cross-validation, despite the fact that most of the attributes, considered as random variables, do not follow the normal distribution.

In the optimum set of results, three out of thirty five attributes are selected in cross validation option with average Tenfold Tst Success Rate at 71.33 percent. This is a very constructive result, where one can get. Only three out of thirty five attributes are enough for taking out the most influential information needed for banking authorities, in order to take proper lending decisions.

Another core conclusion is that alpha parameter on statistical methods is difficult to be decided; generally a value at 0.05 provides more attributes outcomes than required in any selected attribute of the research, while

a at 0.01 delivers less attributes than actually required. This issue is solved by the use of cross validation estimator performance. Furthermore, all statistical methods appeared more effective and robust than the simplest of the true eigenvector-based multivariate analyses (PCA). Moreover, all statistical methods detect significant attributes, as it was verified by cross validation; also all methods failed to detect the optimal attribute set. Generally the PCA method provides more attributes (nine attributes for both in PCA-SPPS and PCA-[16] options for cross validation analysis) and less representative, i.e. seventy percent for average tenfold success rate in both cases, while it is not robust.

The average tenfold success rate for all attributes lies at 68.66 percent. Optimal subset of attributes delivered the most accurate results in terms of generalization are in Pearson's r and Spearman's ρ options for the x26, x33 and x25 attributes. It is in -any terms- visible that qualitative attributes are those that express best sample's credit quality and provide maximum success rate in any case. This is very close to what Greek banking market experts' support that except from borrowers' core financial positions, factors such as quality of cooperation as well as good credit history records with the bank are essential for credit quality's assessment. Also, borrowers (SMEs) with exporting activity, apparently, tend to acquire higher credibility rates than those with solely domestic activity.

6. Conclusion

Traditional practices rely too much on credit quality indicators such as delinquency, nonaccrual, and risk rating trends. Banks have found that these indicators do not always provide sufficient information for a borrower's credit quality. Qualitative criteria are essential for the credit quality assessment. In our research a micro-analysis is made, taking under consideration a loan portfolio with reference to Greek firms. This part identifies the main elements, both quantitatively and qualitatively, that play major part in taking good lending decisions within a banking institution. Using several computational intelligence techniques in a data set from a Greek banking institution we find very thorough results for the bank management, relative to mitigate credit risk in loans portfolios.

More specifically, it is revealed that building a simplified model by using only 3 out of the 35 initially selected features one can achieve the same or slightly better forecasting accuracy when compared to the forecasting accuracy achieved by a model which uses all the 35 features (qualitative and quantitative ones). This is the main contribution of this study; only two firms' qualitative attributes (i.e. 1. Customer's Characterization and 2. Customer's Qualitative elements) as well as one attribute relative to firms' exporting or domestic activity that can provide adequate information for credit officers to mitigate bank's credit risk.

From the experimental results we observe that many of the intuitively selected attributes are redundant, while the generalization performance of many classifiers by using the selected attributes is rather poor. This observation leads us to conclude that the initially selected attributes are not representative enough and that the decision on the behavior of a feature borrower should be also based on other representative attributes, that take into account more custom made and focused characteristics, corresponding to focused entrepreneurial environment for the selected firms, in the sub sector that they enlisted. Furthermore, a richer set of training instances might lead to more accurate results.

In any term, it is generally acceptable that there is no a global credit quality system that fits for all cases, nearly for every loan's portfolio selected. This is a major conclusion that may be enriched in future research towards the understanding of a better and more conclusive segmentation of banks' loan portfolios, based upon certain and robust banking and market oriented features.

References

- [1] Basel Committee on Banking Supervision (2006a). Observed range of practice in key elements of Advanced Measurement Approaches (AMA). Available: <http://www.bis.org/publ/bcbs131.htm>
- [2] A. Benos and G. Papanastasopoulos, "Extending the Merton model: A hybrid approach to assessing credit quality," *Mathematical and computer modelling*, vol. 46, pp. 47-68, 2007.
- [3] K. Bowman and L. Shenton, (1975). Omnibus test contours for departures from normality based on $\sqrt{b_1}$ and b_2 . *Biometrika*, vol. 62, pp. 243-250, 1975.
- [4] G. W. Corder and D. I. Foreman, (2009). *Nonparametric statistics for non-statisticians: a step-by-step approach*: John Wiley & Sons, 2009.
- [5] R. B. d'Agostino, "An omnibus test of normality for moderate and large size samples," *Biometrika*, vol. 58, pp. 341-348, 1971.
- [6] K. Daniels and G. G. Ramirez, "Information, credit risk, lender specialization and loan pricing: Evidence from the DIP financing market," *Journal of Financial Services Research*, vol. 34, pp. 35-59, 2008.
- [7] M. Doumpos and C. Zopounidis, (2001). Assessing financial risks using a multicriteria sorting procedure: the case of country risk assessment. *Omega*, vol. 29, pp. 97-109.
- [8] A. Duff and S. Einig, (2009). Credit ratings quality: The perceptions of market participants and other interested parties. *The British Accounting Review*, vol. 41, pp. 141-153.

<https://sites.google.com/site/icqqmeas2015>

- [9] J. Fernandes, (2000). Corporate credit risk modeling: Quantitative rating system and probability of default estimation," Available at SSRN 722941.
- [10] M. A. Hall and L. A. Smith, (1998). Practical feature subset selection for machine learning.
- [11] C.-L. Huang, M.-C. Chen, and C.-J. Wang, (2007). Credit scoring with a data mining approach based on support vector machines. *Expert systems with applications*, vol. 33, pp. 847-856.
- [12] R. Kohavi and G. H. John, (1997). Wrappers for feature subset selection," *Artificial intelligence*, vol. 97, pp. 273-324.
- [13] Moody's, Moody's, Risk Calc and KMV EDF Risk Calc (v.3,1).
- [14] P. Sieczka and J. A. Holyst, (2009). Collective firm bankruptcies and phase transition in rating dynamics," *The European Physical Journal B-Condensed Matter and Complex Systems*, vol. 71, pp. 461-466.
- [15] J. Sola and J. Sevilla, (1997). Importance of input data normalization for the application of neural networks to complex industrial problems. *Nuclear Science, IEEE Transactions on*, vol. 44, pp. 1464-1468.
- [16] F. Song, Z. Guo, and D. Mei, (2010). Feature selection using principal component analysis, in *System Science, Engineering Design and Manufacturing Informatization (ICSEM)*, 2010 International Conference on, 2010, pp. 27-30.
- [17] V. Vapnik, (2000). *The nature of statistical learning theory*: Springer Science & Business Media.
- [18] V. N. Vapnik and S. Kotz, (1982). *Estimation of dependences based on empirical data* vol. 41: Springer-Verlag New York.
- [19] L. Yu, X. Yao, S. Wang, and K. K. Lai, (2011). Credit risk evaluation using a weighted least squares SVM classifier with design of experiment for parameter selection. *Expert Systems with Applications*, vol. 38, pp. 15392-15399.

<https://sites.google.com/site/icqqmeas2015>

MEASUREMENT OF THE SATISFACTION IN GREECE OUTPATIENTS DEPARTMENTS OF PUBLIC HOSPITALS

George Pierrakos*, Apostolos Yiovanis, Dimitra Latou, Aspasia Goula, John Pateras, Markos Sarris

Technological Educational Institution of Athens Faculty of Administration & Economics Department of Business
Administration, Division: Health and Welfare Management, Division: Business Administration

*gpierrakos@yahoo.gr

ABSTRACT

OBJECTIVE: The objective of this study is to measure the satisfaction in primary health care services in Greece Outpatients departments of Public hospitals. This study is based on a funded project ARCHIMEDES III subproject 45 Methodology of Primary Health Care Services Evaluation in Local Community and Creation of a Manual Of Documented Know How conducted by the Department of Business Administration, Division: Health and Welfare Management, of the Technological Institute of Athens funded European Social Fund (E.S.F) Ministry of Education, Lifelong Learning and Religious Affairs 2012-2015. **METHOD:** The sampling method used was the stratified random sampling. The sample of the study is outpatients from 7 Hospitals 437 total questionnaires. Four of them are specific disease hospitals and other is general hospitals. The sampling ratio was 1:5 that means that for the 5 patients that got out of the clinics we interviewed 1 and the response rate was 57% and 43%. In this study closed-ended questionnaires with 9 elements with 53 questions in two 2 pages which could be completed in 3-5 minutes by an interviewer who was trained and did not belong to outpatients department staff. **RESULTS:** Alpha Cronbach analysis assess the internal consistency of the questions showed reliability. Four models of factor analysis were undertaken for the final result concerning medical care (overall KMO= 0.919), nursing care (overall KMO= 0.938), administrative services (overall KMO= 0.914) and facilities of hospital (overall KMO= 0.911). From the fourth models the most important factors are: Concerning medical care: a) The interest of Physician which is valued 3.7 for the Afternoon outpatient clinics and 3.8 for the Morning outpatient clinics (no statistical significance), Concerning nursing care: a) the Confidence that gives which is valued 3.22 for the Afternoon outpatient clinics and 3.43 for the Morning outpatient clinics (no statistical significance) , Concerning administrative services: a) the Behaviour of the administrative staff which is valued 3.56 for the Afternoon outpatient clinics and 3.44 for the Morning outpatient clinics (no statistical significance) and Concerning facilities of the outpatient department: a) Comfort in waiting rooms which is valued 3.59 for the Afternoon outpatient clinics and 3.25 for the Morning outpatient clinics (no statistical significance). **CONCLUSIONS:** By taking the above issues into consideration, quality healthcare outcomes depend upon: a) patients' perception to recommended treatment regimens and communication they have with physician, professional nurse and behaviour. b) Procedures and waiting time and facilities. There is no difference in satisfaction between morning and afternoon admittance and cost is regardless of the valued of services.

Introduction

The assessment of satisfaction with health services is dynamic, multidisciplinary (Lovato et al. 2013). Patient satisfaction is the result of the comparison between the provided care and patients' expectations (Speight 2005). In order to assess and plan high quality health care, patient satisfaction is one of the most important factors (Dzomeku et al. 2013). Furthermore the aspect of patient satisfaction is strongly related with cost of services (Fenton et al. 2012). A satisfied patient is more inclined to follow doctor's prescription, which in turn will affect patients' satisfaction with the service outcome (e.g. symptoms relief), (MACStravic 1991), avoids complaining and lawsuits (Ahorony and Strasser, 1993) is more loyal to and provides positive referrals about the service provider (Mekoth et al. 2011; Chang et al. 2013).

Primary health care is a major element of any health care system (Raposo et al. 2009), since it brings healthcare closer to citizens' place of residence and work, operating as their first level of contact with health care system (Cueto 2004; Souliotis and Lionis 2003). Primary Health Care in Greece (Noula et al. 2007), is still underperforming despite the efforts that have been made over the last decade. It is important to support research efforts towards the formulation of proposals for the development of policies which will upgrade the offered services, especially in the regional level. The demand for public, free health services, particularly primary health Care Services in Greece increases exponentially, following the reduction of income and loss of insurance coverage of households (Benos 2012). Public hospitals and Outpatient Departments are the main providers of primary health care services, especially in urban areas, with Low purchasing admittance in the morning and High purchasing admittance in the afternoon.

The objective of this study is to measure the satisfaction in primary health care services in Greece Outpatients departments of Public hospitals.

Methodology

It is a prospective study based on a funded project ARCHIMEDES III subproject 45 Methodology of Primary Health Care Services Evaluation in Local Community and Creation of a Manual Of Documented Know How conducted by the Department of Business Administration, Division: Health and Welfare Management, of the Technological Institute of Athens funded European Social Fund (E.S.F) Ministry of Education, Lifelong Learning and Religious Affairs 2012-2015. It is aimed to identify key determinants of patient satisfaction in Greece. Focuses on the satisfaction of group of patients who visited the outpatient departments of public hospitals and their demand for primary health care. Population research is a group of patients, users of primary health care public hospitals in Attica. 22% of public hospitals located in the capital region (NSSG, 2009).

The target population of this study was users of primary healthcare services who visited the outpatient departments of public hospitals in the district of Athens. Eight hospitals were selected for data collection. Four of them were specific disease hospitals and the others were general hospitals. The sampling method used was the stratified random sampling. The sample of the study is outpatients from 7 Hospitals. Four of them are specific disease hospitals and other is general hospitals. The sampling ratio was 1:5 that means that for the 5 patients that got out of the clinics we interviewed 1 and the response rate was 57% (372 out of 650 questionnaires distributed in Morning clinics) and 43% (65 out of 150 questionnaires distributed in Afternoon clinics).

Data were collected through a questionnaire developed to understand patients' perception about primary healthcare service quality. The questionnaire argues that patients perceive quality in 4 dimensions: interpersonal quality through interpersonal relationships between the patient and the provider of health services, technical quality where the effect referred to in perceived by the patient outcome, environmental quality of the facilities and the atmosphere in the space and administrative quality on waiting time functions etc.. The closed-ended questionnaire is with 9 elements with 53 questions in two 2 pages which could be completed in 3-5 minutes by an interviewer who was trained and did not belonged in outpatients department staff. The scales used to measure the four primary healthcare service attributes were adopted from the studies of Dagger et al. (2007), Raposo et al. (2009), Peltier et al. (2013), Rocha et al. (2013). The scale proposed by Oliver (1980) was used to measure patient satisfaction reflecting overall satisfaction, expectations disconfirmation and needs disconfirmation. All items were measured on 5-point Likert scales anchored at 1 (strongly disagree) and 5 (strongly agree).

The data were analyzed using the SPSS 19 (statistical pack for social sciences). The assessment of tool and in particular reliability was performed using the coefficient α Cronbach. Categorical variables were compared using the chi-square (χ^2) test were used for continuous values and multifactor analysis was used to find the most important factors that explained a given variable.

Results

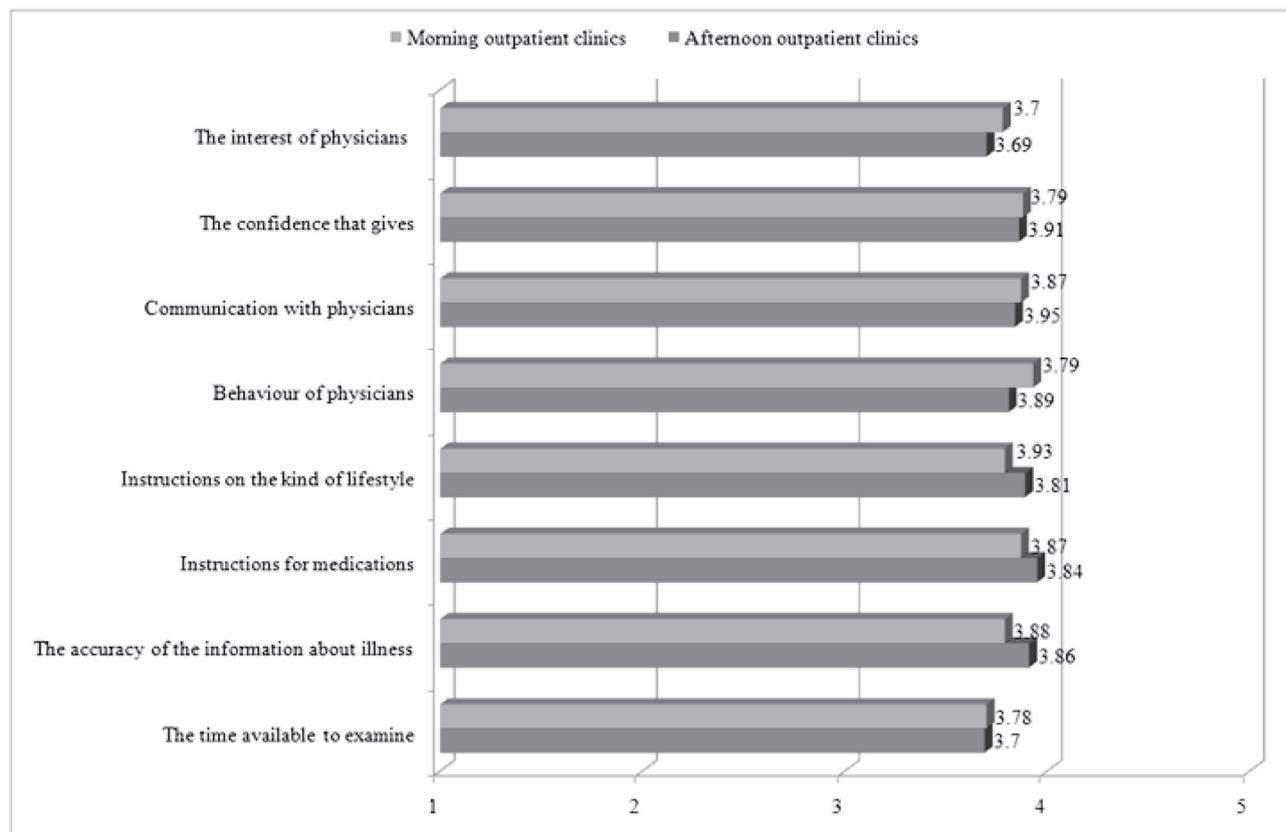
There were included 437 patients enrolled out of 800 questionnaires distributed of which 91.3% were Greek citizens, 58.7% were women. The mean age was 43.8 ± 16.5 and 48.8% majority of the sample had graduated from high school. 42.2% had a monthly household income of €501 - 1000 consisted of families with 3-4 members. 85.1% of the sample visited the morning outpatient clinics and 62.6% did not visit frequently the outpatient clinics.

Alpha Cronbach analysis assess the internal consistency of the questions showed reliability Medical Care evaluation 0.926, Nursing Care evaluation 0.962, administrative 0.928 and the facilities of Outpatients 0.842.

There was a need to establish the communalities of each question of four factors, so the multi factor analysis was used. Four models of factor analysis were undertaken for the final result concerning medical care (overall KMO= 0.919), nursing care (overall KMO= 0.938), administrative services (overall KMO= 0.914) and facilities of hospital (overall KMO= 0.911). From the fourth models the most important factors are:

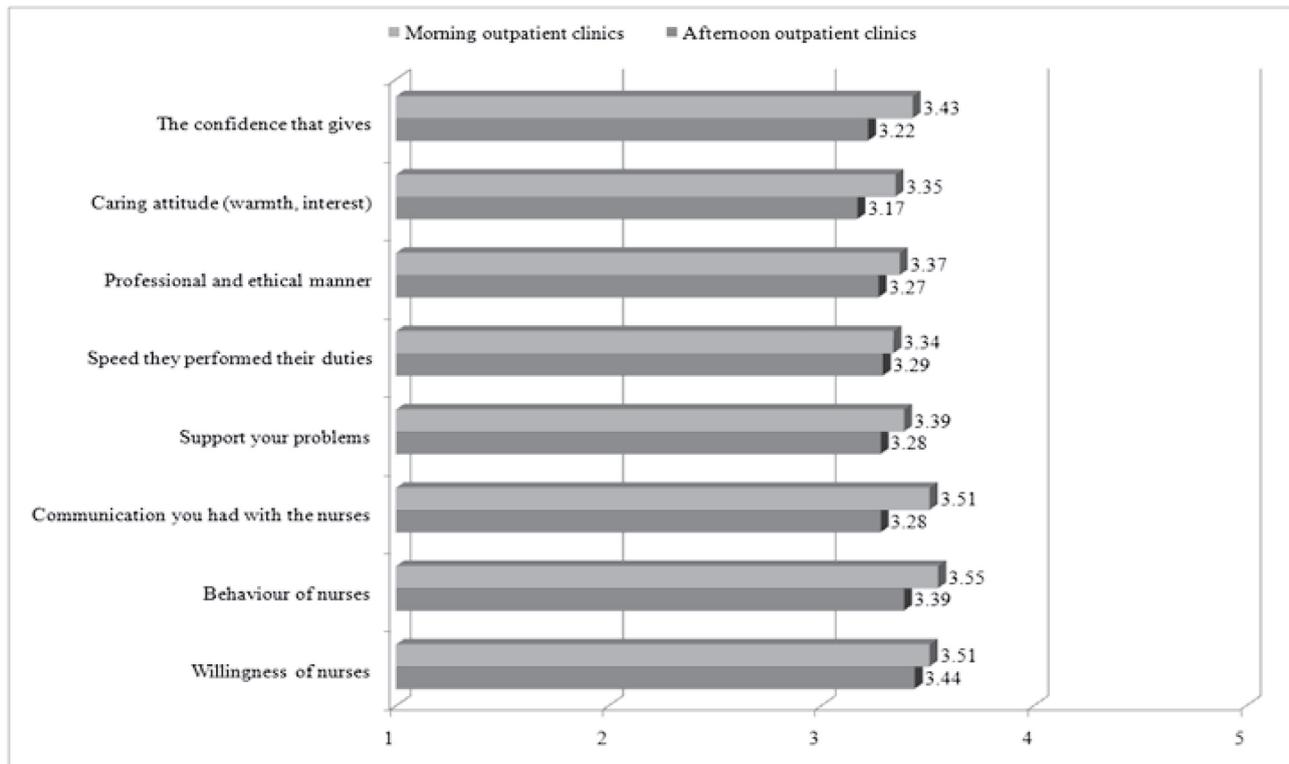
Concerning medical care: a) The interest of Physician which is valued 3.7 for the Afternoon outpatient clinics and 3.8 for the Morning outpatient clinics (no statistical significance) in 5 level Likert scale, b) The confidence that gives which is valued 3.86 for the Afternoon outpatient clinics and 3.88 for the Morning clinics (no statistical significance) and c) the communication they have with physician which is valued 3,84 for afternoon clinics and 3.87 for morning clinics with no statistical significance (figure 1).

Figure 1. Medical Care



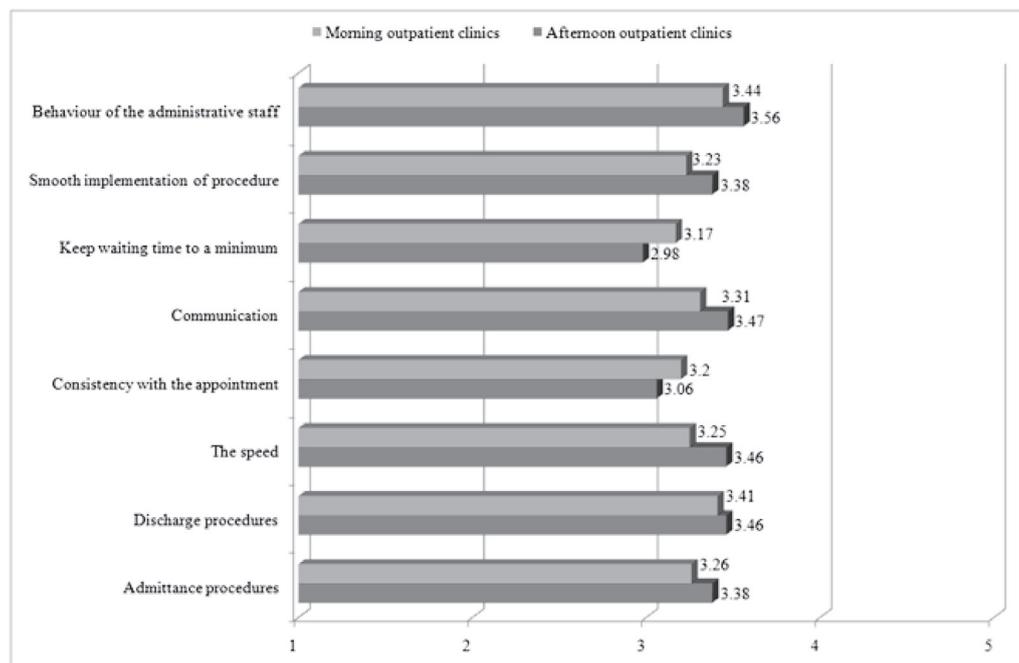
Concerning nursing care: a) the Confidence that gives which is valued 3.22 for the Afternoon outpatient clinics and 3.43 for the Morning outpatient clinics (no statistical significance) in 5 level Likert scale , b) caring attitude which is valued 3.17 for the Afternoon outpatient clinics and 3.35 for the Morning clinics (no statistical significance), c) Professional and ethical manner which is valued 3.27 for the Afternoon outpatient clinics and 3.37 for the Morning clinics (no statistical significance) (figure 2).

Figure 2. Nursing Care



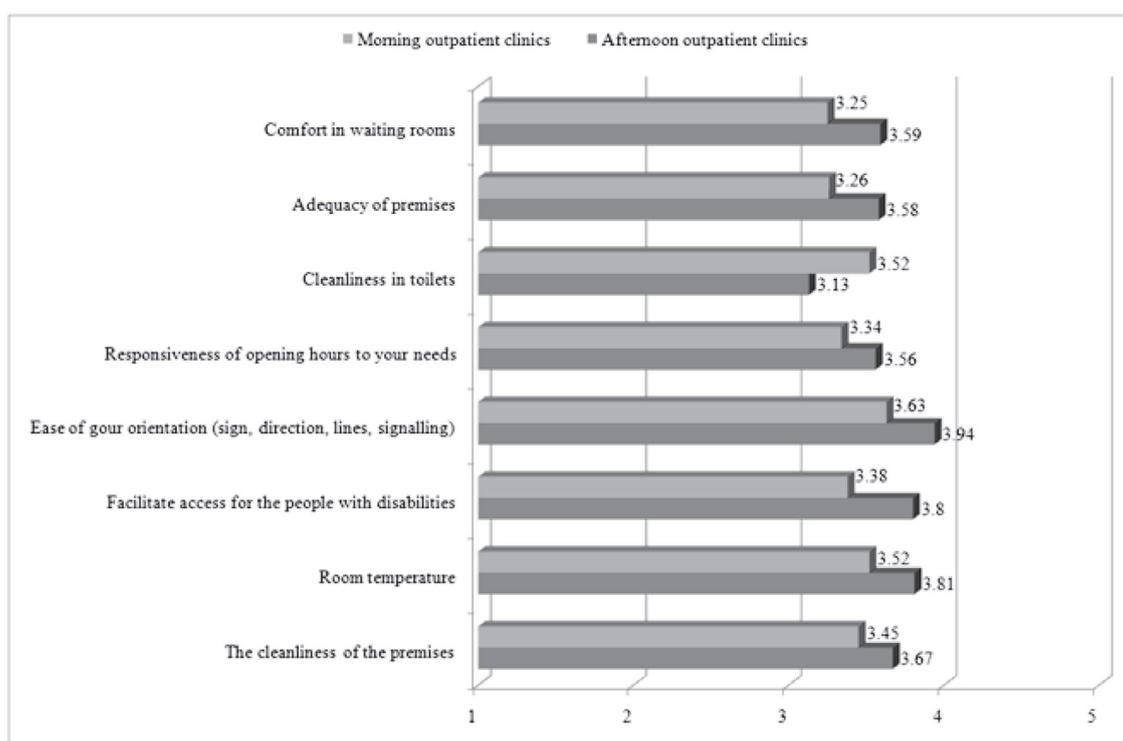
Concerning administrative services: a) the Behaviour of the administrative staff which is valued 3.56 for the Afternoon outpatient clinics and 3.44 for the Morning outpatient clinics (no statistical significance) in 5 level Likert scale , b) Smooth implementation of the procedure which is valued 3.38 for the Afternoon outpatient clinics and 3.23 for the Morning clinics (no statistical significance) (figure 3).

Figure 3. Administrative services



Concerning facilities of the outpatient department: a) Comfort in waiting rooms which is valued 3.59 for the Afternoon outpatient clinics and 3.25 for the Morning outpatient clinics (no statistical significance) in 5 level Likert scale , b) Adequacy of premises which is valued 3.58 for the Afternoon outpatient clinics and 3.26 for the Morning clinics (no statistical significance) (figure 4).

Figure 4. Facilities of the outpatient department



Discussion

By taking the above issues into consideration, quality healthcare outcomes depend upon: a) patients' perception to recommended treatment regimens and communication they have with physician, professional nurse and behaviour, b) Procedures and waiting time and facilities. There is no difference in satisfaction between morning and afternoon outpatient clinics. The hierarchical model of satisfaction (Dagger et al. 2007; Peltier et al. 2013; Rocha et al. 2013;) argues that patients perceive quality in 4 dimensions: interpersonal quality through interpersonal relationships between the patient and the provider of health services, technical quality where the effect referred to in perceived by the patient outcome, environmental quality of the facilities and the atmosphere in the space and administrative quality on waiting time functions etc. More contemporary studies (Chang et al. 2013; Hamilton et al. 2013; Schoenfelder et al. 2011) argue that patient satisfaction, patient participation in the process of diagnosis, and patient participation in treatment decision-making may have a significant impact on hospital loyalty.

Many previous studies have confirmed the patient-physician relationship as the most important indicator of patient satisfaction. Patients feel more satisfied when they have confidence to the doctor and they have established a constant communication with him (Ali and Ndubisi 2011). In accordance with the findings of Scardina (1994), highlights the importance for service providers to invest in the nursing personnel's development, in order to take advantage of the fact that nurses are much closer to the patient, than other members of the staff, and they can easier establish relationships with them.

More contemporary studies indicate that access to the secretariat services creates negative patient satisfaction. The waiting list, often encountered in urban public hospitals in Greece, has negative influence on satisfaction and hence creates dissatisfaction (Tountas et al. 2005). However, the majority of outpatients show understanding about the waiting list when they know the reason about the delays (Niakas and Mylonakis 2005). The attitude and interest of the nursing staff about the prediction of a disease and the reassurance of the patient

<https://sites.google.com/site/icqqmeas 2015>

plays an important role in outpatients satisfaction and improvement in infrastructure is the most important for health services users (Papagianopoulou et al. 2008; Polizos et al. 2005; Pierrakos et al. 2013). Research measuring satisfaction with health care services in an Athens paediatric hospital showed that (Papagianopoulou et al. 2008). Another research concerning the Role of Patient Satisfaction in the Development of Health Care Services Marketing showed that people in Athens hospitals for outpatients services had high expectations of health services (Pierrakos and Tomaras 2009; Pierrakos et al. 2013). Objection to pay for physician services is found to be strongly related to the quality/access characteristics (Danyliv et al. 2013; Romé et al. 2010). However most elderly, don't want to use private services due to limited income (Su et al. 2012).

Conclusion

According to the above results patient satisfaction is a complex concept that is related to patient's needs and it seems that it is associated with the effectiveness of services provided to the patient (ie administrative services, facilities, organisational support) as well as the physical environment (cleanliness of the premises and room temperature). Moreover, patient satisfaction is related with the health professionals' competence and the interpersonal relationships between the health care staff and the patient. As it clearly comes from the results quality healthcare outcomes depend upon patients' adherence to recommended treatment regimens and communication they have with physician, professional nurse and the behaviour, professional manner and ethical approach of the latter to their patients. There is no difference in satisfaction between morning and afternoon admittance.

Acknowledgements

This study is based on a funded project ARCHIMEDES III subproject 45 Methodology of Primary Health Care Services Evaluation in Local Community and Creation of a Manual Of Documented Know How conducted by the Department of Business Administration, Division: Health and Welfare Management, of the Technological Institute of Athens funded European Social Fund (E.S.F) Ministry of Education, Lifelong Learning and Religious Affairs 2012-2015.

References

- Abramovitz, S., Cote, A.A., and Berry, E. (1987). Analyzing patient satisfaction: A multianalytic approach. *Quality Review Bulletin*. Vol. 13. pp.122-130.
- Ahorony, I. and Strasser, S. (1993). Patient satisfaction: what we know about and what we still need to explore. *Med. Care Rev.* Vol. 50. pp. 49-79.
- Ali, S. H. S., and Ndubisi, N. O. (2011). The effects of respect and rapport on relationship quality perception of customers of small healthcare firms. *Asia Pacific Journal of Marketing and Logistics*. Vol. 23. pp. 135-151.
- Annandale, E. and Hunt, K. (1998). Accounts of disagreements with doctors. *Soc Sci Med*. Vol. 46. pp. 119-129.
- Benos, A. (2012). There are other "treatment". Newspaper "ETHNOS", inset Forum: Health in the Intensive Crisis. Saturday Jan. 21.
- Bertakis, K., Roter, D. and Putnam, S. (1991). The relationship of physician medical interview style to patient satisfaction. *J Fam Pract.* Vol 32. pp. 175-181.
- Bredart, A. (2001), *Assessment of Satisfaction with Cancer Care: Development, Cross-Cultural Psychometric Analysis and Application of a Comprehensive Instrument*. Thela Thesis.
- Chang, C.W., Tseng, T.H. and Woodside, A.G. (2013). Configural algorithms of patient satisfaction, participation in diagnostics, and treatment decisions' influences on hospital loyalty. *Journal of Services Marketing*. Vol. 27. pp. 91 – 103.
- Crow R, Gare H, Hampson S, Hart J, Kimber A, Storey L. and Thomas H. (2002). The measurement of satisfaction with healthcare: implications for practice from a systematic review of the literature. *Health Technol Assess.* Vol. 6. pp. 1-244.
- Cueto, M. (2004). Origins of primary health care and selective primary health care. *American Journal of Public Health*. Vol. 94. pp. 1864-1874.
- Dagger, T.S., Sweeney, J.C. and Johnson, L.W. (2007). A hierarchical model of health service quality: Scale development and investigation of an integrated model. *Journal of Service Research*. Vol. 10. pp. 123-142.
- Danyliv A. Pavlova M., Gryga, I. and Groot W. (2013). Willingness to pay for physician services at a primary contact in Ukraine: results of a contingent valuation study. *BMC Health Services Research*. 13:208.
- Donabedian A. (1988). The quality of care: how can it be assessed? *J Am Med Assoc*. Vol. 260. pp. 1743-1748.
- Donabedian, A. (1980). Explorations in quality assessment and monitoring: The definition of quality and approaches to its assessment. *Ann Arbor, MI: Health Administration Press*.
- Gilbert, G.R. and Veloutsou, C. (2006). A cross-industry comparison of customer satisfaction. *The Journal of Services Marketing*. Vol. 20. pp. 298-307.
- Greeneich, D.S., Long, C.O. and Miller, B.K. (1992). Patient satisfaction update: Research applied to practice. *Applied Nursing Research*. Vol. 5. pp. 43-48.
- Hamilton, D. F., Lane, J.V., Gaston, P., Patton, J. T., Macdonald, D., Simpson, A. H. R. W., and Howie, C. R. (2013). What determines patient satisfaction with surgery?. A prospective cohort study of 4709 patients following total joint replacement. *BMJ open*. Vol. 3.
- Henschke, N., Wouda, L., Maher, C.G., Hush, J.M. and Van Tulder M.W. (2013). Determinants of patient satisfaction 1 year after presenting to primary care with acute low back pain. *The Clinical journal of pain*. Vol. 29. pp. 512-517.
- Khayat, K. and Salter, B. (1994) Patient satisfaction surveys as a market research tool for general practices. *Br J Gen Pract*. Vol.44. pp. 215-219.
- Linder-Pelz S. (1982) Social psychological determinants of patient satisfaction: a test of five hypotheses. *Soc Sci Med* . Vol. 16. pp. 583-589.
- Liu, S., Yam, C. H., Huang, O. H., & Griffiths, S. M. (2012). Willingness to pay for private primary care services in Hong Kong: are elderly ready to

move from the public sector?. Health policy and planning. pp. 1-13.

Lovato, E., Minniti, D., Giacometti, M., Sacco, R., Piolatto, A., Barberis, B., Papalia, R., Bert, F. and Siliquini, R. (2012). Humanisation in the emergency department of an Italian hospital: new features and patient satisfaction. *Emerg Med J*. Vol. 30. pp. 487-491.

MacStravic, R. (1991). *Beyond patient satisfaction: building patient loyalty*, Health Administration Press, Ann Arbor, MI.

Mererko, M., Nelson, E.C. and Rubin, H. R. (1990). Patients judgments of hospital quality. *Medical Care*. Vol. 28. pp.1-56.

National Statistical Service of Greece, (2009). *Hospice - Capacity-Type Infirmary, Legal Status, Region*.

Niakas, D. and Mylonakis, J. (2005). Choice of physician, private payment and patient satisfaction. Is there any relationship?. *International Journal of Healthcare Technology and Management*. Vol. 6. pp. 288-295.

Noula M, Gesouli E, Vobiris G, Raftopoulos V. (2007). Projection Of The Use Of Primary Health Care Services In A Greek Primary Health Centre: A Pilot Study. *Health Science Journal*. Vol. 4. pp. 1-10.

Papagiannopoulou, V., Pierrakos, G., Sarris, M. and Yfantopoulos, J. (2008). Measuring satisfaction with health care services in an Athens Paediatric hospital. *Archives of Hellenic Medicine*. Vol. 25. pp. 73-81

Pascoe, G. (1983). Patient satisfaction in primary health care: a literature review and analysis. *Evaluation and Programm Planning*. Vol. 6. pp. 185-210.

Pierrakos, G. and Tomaras, P. (2009). The Role of Patient Satisfaction in the Development of Health Care Services Marketing. *Nosileftiki*. Vol. 48. pp. 104-113.

Pierrakos, G., Sarris, M., Soulis, S., Goula, A., Latsou, D., Pateras, I., Vourliotou, K. and Giannoulatos P. (2013). Comparative analysis of two studies of outpatient satisfaction in primary medical care. *Arch Hellen Med*. Vol. 30. pp. 316-32.

Raposo, M.L., Alves, H.M., and Duarte, P.A. (2009). Dimensions of service quality and satisfaction in healthcare: a patient's satisfaction index. *Service Business*. Vol. 3. pp. 85-100.

Risser, N.L. (1975). Development of an instrument to measure patient satisfaction with nurses and nursing care in primary care settings. *Nursing Research*. Vol. 24. pp. 45-52.

Rogut, L., Newman, L. and Cleary, P. (1996). Variability in patients' experiences at 15 New York city hospitals. *Bull N Acad Med*. Vol. 73. pp. 814-884.

Romé, Á, Persson, U., Ekdahl, C. and Gard, G. (2010). Willingness to pay for health improvements of physical activity on prescription. *Scandinavian Journal of Public Health*. Vol. 38. pp. 151-159.

Rowbotham, M.C (1953). Centralized or decentralized service; Faulkner Hospital combines them for greater efficiency and patient satisfaction. *Mod Hosp*. Vol. 80. pp. 114-116.

Scardina, S.A. (1994). SERVQUAL: A tool for evaluating patient satisfaction with nursing care. *Journal of Nursing Care Quality*. Vol. 8. pp. 38-46.

Schoenfelder, T., Klewer, J. and Kugler, J. (2011). Determinants of patient satisfaction: a study among 39 hospitals in an in-patient setting in Germany. *Int J Qual Health Care*. Vol. 23. pp. 503-509.

Souliotis, K. and Lionis C. (2003). Functional reconstruction of primary health care: a proposal for the removal of obstacles. *Archives of Hellenic Medicine*. Vol. 20. pp. 466-476.

Speigth, J. (2005). *Assessing Patient Satisfaction: Concepts, Applications and Measurement*. Value in Health. Vol. 8. pp:6-8.

Thomas, S, Nay, R., Moore, K., Fonda, D., Hawthorne, G., Marosszeky, N. and Sansoni, J. (2006). *Continence Outcomes Measurement Suite Project (Final Report)*. Australian Government Department of Health and Ageing.

Tountas, Y., Karnaki, P., Pavi, E. and Souliotis, K.(2005). The "unexpected" growth of the private health sector in Greece. *Health Policy*. Vol.74. pp.167-180.

Ware, JE., Snyder, M.K., Wright, W.R. and Davies, A.R. (1983). Defining and measuring patient satisfaction with medical care. *Eval Program Plann*. Vol. 6. pp. 247-263.

Williams, B. (1994). Patient satisfaction: a valid concept?. *Soc Sci Med*. Vol. 38. pp. 509-516.

Williams, S. and Calnan, M. (1991). Key determinants of consumer satisfaction with general practice. *Fam Pract*. Vol. 8. pp. 237-242.

Young-Mahon, P. (1996). An analysis of the concept 'patient satisfaction' as it relates to contemporary nursing care. *Journal of Advanced Nursing*. Vol. 24. pp.1241-1248.

A STUDY ON THE ORGANIZATIONAL CULTURE CHANGE OF MANPOWER EMPLOYMENT ORGANIZATION (O.A.E.D.)

Anastasia D. Sachinidou

Ειδική Υπηρεσία Συστημικών Παρεμβάσεων του Επιχειρησιακού Προγράμματος “Ανθρώπινου Δυναμικού”,
Υπουργείο Εργασίας Κοινωνικής Ασφάλισης και Πρόνοιας, Κοραή 4, Αθήνα 10564, asahinidou@mou.gr

ABSTRACT

O.A.E.D. is a large public agency of Greece which now days implements uniformly a business plan reengineering of the operating systems focusing on organizational, operational and functional upgrading, in order to improve services and remove negative impacts on the labor market. This study is an attempt to diagnose the organizational culture characteristics of O.A.E.D. by means of the Organizational Culture Assessment Instrument (O.C.A.I.) of Cameron and Quinn. O.C.A.I. provides a structured questionnaire that is designed to illustrate the perceptions of the business members relating to the organizational performance. This questionnaire was distributed and completed mainly by the reengineering team of O.A.E.D. The collected data record the perceived difference between the current and desired situation. The data were analyzed and the findings revealed the dominant type and strength of the culture. Besides that they provide information on the leadership style, the management of employees and the working environment, they identify aspects relating to the organizational environment and having an impact on the organizational performance and effectiveness.

Keywords: Organizational Culture, Organizational Change, Public Organizations

DEMOGRAPHIC AND PSYCHOLOGICAL CHARACTERISTICS OF SOCIAL ENTREPRENEURS IN GREECE

A. G. Sahinidis*, D. Kallivokas*, E. Metalidou*, G. A. Sahinidis ** and G. Tsakni***

*Technological Education Institute of Athens

**City College of New York

***Hellenic Quality Assurance and Accreditation Agency

ABSTRACT

Purpose: This study attempts to explore the demographic characteristics and personality traits of social entrepreneurs in Greece. Five dimensions of social entrepreneurship are considered, in terms of their relationship to the Big Five personality traits.

Design/methodology/approach: This study uses the factor analysis method and Multiple Regression in order to test the hypotheses generated from the literature review. The measures used have already been tested elsewhere in the literature and meet the validity and reliability standards required.

Findings: There are already findings which prove that personality traits influence social entrepreneurship. The expected findings in this study should demonstrate the particular relationship of each of the five dimensions – dependent variables – with the independent variables, the Big Five personality traits, as well as the Demographic ones.

Social implications: Having identified the characteristics of social entrepreneurs those can then be integrated within the business education curriculum to help create more social entrepreneurs. Additionally, business leaders also need to be cognizant of the emerging social needs and consider in their staffing decisions people who might accentuate the social aspects of their enterprises.

Originality/value: This is the first study in Greece, concerning social entrepreneurial endeavors and combining personality traits to social entrepreneurship. Since the literature has reported disagreement in findings of other studies, the present study should help illuminate the issue studied.

Key Words: Social Entrepreneur, Personality Traits, The Big Five

Acknowledgement: The authors would like to thank O. Ntoui, E. Karahaliou, A. Tsaka and E.A. Leontitsi for their assistance in the data collection process.

JEL Code: L26

Introduction

The inherent deficiencies of the capitalist economies, coupled with the continuously upward trend of social inequality and the marginalization of large numbers of people (Piketty, 2014), led to the creation of the third sector of the economy or the Social Economy, which purports to provide solutions where the public and the private sectors fail to do so. With the realization of the significance of the social economy, institutions such as the European Union, took action to facilitate the creation of the social enterprises and set an environment conducive to their efficient and productive functioning, with the creation of various types of support mechanisms with aims such as:

“Improving access to funding by:

- facilitating access to private funding;
- mobilizing of EU funds.

Increasing the visibility of social entrepreneurship by

•developing tools to gain a better understanding of the sector and increase the visibility of social entrepreneurship;

•reinforcing the managerial capacities, professionalism and networking of social businesses.

Improving the legal environment by:

- developing appropriate European legal forms which could be used in European social entrepreneurship;
- public procurement;
- State aid.” (Spear, 2014, p. 9)

The EU strategy consists of five pillars addressing issues such as the development of an institutional and legal framework, access to finance, training on social entrepreneurship and increasing visibility, research and monitoring (Spear, 2014). As mentioned in the same report (Spear, 2014), France was the first country to appoint a Minister for the Social Economy, highlighting the importance of the sector in the national economy.

However important the issues of reports and statistics may be, generated by government organizations, they usually fail to shed light on the individuals behind the social enterprises, those who took the initiatives, the risks involved and made the efforts required to build these organizations. This paper will focus on the social entrepreneur, making the effort to examine this breed of individuals, their motives their personality types and their behaviors, using quantitative measures of The Big Five personality type model as used by Schmit et al. (2000) and in the Koe, Nga and Shamuganathan (2010) study. The present study will examine the relationship between individual personality traits, with certain dimensions of social entrepreneurship, drawing comparisons with the corresponding research on commercial entrepreneurship and examining similarities and differences with relevant studies from different countries (Koe et al., 2010; Yitshaki and Kropp, 2015). Given that social needs tend to become more salient and less satisfied by both the governments and the private sector, countries in prolonged crises tend to provide a more fertile ground for the genesis and the proliferation of social enterprises.

Literature Review

There is a large number of definitions of Social Entrepreneurship, in spite of the relative newness of the concept as a research topic (Choi and Majumdar 2014). Austin et al., (2006), distinguish between the broader definitions which include organizations in the for-profit, non-profit sectors and hybrid type ones, and the narrow definitions, including organizations, pooling resources by various agents to create value benefitting the society (Thompson, 2002). In both cases the result is impacting the society in an innovative way, providing a solution to a previously unmet social need. Martin and Osberg defined a social entrepreneur as an individual who: “. . . targets an unfortunate but stable equilibrium that causes the neglect, marginalization, or suffering of a segment of humanity; who brings to bear on this situation his or her inspiration, direct action, creativity, courage, and fortitude; and who aims for and ultimately affects the establishment of a new stable equilibrium that secures permanent benefit for the targeted group and society at large. (2007, p. 39). According to Shaw and Carter, (2007) and Zahra et al. (2009) social entrepreneurship “encompasses the activities and processes undertaken to discover, define, and exploit opportunities in order to enhance social wealth by creating new ventures or managing existing organizations in an innovative manner” (p. 519). The latter definition will be used in this study as it encapsulates the main tenets of the concept throughout the extant literature.

Although the presence of Social entrepreneurship has increased in the pertinent journals, the characteristics of social entrepreneurs have not received much attention, contrary to the trend in the commercial entrepreneurship, in which the corresponding analyses abound. In entrepreneurship studies, the individual, is considered the agent of change, the main factor of the creation of a new organization. In social entrepreneurship, the literature tends to focus on other issues such as the mission, the environmental particularities, the institutional framework

<https://sites.google.com/site/icqqmeas 2015>

etc., offering scant attention to the social entrepreneur characteristics (Koe et al., 2010). When compared to commercial entrepreneurship, according to Austin et al., (2006), social entrepreneurship, provides a solution to problems derived by market failure, when the market cannot or does not have an incentive to act on an issue. This study examines five dimensions of social entrepreneurship and attempts to shed light on how these relate to the Big Five personality traits. The dimensions discussed here are, following previous studies by Brooks (2009) and Koe et al., (2010), Social Vision, Sustainability, Innovativeness, Social Networking and Financial Returns. Social Vision is a sine qua non element for the social entrepreneur embarking on the journey creating a new entity, aiming at the resolution of a social problem or need. Sustainability, refers to the entrepreneur's aim to firstly, create value in a sustainable way, minimizing the use of non-renewable resources in the process and at the same time sensitizing all stakeholders involved. Innovativeness, is a major dimension of social entrepreneurship, since the people involved usually are lacking the resources needed for the launching and sustenance of the new enterprise. The entrepreneur needs to invent ways to fulfill the needs for capital, labor and other resources, so as to accomplish the new organization's mission. The probability of the success of the new social venture is contingent to a large extent on the social networking of the social entrepreneur (Koe et al., 2010). The personal formal and informal relations he/she has, may determine how many resources may be available to the person, in any form, labor, capital, advice etc. Finally, the Financial Returns entail the metrics of performance, goal accomplishment and social impact in a financial sense. The five dimensions of the social entrepreneurship are interwoven and coexist so as to make the probability of success of the venture maximal.

The entrepreneurship literature is fraught with studies examining the characteristics of the commercial entrepreneur (Zhao and Siebert, 2006; Costa & McCrae, 1992; Zhao, Seibert and Lumpkin, 2010). While much of this literature investigates attitudes, (Sahinidis, Vassiliou and Hyz, 2014; Ajzen, 2005), a large part of it examines the psychological characteristics, such as the Big Five personality types (Sahinidis, Frangos and Fragos, 2013; Zhao and Siebert, 2006) and yet another part, focuses on demographic variables (Kruger and Karsrud, 1993; Linan and Chen, 2009). In a landmark study by Zhao and Siebert (2006), the two authors used a meta-analysis of the Big Five Factor model studies, examining the relationship between entrepreneurship and the Big Five personality characteristics, i. e., extraversion, agreeableness, conscientiousness, neuroticism and openness to experience.

Openness to experience characterizes a creative and innovative person, who is open to new experiences and is not afraid to take risks (Zhao Siebert and Lumpkin, 2010; Costa and McCrae, 1992)

Extraversion is the person's tendency to be outgoing, sociable, assertive, talkative and ambitious (Koe et al., 2010; Barrick and Mount, 1991).

Agreeableness is a personality trait including characteristics like trusting, tolerant forgiving, being a good listener and empathizing (Caliendo and Kritikos, 2008; Costa and McCrae, 1992).

Conscientiousness refers to the trait relating to hard work, dependability, responsibility and high need for achievement (Llewellyn and Wilson, 2003; Zhao and Siebert 2006).

Neuroticism, which relates to the person's feelings of high levels of anxiety, shyness and insecurity, is referred to as emotional stability (Barrick and Mount, 1991).

Based on the analysis of the relationships between the variables above the following relationships are expected to be formed and set to be tested:

Extroversion has been related in previous studies with entrepreneurial orientation and behavior, characterized by high need for achievement and assertiveness, thus, enhancing the interest of the individual, in greater financial returns (Caliendo and Kritikos, 2008). They also tend to be charismatic and visionary, influencing their social environment (Llewellyn and Wilson, 2003).

H 1a: EXTROVERSION has a positive influence on the SOCIAL VISION dimension.

H 1b: EXTROVERSION has an influence on the FINANCIAL RETURN dimension.

Agreeableness characterizes consensus and harmonious relationships seeking people, placing an emphasis on relationships rather than financial results, avoiding risk taking, in order to not disturb their surroundings (Costa and McCrae, 1992).

H 2a: AGREEABLENESS has an influence on the SOCIAL VISION dimension.

H 2b: AGREEABLENESS has an influence on the INNOVATIVENESS dimension.

People with high level of consciousness are responsible, dependable and high achievers, while they were found to be related to long term superior performance levels (Koe et al., 2010).

H 3a: CONSCIENTIOUSNESS has an influence on the SUSTAINABILITY dimension.

H 3b: CONSCIENTIOUSNESS has an influence on the FINANCIAL RETURNS dimension.

The high degree of self-confidence required by the entrepreneurs their reliance on resources that they control or can influence and their tolerance for ambiguity and stress, is expected to make them less vulnerable to

stress and more emotionally stable (Simon, Houton and Aquino, 2000; Zhao and Siebert, 2006). This leads us to expect that being a social entrepreneur relates to low neuroticism

H 4a: NEUROTICISM is related to the SOCIAL NETWORK dimension

Openness to new experiences is related to creativity and innovativeness, receptiveness to the unconventional, critical of the status quo and being entrepreneurial (Koe et al., 2010; Costa and McCrae, 1992).

H 5a: There is a positive relationship between OPENNESS and SOCIAL VISION

H 5b: There is a positive relationship between OPENNESS and INNOVATIVENESS

H 5c: There is a positive relationship between OPENNESS and FINANCIAL RETURNS

Methodology

The questionnaire used in this study consists of 54, 7-point Likert-type scale items, measuring the components of Social Entrepreneurship, as in the work of Koe et al. (2010). The Personality traits were measured using the work of Schmit et al. (2000) and Shane and Nicolaou (2013), securing thus high levels of both reliability and validity.

The sample of the study is comprised of 77 social entrepreneurs from central Greece. These are the people who responded to a questionnaire sent via e-mail, to the 312 social entrepreneurs included in a list of social businesses compiled by the Ministry of labor. The response rate of 25%, is considered adequate for the purposes of our analysis. Repeated mailings did not improve the response rate.

The statistical analysis was done with the use of the SPSS, v. 20. We ran a multiple Regression procedure, using as Dependent Variables the Social Entrepreneurship dimensions and as Independent variables the five personality traits.

Results and Discussion

A factor analysis was performed, so as to identify the five personality factors (The Big Five). The five factors produced with Eigen values above 1 are listed below. They explain 65,2% of the variance which is considered to be satisfactory.

Table 1. PERSONALITY FACTOR ANALYSIS

Total Variance Explained

Component	Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
EXTRO	7,009	30,476	30,476	3,672	15,965	15,965
AGREE	2,695	11,718	42,194	3,359	14,605	30,570
OPEN	2,256	9,810	52,004	2,709	11,777	42,347
NEURO	1,666	7,244	59,248	2,693	11,711	54,058
CONSC	1,369	5,954	65,202	2,563	11,144	65,202

Extraction Method: Principal Component Analysis.

A second factor analysis identified the five dimensions of Social Entrepreneurship. Again, the procedure explained 65% of the variance.

Table 2. SOCIAL ENTREPRENEURSHIP FACTORS

Total Variance Explained

Component	Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
SV	10,623	32,190	32,190	6,940	21,029	21,029
SUST	4,492	13,613	45,802	4,864	14,740	35,769
RETRN	3,192	9,672	55,474	4,754	14,405	50,174
INNOV	1,746	5,290	60,765	3,111	9,427	59,600
SN	1,418	4,297	65,062	1,802	5,462	65,062

Extraction Method: Principal Component Analysis.

Table 3. Regression Analysis

	SV		SUSTAIN		RETRN		INNOV		SN	
	b	Sig.	b	Sig.	b	Sig.	b	Sig.	b	Sig.
(Constant)		,743		,836		,971	,185	,853	-,188	,852
EXTRO	,058	,609	,171	,152	,364	,001	4,350	,000	2,371	,021
AGREE	,292	,011	,227	,043	,165	,124	2,375	,021	-,520	,605
OPEN	,186	,103	,225	,039	,348	,002	,199	,843	2,031	,046
NEURO	,269	,019	,133	,259	-,042	,695	1,895	,063	,230	,819
CONSC	-,124	,270	-,065	,577	,241	,027	,350	,727	2,598	,012
R	,465		,384		,537		,563		,435	
R Square	,216		,147		,288		,317		,189	
Adjusted R Square	,155		,081		,233		,264		,125	

The Regression analysis above was used to test the hypotheses stated earlier in the paper. Some of the hypotheses were supported while others did not. Specifically, a significant relationship was found between Extraversion and Financial returns, as expected. Also supported were the hypotheses that agreeableness has a positive relationship with Social Vision, Sustainability and Innovativeness. As expected, Conscientiousness was found to relate to Financial Returns, while it does not relate to sustainability as posited above. Similarly, contrary to our expectation, Social Vision did not relate to Extroverted individuals and Neuroticism is not linked to Social Networks. Openness to experiences did not relate to Social Vision and it did not either to Innovativeness. However, it does have an influence on Financial Returns.

References

- Austin, J., Stevenson, H. and Wei-Skillern, J. (2006), Social and Commercial Entrepreneurship: Same, Different, or Both?. *Entrepreneurship Theory and Practice*, 30: 1–22.
- Barrick, M. R., Mount, M. K. (1991). The Big Five personality dimensions and job performance: A meta-analysis. *Personnel Psychology*, 44, 1–26.
- Brooks, A. C.: 2009, *Social Entrepreneurship: A Modern Approach to Social Venture Creation*, Person International Edition, New Jersey.
- Cho, N.i, and S. Majumdar (2014) Social entrepreneurship as an essentially contested concept: Opening a new avenue for systematic future research, *Journal of Business Venturing* Volume 29, Issue 3, May 2014, Pages 363–376
- Costa, P. T., & McCrae, R. R. (1992). *NEO PI-R Professional Manual*. Odessa, FL: Psychological Assessment Resources
- Koe, Joyce, Hwee Nga & Gomathi Shamuganathan (2010). The Influence of Personality Traits and Demographic Factors on Social Entrepreneurship Start Up Intentions. *Journal of Business Ethics* 95 (2):259 - 282.
- Krueger, N., & Carsrud, A. 1993. Entrepreneurial intentions: Applying the theory of planned behaviour. *Entrepreneurship & Regional Development*, 5(4): 315-330.
- Llewellyn, D. J. and K. M. Wilson: 2003, 'The Controversial Role of Personality Traits in Entrepreneurial Psychology', *Education + Training* 45(6), 341-345.
- Linan, F., & Chen, Y. W. 2009. Development and Cross-Cultural Application of a Specific Instrument to Measure Entrepreneurial Intentions. *Entrepreneurship. Theory and Practice*, 33(3): 593-617.
- Martin, S., and R. Osberg (2007). "Social Entrepreneurship: The Case for Definition," *Stanford Social Innovation Review* 5(2), 26-39.
- Piketty, T. (2014) *Capital in the Twenty-First Century*, Belknap Press
- Sahinidis, A., G., Christos C. Frangos and Konstantinos C. Fragkos (2013) Does the Five Factor Model Help Predict Academic Performance? Evidence from a School of Business, *Proceedings of the 22nd International Business Information Management Association Conference*, 13-14 November, Rome, Italy, pp. 503-530
- Sahinidis, A., G., E. E. Vassiliou and A.B. Hyz (2014) Factors Affecting Entrepreneurs' Intention to Start a New Venture: An Empirical Study, (2014), *International Journal of Strategic Innovative Marketing*, (In Press)
- Schmit, M. J., J. A. Kihm and C. Robie: 2000, 'Development of a Global Measure of Personality', *Personnel Psychology* 53, 153-193.
- Shane, S., Nicolaou, N.. "The genetics of entrepreneurial performance." *International Small Business Journal* 31 (2013): 473-495.
- Shaw, E., and S. Carter (2007). "Social Entrepreneurship: Theoretical Antecedents and Empirical Analysis of Entrepreneurial Processes and Outcomes," *Journal of Small Business and Enterprise Development* 14(3), 418-434.
- Simon, M., Houghton, S. M., & Aquino, K. (1999). Cognitive biases, risk perception and venture formation: How individuals decide to start companies. *Journal of Business Venturing*, 15, 113-134

<https://sites.google.com/site/icqqmeas2015>

Spear, R. (2014) Social entrepreneurship and other models to secure employment for those most in need, Luxembourg: Publications Office of the European Union.

Thompson, J. (2002). The world of the social entrepreneur. *International Journal of Public Sector Management*, 15(5), 412–431.

Yitshaki, R. and Kropp, F. (2015), Motivations and Opportunity Recognition of Social Entrepreneurs. *Journal of Small Business Management*. In Press, Zahra, S. A., E. Gedajlovic, D. E. Neubaum, and J. E. Shulman (2009). "A Typology of Social Entrepreneurs: Motives, Search Processes and Ethical Challenges," *Journal of Business Venturing* 24, 519–532.

Zhao, Hao; Seibert, Scott E. (2006) The Big Five personality dimensions and entrepreneurial status: A meta-analytical review, *Journal of Applied Psychology*, Vol 91(2), Mar 2006, 259-271.

Zhao, H., Seibert, S. E., & Lumpkin, G. T. (2010). The relationship of personality to entrepreneurial intentions and performance: A meta-analytic review. *Journal of Management*, 36, 381–404.

USES AND GRATIFICATIONS IN ONLINE NEWS: COMPARING SOCIAL MEDIA AND NEWS MEDIA USE BY USERS

Siakalli Michailina*, Masouras Andreas, Papademetriou Christos

Neapolis University Pafos, 2 Danais Avenue, 8042 Paphos, Cyprus

*m.siakalli@nup.ac.cy

ABSTRACT

This study investigates the uses and gratifications obtained from reading news online in News Media and Social Media. A comparison is done between these two (News Media and Social Media) related to what type of needs does each of these media fulfil. It also examines the trust and interactivity that participants illustrate in reading news online. A questionnaire was distributed and quantitative analysis was conducted in order to examine the above. A sample of 156 university students completed the questionnaire. A factor analysis on uses and gratifications obtained from News Media and Social Media revealed four factors i.e. Information, Discussion, Entertainment and Surveillance. Results also revealed that (a) Social Media is more about Entertainment whereas News Media is more about Surveillance. No statistical significant differences were obtained related to the gratification of Information and Discussion between the media (b) the intensity of reading online news in News Media depends mainly on how well informed the users would like to be (c) the intensity of reading news in Social Media depends mainly on the age of the user (d) the users trust more News Media rather than Social Media concerning the news they read online.

Keywords: uses and gratifications, News Media, Social Media, trust, intensity, university students

1. Introduction

The conversations around the Media and their social consequences start around the year of 1920, when the School in Frankfurt made its appearance (Serafetinidou, 1995). The term “School of Criticism” is the one that differentiates this school with the corresponding American Positivism School about communication, which developed the empirical, quantitative analysis without dealing with critical theories.

On the other hand, the theorists of the School in Frankfurt take into consideration the organization of the society and the economic-political system; they support the theory of criticism and consider that with only this theory the emancipation of humans and the social reversal is feasible (Carrier & Aslanidou, 2004; Smith, 2001).

What is really interesting regarding the approach of the School in Frankfurt about the Mass Media is that it has developed a philosophy around the dominative nature of the Mass Media-as companies associations now-that regulate the management and conveyance of the message to the society basis. Therefore, what it is developed, basically, around this consideration is that this particular school of pensiveness supports the passiveness of the audience, which accepts any information or any stimuli from the Mass Media and hence, the message itself that the Media aim to pass across to the audience.

In other words, this dominative relationship by the Media and their associations functions against the audiences, making them weak to react in any stimuli of the messages that come from the Mass Media.

Certainly, a basic question that arises here is the extent to which the new technologies affect the level of participation of the audience in the content of Media.

2. Literature Review

The Positivistic approach of the “uses and gratifications” and the New Media

On the other side, the philosophical way of thinking of the School in Frankfurt constitutes the approach of the “uses and gratifications theory”, which-approaching the subject of inclusivity in a positive way of thinking-supports that the Users use the Media for their own benefit based on their own needs and requirements. The authors believe that this is perhaps one of the most powerful characteristic of the theory of uses and gratifications, namely, the communication element that establishes the relation between the users and the media on the base of their needs and their requirements. This is supported by the research of Quan-Haase and Young (2010) that they applied this theory on the case of Facebook and Instant Messaging. It is vital to mention that a special attention would be given to the term of “user” since this term is linked with the aforementioned theory. The reference of the term ‘users’ has a great importance as this term actually replaces the traditional term of the auditor, the viewer and the reader.

The traditional term fits more in the concept of the audiences’ passiveness in contrast to, the contemporary term of the word ‘user’, which fits in the concept of the active audiences, such as the audiences that insert in an interactive procedure with the Medium and the content of this Medium, in general. What really matters regarding the approach of the “uses and gratification” is the one that has already been mentioned above, that the users use the Media to service their concrete needs and of course, these needs vary and differentiate according to the influences (Shao, 2009).

These uses – in case of a research- can be categorized in parameters in order to be applied practically. In other words, the approach of “uses and gratifications” in order to have a methodological and therefore, practical and applicable value will have to be relied on applicable parameters. In the current research, four basic parameters are being examined i.e. Information : the users of the News Media/Social Media who want to collect information, Discussion which is in fact an interactive parameter as basically within the conversation you interact with the other users as well as with the Medium itself or with the journalists, the parameter of Entertainment refers to the users who satisfy their recreative needs within the use of the online Media, and finally, the parameter of Surveillance which refers to the need of users to learn about what’s happening in the world (Lain, 1986).

One of the possible elements however that result through the theory of uses and gratifications – especially if we can apply it in the case of online media and social media – is that of Interactivity as it results from the following terms: Toffler (1980) created the term Prosumer (which is derived from the composition of the words producer and consumer) in order to be referred to the new trend that defines the users as partly producers and consumers, a trend that is presented, for example, at the news portals, where for instance the users can upload their own reportage (Van Dijk, 2009). Bruns (2007, 2008) in his attempt to state that the production and the use are now, confusing concepts, as their meaning in the new digital and interactive interface is the same; he used the term produsage (<production + usage) and the terms Producer (<producer + user) and Co-Creator to describe the increasing production of the content-of the news and other kinds of content- by the users of New Media.

<https://sites.google.com/site/icqqmeas2015>

The users' active role in the processing, the dissemination and the interpretation of the news content is described by the definitions of networked journalism (Jarvis, 2006), a term that shows the range of journalistic records and mostly of online journalism and this range is attributed to the use of new technologies. Participatory journalism (Bowman & Willis, 2003), is used to indicate the inclusivity of joint management, production, promotion and sharing the news content by the users, and citizen journalism (Bruns, 2007) is used to highlight the involvement of the citizens in the particular procedure of production. These definitions precisely demonstrate the new relationship that is created between the user and the content of the news based on new potential and options.

New technologies and on-line media

Radical changes have been noticed in the last century; changes that mostly were caused by the evolution of technology. Nowadays, trends require new sources of journalism; therefore Social Media and online news have become very important in everyone's life in order to be updated and be informed from the very first moment when the news do happen. Social media like Facebook, Twitter and YouTube have conquered the internet. There are widely known all over the planet as the fastest source of diffusion of information in the modern world. According to Keen (2007) many discussions are made in order to examine whether social media are reliable as sources of news to other ways of disseminating information. They have changed the overall way politicians and famous people approach their audience, later this led the professional journalist to provide the news in a different way rather than in the traditional one. Various critical events like elections, deaths of celebrities or well-known politicians, acts of terrorists, hurricanes, earthquakes and many more were first announced to social networks making them very indispensable for the modern professional journalism.

Although, the majority of people questions the reliability and the quality of the provided information/news their popularity is increasing every single day. A recent research of Nielsen and Schroder (2014) who was based on a cross-country online survey, showed that despite the popularity of Social Media the younger generation do not use those tools to produce, comment or share news. However, the time spent using Facebook, YouTube and Twitter is basically for entertainment. These widely disseminated tools offer to the users interaction with every posted information hence they have the opportunity to express their opinion, feelings and participate in conversations giving the news a different dynamic and perspective.

An alternative way to read news online is the News Media. Between the Social and News media there is a great literature on which is considered to be the most accurate and credible source of news. (Leskovec, et. al. 2009; Becker, et. al., 2010; Mathioudakis, et al. 2010).

A research was prepared in the ISLA, University of Amsterdam (Tsagkias, et. al., 2011) in order to understand the relationship between the Social Media and the online news. This research examined the analysis of a news article in the Social Media and the fact that one needs to cross reference the reliability of the information posted from these distributed tools going through the edited content to the unedited. Also, one may wonder for the number of news posted in the social media in contrast to the online newspapers that specialize in providing the news. Overall, both sources of news were the result of the new technological era. Social media provide the freedom to people to use this internet tools to actively engage on sharing and producing news. Then again online news offer the unedited information to the readers allowing them to share it on the social media, edit it and interact with other users. All the above lead to the linked relationship between these two news sources.

3. Methodology and Analysis

Measures

The questionnaire consisted of two parts. The first part included demographics, the frequency and intensity of users in reading news online. It also included 21 items that correspond to the four variables related to the uses and gratifications of reading online news in News Portals i.e. Information, Discussion, Entertainment and Surveillance. It also included the same 21 items referring to the uses and gratifications of reading online news in Social Media. Participants responded on a 5 point likert scale ranging from 1 (strongly disagreement) to 5 (strongly agreement). Some items out of these 21 were taken from the research of Quan – Haase and Young (2010) and Froget et. al (2013). For the purposes of this research items for each variable as aforementioned were summed up. The second part included questions related to the trust that participants show in online News Media along with the participants interactivity. Items were assessed using a five point likert scale where 1 corresponds to no trust and 5 corresponds to a very high degree of trust.

The questionnaire was translated in Greek and then back translated in English by professional linguistics. A pilot study was conducted with a sample of 7 questionnaires. The questionnaires were given to university students in order to check the validity of the questionnaire. Small modifications were done as necessary.

Sample

The study used a cross sectional survey with a representative sample from university students. The survey was conducted anonymously. In total 192 questionnaires were administered (81% of the questionnaires were valid). The sample is constructed by 156 university students, 90 females and 66 males, where 74.4% are less than 25 years, 21.8% are between 26-44 years old and 3.8% are above 45. Seventy nine percent of the sample is undergraduate students while the rest are postgraduate ones. The vast majority of the sample is expert on using the internet as 60% uses the internet for more than 7 years and actually 93% of the sample read news online. The majority of the students read online news of social content. Table 1 represents their preferences.

Table 1. Preferences of the participants in reading online news

	Percentage (%)
Social Content	50.3%
Athletics	21.3%
Politics	16.1%
Other	12.3%

Principal component analysis with Varimax (orthogonal) rotation was performed on the 21 items of the News Media part but also for the Social Media part. The factor analysis referring to the News Media was supported by Bartlett's test of sphericity, $\chi^2(210) = 1256.59$, $p < .05$ and Kaiser-Meyer Olkin measure of sampling adequacy of .87 above the recommended value of .6. Factors with an eigenvalue more than 1 were retained. A four-factor solution was obtained. The first factor included 8 statements on Information which accounted on the 35% of the variance, the second factor included 6 statements on Entertainment accounted for the 11% of the variance, the third factor included 4 statements on Discussion accounted for the 8% of the variance and the fourth factor included 1 statement on Surveillance which is accounted for the 5% of the variance. The 21 statements of the News Media explain 59% of the variation (see Table 2). Principal Components analysis with the Varimax rotation for the Social Media part revealed a four factor solution with eigenvalues exceeding 1, explaining 37%. 12%, 6% and 6% of the variance respectively. Bartlett's test of sphericity, $\chi^2(210) = 1414.98$, $p < .05$ and Kaiser-Meyer Olkin measure of sampling adequacy of .88. The first factor included 8 statements on Information, the second factor included 6 statements on Entertainment, the third factor on Discussion included 4 factors and the fourth factor included 3 statements on Surveillance. The four factor identified explain the 61% of the total variance (see Table 3). Not all questions loaded on the appropriate factor as a more representative sample should be obtained. However, the analysis the appropriate loadings were considered.

Table 2 and 3 show the internal consistency within the current sample and the means and standard deviation referring to the uses and gratification of the online news by News Media and the Social Media.

Table 2. Principal Component Analysis for uses and gratifications related to News Media

Item	FACTOR			
	I	II	III	IV
Information				
To get with current issues (14)	,793	,090	,005	-,015
Its easy to get information (18)	,787	,183	,085	,041
To get information I need (20)	,781	,026	,144	,075
To search for information that I need (15)	,740	,022	,239	,188
To search for information (2)	,728	,143	,061	,088
To get information for free (4)	,715	,174	,038	,065
Online news is a source of current information(11)	,697	,186	,036	,134
To get answers to specific questions (12)	,692	,095	,285	-,104
To find out things I need to know (8)	,656	,264	,189	-,218
Online news is a source of trustworthy information (7)	,523	,312	,068	,012
To occupy my free time (1)	,445	,398	-,016	,376
Entertainment				
Because it passes time away particularly when I'm bored (19)	,160	,860	,137	,086
When I have nothing better to do (21)	,109	,838	-,012	,070

To pass time when I am bored (6)	,215	,746	,187	-,074
Because is a habit just something to do (17)	,323	,601	,045	,186
To entertain my self (10)	,001	,546	,438	-,041
Discussion				
To give my opinion on a topic of discussion (13)	,188	,036	,757	-,032
To participate to group discussions related with news (9)	-,077	,066	,748	-,032
To discuss topics/news I care about (16)	,353	,202	,574	,109
To respond to others discussion on topics of interest to me (3)	,328	,180	,554	,282
Surveillance				
Reading online news is a way to learn about people and places far away (5)	,022	,077	,065	,868
Coefficient alpha	.89	.8	.68	.24
Mean	29.86	18.06	12.48	11.34
Standard Deviation	6.60	4.92	3.51	4.13

Note: Factor loadings in bold in the same column load on the same factor.

Table 3. Principal Component Analysis for uses and gratifications related to Social Media

Item	FACTOR			
	I	II	III	IV
Information				
To get information I need (20)	,776	,119	,365	,015
To search for information that I need (15)	,773	,016	,250	,160
Its easy to get information (18)	,704	,148	,360	,091
To get answers to specific questions (12)	,689	,134	,323	,308
To discuss topics/news I care about (16)	,674	,183	,035	,390
To search for information (2)	,627	,043	,353	,101
To respond to others discussion on topics of interest to me (3)	,552	,237	-,014	,318
To give my opinion on a topic of discussion (13)	,473	,377	-,192	,395
Entertainment				
Because it passes time away particularly when I'm bored (19)	,103	,870	,095	,048
To pass time when I am bored (6)	,105	,820	,114	-,082
To entertain my self (10)	,212	,730	-,082	,014
Because is a habit just something to do (17)	,180	,698	,234	,177
To occupy my free time (1)	-,092	,664	,371	,283
When I have nothing better to do (21)	,039	,371	-,010	,110
Discussion				
Online news is a source of current information (11)	,369	,188	,690	,217
To get information for free (4)	,251	,165	,667	,068
Reading online news is a way to learn about people and places far away (5)	,238	-,013	,618	,198
Online news is a source of trustworthy information (7)	,124	,074	,335	,757
Surveillance				
To participate to group discussions related with news (9)	,397	,177	,005	,689
To find out things I need to know (8)	,225	,104	,430	,621
To get with current issues (14)	,393	,085	,349	,444
Coefficient alpha	.88	.65	.76	.69
Mean	28.66	20.71	12.6	10.34
Standard Deviation	6.64	6.62	3.61	2.58

Note: Factor loadings in bold in the same column load on the same factor.

Using paired t-test, mean-level differences were found for News Media and Social Media related to the factors of Entertainment and Surveillance. The other two factors did not show a statistical significant difference. Thus, the results suggested that readers are more entertained reading news in Social Media rather in News Media. Contrary News Media provide more Surveillance rather than Social Media (see Table 4)

Table 4. Means (SD) and paired t-test results

	Online News in News Media Mean (SD)	Online News in Social Media Mean (SD)	d
Information	29.86 (6.6)	28.66 (6.64)	.18
Discussion	12.48 (3.51)	12.62 (3.61)	-.04
Entertainment*	18.06 (4.92)	20.71 (6.62)	-.45
Surveillance*	11.40 (4.09)	10.34(2.58)	.30

*Note: $p < .05$

Instead of using the frequency, intensity scale of online news is employed (Froget et. al, 2013). Intensity, measures how reading news online is integrated on the users' daily routine, how engaged is the user reading news online i.e. "Reading online news is a part of my every day activity", "Reading online news has become part of my daily routine", "I feel out of touch if I do not read online news" (Froget et. al, 2013). Multiple regression was used in order to explore the relationship between the intensity of reading online news and age, gender and the four variables related to the uses and gratifications of News Media (Information, Entertainment, Discussion and Surveillance). The overall model was significant with $R^2=.29$, Adjusted $R^2=.259$, $F(6,149)=10.04$, $p<.001$ (see Table 5). The variables Age, Information and Entertainment were statistically significant with Information being the most important variable to explain the intensity of reading news online. In addition, all of the aforementioned variables were positively related with the intensity.

Table 5. Results on Multiple Regression Analysis Predicting the Intensity (News Media)

Variable	B	SE	β	T
Constant	2.77	1.192		2.325
Age*	1.305	.391	.246	3.334
Gender	.163	.4	.029	.0409
Information*	.117	.038	.271	3.083
Discussion	.005	.068	.006	.075
Entertainment*	.117	.048	.202	2.407
Surveillance	-.004	.054	-.006	-.075

Note: * $p<.05$.

Multiple regression was also used to explore the relationship between the intensity of reading online news and the uses and gratification of online news in Social Media. Again the overall model was significant ($R^2=.25$, Adjusted $R^2=.22$, $F(6,148)=8.31$, $p<.001$) with Age, Entertainment and Surveillance being the statistically significant predictors of the Intensity with Age being the most important one (see Table 6).

Table 6. Results on the Multiple Regression Analysis Predicting the Intensity (Social Media)

Variable	B	SE	β	t
Constant	2.55	1.38		1.84
Age*	1.66	.39	.31	4.27
Gender	.6	.43	.1	1.4
Information	.08	.04	.19	1.83
Discussion	-.10	.08	-.13	-1.3
Entertainment*	.09	.03	.22	2.78
Surveillance*	.16	.1	.14	1.55

Note: * $p<.05$.

Trust and Interactivity

Differences on the trust that participants show in reading online news in News Media and Social Media was investigated by using a paired t-test. Analyses suggested that there is a statistical significant difference on the average trust that participants show between the two ($t(154)=-10.773$, $p<.05$). Namely, the average trust for the news presented in News Media ($M=3.8$, $SD=0.07$) is higher than the trust for the news in Social Media ($M=2.8$, $SD=0.86$).

The participants also did not show a high interactivity related with the news. The vast majority of the sample just read the news ($M=3.11$, $SD=1.1$), rather than like, share or comment the news.

4. Discussion and Conclusions

In this article we explored the uses and gratifications obtained from a) News Media and b) Social Media. A factor analysis of uses and gratifications from News Media and Social Media revealed four factors i.e. Information, Discussion, Entertainment and Surveillance. Despite the increased interest in Social Media, most studies

focus on uses and social implications of the social media Quan – Haase and Young (2010). However, there is no research related to online news concerning different types of media.

Both News Media and Social Media are seen as important tools in reading news online, but the type of needs that each Media fulfil definitely is not the same. Even though their differences are small, they are central to the way in which users experience the two tools and use them. No differences were obtained between the two types of media related with Information and Discussion. Information may be derived either through the authentic or original news from the News Media, or via notifications in Social Media (secondary data sources). Mean level differences exist for the gratification of Entertainment. Higher values were obtained in Social Media as it was expected (Park et. al, 2009). Social Media essentially shape this need and drive the use of it for the purpose of Entertainment. Another mean level difference was obtained on Surveillance with a higher average for News Media.

In this study it was also investigated which individual factor (Age, Gender, Information, Discussion, Entertainment and Surveillance) predicts the intensity of reading news online in News Media and Social Media. Results have shown that Information is the variable that has the highest impact and is positively related on the intensity of reading news in News Media. Contrary for the intensity of reading news online in Social Media, age is the most important factor to predict the intensity. The fact that the sample is restricted to university students this may regulate to some degree that age is the most important factor. In general, younger people are in favour of using Social Media as opposed to the News Media. The research data also showed that the intensity of using Social Media for online news, if you overlook the age factor, is for entertainment.

The degree of trust shown by the users a) on the News Media, and b) on the Social Media was also discussed. The survey revealed that users trust News Media (for reading online news) compare to the Social Media. This is actually related to the validity and the name of the source that determines significantly the reliability of the news content. However, a recent research by the Reuters Institute (2013) demonstrated that users in UK on a regular basis search the Social Media for news. Despite this fact it is important to mention that only few people trust the Social Media as their primary source for getting information.

This research is the kick start for the extension of the uses and gratifications theory for online news but also for the interaction of the users with online media.

References

- [1] Becker, H., Naaman, M., and Gravano, L. (2010). "Learning Similarity Metrics for Event Identification in Social Media". In. WSDM' 10, pp. 291-300, ACM.
- [2] Bowman, S., & Willis, C. (2003). We media: How audiences are shaping the future of news and information. Media Center at The American Press Institute.
- [3] Bruns, A. (2007, June). "Prodisage". In Proceedings of the 6th ACM SIGCHI conference on Creativity & cognition (pp. 99-106). ACM.
- [4] Bruns, A. (2008). Blogs, Wikipedia, Second Life, and beyond: From production to produsage (Vol. 45). Peter Lang.
- [5] Carrier, J.P., and Aslanidou, S. (2004). Theoretical Approaches to the Analysis of Media. Athens: Tipothito. [In Greek].
- [6] Froget, J.R., Baghestan, G.A., and Asfaranjan, Y.S. (2013). A Uses and Gratifications Perspectives on Social Media Usage and Online Marketing. 15 (1), 134-145.
- [7] Jarvis, J. (2006). Networked journalism. Buzz Machine, 5.
- [8] Keen (2007). The Cult of the Amateur: How Today's Internet is Killing Our Culture, London: Broadway Business.
- [9] Lain, L. B. (1986). Steps toward a comprehensive model of newspaper readership. Journalism Quarterly, 63(1), 69 -74, 121.
- [10] Leskovec, J., Backstrom, L., and Kleinberg, J. (2009). "Meme-tracking and the Dynamics of the News Cycle. In. KDD' 09, pp.497-506, New York: ACM.
- [11] Mathioudakis, M., Koudas, N., and Marbach, P. (2010). "Early Online Identification of Attention Gathering Items in Social Media". In. WSDM' 10, pp. 301-310, ACM.
- [12] Nielsen, R.K., and Schroder, K.C. (2014). "The Relative Importance of Social Media for Accessing, Finding, and Engaging with News", Digital Journalism, Vol. 2, No. 4, pp. 472-489.
- [13] Park, N., Kee, K., & Valenzuela, S. (2009). "Being immersed in social networking environment: Facebook groups, uses and gratifications, and social outcomes". CyberPsychology & Behavior, 12 (6), 729-733.
- [14] Quan-Haase, A., & Young, A. L. (2010). "Uses and gratifications of social media: A comparison of Facebook and instant messaging". Bulletin of Science, Technology & Society, 30(5), 350-361.
- [15] Reuters Institute for the Study of Journalism. (2013). "Digital News Report 2013." Available online, <http://digitalnewsreport.org>
- [16] Serafenitidou, M. (1995). The Sociology of Media: The role of Media in the reproduction of Contemporary Capitalism. Athens: Gutenberg.
- [17] Shao, G. (2009). "Understanding the appeal of user-generated media: a uses and gratification perspective". Internet Research, 19(1), 7-25.
- [18] Smith, P. (2001). Cultural Theory: An Introduction. NJ: John Wiley & Sons.
- [19] Toffler, A. (1980). The third wave. New York: Bantam books.
- [20] Tsagkias, M., Rijke, M., and Weerkamp, W. (2011). "Linking Online News and Social Media". In. WSDM' 11, pp. 535-574, ACM.
- [21] Van Dijck, J. (2009). "Users like you? Theorizing agency in user-generated content". Media, culture, and society, 31(1), 41.

A TYPOLOGY OF STRATEGIC ENVIRONMENTS EXTRACTED FROM A CROSS-TABULATED SWOT ANALYSIS MODEL

Peter J. Stavroulakis*, Dr. Elena Riza

Department of Hygiene, Epidemiology & Medical Statistics, Medical School of Athens, M. Asias 75, Athens 11527, Greece

*pjstav@med.uoa.gr, eriza@med.uoa.gr

ABSTRACT

From the plethora of instruments concerned with strategic management, one may be easily led to remark that SWOT analysis surfaces as the most resilient of techniques, for it is a readily available methodology facilitating the formulation of an effective strategic framework through situation analysis. Although to this day its origin remains obscure, it has proven time and time again to be the strategic instrument of choice for over half a century and for a good reason: SWOT analysis provides a concise snapshot of the strategic environment involving the case at hand and at the same time hints towards strategic directions that should be pursued in order to achieve strategic might. Cross-tabulation on the other hand, provides a methodology from which we can extract an interrelation of causality between categorical data. We investigate the applicability of epidemiological instruments (including but not limited to measures of association) to strategic management topics. From the model formulated, a typology of strategic environments is proposed and can be utilized in order to categorize strategic ventures according to the external environment wherein they are operating (or are about to operate). This work proposes a novel approach concerning SWOT analysis, implicating a correlation of the methodology concerning the critical and analytic review of strategic factors with methodologies contained in epidemiology. The procedure of typology formulation and cross-tabulation can be applied in other cases of study, thus expanding the scope and applicability of SWOT analysis even further.

Keywords: Cross-tabulation, SWOT analysis, strategic environment, strategic management

1. Introduction

A review of the background concerning situation analysis and epidemiological instruments with respect to cross-tabulation is produced and certain cases of interest concerning the utilization of SWOT analysis and the manipulation and/or extension of its traditional form are presented. The presentation and analysis of the two will facilitate towards the explanation of the latent parameters underlying the fusion of the two methodologies, or rather the extraction of methodological instruments derived from epidemiology and their application to strategic management cases, through the instrument of SWOT analysis.

2. Methodological Components

The basic pillars of the model formulated are presented, first through a critical overview of the SWOT method and thence through the examination of pertinent epidemiological extracts that will be utilized in order to produce the model introduced herein and by extension, the typology of strategic environments.

2.1 Situation Analysis

Situational analysis is the first step of strategic management. Without a thorough understanding of our environment, both internal and external, no planning can be fruitful, no mission substantiated and no vision sustained. Even if we agree with the applicability and effectiveness of SWOT analysis or not, its underlying principles are so self-evident that they are inherent in any venture. It is of eminent importance to be able to understand who we are, our competences and limitations, as well as how these particular characteristics will fit outside our external organizational or systemic boundaries; as most systems we are in charge of, organizations are open entities and highly dependent on their environment. A system with null dependency on its environment is sterile and isolated; dead.

Distinctive competencies and sustainable competitive advantages can only surface whence we administer a thorough and comprehensive analysis of how our internal environment will detect and conserve a propitious niche graciously harmonized with its environment [28]. This in particular is the distinctive competence of the SWOT analysis itself. Beyond polemics regarding its validity, it was created (and remains) as a practical instrument of self-awareness and aspiration, where “self” can be our system of focus, our firm, organization or even person and aspiration can be the intrinsic belief or hope that the potential of the self will be utilized in order to move one step closer to our dreams. Situation analysis unwittingly reconciles the gap between what we can (internal environment) and what is allowed (external environment). Along with what we are obliged (ethics, legislature, corporate responsibility) and what we want (corporate culture, values, beliefs), the primal dimensions of a strategic decision are formulated.

2.1.1 SWOT Analysis Applicability

SWOT analysis involves the expression of an inventory of two elements of internal origin, strengths and weaknesses and two elements of external origin, opportunities and threats. The versatility and benefit of this instrument is seen at first glance, for it can be utilized for any basis of analysis, where the user can specify the level of systemic focus desirable. The only constraint that is inherent in SWOT is exactly that; it requires a system with clear boundaries from its environment, for said analysis will facilitate the formulation of particular strategies for the explicit system always with respect to the environment it's operating in. We could conjecture that this particularity is the cornerstone of the viability of SWOT, for it pertains to a holistic and systemic approach of any entity. The fact that this methodology can readily provide an overview of the basic factors affecting a particular system, gives it a basic advantage among the strategic management instruments [12], but at the same time there arises an issue of objectivity and comparison of factors [24]. In a traditional SWOT analysis a list-view of factors is portrayed, erroneously implying that each factor may (or does) hold the same weight as the other. Over the years, several instruments and methods charged with the mitigation of this issue have been implemented.

2.1.2 Overview of Recent Literature Utilizing SWOT Analysis

An initial overview of the recent utilization of SWOT analysis portrays a wide range of applications, from environmental and industry-wide, to classic organizational assessment. Collectively administering a critical overview may hint as to why this instrument is so popular and prevalent; as mentioned above, the key of its excellence is its versatility; still it is a very interesting topic of research providing a plethora of research potential, whereas the methodology as-is can be utilized from any perspective wherein a critical strategic analysis of a system is required. As a topic it could be stakeholder decision making on complex socio-ecological systems [6]

where SWOT is utilized as a methodological assessment instrument, or it can be utilized for the socioeconomic assessment of the commercial weather vane scallop fishery off Alaska [9], whence through this methodology clear directions and recommendations can become evident.

In another study [27] SWOT is teamed up with systems' analysis in order to assess a World Health Organization programme concerning global violence and injury prevention. In [19] the necessity of tacit knowledge with respect to the training of environmental health is assessed with this instrument, whereas Liu et al [16] address the decision path for the construction of a low-carbon city construction within the framework of the Chinese constructional path. Chong [5] utilizes SWOT analysis to assess the situational characteristics of the Malaysian cruise industry and Braun and Amorim [3] address primary information from field diagnosis and consultation with local stakeholders with SWOT analysis in order to inspect environmental impact of different practices and phenomena within a specific region. Öztürk [20] utilizes a ranking SWOT analysis (R'WOT) in order to extract strategies with respect to the environmental conservation of a specific region and Prezelj [21] utilizes a quantitative SWOT analysis to explain a division between the strengths and weaknesses of inter-organizational cooperation within the anti-terrorism field.

Through a different focal perspective, Manzano-García and Ayala-Calvo [17] utilize the instrument to provide a global overview of the strategic factors affecting the nursing industry. Mphasha [18] utilizes SWOT analysis in order to portray the impact of folktales for strategy formulation of cultural heritage. Raslavičius et al [22] provide a developed SWOT analysis with respect to electric vehicles situational parameters within the Baltic region. Sharma and Singh [23] provide a complete analysis of ICT utilization and potential within the framework of six universities in India. From anti-terrorism to folktales, the scope of applications wherein this instrument finds pertinence seems endless.

2.1.3 Instruments Based on SWOT Analysis

The trials and tribulations of the traditional SWOT have seen the manifestation of novel instruments, differentiating themselves from the caveats of the original, but simultaneously attempting to sustain its strengths. Kurttila et al [14] paired the decision analysis tool AHP (analytic hierarchy process) with SWOT in order to bypass some weaknesses of the generic SWOT, whereas Stewart et al [26] provide the same solution to the expectance of an analytical method to prioritize the strategic factors of the SWOT analysis. Gao and Peng [7] present a quantified SWOT analytical method based on the multiple criteria group decision-making (MCGDM) concept. Kuo-liang and Shu-chen [15] provide a fuzzy quantified SWOT to evaluate strategic environments. Hadighi et al [10] introduce a three phase clustering algorithm to a SWOT analysis framework. Along with the scope comes the modifiability of the instrument; again, it seems vast.

2.2 Extracts from Epidemiology

Since the discipline of Epidemiology as defined by Last [2] is “the study of the distribution and determinants of health-related states or events in specified populations, and the application of this study to the prevention and control of health problems”, we observe two parameters of interest for this work; initially what could be defined as a specified population and thence what could consist of prevention and control of a health problem. If we adjust the scope of the specified population to an organizational unit and take under consideration the World Health Organization's definition of health as the “state of complete physical, mental and social well-being and not merely the absence of disease or infirmity” we can apply this definition under the selected unit of study and we can glimpse at the potential offered through epidemiology. Simultaneously we may hazard the conjecture that specific instruments of epidemiology utilized to measure causality, to monitor a disease and by extension prevent it, could be applied effectively to organizational management, a discipline that from conception has been expanding in ideas that further efficiency, manage and/or minimize disorder.

Originating from the definitions above, we may propose that epidemiology can as well be instituted as an organizational management application, for the scope of this discipline is concretely adjacent to management. Epidemiology is the systematic application of methodologies in order to prevent and/or treat disorder; to lead through analysis to the optimum decision with respect to a collective group of individuals, but so is management science, from its birth. Disease (as disorder) can include a range of occurrences and epidemiology can be called upon to provide effective solutions in topics ranging from corporate inefficiency to distracted driving [13].

Despite its insurmountable differentiations, it is very consoling that in the face of adversity, whether it is a financial crisis or a viral epidemic, science is united in providing effective solutions for the world based in transparency, efficient communication and trust [29].

2.2.1 Epidemiological Instruments

Epidemiology can be directly linked with economic impact [11]; simultaneously it can be accepted as the dynamic body of knowledge currently addressing issues of personalized health, well-being and prevention [25]. Particular case-control studies [1] are in use and popular for a good reason; despite several types of potential bias and confounding that can be assessed a posteriori with a meta-analysis and/or a systematic review as with other instruments [8] along with better planning [4], they provide a very valid and reliable instrument. Contingency tables in their two by two form are utilized extensively in these types of studies as they provide the basis of analysis of the interrelation of two variables of categorical data, the disease and the risk-factor.

2.2.2 Cross-tabs and Measures of Association

Concerning a basic cross-tab, the critical factor is the association of exposure and disease (risk). By correlating exposure with disease we are able to extract a near-definite outcome as to the etiology of the disease. Let us consider a basic two by two construct (Figure 1, second part). In a general scenario, there are two categorical variables each of which can be contained in one of two states. The two distinct states are exposure (and in-exposure) with respect to a specific factor and the presence (or absence) of a specific condition.

The typical measures of association that will interest us herein are the attributable risk (AR = difference between exposed and unexposed with condition present = a-c) the risk ratio (RR= attack rate for exposed to attack rate for unexposed = $a*(c+d)/c*(a+b)$) and the odds ratio (OR = exposure within the condition to that of the absence = $(a/c)/(b/d)=a*d/c*b$).

3. Model Formulation

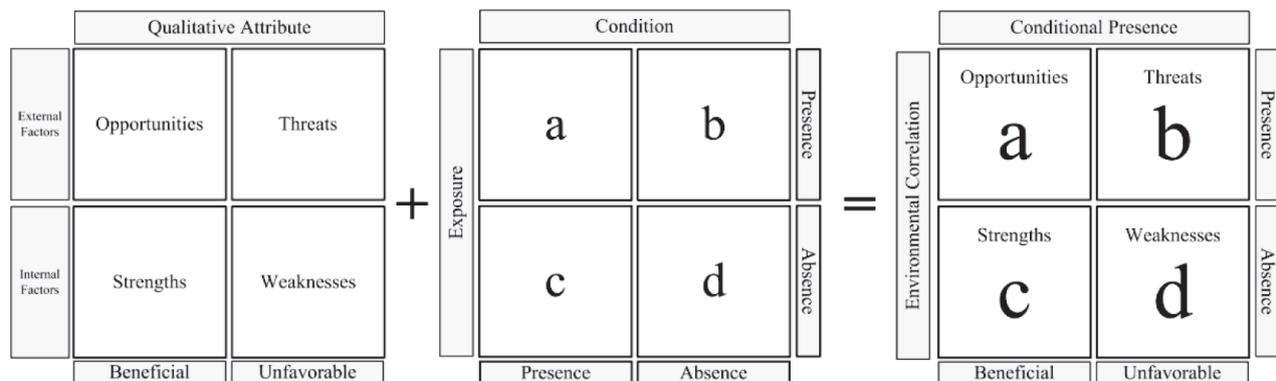
The formulation of the model is presented, along with an indicative calculation and a proposed typology of strategic environments.

3.1 Fusion of SWOT and Crosstabs

The generic SWOT analysis (as seen in the first part of Figure 1) can be paired up with a rudimentary cross-tab in order to provide the added aspects of the epidemiological perspective. External factors can be simulated with exposure, since exposure implies a derivation from the external environment; opportunities and threats can be a result of systemic exposure.

The condition (at this point the model may diverge from the generic case-control crosstab, wherein the condition is considered a disease, though this is not always the case) can be unified with the qualitative attribute that can be either beneficial or unfavorable. Within this rationale, strength can be considered the presence of a (favorable) condition without exposure to the external environment, whereas a threat can be regarded as the absence of a (favorable) condition deriving from the external environment (exposure).

Figure 1. Fusion of SWOT and a crosstab.



Since the main disadvantage of the traditional SWOT is the absence of an analytical methodology, utilizing a quondam calculation on ranking or appraisal of strategic factors, the crosstab can be compiled. Once we have numerical values signifying the ranking (or numeration) of the specific strategic factors we are able to proceed to the calculation of measures of association. The different measures will portray a different dimension with re-

spect to the strategic environment. The attributable risk will show the difference of opportunities and strengths; a large AR may denote a very favorable external environment with respect to beneficial outcomes and/or a lack of beneficial internal factors.

The risk ratio will portray the favorability of the environment with respect to the internal capabilities of the system. A calculation of a RR of 1 will denote that the system has the same exact rhythm with its environment, whereas a ratio greater than 1 will indicate a more dynamic environment with respect to the system. Whence the odds ratio is calculated, it will denote the impact of the external environment in creating favorable. Through these calculations a diverse typology of environments can be formulated.

3.2 Strategic Environment Typology

We would propose that a typology of strategic environments can be created based on a particular measure of association. For example, let us choose the RR. It signifies the environmental potential to the system's potential. If it is found equal to 1, thence the environment can be categorized as harmonic (or the system as harmonized). If a result of over 1 is generated, the strategic environment can be categorized as potent or fertile, and if we result in less than 1, it can be considered as hostile or barren.

3.3 An Example Utilizing the Model

As an example whose intake data is extracted from [14], we may add the overall priority of the strategic factors according to which dimension they belong, to render the figures of $S=0.267$, $W=0.155$, $O=0.496$ and $T=0.083$ that give an ensuing calculation of an $AR=0.496-0.267=0.229=22.4\%$ a $RR=0.496/0.267=1.85$ and an $OR=(0.496*0.155/0.267*0.083)=3.5$. These results indicate a potent strategic environment, wherein the firm may have to keep up with its dynamic.

4. Conclusions

The model may prove useful in calculating a diverse range of analytics, for it can accept as intake any method of calculation, so long as it produces a numeric result; the model is unaware and indifferent of how we collected, analyzed and extracted the calculatory intake. Depending on the objectivity of said calculations, the meta-calculations that the model will provide will favor any balance already chosen. Limitations of the model proposed herein are numerous; its main constraint is that an initial calculation is required in order to provide it with the basic data, that may within itself be erroneous; the model could prove to succumb to errors in the original data, so it may be prone to error propagation, for it will convey random error as well as any bias (systematic error) contained within the raw data. Despite any limitations, cross-tabulation methodologies may be applied to concepts in strategic management such as quantified SWOT analyses. For a future direction we would suggest further examination of epidemiological instruments that may prove useful to management science, as the assessment of the applicability of incidence and prevalence with respect to organizational issues, concepts/instruments of causality and causation applied to organizational management and the extraction of epidemiological typologies and models that are directly applicable to management science.

References

- Aggarwal, R. (2015). How to plan a good case-control study? *Indian Journal of Rheumatology*. Article in Press (DOI: 10.1016/j.injr.2015.01.004).
- Bonita, R., Beaglehole, R. and Kjellström, T. (2006). *Basic epidemiology*, 2nd edition. World Health Organization.
- Braun, R. and Amorim, A. (2015). Rapid 'SWOT' Diagnosis Method for Conservation Areas. *Scottish Geographical Journal*, 131 (1), pp. 17-35.
- de Bruin, M., McCambridge, J. and Prins, J.M. (2015). Reducing the risk of bias in health behaviour change trials: Improving trial design, reporting or bias assessment criteria? A review and case study. *Psychology and Health*, 30 (1). pp. 8-34.
- Chong, K.L. (2015). Cruise tourism in Malaysia: A SWOT analysis. *Theory and Practice in Hospitality and Tourism Research - Proceedings of the 2nd International Hospitality and Tourism Conference 2014*, pp. 189-193.
- Elsawah, S., Guillaume, J.H.A., Filatova, T., Rook, J. and Jakeman, A.J. (2015). A methodology for eliciting, representing, and analysing stakeholder knowledge for decision making on complex socio-ecological systems: From cognitive maps to agent-based models. *Journal of Environmental Management*, 151, pp. 500-516.
- Gao, C-Y. and Peng, D-H., (2011). Consolidating SWOT analysis with nonhomogeneous uncertain preference information. *Knowledge-Based Systems*, Volume 24, Issue 6, pp. 796-808.
- de Glas, N.A., Kiderlen, M., de Craen, A.J.M., Hamaker, M.E., Portielje, J.E.A., van de Velde, C.J.H., Liefers, G.J. and Bastiaannet, E. (2015). Assessing treatment effects in older breast cancer patients: Systematic review of observational research methods. *Cancer Treatment Reviews*, 41 (3). pp. 254-261.
- Glass, J.R., Kruse, G.H. and Miller, S.A. (2015). Socioeconomic considerations of the commercial weathervane scallop fishery off Alaska using SWOT analysis. *Ocean and Coastal Management*, 105, pp. 154-165.
- Hadighi, S., Sahebjamnia, N., Mahdavi, I. and Shirazi, M. (2013). A framework for strategy formulation based on clustering approach: A case study in a corporate organization, *Knowledge-Based Systems*, Volume 49. pp. 37-49.

<https://sites.google.com/site/icqqmeas2015>

- Henschke, N., Kamper, S.J. and Maher, C.G. (2015). The epidemiology and economic consequences of pain. *Mayo Clinic Proceedings*, 90 (1). pp. 139-147.
- Houben, G., Lenie, K. and Vanhoof, K. (1999). Knowledge-based SWOT-analysis system as an instrument for strategic planning in small and medium sized enterprises. *Decision Support Systems*, 26 (2). pp. 125-135.
- Huisingh, C., Griffin, R. and McGwin, G., Jr. (2015). The Prevalence of Distraction Among Passenger Vehicle Drivers: A Roadside Observational Approach. *Traffic Injury Prevention*, 16 (2). pp. 140-146.
- Kurttila, M., Pesonen, M., Kangas, J. and Kajanus, M. (2000). Utilizing the analytic hierarchy process (AHP) in SWOT analysis – a hybrid method and its application to a forest-certification case. *Forest Policy and Economics* 1, pp. 41–52.
- Kuo-liang, L. and Shu-chen, L. (2008). A fuzzy quantified SWOT procedure for environmental evaluation of an international distribution center. *Information Science* 178. pp. 531–549.
- Liu, T.-X., Niu, J.-Y. and Zhou, J.-S. (2015). The SWOT analysis and path selection of the construction of low-carbon city in our country. *Environmental Science and Engineering (Subseries: Environmental Science)*, 148, pp. 225-238.
- Manzano-García, G. and Ayala-Calvo, J. (2014). An overview of nursing in Europe: A SWOT analysis. *Nursing Inquiry*, 21 (4), pp. 358-367.
- Mphasha, L.E. (2015). Folktales reveal the cultural values of the community: A SWOT (strengths, weaknesses, opportunities, and threats) analysis. *Anthropologist*, 19 (1), pp. 295-302.
- Nicolopoulou-Stamati, P., Matiatos, I., Kotampasi, C., Stamatis, P., Sasco, A.J., Protopapa, E. and Hens, L. (2015). Training in environmental health necessitates tacit knowledge Environment, Development and Sustainability, 16 p. Article in Press (DOI: 10.1007/s10668-015-9625-2).
- Öztürk, S. (2015). Determining management strategies for the Sarikum Nature Protection Area. *Environmental Monitoring and Assessment*, 187 (3), 9 p.
- Prezelj, I. (2015). Improving Inter-organizational Cooperation in Counterterrorism: Based on a quantitative SWOT assessment. *Public Management Review*, 17 (2), pp. 209-235.
- Raslavičius, L., Azzopardi, B., Keršys, A., Starevičius, M., Bazaras, Ž. and Makaras, R. (2015). Electric vehicles challenges and opportunities: Lithuanian review. *Renewable and Sustainable Energy Reviews*, 42, pp. 786-800.
- Sharma, D. and Singh, V. (2010). ICT in Universities of the Western Himalayan Region of India II: A Comparative SWOT Analysis. *IJCSI International Journal of Computer Science Issues*, Vol. 7, Issue 1, No. 3, pp. 62-70.
- Shinno, H., Yoshioka, H., Marpaung, S. and Hachiga, S. (2006). Quantitative SWOT analysis on global competitiveness of machine tool industry. *Journal of Engineering Design*, 17 (3), pp. 251-258.
- Song, M. (2014). The potential application of personalized preventive research. *Japanese journal of clinical oncology*, 44 (11). pp. 1017-1024.
- Stewart, R.A., Mohamed, S. and Daet, R. (2002). Strategic implementation of IT/IS projects in construction: a case study. *Automation in Construction* 11. pp.681–694.
- Wadhvaniya, S., Meddings, D., Gururaj, G., Ozanne-Smith, J., Ameratunga, S. and Hyder, A.A. (2015). E-mentoring for violence and injury prevention: Early lessons from a global programme. *Global Public Health*, 19 p. Article in Press (DOI: 10.1080/17441692.2014.1001766).
- Wheelen, T. and Hunger, J. (2011). *Concepts in Strategic Management and Business Policy: Toward Global Sustainability*. Pearson; 13 edition.
- Yarborough, M. (2014). Openness in science is key to keeping public trust. *Nature*, 515 (7527). p. 313.

SYSTEMS' HYPOCRISY THEORY: THE DIVERGENCE OF ERGONOMICS AND ORGANIZATIONAL HEALTH

Peter J. Stavroulakis*, Dr. Elena Riza

Department of Hygiene, Epidemiology & Medical Statistics, Medical School of Athens, M. Asias 75, Athens 11527, Greece

*pjstav@med.uoa.gr, eriza@med.uoa.gr

ABSTRACT

Long has it been argued that the invaluable solutions that ergonomics is capable to provide to institutions, organizations, firms and systems in general, are under-utilized. Ergonomics, as a state of assessing our organizational philosophy has to encounter and include many aspects that do not have anything to do with any abstract or tedious task, but are deeper, profound and are concerned with broader parameters, such as education and culture. This find happens to consort an observed modus operandi that shows resilience. The instruments are there, readily available to be applied in order to transform organizational practice to the definition of a win-win practicality, but they are not, and subsequently systems are left to torment, dysfunction and disease. At the same time, a body of knowledge that is concerned with organizational health has been crystallizing: the wellbeing of the organization directly correlated with the wellbeing of its employees. Pertinent indicators have been formulated and results show that organizational culture may be suffering from absence of ideals unleashed to the world even as far back as the human relations' school. This paper introduces a conceptual system with respect to the correlation of the key principles of ergonomics with those rooted in organizational health. The practical divergence of these principles is coined as systems' hypocrisy and the consequent theory is formulated. From this conceptual infrastructure practical guidelines may be laid out in order to achieve a better understanding towards the manifestation and sustainability of systemic health.

Keywords: Ergonomics, systems' hypocrisy, organizational health

1. Introduction

According to the International Ergonomics Association (IEA), *ergonomics is the scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimize human well-being and overall system performance.* Ergonomics facilitate the harmonic co-existence of aspects that interact with people in terms of people's needs, abilities and limitations. A superficial attempt to recognize its importance through its definition, will lead to an initial glance as to the relevance and universal pertinence of this discipline. Its reason of existence is the conciliation of human beings and their systems.

It is not an instance of luck that this is directly correlated with the goals of any managerial activity and by extension indeed any human activity that requires care. The optimum synergy between human beings and their respective task and/or environment is a field that is as old as human beings themselves, an ever-ending pursuit and a journey in perpetuity. Each and every second in any era of human history, whence an interface between two systems has been created, the optimum solution has been sought after, whether the goal is to minimize costs, magnify benefits, or heighten efficiency altogether; the question that remains prevalent to this day, is how are we able to get the job done with the minimum of cost whilst attaining the quality standard requested, whence simultaneously the people getting the job done remain content. One may be led to remark that this syllogism is over-aspiring and unreal, but its instances are there and so are its precedents. Ecosystems wherein all components flourish in abundance and prosper are everywhere in nature, waiting to become the objects of our scientific study. Examples set as best practices in management and cases of uniqueness are also there for reflection; for one, the car manufacturer employee that is so dedicated to the quality of his firm's culture that every day after his work at the factory whence he walks home, he aligns all windshield wipers of the cars (only his company's of course) that he meets in his path. This kind of commitment that could be coined as sacred is an exceptional circumstance that could be included in the design process of a system; the only way to achieve this is through ergonomics.

Ergonomics is of the few sectors that utilizes scientific rigor and discipline in order to better understand the needs and capabilities of us all and for once not point the finger and scavenger for blame but instead understand and build around human weakness, in order to attest that it is better to be human and mistake, that it's all part of the learning experience, if built upon a stylobate of anthropocentrism. With ergonomics the meaning of discipline shifts from a hue of guilt and coercion, to the practical manifestation of freedom of the soul, expression and acceptance. Ergonomics is one of the few practices that follow parallel and tacit to each task, enhancing it with superior performance, whilst simultaneously enriching the experience of the user.

Apart from the specifics of ergonomics and its inherent sectors, we would point that there is a high-level component of this discipline that can be included anywhere. Sure we could utilize organizational ergonomics or macro-ergonomics in order to pursuit system linkages and synergies, but what about ergonomics as a state of the mind, what about ergonomics as a component of systemic health, as the intangible ingredient in all our operations? The route is there and it is not only feasible, but the road more manageable and convenient, for it is free of crises. Whence utilizing a holistic system approach and taking under consideration all systemic interconnections, dysfunction is absent and it is highly improbable to have any discrepancies and conflicts manifested, for whence any issues arises, the same principles will strive for mitigation and deliver it through a framework of systemic bliss.

At the same time, we are very lucky for we live in a world where health encompasses an encircling and non-exclusive connotation. Through this prism, we are relieved of having to analyze and extract pertinent specifics as to the goals or objectives of our operations or ourselves; the answer is there, waiting to be utilized and exploited. It is health. Health can be the journey and the destination, the sine qua non, the desirable and non-negotiable characteristic in anything and everything. The interesting aspect here is that there lies a shared link between health and ergonomics that as explained above for the latter, is to be instated as an intangible component of our system of values and convictions.

The vulnerable aspect of these facts is as in their initial crystallization, the paradox that is man; as capable of unimaginable greatness and simultaneous inhumanity. The trade-off would arise not as an issue of ability, but of desire, not of capacity but of will. The boundaries are not many times lucid and our capability enough to understand them; the system is nonetheless multi-parametric and we cannot be aware of all parameters and even if we were, it would be impossible to impose beneficial change in all of them simultaneously. Stakes thence become a conflicting eventuality only to bear the ultimate cost, that if everyone doesn't gain, no one does. In our very stochastic universe, this truth holds as a deterministic exemption from usual decorum.

2. Ergonomics' Corollaries

The state of the discipline can be traced thousands of years ago [17] and its evolution is evident, though some issues pointed out in literature a while back seem [11] to be prevalent as well, whence there are needs of the incorporation of ergonomics' considerations in planning. The dimensions of this application, its interdependencies and considerations have been registered as well [29]. Theberge and Neumann [26] provide a very interesting inventory of the intricacies concerning the practice of ergonomics and as to the holistic approach that should be sought after in order to invoke beneficial change, which is the thesis of Maciel in [15] a case study involving participatory ergonomics. This instance is observed in [2] as well, where a case of participatory ergonomics showcased the variable sectors wherein ergonomics can provide beneficial change.

Considering the topic of physical ergonomics, we may observe the undisputed superiority of the discipline; in [32] the application of ergonomics is evident to have provided enormous benefits to the systems' applied, as in [1] the extended benefits deriving from ergonomic interventions are presented, including their inherent psychosocial factors. Rochlin [21] reminds us the broad perspective that safety must encompass and the eventualities that it is evident in an organization as well as the multi-faceted approach that is required in order to achieve a culture of safety. All issues presented can be nullified with a macro-ergonomic approach to the organization.

The facilitations of ergonomics are not without their grave limitations that have been acknowledged in the past, for the discrepancies of theories and practices were apparent from the beginning. Slappendel [24] provides a very interesting analysis as to the causes of this phenomenon in order to tackle ergonomics' utilization issues; the links between organizational structure, planning, quality and innovation are investigated and how these aspects can be interwoven with strategic management, which is the case in [6] as well, where the interrelation of ergonomics and strategy are investigated.

Utilizing a narrow approach, a discrepancy and inability of correlation between strategy and ergonomics could be ventured, though it would not find viable territory, for as explained, ergonomics are a dynamic instrument of universal utility. The implication of administering the ergonomics' philosophy are rendered so far up the corporate chain as to be instilled in corporate strategy; these ideas are far from theoretical and eagerly await practical manifestation in order for all stakeholders to benefit, as we may observe in [13] the case of best practices in everyday operations through the utilization of ergonomics.

Ergonomics' methodologies can be applied wherever system theory surfaces [25] and within all contexts of an organizational setting and environment [33]. The intricacies in order for the perspectives to remain in a materiality principle ecosystem are numerous [3] but not unobtainable. Specific guidelines as to the implementation of ergonomics can be evidenced [8] and utilized. The issue here remains that the impact of the top level existence of ergonomics' culture is uncontested [9] and there should be a closer analysis on the pertinence of the socio-technical approach [12] and the concept of "joint optimization". We would venture to call it a synergistic effect of one subsystem to another, only to arrive at the conclusion that these systems are not only open, but interconnected and in no way or form does prosperity of one imply decline of the other; we move to observe the timid crystallization of the holistic principle.

3. Organizational Health

Recent literature [35] renders a working definition of organizational health for this concept has come to be considered the ultimate goal of an organization as the stepping stone of a sustainable competitive advantage. We are able to observe many models [14] linking organizational health with cultural manifestations. It may be of interest to follow the route of the symbolisms concerning organizations through the years and with some optimism we can extract an anthropocentric shift: from work to well-being for people, and from sterile monetary returns to health for organizations.

The practical matter would be that as not a single person in the world encompasses all the aspects of the definition of health (World Health Organization's definition), with the same etiology neither does an organization. Nonetheless this is a strong point of the concept and definition, for it is so broad that it signifies the constant dynamic struggle towards its realization; it doesn't allow acquiescence to the slightest degree. This exact specific is the critical advantage of the concept, for it signifies an intricate corporate value-system and like the basic principle of all entities, it also embodies permanence. Another benefit is that the framework of organizational health was coined to imply employee wellbeing [18] and the concept extended [5]. In addition to conceptual constructs, many models address the notion analytically, whether through indicators [28] to measure the correlation with organizational change [19], or through dedicated diagnostic models [22].

Major components of the organizational health concept are kept within values and the intangible aspects of organizations [30] such as trust and knowledge sharing, or the impact and importance of communication

styles [10]. Vinberg and Gelin [31] investigate organizational and health performance and come to support the holistic approach. Golzari [7] found a direct correlation of organizational health with customer satisfaction and especially within an organizational context of environment and facilities. Yüceler et al [36] found correlations of organizational health to organizational commitment and Shoaf et al [23] bridge the gap between at first conflicting parameters to propose specific metrics of organizational health assessment, whereas Mako et al [16] stress the importance of dynamic metrics of job satisfaction.

Thompson et al [27] demonstrated the need to have a solid organizational family from the aspects of employee evolution and their organizational recognition in order to achieve organizational health, whereas Wright [34] indicates the importance of a diagnostic and pathological approach to mitigate issues in an organizational context, as well as organizational physicals. Perry and Barney [20] expand on the dysfunctional aspects imposed on organizational health through lack of transparency and that as in family, realistic goals have to be set on a basis of anthropocentric values. Cheramie et al [4] indicate the importance of overall organizational health to the employees decisions with respect to loyalty.

Of the constructs available in management, we would conjecture that the one of organizational health is the most promising, systemic and holistic; for this reason we move to correlate it with ergonomics for they share a mutual infrastructure of joint anthropocentrism and effectiveness.

4. Theory Formulation

We begin with systems' theory. It can exclusively contain humans or frolic in automation, little does the difference matter. All systems receive inputs and generate outputs based on their intrinsic constructs and may learn to deal with disorder through feedback. If these intrinsic constructs (for a person they could be a value system, ethics, culture, ambitions etc.) are harmonized with the internal systemic structure (facilitated through ergonomics), health will be a given (organizational if we are addressing an organizational system). The point of the matter is that whence the human element is introduced, health pertains to the vision and ergonomics to the strategy. Exactly as strategy is the flight plan towards vision, so is ergonomics the path towards organizational health. For systems to function in harmony a definite merger of ergonomics with the framework of organizational health should be pursued; through this fusion a healthy ecosystem will emerge, for it will find profit in the mutual benefaction of its components. This profit will emerge from the exact understanding and acceptance that the mutual functionality through ergonomics will provide.

If the system does not hold in its core a culture of ergonomics, it will be left to isolation. Is it in part because of this fact that we observe systems with complete conceptual constructs (whether it be laws, regulations, directives, and/or policies) that nevertheless fail hopelessly in real-world practice. We can never diverge from the fact that human beings are the central, core and key component, even if the system is automated (planning, design, maintenance and oversight authority are still left to the human factor); if we put a person within a system that lacks an ergonomically sound framework, the verdict is already cast, and it is one of tribulations and subsequent decay. Even if at first we have the notion of function, it is and will remain an illusion, for the parameter of sustainability will not be met.

If a system lacks the direct fusion of a holistic ergonomics' approach, it's doomed to isolation, for its intrinsic constructs will never find materiality. It will be a component within a super-system and it will be alone, wondering what it's all about; it will be a person amongst a plethora of peers and feel as lonely as ever. Within an organization, systemic isolation will lead to structural and functional inefficiencies, eventual financial losses, corruption and organizational chronic disease. If a human system is left in isolation, we will lose all that is human and hold the husk of a psyche, a shadow of what could have been. The generic term that could coin this instance of systemic isolation is hypocrisy and since we are referring to systems, it would be formulated to systems' hypocrisy. Thence the organizational health metrics would be the inverse correlation of systemic hypocrisy, for systemic hypocrisy is the exact opposite of health, so much so that it may be proposed to signify the level of disease.

Whence a system in all its functions has accepted its intrinsic constructs, it is able to shatter any veneer that isolates it from its respective super-system and function for what it truly is. In a practical application this will manifest as a work day so fulfilling that the employee will not want it to end, as the intoxicated asks for a trace of a dose or as the person in love does wishes to never part with its mate. Exactly this will be the systemic benefit of the correlation of ergonomics with organizational health; relative systems will manifest as partner systems functioning in synergy and harmony with one another. Thus the conceptual model of systems' hypocrisy is constructed and awaiting testing and practical trial.

5. Conclusions

The culture that ergonomics formulates can be regarded as a systemic catalyst of excellence. Organizational health provides a holistic framework of componential considerations that will offer sustainability through abundance and collective well-being. Ergonomics paired with occupational health can be the key to organizational permanence, for one may act as its vessel and the other as its fuel. All this will be able to materialize if systemic hypocrisy is absent, for it is an index of systemic disease. The applicability of this model depends on systemic culture and this parameter will add an additional dimension that has to be considered. Another hurdle may be that of working environments' globalization, as many times its expression is not a product of systematic study. Metrics of the theory could be developed in order to provide an analytical construct that will assess any systemic instance and could provide a dynamic complementary aspect with respect to the conceptual model introduced herein.

References

- Bongers, P.M., Ijmker, S., Van Den Heuvel, S. and Blatter, B.M. (2006). Epidemiology of work related neck and upper limb problems: Psychosocial and personal risk factors (Part I) and effective interventions from a bio behavioural perspective (Part II). *Journal of Occupational Rehabilitation*, 16 (3). pp. 279-302.
- Buarque de Macedo Guimarães, L., Anzanello, M.J., Ribeiro, J.L. and Saurin, T.A. (2015). Participatory ergonomics intervention for improving human and production outcomes of a Brazilian furniture company, *International Journal of Industrial Ergonomics*, ISSN 0169-8141, <http://dx.doi.org/10.1016/j.ergon.2015.02.002>.
- Carayon, P. (2006). Human factors of complex sociotechnical systems. *Applied Ergonomics*, 37 (4 SPEC. ISS.), pp. 525-535.
- Cherame, R.A., Sturman, M.C. and Walsh, K. (2007). Executive career management: Switching organizations and the boundaryless career. *Journal of Vocational Behavior*, Volume 71, Issue 3, December. pp. 359-374.
- Cotton, P. and Hart, P.M. (2003). Occupational wellbeing and performance: A review of organisational health research. *Australian Psychologist*, 38 (2). pp. 118-127.
- Dul, J., and Neumann, W.P. (2009). Ergonomics contributions to company strategies. *Applied Ergonomics*, Volume 40, Issue 4, July. pp. 745-752.
- Golzari, A.A. (2012). Relationship between organizational health and customer satisfaction in branches of Meli Bank in Sirjn city. *Advances in Environmental Biology*, 6 (7). pp. 1928-1934.
- Grote, G. (2014). Adding a strategic edge to human factors/ergonomics: Principles for the management of uncertainty as cornerstones for system design, *Applied Ergonomics*. Volume 45, Issue 1, January. pp.33-39.
- Hendrick, H.W. (1991). Ergonomics in organizational design and management. *Ergonomics*, 34 (6). pp. 743-756.
- Hicks, J.M. (2011). Leader communication styles and organizational health. *Health Care Manager*, 30 (1). pp. 86-91.
- Ivergård, T. (1973). The use of ergonomics in the design of new industries, *Applied Ergonomics*, Volume 4, Issue 3, September. pp. 150-153.
- Jensen, P.L. (2002). Human factors and ergonomics in the planning of production. *International Journal of Industrial Ergonomics*, 29 (3). pp. 121-131.
- Joseph, B.J. (2003). Corporate ergonomics programme at Ford Motor Company, *Applied Ergonomics*, Volume 34, Issue 1, January. pp. 23-28.
- Lin, Y.-W. and Lin, Y.-Y. (2014). A multilevel model of organizational health culture and the effectiveness of health promotion. *American Journal of Health Promotion*, 29 (1). pp. e53-e63.
- Maciel, R. (1998). Participatory ergonomics and organizational change, *International Journal of Industrial Ergonomics*. Volume 22, Issues 4-5, November. pp. 319-325.
- Mako, H.Sz., Sze-Mako, N. and Deak, A. (2012). P-897 - Importance of job satisfaction measures in organizational health protection. *European Psychiatry*, Volume 27, Supplement 1. p. 1.
- Marmaras, N., Poulakakis, G. and Papakostopoulos, V. (1999). Ergonomic design in ancient Greece, *Applied Ergonomics*, Volume 30, Issue 4, August. pp. 361-368.
- Miller, R.L., Griffin, M.A. and Hart, P.M. (1999). Personality and organizational health: The role of conscientiousness. *Work and Stress*, 13 (1). pp. 7-19.
- Nair, H.A.P., Kumar, D. and Sri Ramalu, S. (2014). Organizational health: Delineation, constructs and development of a measurement model. *Asian Social Science*, 10 (14). pp. 145-157.
- Perry, L.T. and Barney, J.B. (1981). Performance lies are hazardous to organizational health, *Organizational Dynamics*, Volume 9, Issue 3, Winter. pp. 68-80.
- Rochlin, G.I. (1999). Safe operation as a social construct. *Ergonomics*, 42 (11), pp. 1549-1560.
- Saeed, B.B., Wang, W. and Peng, R. (2014). Diagnosing organisational health: A case study of pakistani banks. *International Journal of Information Systems and Change Management*, 7 (1). pp. 43-69.
- Shoaf, C., Genaidy, A., Karwowski, W. and Huang, S.H. (2004). Improving performance and quality of working life: A model for organizational health assessment in emerging enterprises. *Human Factors and Ergonomics In Manufacturing*, 14 (1). pp. 81-95.
- Slappendel, C. (1994). Ergonomics capability in product design and development: an organizational analysis. *Applied Ergonomics*, Volume 25, Issue 5, October. pp. 266-274.
- Stanton, N.A., Stewart, R., Harris, D., Houghton, R.J., Baber, C., McMaster, R., Salmon, P., Hoyle, G., Walker, G., Young, M.S., Linsell, M., Dymott, R. and Green, D. (2006). Distributed situation awareness in dynamic systems: Theoretical development and application of an ergonomics methodology. *Ergonomics*, 49 (12-13). pp. 1288-1311.
- Theberge, N. and Neumann, W.P. (2010). Doing 'organizational work': Expanding the conception of professional practice in ergonomics. *Applied Ergonomics*, Volume 42, Issue 1, December. pp. 76-84.
- Thompson, P.H., Kirkham, K.L. and Dixon, J. (1985). Warning: The fast track may be hazardous to organizational health, *Organizational Dynamics*, Volume 13, Issue 4, Spring. pp. 21-33.

<https://sites.google.com/site/icqqmeas2015>

- Tofighi, Sh., Chaghary, M., Amerioun, A. and Karimi Zarchi, A.A. (2011). Effect of organizational changes on organizational health indicators and its relationship with organizational effectiveness. *Journal of Military Medicine*, 13 (3). pp. 173-179.
- Trist, E. (1981). *The Evaluation of Sociotechnical Systems*. Quality of Working Life Center, Toronto.
- Tuan, L.T. (2013). Underneath organizational health and knowledge sharing. *Journal of Organizational Change Management*, 26 (1). pp. 139-168.
- Vinberg, S. and Gelin, G. (2005). Organizational and health performance in small enterprises in Norway and Sweden. *Work*, 24 (3). pp. 305-316.
- Westgaard, R.H., Winkel, J. (1997). Ergonomic intervention research for improved musculoskeletal health: A critical review. *International Journal of Industrial Ergonomics*, 20 (6). pp. 463-500.
- Wilson, J.R. (2000). Fundamentals of ergonomics in theory and practice. *Applied Ergonomics*, 31 (6). pp. 557-567.
- Wright, R. (1969). Are you wasting your consultants?: Organizational health, not first aid. *Business Horizons*. Volume 12, Issue 5, October. pp. 75-82.
- Xenidis, Y. and Theocharous, K. (2014). Organizational Health: Definition and Assessment. *Procedia Engineering*, Volume 85. pp. 562-570.
- Yücel, A., Doğanalp, B. and Kaya, Ş.D. (2013). The relation between organizational health and organizational commitment. *Mediterranean Journal of Social Sciences*, 4 (10). pp. 781-788.

POTENTIALS AND BARRIERS OF DEVELOPING ELECTRONIC HEALTH RECORDS APPLICATIONS (EHR APPS) FOR MOBILE-HEALTH TECHNOLOGIES

Maria Tsirintani¹, Spyridon Binioris² Klimis Dalianis³

^{1,2,3} Technological Educational Institute of Athens, Dept of Business Administration Agiou Spyridonos Street, Aigaleo, P.C.
12210, Athens, Greece, *marts@teiath.gr

ABSTRACT

Mobile Health (mHealth) is an emerging and rapidly developing field: around 100,000 applications are currently available across multiple platforms on the global market. It has the potential to play a part in the transformation of healthcare and increase its quality and efficiency as a sub-segment of Electronic Health (eHealth) that covers both medical and public health practice supported by mobile devices. In this article, we will examine the potentials and the barriers for developing Electronic Health record's applications for mHealth technologies that contributes to the empowerment of patients. Putting the patients in the centre of care also forces them to take control of their wellbeing, health management and/or disease management especially for patients with chronic diseases and heart disorders.

Keywords: mobile health technologies, electronic health records, chronic diseases they could manage their health more actively, live more independently thanks to self-assessment or remote monitoring solutions. mHealth can also support healthcare professionals in treating patients more efficiently as mobile apps can encourage adherence to a healthy lifestyle

**A SURVEY ON GREEK ENTREPRENEURS' PERCEPTIONS REGARDING
THE DETERMINANTS OF THEIR BUSINESS INNOVATIVE BEHAVIOR:
THE CASE OF EPIRUS REGION**

**Konstantinos Z. Vasileiou^{1*}, Demetrios Tsakiris², Christos C. Frangos³, Constantinos C. Frangos⁴,
Ioannis Sotiropoulos⁵**

¹Department of Business Administration, TEI of Western Greece, vasileiou@teiwest.gr

²Department of Business administration, TEI of Epirus, Greece, dmtsak@teiep.gr

³Department of Business Administration, TEI of Athens, Greece, cfragos@teiath.gr

⁴Division of Medicine, University College London, UK, constantinos.frangos.09@ucl.ac.uk

⁵Department of Accounting and finance, TEI of Epirus, Greece, sotiropoulosioan@yahoo.gr

ABSTRACT

Innovation is generally considered as a key success factor for businesses in terms of improving and retaining their competitive advantage. In order to investigate Greek entrepreneurs' perceptions about the determinants of their business innovative behavior a questionnaire survey was carried out in the Region of Epirus. The sample selection focused mainly on the most competitive and innovative businesses in that area. Entrepreneurs perceive that the lack of financing in general and particularly for new investments, as well as, the high risk of failure are the most important factors that hinder the attainment of innovative actions. They also deem that most important success factor for innovative entrepreneurship is the high level of education and skills of business human resources. Additionally, respondents stated that the successful implementation of innovative activities is playing a crucial role in their business survival in terms of obtaining and maintaining competitive advantage. Around two thirds of the respondents claimed to have achieved innovative actions during the last three years with regard to reorganizing their business operations and improving their production process. Results indicate potential policy actions that could positively impact on the successful implementation of entrepreneurship innovative activities as well as individual firm actions that may enhance their performance.

Keywords: innovative behavior, entrepreneurship, determinants, survey, Greece.

1. Introduction

It is widely accepted that the assumption and successful implementation of innovative ventures is crucial for any company in order to develop and maintain a competitive advantage (Siccote et al, 2012; Sarri et al, 2012; Bargheh et al, 2012). This is supported by a great number of researches around the world which proved that there is strong positive relationship between the achievement of innovative actions and high business performance (Hull et al, 2008; Spanjol et al., 2011; Lin et al, 2007; Calantone et al., 2002).

Despite the significant role of innovation for the successful operation of contemporary companies there is no a consensus on its definition. However, almost everybody considers that innovation represents something new (Grønhaug and Kaufmann, 1988). Most researches regard innovativeness as the enterprise's disposition to engage in and support new ideas and create new processes (Wiklund et al, 2005). It could be supported that nowadays companies are forced to secure continuous innovative achievements in order to adjust to a rapidly changing business environment, characterized by ever increasing product and technological change, deregulation, global competition, demographic changes and political instability (Sarri et al, 2010).

There are two main streams of innovation, namely the product and the process innovation (Nybak et al, 2008; Kubezcko et al., 2006). Kubezcko et al. (2006) define product innovation as the successful changes in the output of an enterprise or organization, while process innovation refers to either technological innovations or change in the organization.

Given the great importance of innovativeness for entrepreneurship a number of studies and surveys, even recently, have been conducted in Greece (Chletsos, 2008; Petrakis, 2008; Sarri et al, 2010; IOBE 2015; 2014; 2012, Kyritsis, C. and Chytis, E. 2013, Vasileiou et al, 2013). Sarri et al (2010) investigated the importance of entrepreneur training regarding creativity and innovation and they concluded that entrepreneurs and managers of SMEs acknowledge the significance of creativity and innovation, considering their high positive relationship and their impact on the development of their business. Their study also revealed that the most important obstacle that companies encounter concern financial resources, experience, time, infrastructure and not risk averse.

IOBE (2015; 2014; 2012) conducts since 2003 the annual survey on entrepreneurship in Greece, using of a representative sample of 2000 respondents 18-64 years, under the research program of the Global Entrepreneurship Monitor (GEM). The report for the period 2012-2013, in addition to the main business indicators analyzes the perceptions and motivations for entrepreneurship, the demographic and qualitative characteristics of business endeavors. A part of these surveys is dedicated to the innovativeness of entrepreneurial ventures and the 2012-13 Report (IOBE 2014) revealed that 16.28% of male entrepreneurs claimed that their product/service is considered new and innovative from all their customers, while the corresponding percentage for women entrepreneurs is only 9.52%.

This study aims to contribute to the existing knowledge on entrepreneurs' perceptions regarding the determinants of their business innovative behavior. In this light, our paper proceeds as follows: In the next section we briefly describe the methodology employed and then the empirical data derived from the questionnaire survey are analyzed. Our work ends with our conclusions, recommendations and limitations that we see in our examination.

2. Approach

2.1. Method

Based on a literature review a draft questionnaire, consisting of six sections, was initially developed in order to fulfil the aim and objectives of this study. The participants' self-assessment for their business innovative performance was explored by five statements (Nybak, 2008; IOBE 2014). Respondents were also asked to confirm whether or not their enterprise has achieved each of the proposed innovations during the last three years.

Four factors were selected in order to investigate the factors that determine the successful assumption and implementation of innovative actions, specifically:

- the factors constraining the achievement of innovative actions (Darroch, 2005; Sarri et al, 2010; Petrakis, 2008);
- the factors facilitating the achievement of innovative actions (Sarri et al, 2010; de Jong et al, 2006; Romero et al, 2012; Chaston et al, 2012);
- the expected results of innovative actions (Petrakis, 2008), and
- the sources of information for innovative actions (de Jong et al, 2006; Romero et al, 2012; Petrakis, 2008; Bargheh et al, 2012; Moica et al, 2012)

A five point Likert Scale was used for the first three sections, where respondents were asked to report their level of agreement or disagreement with the statement from strongly disagree (1) to strongly agree (5), while (2) was appointed to rather disagree, (3) to neither agree nor disagree and (4) to rather agree. For the section regarding the sources of information for innovative actions a five point Likert Scale was also employed, where participants mentioned the degree of significance of each source from not at all (1) to extremely (5) significant, while (2) was appointed to a little, (3) to rather and (4) to very significant.

Moreover, the last section of the questionnaire included the socio-demographic characteristics of participants and their businesses (Chaston et al 2012; Petrakis 2008; Sarri et al, 2010; Romero et al, 2012).

Next, the draft questionnaire was further discussed with 5 entrepreneurs and two professors of the TEI of Epirus in order to select the most important and relevant items for each construct, in an effort to end up to a comprehensive, but as short as possible questionnaire. Finally, the questionnaire was pretested by 10 entrepreneurs in order to detect and eliminate weaknesses in functionality and comprehensibility.

2.2. Sample

A convenience sample of 140 businesses, among the most innovative and competitive, from the four Regional Units of the Epirus Region was used (Table 1). The main stratification criteria were the Regional Unit where the enterprise is located, the sector involved, the size and the share of exports to total sales. The last criterion was selected, as it is generally deemed that export companies tend to be more innovative and competitive than the rest of their sector, given the additional obstacles they usually have to overcome.

The average age of the participants is much lower than of the actual population of entrepreneurs. Moreover, the portion of the sampled companies in the form of a legal person is almost more than twice of the total population of companies. The size of the sampled enterprises, in terms of the number of employees, is clearly greater than the whole population, as the share of the very small businesses in the sample is only 76%, against 97% of the population. Moreover, the educational level of participants is much higher than the population, as the percentage of the graduates from Universities and TEIs is more than double of the population. 25% of companies in the sample are engaged in export activities, compared to 1.57% of Greek companies. Finally, a quarter of respondents reported that their enterprises applies a quality assurance system.

Table 1. Sample characteristics (% of respondents, N=140)

Respondent					
Sex		Age		Education	
Male	68,57	18-24	6,4	MSc/PhD	10,7
Female	31,43	25-34	31,4	University/ College	45,0
		35-44	29,3	High School	22,9
		45-54	17,1	Secondary School	21,4
		55-64	15,7		
Company					
Legal status		Sector		Exports (of total sales)	
Sole proprietorship	64,3	Primary	15,7	0	75,00
General partnership	15,7	Manufacturing	22,1	0,01% - 5%	14,29
Limited partnership	3,6	Commerce	32,9	5% - 10%	6,43
Ltd.	4,3	Services	20,0	11% - 25%	2,86
S.A..	8,6	Tourism	9,3	26% - 50%	0,71
Other	3,6			> 50%	0,71
Regional Unit		No of employees		Quality Assurance System	
Ioannina	42,9	1-9	75,7	Yes	26,43
Preveza	21,4	10-49	21,4	No	73,57
Arta	19,3	50-249	2,1		
Thesprotia	16,4	>250	0,7		

3. Results

The lack of financing for new investments and the high failure risk are considered as the most important factors that hinder the achievement of innovative actions (Table 2). Specifically, the participants in the survey at a percentage of 85% and 73%, respectively, (rather or strongly) agree with the relevant statements, while the mean value of answers is 4.18 and 4.06, respectively. Indeed, only about 6% of respondents disagreed (rather or strongly), that these factors hinder the achievement of innovative actions.

The next inhibitory factors, in terms of significance, are considered to be a) the lack of necessary infrastructure and b) the high innovative cost, where the percentage of those who agree is almost 65% and the average of answers is around 3.8 for both these statements. The percentage of those who disagree is only 14% and 9%, respectively.

The difficulty of finding cooperative partners, the uncertainty of demand for innovative goods or services and the lack of information on customer needs, are considered to hinder the achievement of innovative actions to a rather moderate extent, since the average of answers ranges between 3.34 and 3.47. Specifically, 46% to 50% of respondents agreed (rather or strongly), with the relevant statements, only 5% strongly disagreed and 11.4% to 19.3% rather disagreed.

The lack of skilled staff was evaluated as the least significant obstacle for the achievement of innovative actions. However, it should be mentioned that the participants views are quite diverse, as the standard deviation gets its largest price, 1.36, in relation to the other factors, and the mean value is 3.16, approaching the answer "neither agree nor disagree".

Considering the above, we realize that the entrepreneurs think that the major obstacles for achieving innovative actions are related to financial issues and, in general, to the unprecedented difficult economic situation which has affected the entire Greek economy, something that was largely expected. Consequently, they consider that it is both extremely difficult to ensure adequate funding, and secondly, even in case that funds are found, the high failure risk discourages them from assuming innovative actions. As a consequence to the above, they also believe that the high cost of innovation and the lack of necessary infrastructure are extremely significant discouraging factors in undertaking innovative business activities. Regarding the problems of the microenvironment, such as the difficulty of finding cooperative partners, the lack of information on customer needs and the lack of skilled staff, even though there is considerable dispersion of opinions, are generally considered not to significantly prevent them from undertaking innovative business activities. But, it is particularly interesting that the participants do not think that the uncertainty of demand for innovative goods or services is an important inhibitory factor, which can possibly be explained by the relatively stable consumer preference for innovative goods.

Table 2. Factors constraining the achievement of innovative actions: % of valid answers and descriptive statistics

	1	2	3	4	5	Mean	Std. dev.
Lack of financing for new investments	0.0%	5.7%	10.0%	45.0%	39.3%	4.18	.83
High risk of failure	2.1%	3.6%	20.7%	32.9%	40.7%	4.06	.98
Lack of the necessary infrastructure	3.6%	10.7%	22.1%	31.4%	32.1%	3.78	1.12
High cost of innovation	.7%	7.9%	24.3%	41.4%	25.7%	3.84	.93
Lack of skilled staff	11.4%	28.6%	15.7%	21.4%	22.9%	3.16	1.36
Difficulty of finding cooperative partners	5.0%	17.1%	27.9%	28.6%	21.4%	3.44	1.15
Uncertain demand for innovative goods or services	5.0%	11.4%	31.4%	35.7%	16.4%	3.47	1.06
Lack of information on customer needs	5.0%	19.3%	29.3%	30.0%	16.4%	3.34	1.12

The survey revealed that the main factors favoring the achievement of innovative business actions are related with the education of the business staff (Table 3). Specifically, 40% of participants in the research mentioned that they totally agree with the relevant statements regarding to a) the continuous training of employees and b) the educational level of those who make the decisions, while the percentage of those who rather agree is more than 31% for both. The average of answers is nearly 4, corresponding to "rather" agree.

Next factors facilitating the innovative business actions were found to be a) the belief of the entrepreneur that only with innovative actions will be able to deal with the competition, b) the intense competition in the industry, c) the cooperation with other companies or suppliers seeking innovative actions d) the participation in

exhibitions and e) securing financing for new investments. The mean value of answers ranges between 3.78 and 3.86, approximating to “rather” agree, which was the mode value. The percentage of those who agree (rather and strongly) ranges from 55% to 70%, while less than 11% disagree (rather and strongly).

The existence of the necessary infrastructure, with a mean value of answers 3.68, is considered to contribute less in the achievement of achieve innovative business activities. Although the standard deviation takes the largest value (1.11), in comparison with other relevant factors (0.89 to 1.06), both the median and the mode were “rather” agree.

From the above analysis it is evident that all the proposed facilitating factors for innovative business actions are considered by the entrepreneurs to be important, although there is some classification. In particular, the education of the enterprise’s human resources is the most important factor, which was expected, since the adoption and successful implementation of innovative business activities presuppose a high level of knowledge, as well as the predisposition to continuous improvement and adjustment to the changes of the business environment. Consequently, the entrepreneurs’ belief that only with innovative actions they will be able to face the competition, as well as the intense competition in the industry, urges them to assume innovative business activities. But it is worth mentioning that entrepreneurs have largely understood that nowadays their performance is directly dependent on their cooperation with the other actors of the supply chain, and therefore, they recognize that they should strive for cooperation with other companies or suppliers seeking innovative actions. Consistent with their perceptions about the factors hindering the achievement of innovative actions, the participants felt that both securing financing for new investment and the existence of the necessary infrastructure play a significant role in the successful implementation of innovative actions, albeit to a lesser extent compared to the aforementioned factors.

Table 3. Factors facilitating the achievement of innovative actions: % of valid answers and descriptive statistics

	1	2	3	4	5	Mean	Std. dev.
Existence of the necessary infrastructure	4.3%	12.9%	18.6%	39.3%	25.0%	3.68	1.11
Educational level of the decision makers	2.9%	7.1%	20.7%	31.4%	37.9%	3.94	1.06
Securing financing for new investments	2.9%	8.6%	25.7%	33.6%	29.3%	3.78	1.05
Cooperation with other companies or suppliers seeking innovative actions	1.4%	5.0%	23.6%	45.7%	24.3%	3.86	.89
Participation in exhibitions	1.4%	7.9%	25.0%	37.9%	27.9%	3.83	.97
Continuous staff training	1.4%	5.7%	20.0%	32.1%	40.7%	4.05	.98
Intense competition in the industry	0.0%	11.4%	22.9%	31.4%	34.3%	3.89	1.01
Entrepreneur’s belief that only with innovative actions will be able to face competition	2.1%	5.7%	22.9%	41.4%	27.9%	3.87	.96

Respondents appreciate that the expected results from the successful implementation of the innovative actions are diverse and extremely important for improving the competitive position and consequently, the viability of their businesses (Table 4). About half of the respondents strongly agree and additionally 40% of them “rather” agree that the market share of their business will increase as a result of the assumption and successful implementation of innovative actions, while only 4% disagreed (strongly or rather).

Respondents also more than “rather” agree that the expected results of the successful implementation of innovative actions include a) the improvement of the products or services quality, b) the entry into new markets, c) the reduction of total costs per unit produced, and d) the increase of products or services range. Specifically, the mean value of answers ranged between 4.06 and 4.16, and the percentage of those who disagree (rather or strongly) does not exceed 7%.

In terms of improving the flexibility of production or service, more than 47% of survey respondents “rather” agree that it is included in the expected innovation results. Both the mean value and the mode was 4 (rather agree), while only 3% disagree (strongly or rather).

In conclusion, the entrepreneurs consider that the taking up and the successful implementation of innovative actions is a key factor for obtaining and maintaining competitive advantage and, therefore, to improve the efficiency of their businesses. For all the expected innovation results, which were evaluated by the entrepreneurs, the percentage of those agreeing (rather or strongly) was too high. However, the most expected results

are the increase in market share and the entry into new markets. This follows as a consequence of the expected improvement of both the effectiveness, by improving the quality of products or services, increasing the products or services range, and the efficiency, by reducing the total cost per unit produced.

Table 4. Expected results of innovative actions: % of valid answers and descriptive statistics

	1	2	3	4	5	Mean	Std. dev.
Increased range of products or services	0.0%	7.1%	12.9%	42.9%	37.1%	4.10	.88
Entering into new markets	0.7%	5.0%	17.1%	31.4%	45.7%	4.16	.93
Increased in market share	0.7%	2.9%	9.3%	38.6%	48.6%	4.31	.81
Improved product or services quality	0.7%	2.1%	7.9%	56.4%	32.9%	4.19	.73
Improved flexibility of production process	0.7%	2.9%	22.1%	47.1%	27.1%	3.97	.82
Reduced total cost per unit	1.4%	4.3%	21.4%	32.1%	40.7%	4.06	.96

The respondents consider that the most important source of information for innovative business activities are the conferences and the exhibitions, as 35% of them claim to be very important and 41% extremely important (Table 5). The percentage of those who think that these are a little or no at all significant amounts to only 9% and the mean value is corresponding to “very important”.

The internal sources, the consultants, the customers and the suppliers, namely the supply chain network of the enterprise are the next most important sources of information on potential innovative actions, for which respondents tend to consider them very important, as the mean of answers range from 3.70 to 3.78. The percentage of those who felt that each of these sources are very or extremely important exceed 60%, while the percentage of those who perceive them as a little or not at all important in any case was less than 14%.

Research institutes, journals and competitors are considered as very or extremely important sources of information for innovative actions by 60% of participants, with an average of 3.63, 3.56 and 3.49, respectively. It should be noted that the percentage of those who think these to be a little or not at all significant amounts for each of these three sources to 20%, and thus a relative divergence in opinions was observed.

Higher education institutions (Universities and TEIs) and the Chambers of Commerce were among the sources that fewer than half of the participants claimed to be very or extremely important sources from which they could draw information on innovative business operations. For both these sources the percentage of respondents that stated to a little or not at all significant exceeds 25% and the average is only about 3.3.

It is apparent from the above that entrepreneurs consider conferences and exhibitions to be the most important source of information for innovative business activities. The next sources in terms of significance are those that constitute the wider supply chain network of the enterprise. Research institutions and scientific journals are clearly regarded as more important sources of information than the higher education institutions, which indicates that the cooperation between Universities - TEI and business should increase significantly in the future. Moreover, a significant proportion of the participants judge competitors as a relatively good source of information. The Chambers of Commerce are the latest in terms of importance resource for innovative actions, which is rather surprising, given their institutional role and the information dissemination activities they often organize. Possibly, these results may be due to the non-verification of the participants' expectations from the Universities - TEI and the Chambers of Commerce.

Table 5. Sources of information on innovative actions: % of valid answers and descriptive statistics

	1	2	3	4	5	Mean	Std. dev.
Internal sources	3.6%	9.4%	18.7%	44.6%	23.7%	3.76	1.03
Suppliers	4.3%	8.6%	22.9%	41.4%	22.9%	3.70	1.05
Customers	3.6%	9.3%	25.7%	28.6%	32.9%	3.78	1.11
Competitors	11.5%	10.1%	19.4%	36.0%	23.0%	3.49	1.27
Consultants	5.0%	8.6%	23.7%	28.8%	33.8%	3.78	1.15
Universities - TEI	9.4%	15.8%	27.3%	26.6%	20.9%	3.34	1.24
Research Institutions	6.5%	12.9%	20.9%	30.2%	29.5%	3.63	1.22

Conferences - Exhibitions	2.9%	5.8%	15.1%	35.3%	41.0%	4.06	1.03
Scientific Journals	5.0%	14.4%	24.5%	31.7%	24.5%	3.56	1.16
Chamber of Commerce	11.5%	15.8%	22.3%	36.0%	14.4%	3.26	1.22

The reorganization of the operation of the company and the existence of significant changes in the way goods/services are produced are the innovative actions which most of the respondents stated that they achieved during the last three years, at a percentage of 68% and 65%, respectively. 57% of the participants reported that the company's products/services are perceived by the customers perceive as something significantly different, while 53% of them claimed that it has significantly changed the way in which the company cooperates with other companies and its suppliers and that there were significant changes in the way products are marketed. Therefore, most businessmen believe that they adopted and successfully implemented innovative actions over the last three years, which explains their belief that only with innovative actions they will be able to face competition.

Table 6. Achievement of innovative actions during the last three years: % of valid answers

	Yes	No
There have been significant changes in the way in which the products/services are produced	65,0%	35,0%
There have been significant changes in the way products are marketed	52,9%	47,1%
The company has been reorganized	67,9%	32,1%
The way in which the company cooperates with other companies and suppliers has significantly changed	53,6%	46,4%
The company's products/services are perceived by customers as something significantly different	57,1%	42,9%

4. Conclusions, Recommendations and Limitations

The education level of entrepreneurs and employees contributes significantly in undertaking and successfully implementing innovative actions. Therefore, the knowledge-intensive investment business plans should be treated favorably in terms of both being approved and included in the subsidized investment programs, and securing funding by financial institutions. Special treatment should also be awarded to the innovative business ventures of young entrepreneurs, especially those of 30-45 years old, who combine relevant experience with relatively high educational level and the availability and strength for hard and tedious work, which are the prerequisites for the successful implementation of innovative ventures.

Entrepreneurs have a rather neutral view on the contribution of Universities and TEIs in gathering information for innovative actions by ranking them in the penultimate position of information sources significance, slightly above the Chambers of Commerce. However, the continuous training of personnel and the educational level of those who make the decisions are considered by entrepreneurs as the most important factors that contribute to the successful implementation of innovative ventures. Therefore, the further strengthening of the role of higher education institutions and their cooperation with the local business community, including through the Chambers of Commerce, would contribute significantly to the development of the entrepreneurship with mutual benefits for both the businesses and the academic community. The University and the TEI located in Epirus may further contribute to the development of qualifications and skills of young people of Epirus, reduce internal migration most potential workforce and may attract leading scientists from the rest of Greece. Therefore, everyday and strategic issues concerning business operations will be approached in a more professional, continually updated and methodical way.

High-quality education that takes into account both scientific progress and the reality of the local business community will also contribute to the significant reduction and the control of the risk of failure of innovative business ventures, better use of existing and future infrastructure, even in discovering innovative solutions with the existing limited equipment, and thus reduce the cost of adopting innovative actions, which is often considered to be very high. It will also contribute to building a shared understanding of the operation of the entire supply chain and that the success of a company depends directly and to a large extent on achieving and maintaining a competitive advantage from the entire supply chain.

The enhanced role of the University and TEI will contribute greatly to the adoption and mainly to the successful application of innovative ventures by enterprises, given, of course, that the academic and the business

community realize the many mutual benefits of cooperation, as it happens in economically developed countries. In this case it would be much more feasible to improve the communication with customers, to enter into new markets, to improve the effectiveness of the company's products and to reduce the production cost per unit. Besides, it should be mentioned that firms' profit margins are already very low and their further shrinking will simply shorten the companies' exit time from the market.

Acknowledgements

The authors would like to acknowledge the support of the Unit of Innovation and Entrepreneurship (UoIE) of the TEI of Epirus for this research under the project number OPS 304320 of the O.P. "Education and Lifelong Learning".

References

- Baregheh, A., Rowley, J., Sambrook, A. and Davies, D. (2012). Innovation in food sector SMEs. *Journal of Small Business and Enterprise Development*. Vol. 19. No. 2. pp. 300-321.
- Calantone, R.J., Cavusgil, S.T. and Zhao, Y. (2002). Learning orientation, firm innovation capability and firm performance. *Industrial Marketing Management*. Vol. 31. pp. 515-24.
- Chaston, I., and Scott, G. (2012). Entrepreneurship and open innovation in an emerging economy. *Management Decision*. Vol. 50. No. 7. pp. 1161-1177.
- Chletsos, M. (2008). Survey of Youth Entrepreneurship in the Region of Epirus. Youth Entrepreneurship Observatory. University of Ioannina. Ioannina. Χλέτσος, Μ. (2008). Έρευνα για την Νεανική Επιχειρηματικότητα στην Περιφέρεια της Ηπείρου. Παρατηρητήριο Νεανικής Επιχειρηματικότητας. Πανεπιστήμιο Ιωαννίνων. Ιωάννινα.
- Darroch, J. (2005). Knowledge management, innovation and firm performance. *Journal of Knowledge Management*. Vol. 9. No. 3. pp. 101-115.
- de Jong, J. and Marsili, O. (2006). The fruit flies of innovations: A taxonomy of innovative small firms. *Research Policy*. Vol. 35. pp. 213-229.
- Grønhaug, K. and Kaufman, G., (1988). *Innovation: A Cross-Disciplinary Perspective*. Norwegian University Press, 530 pp.
- Hull, C. and Rotenberg, S. (2008). Firm performance: the interactions of corporate social performance with innovation industry differentiation. *Strategic Management Journal*. Vol. 29. pp. 781-9.
- IOBE (2012). The Entrepreneurship in Greece 2010-2011. The small entrepreneurship in time of crisis. *Global Entrepreneurship Monitor GEM*. Foundation for Economic and Industrial Research. IOBE (2012). Η Επιχειρηματικότητα στην Ελλάδα 2010-2011. Η μικρή επιχειρηματικότητα σε περίοδο κρίσης. Παγκόσμιο Παρατηρητήριο Επιχειρηματικότητας GEM. Ίδρυμα Οικονομικών και Βιομηχανικών Ερευνών. Αθήνα.
- IOBE (2014). The Entrepreneurship in Greece 2012-2013. Signs of recovery of small entrepreneurship. *Global Entrepreneurship Monitor GEM*. Foundation for Economic and Industrial Research. IOBE (2014). Η Επιχειρηματικότητα στην Ελλάδα 2012-2013. Ενδείξεις ανάκαμψης της μικρής επιχειρηματικότητας. Παγκόσμιο Παρατηρητήριο Επιχειρηματικότητας GEM. Ίδρυμα Οικονομικών και Βιομηχανικών Ερευνών. Αθήνα.
- IOBE (2015). The Entrepreneurship in Greece 2013-2014. The dynamics of youth entrepreneurship. *Global Entrepreneurship Monitor GEM*. Foundation for Economic and Industrial Research. IOBE (2015). Η Επιχειρηματικότητα στην Ελλάδα 2013-2014. Η δυναμική της νεανικής επιχειρηματικότητας. Παγκόσμιο Παρατηρητήριο Επιχειρηματικότητας GEM. Ίδρυμα Οικονομικών και Βιομηχανικών Ερευνών. Αθήνα.
- Kubeczko, K., Rametsteiner, E. and Weiss, G., (2006). The role of sectoral and regional innovation systems in supporting innovations in forestry. *Forest Policy and Economics*. Vol. 8 No 7. pp. 704-715.
- Kyritsis, C. and Chytis, E. (2013). «Simulation for the estimation of the survival probabilities of enterprises and banks within a prolonged duration if the dept crisis», 3rd International Conference on Quantitative and Qualitative Methodologies in the Economic and Administrative Sciences, T.E.I. of Athens, Greece, ISBN: 978-960-98739-4-9, pp.255-260, May, 2013.
- Lin, Y-Y, and Chen, Y-C. (2007). Does innovation lead to performance? An empirical study of SMEs in Taiwan. *Management Research News*. Vol. 30 No. 2. pp. 115-132 .
- Moica, S., Socaciua, T. and Radulescu, E., (2012). Model innovation system for economical development using entrepreneurship education. *Procedia Economics and Finance*. Vol 3. pp. 521 – 526.
- Nybak, E. and Hansen, E. (2008). Entrepreneurial attitude, innovation and performance among Norwegian nature-based tourism enterprises. *Forest Policy and Economics*. Vol. 10. pp. 473-479.
- Petrakis, E., (2008). Survey of Trends of Youth Entrepreneurship in the Region of Crete. Youth Entrepreneurship Observatory. University of Crete. Πετράκης, Ε. (2008). Έρευνα Τάσεων Νεανικής Επιχειρηματικότητας στην Περιφέρεια Κρήτης. Παρατηρητήριο Νεανικής Επιχειρηματικότητας. Πανεπιστήμιο Κρήτης.
- Romero, I. and Martínez-Román, J. (2012) Self-employment and innovation. Exploring the determinants of innovative behavior in small businesses. *Research Policy*. Vol. 41. pp. 178- 189.
- Sarri, K., Bakouros, I. and Petridou, E. (2010). Entrepreneur training for creativity and innovation. *Journal of European Industrial Training*. Vol. 34 No. 3. pp. 270-288.
- Sicotte, H., Drouin N. and Delerue H. (2012). Marketing and technology strategies for innovative performance. *International Journal of Managing Projects in Business*. Vol. 5. No. 2. pp. 195-215.
- Spanjol, J., Qualls, W.J. and Rosa, J.A. (2011). How many and what kind? The role of strategic orientation in new product ideation. *Journal of Product Innovation Management*. Vol. 28 No. 2. pp. 236-50.
- Vasileiou Konstantinos Z., Sotiropoulos Ioannis, Kyritsis Konstantinos and Alina Barbara Hyz, (2013). Exploring the entrepreneurial intentions and attitudes of business students. 1st International Conference on Applied Innovation, Innovation and Entrepreneurship Unit, TEI of Epirus, Greece, ISSN ON LINE 2241-6862, ISSN CD ROM 2241-6870, pp. 32-49
- Wiklund, J and Shepherd, D., (2005). Entrepreneurial orientation and small business performance: a configurational approach. *Journal of Business Venturing*. Vol. 20 No 1. pp. 71-91.

GENDER STEREOTYPING AND SUCCESSFUL MANAGERS' PERSONALITY TRAITS: DOES THE MALE MANAGERIAL FORTRESS STILL HOLD?

Konstantinos Vassakis¹, Dr Evangelos Tsoukatos^{1,2*}, Dr Christos Lemonakis^{3,1}

¹TEI of Crete, Greece, ²University of Nicosia, Cyprus, ³Pancretan Bank

*tsoukat@staff.teicrete.gr

EXTENDED ABSTRACT

Although the number of women in managerial positions has grown rather rapidly during the past decades, women remain significantly underrepresented in upper-middle and senior management positions. Theories attempting to elucidate this phenomenon comprise lack of line experience, insufficient career opportunities, gender differences in socialization, the “old boy” network etc. (Schein, 1973, 1979, 2001, 2007; Kilian et al., 2005; Bac and Inci, 2010). Alternative explanations involve gender-role and requisite management characteristics stereotyping (Schein, 2001, 2007; Eagly and Carli, 2003).

Groundbreaking is the work of Virginia Schein who in 1973 introduced a 92-item Index (Schein's Descriptive Index) of human personality traits that was later used to reveal genders' perceptions of each other and managers with the view to developing sufficient understanding of perceptual hurdles restraining women's advancement towards conquering managerial positions. Schein's (1973) “think-manager, think-male” maxim was subsequently and up to the present day researched in quite a multitude of settings (Brenner et al., 1989; de Pillis et al., 2008; Dodge et al., 1995; Schein et al., 1989; Orser 1994; Booyesen and Nkomo 2010). With a few distinct exceptions (e.g. Booyesen and Nkomo, 2010), however, most published studies, on the subject, report findings from protestant societies. Pursuing the investigation of gender role stereotyping across different cultures will complement current understanding on the topic, especially in view of the “gender paradoxical” findings that have been reported. As it appears, gender role stereotyping and gender-related personality differences are significantly larger in more gender-egalitarian cultures as compared to less egalitarian ones (Costa et al, 2001; McCrae et al., 2005).

The purpose of this study is to follow the research trajectory on the relationships between gender role stereotyping and essential managers' personality traits, originated by Schein (1973), on evidence from Greece that reportedly stands quite apart (e.g. Hofstede, 2005) from the protestant societies that so far have hosted studies on the subject, as reported in the literature. This study is quantitative in nature. Data was collected through two similar, but not identical, research instruments, both built around Schein's Descriptive Index (SDI) (Schein, 1973) in two stages. Stage one dealt with collecting evidence on respondents' perceptions of successful managers' personality traits while stage two with collecting evidence on respondents' own personality characteristics. Questionnaires were administered on-line to two separate convenience samples of 250 and 200 prospective respondents respectively that produced $n_1=134$ and $n_2=101$ filled and usable questionnaires – response rates 53.6% and 50.5% respectively. All questionnaire items, except demographics, were rated on identical 7-point Likert scales. Reliability analysis (Cronbach's α) was employed for scale refinement, while intra-class correlation coefficient (r) (Hays, 1963) was used for assessing the similarity of stage one and stage two respondents' responses across the SDI items, after refinement. Data analysis resulted in findings directly challenging Schein's “think manager think male” maxim and, on the other hand, offering support to previous culturally paradoxical findings suggesting gender role stereotyping being larger in gender egalitarian societies. (Costa et al, 2001; McCrae et al., 2005). This study's findings: a) suggest that perceptions of successful managers' personality traits between men and women are matching, b) challenge the idea that successful managers' personality traits are necessarily masculine and c) reveal no differences between men and women in relation to the identification of their own personality traits and d) reveal no differences between men and women in relation to matching their own personality traits with the respective traits of successful managers. Research about gender role stereotype in management on evidence from Greece is scarce (e.g. Mihail, 2006). In view of this scarcity this study contributes to the on-going debate on the subject. As regards practice the study unveils a) lack of gender role stereotyping and b) significant similarity of personality traits across genders, both challenging, in the case of Greece, popular aphorisms such as “Think manager – Think male”, “Old Boys Club” etc., even though the country's cultural standing is not among the most gender-egalitarian in the world. This study's findings yield important implications to both academia and practice. In relation to academia the study adds to the literature on existing relationships between gender role stereotyping and perceptions of managerial personality characteristics. Limitations of this study are certainly related to: a) drawing evidence from a convenience sample and b) surveying through the internet. However, due care was taken so that sampling bias was excluded.

ΨΥΧΟΚΟΙΝΩΝΙΚΗ ΠΡΟΣΕΓΓΙΣΗ ΤΟΥ ΘΕΣΜΟΥ ΤΗΣ ΥΙΟΘΕΣΙΑΣ ΣΤΗΝ ΕΛΛΑΔΑ: ΑΠΟΤΕΛΕΣΜΑΤΑ ΑΠΟ ΠΟΣΟΤΙΚΗ ΚΑΙ ΠΟΙΟΤΙΚΗ ΕΡΕΥΝΑ

Βουκελάτου Γιάννα, Ψυχολόγος, Κοινωνική Λειτουργός, MSc, PhD.

E-mail: giannavoukelatou@gmail.com

ΠΕΡΙΛΗΨΗ

Η υιοθεσία ως κοινωνικός θεσμός αποσκοπεί να καλύψει τις ψυχοσυναισθηματικές ανάγκες του παιδιού και να του εξασφαλίσει ένα μόνιμο και ασφαλές οικογενειακό περιβάλλον. Η διαδικασία της υιοθεσίας τελείται και ολοκληρώνεται με τη δικαστική απόφαση. Η πολύχρονη εφαρμογή του θεσμού της υιοθεσίας οδηγεί σήμερα στην πολυδιάστατη προσέγγιση και μελέτη του, με στόχο τη διασφάλιση των συμφερόντων και την ευημερία του απροστάτευτου παιδιού και της οικογένειάς του.

Στη μελέτη με θέμα: «Ψυχοκοινωνική προσέγγιση του θεσμού της Υιοθεσίας στην Ελλάδα: Αποτελέσματα από Ποσοτική και Ποιοτική Έρευνα», γίνεται προσπάθεια προσέγγισης του θεσμού της υιοθεσίας από ψυχολογική και κοινωνική πλευρά, δίνοντας ιδιαίτερη έμφαση στη ψυχική διεργασία που αφορά την ενημέρωση του παιδιού για την υιοθεσία του. Ειδικότερα, επιχειρείται η διερεύνηση του θέματος μέσα από τη μεθοδολογία της ποσοτικής και της ποιοτικής έρευνας. Η ποσοτική μελέτη αφορά στη διερεύνηση των γνώσεων, των απόψεων και των εμπειριών των εκατόν ενενήντα (190) επαγγελματιών ψυχικής υγείας που συμμετείχαν στην έρευνα. Η ποιοτική έρευνα διερευνά με τη μέθοδο της «εις βάθος συνέντευξης» στις σκέψεις, τα συναισθήματα, τις αντιλήψεις, τις πεποιθήσεις, τα βιώματα, τις εμπειρίες, τις απόψεις και τις στάσεις των τριάντα (30) θετών μητέρων, τριάντα (30) θετών πατέρων και τριάντα (30) υιοθετημένων ενηλίκων που συμμετείχαν στην έρευνα. Τα ευρήματα των δύο ερευνών οδηγούν στην εξαγωγή χρήσιμων συμπερασμάτων και στη διατύπωση συγκεκριμένων προτάσεων για τη βελτίωση του θεσμού γενικότερα.

Λέξεις-Κλειδιά

υιοθεσία, απώλεια, ψυχικό τραύμα, θεοί γονείς, υιοθετημένο παιδί, ηλικιακά όρια, ψυχολογικοί κίνδυνοι, ενημέρωση, ψυχολογική υποστήριξη, εξειδίκευση, διεπιστημονική ομάδα, ευημερία παιδιού

1. Εισαγωγή

Ο θεσμός της υιοθεσίας ακολουθεί τις εξελίξεις της κοινωνίας αντικατοπτρίζοντας τις κοινωνικές τάσεις και το πνεύμα της κάθε εποχής. Η υιοθεσία αποτελεί μια νομική διαδικασία, μέσω της οποίας δημιουργείται μια νόμιμη οικογένεια για το παιδί του οποίου οι βιολογικοί γονείς δεν είναι ικανοί ή δεν επιθυμούν ή τους έχει αφαιρεθεί από το νόμο το δικαίωμα να το φροντίζουν. Η υιοθεσία στοχεύει στη μακροχρόνια ευημερία του παιδιού. Μία επιτυχής υιοθεσία παρέχει ένα σταθερό και ασφαλές οικογενειακό περιβάλλον και καλύπτει τις ψυχοσυναισθηματικές και κοινωνικές ανάγκες του παιδιού.

Η διαδικασία της υιοθεσίας τελείται και ολοκληρώνεται με τη δικαστική απόφαση. Οι παράγοντες που συμβάλλουν στην πραγματοποίησή της είναι οι βιολογικοί γονείς του προς υιοθεσία παιδιού, κυρίως η μητέρα, το παιδί, οι θετοί γονείς, οι αρμόδιες κοινωνικές υπηρεσίες και το δικαστήριο που αποφασίζει για την υιοθεσία. Ο Σπυριδάκης αναφέρει ότι ο όρος «υιοθεσία» δεν αποδίδει μόνο τη νομική πράξη της υιοθεσίας, αλλά και την ίδια την έννομη σχέση του θετού γονέα και του θετού τέκνου, που δημιουργείται με τη νομική πράξη¹.

Σε διεθνές επίπεδο, διαπιστώνεται ότι το θέμα της υιοθεσίας έχει απασχολήσει πολλούς μελετητές και υπάρχει πλούσιο υλικό από επιστημονικές μελέτες και έρευνες που καλύπτουν ένα μεγάλο φάσμα της προβληματικής του θεσμού. Στην πλειονότητά τους οι έρευνες των Brodzinsky (1993) και Triseliotis (1997) επιβεβαιώνουν ότι οι γονείς που υιοθέτησαν και τα υιοθετημένα παιδιά είναι ικανοποιημένοι με την υιοθεσία. Ο Τρισελιώτης το 1989 πιστεύει ότι ένα στερημένο και διαταραγμένο παιδί όταν βρίσκεται μία μόνιμη και στοργική οικογένεια μπορεί να επουλώσει τα τραύματά του². Ο Rowe το 1991 υποστηρίζει ότι η υιοθεσία είναι μία ευκαιρία για το παιδί για καλύτερη ζωή³. Ο Watson το 1994 αναγνωρίζει τη μοναδικότητα των θετών γονέων και τονίζει το συνεχές ρόλο της βιολογικής κληρονομιάς του παιδιού στη ζωή της θετής οικογένειας⁴. Η μυστικότητα αποτελεί τον πυρήνα της πρακτικής της υιοθεσίας για πολλά χρόνια, με αποτέλεσμα το είδος της κλειστής υιοθεσίας να επικρατεί σημαντικά. Ο Τρισελιώτης το 2000 επισημαίνει ότι μία επιτυχής υιοθεσία εξαρτάται από την καλή νομοθεσία, τις υπηρεσίες που πρέπει να έχουν καλή υποδομή και παροχές και τους επαγγελματίες, να είναι ευαισθητοποιημένοι, έμπειροι, γνώστες της πρόσφατης θεωρίας και να νοιάζονται για το συμφέρον του παιδιού⁵.

Όσον αφορά την ελληνική βιβλιογραφία διαπιστώνεται ότι οι μελέτες γύρω από το θεσμό της υιοθεσίας είναι περιορισμένες. Η έρευνα της Ασπασίας Καλούτση-Ταυλαρίδου το 1970 μελέτησε το θέμα της υιοθεσίας μέσα από το πρίσμα της προβληματικής της διαταραχής της ταυτότητας του υιοθετημένου παιδιού⁶. Η έρευνα που διενήργησε ο Ι. Παρασκευόπουλος το 1971 στο Δημοτικό Βρεφοκομείο Αθηνών στα πλαίσια ερευνητικού προγράμματος σε συνεργασία με το Πανεπιστήμιο του Ιλλινόις μελέτησε τις αντιδράσεις και τα προβλήματα των θετών γονέων σε μια εξελικτική μορφή καλύπτοντας τη χρονική περίοδο πριν από την υιοθεσία, κατά τη διαδικασία της υιοθεσίας και μετά από την τέλεση της υιοθεσίας⁷. Επίσης, ο Ι. Παρασκευόπουλος το 1971 διενήργησε μελέτη για τα υιοθετημένα παιδιά, στην οποία περιγράφει την κοινωνική τους προσαρμογή και τη σχολική τους επίδοση με τη χρήση του ερωτηματολογίου του «Ιλλινόις Τέστ Ψυχογλωσσικών Ικανοτήτων» (ITPA)⁸. Έρευνες για την υιοθεσία έχει διενεργήσει η Τσίτσικα το 1988 σχετικά με τα προβλήματα συμπεριφοράς και τη σχολική προσαρμογή των υιοθετημένων παιδιών και η Μαγκανιώτου και η Κουσιδού σχετικά με την ενημέρωση των παιδιών για την υιοθεσία τους σε παιδιά που υιοθετήθηκαν από το Κέντρο Βρεφών «Η Μητέρα». Επίσης, η Βορριά διενήργησε διαχρονική έρευνα παρακολουθώντας από το 1983 την εξελικτική πορεία υιοθετημένων παιδιών που υιοθετήθηκαν από το Κέντρο Βρεφών «Η Μητέρα».

Στο παρόν άρθρο γίνεται προσπάθεια ψυχοκοινωνικής προσέγγισης του θεσμού της υιοθεσίας μέσα από τη μεθοδολογία της ποσοτικής και ποιοτικής έρευνας. Η ποσοτική έρευνα απευθύνεται σε εκατόν ενενήντα (190) επαγγελματίες ψυχικής υγείας (κοινωνικούς λειτουργούς, ψυχολόγους, παιδοψυχιάτρους, ψυχιάτρους) και άλλους επαγγελματίες που ασχολούνται με την υιοθεσία (δικαστικούς λειτουργούς, εκπαιδευτικούς) με τη χρήση ημιδομημένου ερωτηματολογίου. Η ποιοτική έρευνα απευθύνεται σε τριάντα (30) θετές μητέρες, σε τριάντα (30) θετούς πατέρες και σε τριάντα (30) υιοθετημένους ενήλικες με βάση τη τεχνική της «εις βάθος συνέντευξης».

¹ Σπυριδάκης, Σ.Ι. (2006). Υιοθεσία ανηλίκου. Εκλαϊκευμένη νομική βιβλιοθήκη. (11). Αθήνα. Αντ. Σάκκουλα, σ. 1,2.

² Triseliotis, J., Κουσιδού, Τ. (1989). Η Κοινωνική Εργασία στην υιοθεσία και στην Αναδοχή. Αθήνα. Κέντρο Βρεφών «Η ΜΗΤΕΡΑ».

³ Rowe, J., M. A. (1991). Perspectives on Adoption. In: Hibbs, E. D. Adoption: International Perspectives. International Universities Press, pp. 3-5, pp. 7-8, Madison, Connecticut.

⁴ Watson, K. (1994). «The history and future of adoption». Keynote address, North American Council on Adoptable Children. Reprinted in Family Matters, February, p.2

⁵ Triseliotis, J. (2000). «Επίκαιρα θέματα στην πολιτική και πρακτική της υιοθεσίας στη Βρετανία» στο Υιοθεσία, Τάσεις, Πολιτική, Πρακτική. Κέντρο Βρεφών «Η ΜΗΤΕΡΑ». Αθήνα. Γρηγόρης, σ. 7

⁶ Καλούτση-Ταυλαρίδου, Α. (1970). Συμβολή στην κατανόηση προβλημάτων υιοθεσίας. Η διαταραχή της ταυτότητας της υιοθεσίας. Αθήνα. Εμμ. Ροδάκης & Σία, σ. 2

⁷ Παρασκευόπουλος, Ι. (1971). Εμπειρίες και απόψεις των θετών γονέων για τον θεσμό της υιοθεσίας. Θεσσαλονίκη. Π. Πουρνάρα, σ. 9

⁸ Παρασκευόπουλος, Ι. Ψυχογλωσσική ανάπτυξη, κοινωνική προσαρμογή και σχολική επίδοση των θετών παιδιών. Ιωάννινα. Ψυχογλωσσικών και Παιδαγωγικών Εργαστηρίων Πανεπιστημίου Ιωαννίνων.

Τα αποτελέσματα που προκύπτουν από τις δύο έρευνες, οδηγούν στη εξαγωγή χρήσιμων συμπερασμάτων και στη διατύπωση συγκεκριμένων προτάσεων για τη βελτίωση του θεσμού της υιοθεσίας στην Ελλάδα.

A. Η ΠΟΣΟΤΙΚΗ ΕΡΕΥΝΑ

Το ερευνητικό πλαίσιο

Το ερευνητικό πλαίσιο που βασίστηκε η ποσοτική έρευνα αποτελούν το ισχύον ελληνικό δίκαιο (ν. 2447/1996) για την τέλεση της υιοθεσίας των ανηλίκων, τα Π.Δ. και οι νόμοι που ακολούθησαν συμπληρώνοντας τις διατάξεις της ισχύουσας νομοθεσίας, καθώς και η Σύμβαση της Χάγης, όπως κυρώθηκε από την Ελλάδα με το ν. 3765/2009.

Σκοπός και στόχοι της έρευνας

Η παρούσα μελέτη έχει σκοπό τη ψυχοκοινωνική προσέγγιση του θεσμού της υιοθεσίας διερευνώντας τις γνώσεις, τις απόψεις και τις εμπειρίες των επαγγελματιών ψυχικής υγείας και των άλλων συμμετεχόντων στην έρευνα με στόχο τη βελτίωση της πρακτικής σε επαγγελματικό επίπεδο και την προώθηση αλλαγών στο πλαίσιο της εργασίας τους με τη βιολογική και τη θετή οικογένεια.

Πρωτοτυπία έρευνας

Η παρούσα έρευνα μπορεί να θεωρηθεί πρωτότυπη, επειδή μελετά τις γνώσεις, τις απόψεις και τις εμπειρίες των επαγγελματιών ψυχικής υγείας και τα πορίσματά της μπορούν να αξιοποιηθούν από τους ίδιους τους επαγγελματίες ψυχικής υγείας, τους θετούς γονείς και από τις κοινωνικές επιστήμες με στόχο τη βελτίωση της πρακτικής εφαρμογής του θεσμού της υιοθεσίας στην Ελλάδα.

Παραδοχές και περιορισμοί της έρευνας

Η συμπλήρωση του ερωτηματολογίου έγινε με εθελοντική συμμετοχή. Καταγράφει γνώσεις, απόψεις και εμπειρίες των επαγγελματιών που ασχολούνται με το θεσμό της υιοθεσίας σε κρατικούς και μη κρατικούς φορείς. Οι περιορισμοί της έρευνας έγκειται στην πίεση του χρόνου, λόγω των αλλαγών που έγιναν στις κοινωνικές υπηρεσίες με την καθιέρωση του θεσμού του «Καλλικράτη», την αρνητική ή αδιάφορη στάση ορισμένων επαγγελματιών να συμπληρώσουν το ερωτηματολόγιο, λόγω συνταξιοδότησής τους, η μη προώθηση των ερωτηματολογίων στους επαγγελματίες από τους Διευθυντές των κοινωνικών υπηρεσιών και η αδυναμία άμεσης εποπτείας στους συμμετέχοντες από την ερευνήτρια κατά τη συμπλήρωση του ερωτηματολογίου.

Εργαλείο συλλογής δεδομένων / Ερωτηματολόγιο

Το εργαλείο συλλογής των δεδομένων της έρευνας είναι το ερωτηματολόγιο. Το ερωτηματολόγιο είναι ημι-δομημένο και αυτοσυμπληρούμενο και δόθηκε προσωπικά ή στάλθηκε ταχυδρομικά στους συμμετέχοντες. Αποτελείται από κλειστές και ανοικτού τύπου ερωτήσεις. Η επεξεργασία των δεδομένων έγινε με εισαγωγή στην Access και η ανάλυση τους με το στατιστικό πακέτο SPSS.

Μέθοδος συλλογής των Δεδομένων

Η συλλογή των δεδομένων έγινε σε δύο φάσεις: Η πρώτη φάση πραγματοποιήθηκε το 2009 και περιλαμβάνει την πιλοτική έρευνα. Κατά την πιλοτική έρευνα έγινε έλεγχος του ερωτηματολογίου ως προς την εξωτερική του εμφάνιση, τις οδηγίες συμπλήρωσης, τη σειρά των ερωτήσεων, τη διατύπωση και το χρόνο συμπλήρωσής του. Η δεύτερη φάση περιελάμβανε την κυρίως έρευνα, η οποία υλοποιήθηκε από τον Οκτώβριο 2010 μέχρι τον Μάρτιο 2011 σε όλη την Ελλάδα.

Δομή Ερωτηματολογίου

Το ερωτηματολόγιο αποτελείται από πενήντα (50) συνολικά ερωτήσεις και η δομή του διακρίνεται σε έξι (6) Μέρη:

Α' Μέρος: Δημογραφικά στοιχεία

Β' Μέρος: Εμπειρία σε ζητήματα υιοθεσίας

Γ' Μέρος: Η διαχείριση της ενημέρωσης της υιοθεσίας

Δ' Μέρος: Ο ρόλος των επαγγελματιών

Ε' Μέρος: Επαγγελματική κατάρτιση των επαγγελματιών

ΣΤ' Μέρος: Νομικό πλαίσιο

Δείγμα

Το δείγμα της έρευνας αποτέλεσαν 190 επαγγελματίες ψυχικής υγείας και άλλοι επαγγελματίες. Από τους 190 επαγγελματίες, 127 είναι κοινωνικοί λειτουργοί, 28 ψυχολόγοι, 12 παιδοψυχίατροι, 1 ψυχίατρος, 10 δικαστικοί λειτουργοί και 22 επαγγελματίες από άλλες ειδικότητες, εκπαιδευτικοί, επισκέπτες υγείας και διοικητικοί υπάλληλοι, οι οποίοι εντάσσονται στην κατηγορία «Άλλο».

Πίνακας 1. Οι συμμετέχοντες στην έρευνα είναι:

Φύλο	Συχνότητα	Ποσοστό %
Άρρεν	16	8,4
Θήλυ	174	91,6
Σύνολο	190	100,0

Ερευνητικά ερωτήματα

Τα ερευνητικά ερωτήματα που προκύπτουν από το σκοπό και τους στόχους της έρευνας είναι τα εξής:

1. Είναι σημαντικό να ενημερώνονται τα υιοθετημένα παιδιά για την υιοθεσία τους;
2. «Πότε», ποια ηλικία θεωρείται η πιο κατάλληλη, ώστε να ενημερώνονται τα υιοθετημένα παιδιά για την υιοθεσία τους;
3. Είναι σημαντική η παρακολούθηση της θετικής οικογένειας για την προσαρμογή παιδιού μετά από την υιοθεσία του;
4. Πόσο σημαντική είναι η ηλικία των θετών γονέων στην καλή έκβαση της υιοθεσίας του παιδιού;
5. Πόσο καταρτισμένοι και εξειδικευμένοι είναι οι επαγγελματίες ψυχικής υγείας, κοινωνικοί λειτουργοί, ψυχολόγοι, παιδοψυχίατροι, ψυχίατροι στο θέμα της υιοθεσίας;
6. Είναι αναγκαία η λειτουργία της διεπιστημονικής επιτροπής στη βελτίωση του θεσμού της υιοθεσίας;

Αποτελέσματα

Από την επεξεργασία των δεδομένων προέκυψαν τα παρακάτω αποτελέσματα:

Πίνακας 2. Πόσο σημαντικό θεωρείτε να ενημερώνονται τα υιοθετημένα παιδιά για την υιοθεσία τους;

	Συχνότητα	Ποσοστό %
1. Καθόλου	2	1,1
2. Πολύ λίγο	0	0,0
3. Λίγο	2	1,1
4. Πολύ	19	10,0
5. Πάρα πολύ	167	87,9
Σύνολο	190	100,0

Η μεγάλη πλειοψηφία των ερωτώμενων του δείγματος σε ποσοστό 87,9% θεωρούν ότι είναι πάρα πολύ σημαντικό να ενημερώνονται τα υιοθετημένα παιδιά για την υιοθεσία τους. Η καταλληλότερη ηλικία για την ενημέρωση θεωρούν ότι είναι 3-4 ετών και πρέπει να έχει ενημερωθεί οπωσδήποτε μέχρι 6 χρονών. Αναφορικά με την παρακολούθηση της προσαρμογής του παιδιού μετά από την υιοθεσία του από την κοινωνική λειτουργό της υπηρεσίας που τέλεσε την υιοθεσία του παιδιού διαπιστώνεται ότι μόνο 48,9% των ερωτώμενων του δείγματος δηλώνουν ότι γίνεται παρακολούθηση της οικογένειας.

Οι συμμετέχοντες στο δείγμα ρωτήθηκαν πόσο σημαντική θεωρούν την ηλικία των υποψηφίων θετών γονέων για την υιοθεσία του παιδιού. Οι απαντήσεις φαίνονται στο διάγραμμα που ακολουθεί:

Διάγραμμα 1. Η ηλικία των υποψηφίων θετών γονέων για την υιοθεσία παιδιού



Το μεγαλύτερο ποσοστό των ερωτώμενων του δείγματος θεωρούν «πολύ σημαντική» την ηλικία των υποψηφίων θετών για την υιοθεσία ενός παιδιού και ακολουθεί το «πάρα πολύ σημαντική».

Όσον αφορά στην εξειδίκευση των επαγγελματιών, διαπιστώνεται ότι δεν υπάρχει εξειδίκευση στα θέματα της υιοθεσίας και οι επαγγελματίες ψυχικής υγείας λειτουργούν βασιζόμενοι στην εμπειρία τους και στην ανταλλαγή απόψεων με άλλους συναδέλφους τους. Επίσης, οι συμμετέχοντες στην έρευνα ρωτήθηκαν για την λειτουργία διεπιστημονικής επιτροπής.

Πίνακας 3: Συμφωνείτε με τη συγκρότηση διεπιστημονικής επιτροπής;

	Συχνότητα	Ποσοστό %
Ναι	178	93,7
Όχι	12	6,3
Σύνολο	190	100,0

Είναι φανερό ότι το 93,7% των συμμετεχόντων συμφωνεί με τη λειτουργία της διεπιστημονικής επιτροπής, η οποία θα ασχολείται με το θεσμό της υιοθεσίας πριν από την υιοθεσία του παιδιού, κατά την υιοθεσία και μετά από την υιοθεσία του.

Συζήτηση-Συμπεράσματα

Από τα αποτελέσματα της έρευνας, διαπιστώνεται ότι η πλειοψηφία των συμμετεχόντων, θεωρεί ότι είναι πάρα πολύ σημαντικό να ενημερώνονται τα υιοθετημένα παιδιά για την υιοθεσία τους. Το εύρημα αυτό συμφωνεί με τα πορίσματα της έρευνας των Hindle και Shulman το 2008 που υποστηρίζουν ότι τα υιοθετημένα παιδιά, τα οποία γνωρίζουν για την υιοθεσία τους μπορούν να ενσωματώσουν τις εμπειρίες και τα συναισθήματά τους στην ανάπτυξη και διαμόρφωση της ταυτότητάς τους⁹. Η Lifton επισημαίνει την αίσθηση της απώλειας, του πόνου, του κενού, του αποκλεισμού και της απόρριψης που συνοδεύουν την υιοθεσία¹⁰. Οι ερωτήσεις που απασχολούν ένα υιοθετημένο άτομο είναι: «αν ήμουν επιθυμητό», «αν με αγαπούσαν», «αν άξιζω να με αγαπούν» και «για ποιους λόγους με έδωσαν για υιοθεσία;». Τα αναπάντητα αυτά ερωτήματα μπορεί να το οδηγήσουν σε μύθους και φαντασιώσεις, σε δυσκολίες προσαρμογής, σε έλλειψη ή χαμηλή αυτοεκτίμηση, μαθησιακές δυσκολίες, καθώς και σε αρνητική εικόνα για τον εαυτό του. Συνυπάρχουν συναισθήματα κατάθλιψης, απελπισίας, ενοχής, θυμού και έντονου άγχους. Το νέο στοργικό, σταθερό και θετικό περιβάλλον μπορεί να ανατρέψει τις αρνητικές εμπειρίες. Δεν είναι όμως μόνο το οικογενειακό περιβάλλον που παίζει πολύ σημαντικό ρόλο στη διαμόρφωση της ταυτότητας του υιοθετημένου παιδιού, αλλά ακόμη το συγγενικό και το κοινωνικό περιβάλλον. Οι συναισθηματικές δυσκολίες που παρουσιάζει το παιδί εγκυμωθούν ψυχολογικούς κινδύνους και άπτονται της ειδικής αγωγής, καθώς απαιτείται εξειδικευμένη αντιμετώπιση από τις κοινωνικές υπηρεσίες. Η άποψη αυτή ενισχύεται ακόμη περισσότερο από τα

⁹ Hindle, D., & Shulman, G. (2008). *The Emotional Experience of Adoption. A psychoanalytic perspective*. London and New York, Routledge.

¹⁰ Lifton, B. J. (1988). *Lost & Found. The adoption experience*. University of Michigan Press, Ann Arbor.

αποτελέσματα της παρούσας έρευνας ότι τα υιοθετημένα άτομα σε σχέση με τα μη υιοθετημένα άτομα παρουσιάζουν ιδιαιτερότητες. Οι επαγγελματίες πιστεύουν ότι οι ιδιαιτερότητες συσχετίζονται με τις αυξημένες συναισθηματικές ανάγκες των υιοθετημένων παιδιών και το δύσκολο ιστορικό της βιολογικής τους οικογένειας. Διαπιστώνεται ότι, όσο μεγαλύτερη είναι η ηλικία του παιδιού που υιοθετείται τόσο πιο συχνά εντοπίζονται συναισθηματικές δυσκολίες. Τα αποτελέσματα μελετών του Τρισελιώτη έδειξαν ότι το υιοθετημένο παιδί βλέπει τον εαυτό του διαφορετικό από τα άλλα παιδιά, κυρίως όταν προέρχεται από άλλη εθνικότητα, πολιτισμό ή φυλή, όπως συμβαίνει με τις διακρατικές υιοθεσίες¹¹. Η παραδοχή των διαφορών εκ μέρους της θετής οικογένειας, διευκολύνει την καλή επικοινωνία και οδηγεί στην ισορροπία και τη σταθερότητα της οικογένειας.

Σε ό,τι αφορά την άποψη των συμμετεχόντων σχετικά με την ηλικία που θεωρούν πιο κατάλληλη να ενημερωθεί το παιδί για την υιοθεσία του, κυριαρχεί η άποψη ότι θα πρέπει να κυμαίνεται ανάμεσα στο τρίτο και στο τέταρτο έτος που το παιδί αρχίζει να κατανοεί έννοιες. Η Eldridge τονίζει ότι το πιο σημαντικό για το υιοθετημένο παιδί και αυτό που έχει μεγαλύτερη ανάγκη είναι να του επιτραπεί να νιώθει ελεύθερο να εκφράζει με άνεση τα αντιφατικά του συναισθήματα, θετικά και αρνητικά, χωρίς το φόβο ότι οι γονείς του θα το επικρίνουν. Τότε, το ψυχικό τραύμα αρχίζει να επουλώνεται και το παιδί νιώθει ανακούφιση και ασφάλεια¹².

Η ηλικία των υποψηφίων θετών γονέων είναι ένα ζήτημα που προκαλεί πολλές συζητήσεις μεταξύ των επαγγελματιών ψυχικής υγείας και έχει απασχολήσει πολλούς μελετητές, αφού σε ορισμένες περιπτώσεις η μεγάλη διαφορά ηλικίας θετών γονέων και παιδιού, αποτελεί αιτία εμφάνισης έντονων συγκρούσεων. Κάποιοι συμμετέχοντες υποστηρίζουν ότι η διαφορά ηλικίας θα πρέπει να μειωθεί διότι οι αντοχές των υποψηφίων θετών γονέων μειώνονται με αποτέλεσμα να αδυνατούν να αντεπεξέλθουν με άνεση στις ψυχοκοινωνικές ανάγκες του παιδιού τους. Επικρατεί η άποψη που επισημαίνει την ανάγκη ευελιξίας στα ηλικιακά όρια και την κατά περίπτωση εξέταση των υποψηφίων θετών γονέων. Επίσης, από την έρευνα, προκύπτει η ανάγκη της επαγγελματικής εξειδίκευσης των συμμετεχόντων επαγγελματιών που ασχολούνται με την υιοθεσία, η αναγκαιότητα λειτουργίας διεπιστημονικής επιτροπής και ο εκσυγχρονισμός του θεσμού της υιοθεσίας γενικότερα.

B. ΠΟΙΟΤΙΚΗ ΕΡΕΥΝΑ

Σκοπός και Στόχος

Σκοπός είναι η συλλογή πληροφοριών που αφορούν στις σκέψεις, τα συναισθήματα, τις αντιλήψεις, τις εμπειρίες και τις απόψεις των θετών γονέων και των υιοθετημένων ενηλίκων σε σχέση με την εμπειρία της υιοθεσίας, στοχεύοντας ταυτόχρονα στην εξαγωγή χρήσιμων συμπερασμάτων που θα συμβάλλουν στην καλύτερη διαχείριση της υιοθεσίας από τους επαγγελματίες, το παιδί και τη θετή του οικογένεια.

Παραδοχές και Περιορισμοί

Στην παρούσα έρευνα, υπήρξαν περιορισμοί σχετικά με τη μεγάλη συσσώρευση του ποιοτικού υλικού και τη στάση ορισμένων αρμοδίων κοινωνικών υπηρεσιών απέναντι στην έρευνα κατά τη φάση της προσέγγισης του δείγματος. Το πλούσιο υλικό που συγκεντρώθηκε από τις συνεντεύξεις των τριάντα μητέρων, των τριάντα πατέρων και των τριάντα υιοθετημένων ενηλίκων, από την μια πλευρά αποτέλεσε σημαντικό παράγοντα για τη συλλογή και επεξεργασία των ποιοτικών δεδομένων, από την άλλη όμως, δημιούργησε δυσκολίες κατά την ανάλυση και επεξεργασία του. Άλλοι περιορισμοί ήταν η αρνητική ή η αδιάφορη στάση των κοινωνικών υπηρεσιών να επικοινωνήσουν με θετές μητέρες, θετούς πατέρες και υιοθετημένους ενήλικες. Επιπρόσθετα, υπήρχε δυσκολία προσέγγισης των υιοθετημένων ενηλίκων, επειδή οι υιοθετημένοι ενήλικες μπορούσαν να κληθούν μόνο από τους κρατικούς οργανισμούς/ιδρύματα. Βασικοί παράγοντες μείωσης των περιορισμών της έρευνας αναφέρεται η ελεύθερη επιλογή και η γραπτή συναίνεση των θετών γονέων και των υιοθετημένων ενηλίκων που συμμετείχαν στην ερευνητική διαδικασία. Άλλοι σημαντικοί παράγοντες ήταν η σχέση εμπιστοσύνης που εγκαθιδρύθηκε μεταξύ των συμμετεχόντων και της ερευνήτριας, η ανάγκη και η προθυμία τους να μιλήσουν για τα βιώματα και τις εμπειρίες της προσωπικής τους ζωής και η διάθεσή τους να εκφράσουν με ειλικρίνεια τις σκέψεις, τα συναισθήματα, τις επιθυμίες τις αντιλήψεις και τις απόψεις τους. Η μαγνητοφώνηση των συνεντεύξεων θεωρείται ότι δεν επηρέασε σημαντικά τους συμμετέχοντες.

Πρωτοτυπία της έρευνας

Η πρωτοτυπία της έρευνας βασίζεται στον τρόπο προσέγγισης των θετών μητέρων, των θετών πατέρων και των υιοθετημένων ενηλίκων με τη μέθοδο της «εις βάθος συνέντευξης», η διερεύνηση των εμπειριών, των σκέψεων, των συναισθημάτων και των απόψεών τους, μέσω του ονείρου και του σχεδίου της οικογένειας. Η συνέντευξη

¹¹ Triseliotis J., ό.π.,σσ. 238.239

¹² Eldridge, S. (2003). Parents de Coeur. Comprendre l'enfant adopte. Albin Michel S.A., Paris.

αποτελείται από τρεις βασικούς θεματικούς άξονες όσον αφορά τις Μπτέρες και τους Πατέρες: 1. Η Υιοθεσία Πριν και Μετά. 2. Ο Γονεϊκός Ρόλος. 3. Η Ψυχική Διεργασία της Ενημέρωσης του Παιδιού για την Υιοθεσία του. Επίσης, από τρεις άξονες αποτελείται και η συνέντευξη των Υιοθετημένων Ενηλίκων: 1. Η Θετή Οικογένεια. 2. Η Ψυχική Διεργασία της Ενημέρωσης του Παιδιού για την Υιοθεσία του. 3. Η Βιολογική Οικογένεια. Τα αποτελέσματα της ποιοτικής έρευνας μπορούν να αξιοποιηθούν από τους επαγγελματίες που ασχολούνται με την υιοθεσία, τις θετές οικογένειες, τις υπηρεσίες που σχεδιάζουν και υλοποιούν προγράμματα επιμόρφωσης και να συμβάλλουν στο άνοιγμα του ερευνητικού πεδίου για το θεσμό της υιοθεσίας.

Η Ερευνητική Διαδικασία

Η διεξαγωγή της ερευνητικής διαδικασίας διήρκησε από τον Ιούλιο του 2010 και ολοκληρώθηκε τον Σεπτέμβριο του 2011 στην Αθήνα, τη Θεσσαλονίκη και Πάτρα, ύστερα από την επίσημη έγκριση ίδρυσης και λειτουργίας αρχείου με ευαίσθητα δεδομένα από την Αρχή Προστασίας Δεδομένων Προσωπικού Χαρακτήρα. Ο ερευνητικός σχεδιασμός περιελάμβανε τη διεξαγωγή πιλοτικών συνεντεύξεων με τη μέθοδο της ημιδομημένης συνέντευξης από δύο μπτέρες, δύο πατέρες και δύο υιοθετημένους ενήλικες. Ο σκοπός της πιλοτικής έρευνας ήταν ο έλεγχος των θεματικών αξόνων της συνέντευξης, των κατηγοριών, η σειρά, η διατύπωση και η κατανόηση των ερωτήσεων, καθώς και η χρονική διάρκεια της συνέντευξης. Η διεξαγωγή της κύριας συνέντευξης έγινε με τη μέθοδο της ημιδομημένης συνέντευξης με τη χρήση μαγνητοφώνου και απευθυνόταν σε πληθυσμό 30 μπτέρων, 30 πατέρων και 30 υιοθετημένων ενηλίκων. Η ερευνητική διαδικασία υλοποιήθηκε σε τρεις φάσεις: Τη φάση πριν από τη συνέντευξη, η οποία περιελάμβανε την επαφή με τις κοινωνικές υπηρεσίες, τη φάση κατά τη συνέντευξη που πραγματοποιήθηκε η διεξαγωγή της συνέντευξης και τη φάση μετά από τη συνέντευξη που έγινε η διαδικασία της καταγραφής των σημειώσεων που αφορούσαν τη συνέντευξη.

Μέθοδος ανάλυσης δεδομένων

Στην παρούσα έρευνα, η απομαγνητοφώνηση των ενενήντα (90) συνολικά συνεντεύξεων, απαιτούσε μία επίπονη, επίμονη και χρονοβόρα διαδικασία, η οποία ήταν απαραίτητη, προκειμένου να γίνει η μετατροπή του προφορικού λόγου σε γραπτό κείμενο και στη συνέχεια να γίνει η επεξεργασία του.

Τα βήματα που ακολουθήθηκαν για την ανάλυση και ερμηνεία των ποιοτικών δεδομένων ήταν:

1. Απομαγνητοφώνηση των συνεντεύξεων.
2. Διάβασμα του υλικού. Εξοικείωση με τα δεδομένα.
3. Κατάταξη των απαντήσεων των συμμετεχόντων και εξάλειψη του υλικού που ήταν άσχετο με τους στόχους της έρευνας
4. Ηλεκτρονικός έλεγχος του υλικού με βάση το εργαλείο ATLAS.ti¹³.
5. Κωδικοποίηση των απαντήσεων και διαμόρφωση των απαντήσεων σε κατηγορίες
6. Ανάλυση περιεχομένου.
7. Ευρήματα-Αποτελέσματα.

Συζήτηση-Συμπεράσματα

Η ερευνήτρια κατέγραψε τα γεγονότα έτσι όπως τα αφηγήθηκαν οι συμμετέχοντες. Τα αποτελέσματα της έρευνας δείχνουν ότι το ζευγάρι βιώνει έντονο πένθος, τόσο για την απώλεια της απόκτησης βιολογικού παιδιού όσο και για την ταλαιπωρία που υφίσταται μέχρι να βρεθεί το παιδί που θα υιοθετήσει και να ολοκληρωθεί η νομική διαδικασία της υιοθεσίας του. Από την πλευρά τους, τα υιοθετημένα παιδιά βιώνουν την απώλεια της βιολογικής οικογένειας και έχουν ανάγκη να θρηνήσουν αυτή την απώλεια. Από πολύ νωρίς στη ζωή τους νιώθουν την ανάγκη να ενσωματώσουν στην αναπτυσσόμενη προσωπικότητά τους δύο οικογένειες, μία βιολογική και μία ψυχολογική. Οι υιοθετημένοι ενήλικες δηλώνουν ότι «νιώθουν καλά που ανήκουν σε μία οικογένεια, που ανήκουν κάπου» και υποστηρίζουν ότι έχουν δεχτεί πολύ αγάπη, στοργή και φροντίδα από τους γονείς που τους μεγάλωσαν.

Όσον αφορά στην ενημέρωση του παιδιού για την υιοθεσία του από τους γονείς του, οι υιοθετημένοι ενήλικες διατυπώνουν την άποψη ότι «μία σχέση και πόσο μάλλον η γονική, δεν μπορεί να θεμελιώνεται στην απόκρυψη της αλήθειας». Οι υιοθετημένοι ενήλικες στην πλειονότητά τους αναφέρουν ότι, η ενημέρωση στις περισσότερες περιπτώσεις έγινε κυρίως από τη μπτέρα, η οποία ένιωθε ιδιαίτερο άγχος και ανασφάλεια τη στιγμή της ενημέρωσης. Σε πολλές περιπτώσεις οι συμμετέχοντες έμαθαν για την υιοθεσία τους στην ενήλικη ζωή τους από τρίτα πρόσωπα που μπορεί να ανήκαν στο ευρύτερο συγγενικό ή φιλικό τους περιβάλλον ή ακόμη και από τη

¹³ Ιωσηφίδης, Θ. (2008). Ποιοτικές μέθοδοι έρευνας στις κοινωνικές επιστήμες. Κριτική. Αθήνα.

γειτονιά. Το γεγονός αυτό τους προκάλεσε ψυχικό τραύμα με επιπτώσεις στις σχέσεις τους με τους γονείς τους. Οι περισσότεροι από τους υιοθετημένους ενήλικες που συμμετείχαν στην έρευνα υποστηρίζουν πως το παιδί πρέπει να ενημερώνεται «από την πρώτη στιγμή». Τα παραμύθια για την υιοθεσία πιστεύουν ότι βοηθούν τους γονείς στην ενημέρωση της υιοθεσίας. Είναι σημαντικό η ενημέρωση να είναι ξεκάθαρη και να γίνεται και από τους δύο γονείς. Οι γονείς έχουν ανάγκη ενίσχυσης και ενδυνάμωσης στο γονεϊκό τους ρόλο.

Η άποψη των γονέων και των υιοθετημένων ενηλίκων για τα ηλικιακά όρια των θετών γονέων είναι σύμφωνη με την άποψη των επαγγελματιών, οι οποίοι υποστηρίζουν ότι είναι σημαντικό να εξετάζονται κατά περίπτωση. Επίσης, είναι σημαντική η παρακολούθηση του παιδιού μετά από την τέλεση της υιοθεσίας του. Η παρακολούθηση του παιδιού και της οικογένειας μετά από την υιοθεσία του αποσκοπεί στην παροχή συμβουλευτικής εργασίας και ψυχολογικής υποστήριξης. Η άποψη των θετών γονέων και των υιοθετημένων ενηλίκων που συμμετείχαν στην έρευνα είναι παρόμοια σε ό,τι αφορά την εξειδίκευση των επαγγελματιών που στελεχώνουν τις κοινωνικές υπηρεσίες και ασχολούνται με την υιοθεσία, καθώς και με την αναγκαιότητα λειτουργίας διεπιστημονικής επιτροπής, προκειμένου να επιλαμβάνεται σε επίπεδο διεπιστημονικότητας όλα τα ζητήματα της υιοθεσίας.

Βιβλιογραφία

- [1] Brodzinsky, D. M., Pappas, C., Singer, L. M., & Braff, A. M. (1981). «Children's conception of adoption: A preliminary investigation», *Journal of Pediatric Psychology*, Vol. 6, No 2, pp. 177-189
- [2] Brodzinsky, D. M. (1993). «Long-term Outcomes in Adoption». *The Future of Children. Adoption*. Vol. 3, No 1, pp: 153-166.
- [3] Brodzinsky, D. M., & Palacios, J. S. (2005). *Psychological Issues in Adoption. Research and Practice*. Connecticut, Praeger.
- [4] Eldridge, S. (2003). *Parents de Coeur. Comprendre l'enfant adopte*. Albin Michel S.A., Paris.
- [5] Hindle, D., & Shulman, G. (2008). *The Emotional Experience of Adoption. A psychoanalytic perspective*. London and New York, Routledge.
- [6] Ιωσφιδης, Θ. (2008). *Ποιοτικές μέθοδοι έρευνας στις κοινωνικές επιστήμες*. Κριτική. Αθήνα.
- [7] Καλούτσιου-Ταυλαρίδου, Α. (1970). *Συμβολή στην κατανόηση προβλημάτων υιοθεσίας. Η διαταραχή της ταυτότητας της υιοθεσίας*. Αθήνα. Εμμ. Ροδάκης & Σία, σ. 2
- [8] Lifton, B. J. (1988). *Lost & Found. The adoption experience*. University of Michigan Press, Ann Arbor.
- [9] Μανωλεδάκη -Κουνεγέρη, Ε.(2006). Ουσιαστικές προϋποθέσεις τέλεσης της υιοθεσίας ανηλίκων. Ο ν. 2447/1996 και οι νομοθετικές και νομολογιακές εξελίξεις της πρώτης δεκαετίας της εφαρμογής του. *Εταιρεία Νομικών Βορείου Ελλάδος*, τεύχος 57. Αθήνα-Θεσσαλονίκη. Σάκκουλα.
- [10] Παρασκευόπουλος, Ι. (1971). *Εμπειρίες και απόψεις των θετών γονέων για τον θεσμό της υιοθεσίας*. Θεσσαλονίκη. Π. Πουρνάρα, σ. 9
- [11] Παρασκευόπουλος, Ι. *Ψυχολογιστική ανάπτυξης, κοινωνική προσαρμογή και σχολική επίδοση των θετών παιδιών*. Ιωάννινα. Ψυχολογιστικόν και Παιδαγωγικόν Εργαστήριον Πανεπιστημίου Ιωαννίνων.
- [12] Rowe, J., M. A. (1991). *Perspectives on Adoption*. In : Hibbs, E. D. *Adoption : International Perspectives*. International Universities Press, pp. 3-5, pp. 7-8, Madison, Connecticut.
- [13] Rutter, M. (2000). «Children in substitute care: Some conceptual considerations and research implications», *Children and Youth Services Review*, Vol. 22, No 9, pp. 685-703.
- [14] Σπυριδάκης, Σ.Ι.(2006). *Υιοθεσία ανηλίκου*. Εκλαϊκευμένη νομική βιβλιοθήκη. (11). Αθήνα. Αντ. Σάκκουλα, σ. 1,2.
- [15] Triseliotis, J., Κουσίδου, Τ. (1989). *Η Κοινωνική Εργασία στην υιοθεσία και στην Αναδοχή*. Αθήνα. Κέντρο Βρεφών «Η ΜΗΤΕΡΑ».
- [16] Triseliotis, J. (2000). «Επίκαιρα θέματα στην πολιτική και πρακτική της υιοθεσίας στη Βρετανία» στο *Υιοθεσία, Τάσεις, Πολιτική, Πρακτική*. Κέντρο Βρεφών «Η ΜΗΤΕΡΑ». Αθήνα. Γρηγόρης.
- [17] Watson, K. (1994). «The history and future of adoption». *Keynote address, North American Council on Adoptable Children*. Reprinted in *Family Matters*, February.

MONEY SUPPLY IN THE STAT OF QATAR UNIVERSITY

Adil Yousif, Maryam, Al Tamimi, Ameena Al Abdalla, Amna Alabduljabar, Khadija Al-Majid

Qatar University
aeyousif@qu.edu.qa

ABSTRACT

The objective of this paper is to study the trend of the money supply in Qatar Central Bank. This study displays comprehensive view of the time series properties of monthly returns of Qatar Central Bank money supply. Data for this project was obtained from the monthly bulletins over the time period between: 2007 - 2014. Several time series models were used for the data analysis and forecasting, and multiple linear regression was utilized to estimate the relationship between the currency in circulation (response) and other factors. Based on the time series analysis the Double Exponential Smoothing model was found to be the best fitting model for all variables except the Quasi money, where the Additive Decomposition model was the best fitting one. Ten months ahead were predicted using all models that fit the data. Actual values for few months were obtained, after the data for this study was finalized, and were compared with the forecast values.

Keywords: Money Supply, Qatar, Money Circulation, Currency Circulation, Time Series, Forecasting

MONEY SUPPLY IN THE STAT OF QATAR UNIVERSITY

Adil Yousif, Maryam, Al Tamimi, Ameena Al Abdalla, Amna Alabduljabar, Khadija Al-Majid

Qatar University
aeyousif@qu.edu.qa

ABSTRACT

The objective of this paper is to study the trend of the money supply in Qatar Central Bank. This study displays comprehensive view of the time series properties of monthly returns of Qatar Central Bank money supply. Data for this project was obtained from the monthly bulletins over the time period between: 2007 - 2014. Several time series models were used for the data analysis and forecasting, and multiple linear regression was utilized to estimate the relationship between the currency in circulation (response) and other factors. Based on the time series analysis the Double Exponential Smoothing model was found to be the best fitting model for all variables except the Quasi money, where the Additive Decomposition model was the best fitting one. Ten months ahead were predicted using all models that fit the data. Actual values for few months were obtained, after the data for this study was finalized, and were compared with the forecast values.

Keywords: Money Supply, Qatar, Money Circulation, Currency Circulation, Time Series, Forecasting

