

Organizational Structure, Operational Strategy, Indexes and Forecasting in the Telecommunication Market

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Abstract. The modern business environment is characterized by intense competition, which has led telecommunication companies to a continuous race towards gaining and maintaining a competitive advantage. In order to succeed, telecommunication companies “cultivate” cultures as non – imitable characteristics, capable to ensure long – term corporate viability and growth. This thesis provides an insight into the Greek telecommunication industry by contributing: a) to the creation of national cultural profile in telecommunication industry, which can become a starting point in a wider trial to create a European industry profile, b) to the empirical testing of the correlation between culture and a series of administrative and financial indexes and c) to the examination of the extent to which background factors (such as firms’ age and size) should be taken into account during the implementation of a business strategy. Moreover, the thesis scope is to use historical data in order to forecast Greek GDP. By using a range of forecasting models the Greek economy’s performance is investigated and the main indicators are revealed. Main findings are the revealing of important economic indexes determining the Greek GDP as retail trade index, industrial production index, unemployment rate and touristic index, and the forecast of high recession for the year 2012.

1 Introduction

During the last two decades of the 20th century, economies’ globalization, markets’ deregulation and the privatization of governmental monopolies, have significantly changed the way companies and markets, work. The new, complicated competitive environment intensified the need for operational control, but moreover the need for comprehension of the competition.

Historically, the traditional financial tools (profit indexes, return of investment, etc.), which have been the most important source of information for the administrative executives, proved to face limitations compared to the market needs. Scientists realized that the pressure for immediate financial profitability could lead to short-term results, but this could undermine the company’s ability to produce future economic

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value, through the sustainable development of elements, such as organizational culture. In the modern, globalized, business environment, where firms compete for a sustainable competitive advantage, profits are still thought to be important, but the way they are obtained, is considered to be first priority.

Telecommunications providers should take into consideration these operational changes, and to adopt, “soft core” factors, such as organizational culture. Managers should be able to give solutions in problems related to the coordination between organizational characteristics and desirable business strategy, as well as to answer the question how this coordination can prevail intensive market competition. Furthermore, understanding leadership’s role is of high importance, in order to understand the way managers formulate operational structures and the relationships with “external” associates (customers, suppliers, competitors and state). Moreover, managers and regulators should have the ability to understand how organizational characteristics, such as size and age, affect perceived work conditions, so as to develop financially effective structures and to obtain the best operational result.

Under these circumstances, telecommunication industry has been selected, in order to understand and present its organizational structure, operational strategy and its main business indexes. The specific industry has been chosen as a representative of the whole market because of its substantive organizational and business characteristics that permit international comparisons. The market is characterized by free and intense competition, while no entry barriers exist. The technological, economic and regulatory developments affect directly the market, and phenomena of acquisitions, mergers and strategic alliances redefine its boundaries. In most developed as long as in the developing countries, telecommunication product is a validated entrepreneurial and consumable product, while its usage can determine the countries’ overall economic potentials (in terms of Gross Domestic Product), according to several studies. Finally, the telecommunications market is mature, as it has made its way from quantitative financial indexes to a multifactoral system, which consists of both quantitative and qualitative indexes. This fact allows conducting research; in order to conclude about a firm’s competitiveness and business success, but moreover on how these can be achieved.

Organizational structure and operational strategy, have been determined by measuring fixed and mobile operators’ organizational culture, along with their in between interactions. The study’s aim is to understand the specifications of: a.) each company, b.) each industry (fixed-mobile telephony) and c.) the market as a whole. Organizational structure, operational strategy and efficiency indexes are determined through the interdependent relationship between organizational culture and:

- market’s competition level,
- leadership’s character,
- company’s size,
- company’s age,
- market orientation and
- performance indexes.

All these are examined in order to determine strategies or / and business practices that will enable: researchers to make international comparisons, administrative executives to practice effectively their duties and regulators to define measures for attaining a better level of competition, according to market’s characteristics.

1.1 Method

The thesis employed a quantitative research tool, the Organizational Culture Assessment Instrument (OCAI) created by R.E Quinn & K.S Cameron [1] to create the theoretical framework used so as to conduct the study presented hereafter. This instrument recognizes six cultural dimensions: dominant characteristics, leadership style, employees' management, organizational glue, strategy and criteria of success. The model has two dimensions (flexibility and orientation), which create four types of culture (Figure 1). The two dimensions create four distinct quadrants, each one representing a different type of organizational culture. Each type of organizational culture has its own characteristics and its own strengths and weaknesses. Of course, an organization can have elements from more than one type and that is why the reader must be familiar with all types.

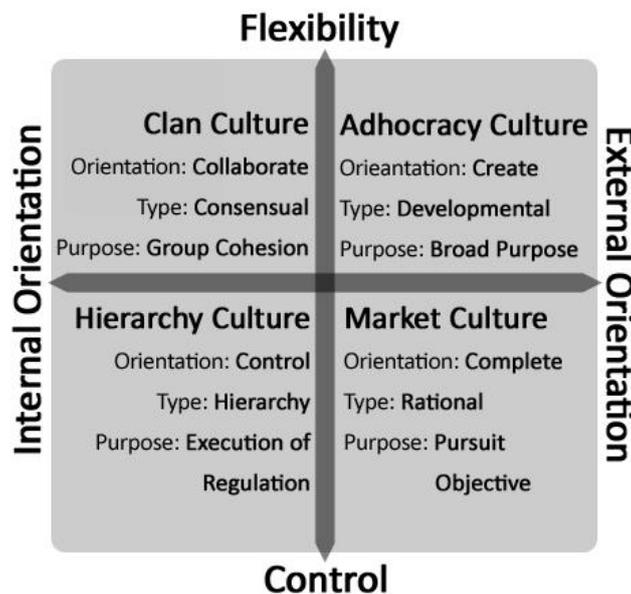


Fig. 1: Quinn & Cameron's model

Author selected a quantitative approach, instead of a qualitative one, taking into account the nature of research and the strengths – limitations both approaches have. The non-experimental, quantitative approach selected gives: a) precision, through quantitative and reliable measurement, b) statistical techniques for sophisticated analyses and c) replicable results. This approach permits to apply conventional standards of reliability and validity, while the results are open to criticism. Moreover, the quantitative approach is conducted in an attempt to answer certain questions and to test hypotheses. It represents an attempt to identify why something happens, what causes some event, or under what conditions an event does occur. To answer such questions researchers have to eliminate the simultaneous influence of many variables to isolate the cause of an effect. Controlled inquiry is absolutely essential to this because without it the cause of an effect could not be isolated. Qualitative approaches

for example appear to be subject of anonymity and confidentiality which have a profound effect in the subjects of study, while the viewpoints of both researcher and participants have to be identified and elucidated because of issues of bias.

Data regarding organizational culture in the Greek telecommunication industry were collected by interviews and mails. No judgmental criteria have been used because of the relatively small number of telecommunication companies operating in the Greek market. The questionnaire comprised of twenty one (21) closed-type multiple choice questions. A trial survey was conducted in the last trimester of 2008 to establish if the answering procedure could be easily understood and complied with, while the research questionnaires were made available a few months later, during 2009. Three hundred and two (302) employees and middle line managers from five fixed operators and three mobile operators participated in the research. Employees were asked to fill out the questionnaires and return them, while firms' managers were interviewed. The purpose of the interviews was to achieve a profound understanding of the framework under which each company operates (in top management level) and to measure its overall organizational culture. Interviews were conducted in order to persuade managers to participate in the research and to save time from exploring and trying to understand the questionnaire. Moreover, interviews provided important qualitative characteristics about the structures and the operational management of each firm.

At the end, 80 questionnaires from managerial representatives were collected by interviews and 222 questionnaires from employees were sent back (out of 374 totally sent to employees – response rate of 59.36%). The survey only includes companies that achieved predetermined limit of 25 questionnaires, in order to gain a statistically significant view for each firm. Although the analysis conducted in the paper was at firm level, the characteristics of respondents were also provided (Table 1) in order to achieve higher comprehension of the participants in the research. Firms' age measured by years since the founding date and data reveal that the majority of companies are relatively new (less than 10 years old). Firms' size measured according to current number of employees and reveals that the vast majority of firms (62.50 per cent) can be characterized as medium or small size enterprises (until 250 employees).

2 Results and discussion

In the second part of the thesis the main results are presented. The results concern: a) the role of organizational culture in the new business environment and b) the methods used in order to forecast the Greek GDP

2.1 Organizational culture and market orientation in Greek telecommunication market

Three research hypotheses were examined in order to reveal the relationship between organizational culture and market orientation in the Greek telecommunication market:

H1: *The degree of market orientation among the Greek telecommunication providers varies from highest to lowest depending on the dominant culture type. In other words, the greater the prevalence of the market culture, the highest the degree of market orientation.*

H2: *If H1 holds true then extrovert-type cultures (adhocracy – market) will result in improved performance compared to introvert-type cultures (clan – hierarchy).*

H3: *The special traits of telecommunication providers (size and age) influence the degree of market orientation and the dominant culture type (introvert or extrovert)*

The internal consistency of the questionnaire variables was controlled with the Cronbach α consistency coefficient and use of the SPSS statistical package. The Cronbach α consistency coefficient constitutes one of the most widely-acknowledged methods for consistency control defining the consistency coefficient for each individual variable but also for the set of variables as a whole. Based on Kurtinaitiene [2] and Nunnaly [3], a tool is considered consistent when the “ α ” coefficient, ranging between 0 and 1, exceeds 0.7. As illustrated in Table 1 the “ α ” coefficient for the research tools ranges between 0.691 and 0.703, satisfying the set criterion.

Table 1. Consistency Results

Criteria	Number of questions	Cronbach α
Clan Culture	6	0.700
Adhocracy Culture	6	0.691
Market Culture	6	0.778
Hierarchical Culture	6	0.703

Given the number of companies comprising the sample and the fact that results do not follow normal distribution at all times, the Kendall coefficient was used in order to examine the possible correlation between the different variables in the samples. The findings that emerged are statistically significant and are presented below.

The first research hypothesis examines the link between market orientation among the Greek telecommunication companies and the dominant culture type. The results indicate that extrovert culture types (market and adhocracy) are positively correlated with the degree of market orientation, with the correlation index reaching values of 0.429 and 0.238 respectively, compared to other two types. The Research Hypothesis H1 is therefore confirmed. Market orientation among Greek telecommunication companies is indeed influenced by the dominant culture within the company. In particular, companies with extrovert culture types display the greatest extent of market orientation, compared to those with dominant cultures with introvert characteristics.

Furthermore, comparing culture types in sets of two (clan and hierarchical to adhocracy and market) it is observed that when companies tend towards 'control' as opposed to 'flexibility' they are market orientated to a greater degree. It is therefore derived that the more Greek telecommunication companies tend towards control, the greater their degree of market orientation. In fact, the only culture type negatively correlated to market orientation is the clan culture, which displays a great degree of

flexibility and introvert characteristics. The findings linked to this research hypothesis are presented in Table 2.

Table 2. Link between market orientation and culture type

	Clan Culture	Adhocracy Culture	Market Culture	Hierarchical Culture
Market orientation	-0.524	0.238*	0.429	0.143

Note: All correlations are significant ($\alpha = 0.01$) except those marked by * which are only significant at an $\alpha = 0.05$

The second research hypothesis attempts to shed light on the link between performance and dominant culture type. In order to examine this link, two indicators were used, profitability and financial growth, as observed among the Greek telecommunication companies. The findings indicate positive correlation between the adhocracy and market culture types with the two indicators of financial performance and a negative correlation between the other two culture types and the indicators used. These empirical findings confirm Research Hypothesis H2 and underline the earlier results obtained by Papadimitriou et al. [4] on the Greek telecommunication companies.

It is interesting to note that in regards to performance, the greater tendency is observed among the telecommunication companies with extrovert characteristics and also greater flexibility. Therefore, the companies with an adhocracy culture display higher performance levels in comparison to those with market culture (and decidedly improved are the results for clan culture companies compared to those with hierarchical cultures. The findings linked to the second research hypothesis are presented in Table 3.

Table 3. Link between performance and culture type

	Clan Culture	Adhocracy Culture	Market Culture	Hierarchical Culture
Profitability	-0,048	0.810	0.143*	-0.238*
Growth	-0.143	0.714	0.048	-0.524

Note: All correlations are significant ($\alpha = 0.01$) except those marked by * which are only significant at an $\alpha = 0.05$

The third research hypothesis focuses on whether the dominant culture type and the degree of market orientation are influenced by company-specific indicators, like size and age. It emerged that the larger the company the more dominant the hierarchical culture (0.619), somewhat expected for large companies where operational control demands bureaucratic structures compared to smaller and more flexible companies [5]. The same findings are observed in the links between culture and company age. Finally, the correlation between market orientation and the two company-specific indicators is positive confirming Research Hypothesis H3. This finding is mainly attributed to the fact that in these companies the application of marketing approaches is a formalized process that is carried out on a frequent basis [6]. The findings linked to the third research hypothesis are presented in Table 4.

Table 4. Link between market orientation, culture type, age and size

	Clan Culture	Adhocracy Culture	Market Culture	Hierarchical Culture	Market orientation
Size	-0.048*	-0.238	-0.238	0.619	0.143*
Age	-0.390	-0.390	-0.098*	0.781	0.390

Note: All correlations are significant ($\alpha = 0.01$) except those marked by * which are only significant at an $\alpha = 0.05$

2.2 Greek GDP forecast estimates

There are a lot of methods to forecast economic magnitudes: Time Series Decomposition [7], ARIMA methodology [8], Vector Autoregressive methods (VAR) [9], Dynamic Factor Model (DFM) [10] and regression [11].

Three different methods have been used, in order to forecast the Greek GDP: Time series decomposition, ARIMA methodology and regression of GDP as dependent variable and different economic indexes as independent variables and forecast of the independent variables. All using data are quarterly and originate from Eurostat and Hellenic Statistical Authority. The data are at constant prices of 2005.

All three models forecast recession exceeding 9%, while the most pessimistic forecast (OECD) was referring to a recession of 5,3%. This divergence can become an obstacle during the governmental strategic planning. The Center of Planning and Economic Research, a Greek independent institute, announced on June 2012 that recession reached 6,54% the Q1/2012 and 6,87% the Q2/2012, while there is an estimation for a total recession of 6,7% for the whole 2012 [12]. The forecasting method used by KEPE, ([12], [13]), is the Dynamic Factor Model, with six factors calculated from 144 different variables and maximum variance explained 64%, which is not large.

Table 5. GDP forecast of different organizations

	2009	2010	2011	2012	2013
OECD	-3,2	-3,5	-6,9	-5,3	-1,3
IMF		-3,5	-6,9	-4,7	0,0
European Commission		-3,5	-6,9	-4,7	0,0
Greek Budget Program		-3,5	-5,5	-2,8	
Forecast Methodologies					
Time Series Decomposition				-9,4	
ARIMA				-10,1	
Regression				-9,9	
Percentage change, volumes (2005 prices)					

A well defined formula with dependent variable GDP and independent or predictor variables different economic indexes is found. Two equations have been produced with initial value the first quarter of 2004: in the first data are taken into account until

the fourth quarter of year 2010 and in the second until the fourth quarter of year 2011. Respectively, the equations are:

$$\begin{aligned}
 GDP &= 27.992,63 + 62,97 INPR + 0,404 INV \\
 &\quad + 111,31 RET - 12,65 CON \\
 &\quad - 229,61 UNR + 51,46 TI + 0,10886 DIFF
 \end{aligned} \tag{1}$$

$$\begin{aligned}
 GDP &= 29.140,36 + 58,01 INPR + 0,438 INV \\
 &\quad + 109,73 RET - 13,33 CON \\
 &\quad - 252,89 UNR + 49,59 TI + 0,09811 DIFF
 \end{aligned} \tag{2}$$

Where:

GDP: (Millions)

INPR: Industrial Production Index (Volume).

INV: Public Investment (Millions).

RET: Retail Trade Index (Turnover).

CON: Construction Index (Turnover).

UNR: Unemployment Rate.

TI: Touristic Income Index (Turnover).

DIFF: General Government Expenses minus Total Government Income.

The presented equations reveal a paradox: the negative coefficient of the variable CON. The construction index was due to Olympic Games in very high levels during and before the year 2004 and has been normalized to smaller values after 2 years, during GDP increased. The very high values of negative slope during the years 2004 and 2005 led to the negative coefficient of the variable CON, even if the variable is statistically significant. The contribution of other economic indexes such as "Agriculture, hunting and forestry, fishing index" tends statistically to zero. These equations have the advantage to reveal us which economic variables contribute to the Greek GDP and to understand the reality of the Greek economy.

For the Equation 1 the Durbin-Watson statistic is $1,85022 < 2,071$ for 0,05 significant level with the test to be inconclusive and greater than the value 1,847 for 0,01 significant level ($n=28$, $K=7$ independent variables). $R^2=97,1\%$, $R^2(\text{adjusted})=96,1\%$ and $R^2(\text{prediction})=94,27\%$. The p-values are much smaller 0,05 except for UNR variable with p-value 0,075 and all VIF factors smaller than 4.

For the Equation 2 the Durbin-Watson statistic = $2,05909 > 2,004$ for 0,05 significant level and greater than the value 1,788 for 0,01 significant level ($n=32$, $K=7$ independent variables). For both cases there is not serial correlation. $R^2=97,6\%$, $R^2(\text{adjusted})=96,9\%$, and $R^2(\text{prediction})=95,53\%$, all VIF factors are smaller than 6 and p-values much smaller than 5%. Using Equation 1 and put to the independent variables the actual values of 2011 it leads to a recession of -6,82% and Equation 2 with the same values leads to a recession of -6,85%, both in very good agreement with the actual recession of -6,91%.

In order to forecast the GDP and the recession for the year 2012 the values of independent variables are needed. There are different models to forecast the economic indexes – independent variables. One of them is using VAR models in different groups of endogenous variables. The absence of suitable data has made the application of such a technique impossible. Instead time series decomposition and

ARIMA models have been used in order to calculate the needed values. ARIMA models are the best univariate forecasting tool for a wide family of functions [14].

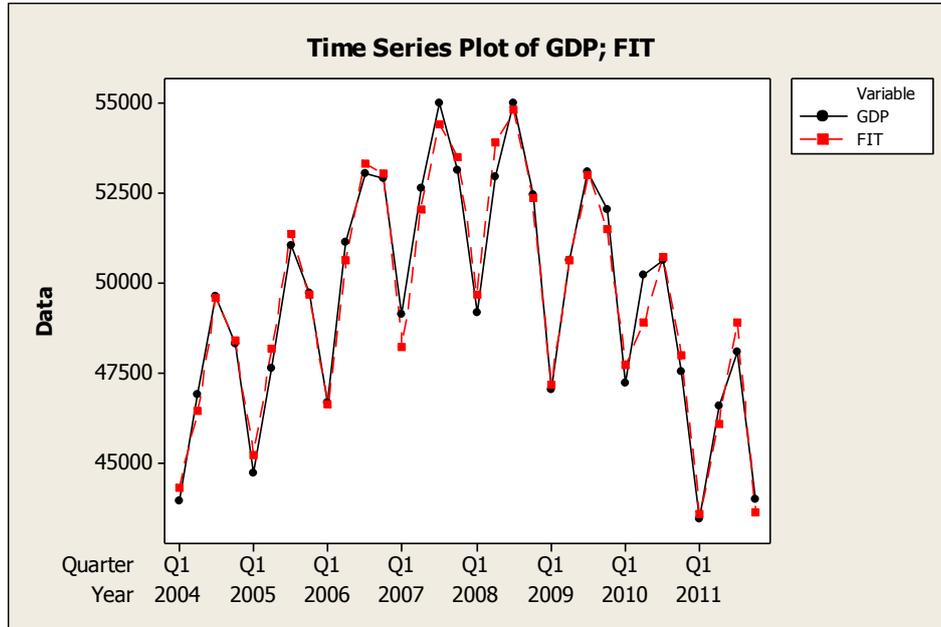


Fig. 1. GDP actual values (black curve) and the FIT (red curve) from Equation 2.

Particularly for every given predictor the following technique is used, while the results are given in Table 4:

INPR: ARIMA model $(0,1,1)(1,1,0)$ with a seasonal period of 4.

RET: For this predictor it was not possible to find a satisfactory ARIMA model. The residuals were in every chosen model strongly autocorrelated and partial autocorrelated, even if the models (coefficients) were statistically well satisfied. Because the time series show a seasonal pattern, time series decomposition has been used. The trend is quadratic and CI is calculated with an ARIMA(0,0,2) model.

CON: ARIMA model $(1,1,0)(0,1,0)$ for $\ln(\text{CON})$ with seasonal period of 4.

UNR: ARIMA model $(0,2,1)(0,1,1)$ with seasonal period of 4.

TI: ARIMA model $(2,1,0)(0,1,0)$ with seasonal period of 4.

INV, DIFF: For these two predictors we have not forecasted any value because they depend on governmental decisions and the memorandum's implementation and not on the dynamic of Greek economy. We use these two predictors as parameters. Particularly for the predictor *INV* an ARIMA model $(0,0,0)(1,0,0)$ with a seasonal period of 4 is used, in order to complete the missing values for the third and fourth quarter of 2011.

Table 6. Predicted values for the independent variables and the resulting GDP quarterly and annually.

VAR	Q1	Q2	Q3	Q4	SUM 2011
GDP	39.610,38	41.738,39	43.757,14	39.183,15	164.289,06
INPR	72,81	75,30	74,68	66,12	
INV	677	1454	1910,33	2597,21	
RET	87,89	82,98	81,98	98,36	
CON	32,57	36,10	47,34	41,87	
UNR	23,31	24,65	26,89	30,33	
TI	43,22	91,54	148,34	45,44	
DIFF	5.007,00	6.757,00	5.373,00	2.557,00	

The predicted recession is -9,77% taken in to account the values for INV and DIFF from the year 2010. If we halve the values of INV and DIFF the recession reaches a value of -11,10%, also an increase of about 1,33%.

Using Equation 1 with the same values as in Table 6 the recession reaches a value of -9,46% in good agreement with the results of Equation 2. For values outside from the initial intervals the prediction interval becomes wider. In order to examine the influence of each independent variable on GDP, a Tornado Diagram has been constructed. A difference to the values of order of +- 10% has been assumed. As basis we take the values of the second quarter of 2011. RET variable is the most influential, followed by INPR, TI and UNR. The other variables can play a significant role, only if their changes are very large.

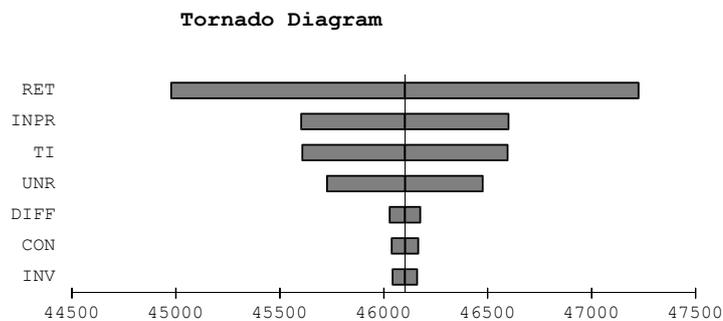


Fig. 2. Sensitivity analysis of the independent variables in a Tornado Diagram

From Fig. 2, it can be understood, why the recession in Greece is very high. All the taken measures in Greece, high taxes on medium to low income and no income citizens - unemployed, have as result the sharp drop of the retail trade. Consequence

of that is the increase of unemployment rate and farther decrease of industrial production and of internal tourism. Taking also into account the difficult international economic conditions and the introvert function of the Greek economy, Greece is led to high recession. When the Greek economy reaches a stability point and which is the stability point, is to find out.

3 Conclusions

Three research hypotheses were examined in order to ascertain the links between culture type and market orientation, culture type and performance, as well as the links between culture type and telecommunication company age and size. Telecommunication companies giving emphasis to their external environment (market and adhocracy oriented cultures) tend to have higher degree of market orientation. In other words, there are indications that clan and hierarchy cultures do not match the demands of their competitive environment.

The results indicate that telecommunication companies are heavily affected by factors such as age and size, while firms' age, the results are consistent with organizational life cycle theories where it is proposed that more hierarchical structures emerge as organizations grow and age, since the growing firms might develop more complex management systems [15]. The Greek telecommunication companies have cultural types which are mainly "control – oriented", which confirms Hofstede's [16] results about a high degree of uncertainty avoidance in this specific national business environment. The type of organizational culture affects the overall performance in terms of profitability and growth and affects companies' viability and future expansion, while cultural type is heavily connected with market orientation [17].

Growing competition, reduced market shares and profitability can create a tough business environment. In such an environment market oriented culture can become a non – imitable characteristic, capable to ensure corporate viability, as it is directly related with profitability and growth [18]. The emerging findings can provide executives with new market opportunities to be considered during their long – term planning determination.

As far as GDP's forecast affects, a series of empirical tests have been conducted in order to evaluate various economic and financial variables before determine which ones play a significant role to GDP's formation. The results indicate a GDP formatted mainly by industrial production, public investment, retail trade, construction, unemployment (as a factor determining the product's demand), tourism and finally, general governmental expenses minus total governmental income [19]. The results indicate the absence of variables such as private investments, exports and consumers' expectations, which are fundamental for an economic renaissance.

The differences between the two proposed equations permit a comparison between 2010 and 2011 in order to understand the Greek economy's depreciation. Equations enrich our understanding about each variable's influence on GDP (positive or negative) and the progress conducted during these two years. Six out of seven variables have either a stronger negative or a smaller positive effect on GDP from

2010 to 2011. Only public investments tend to lead to a greater GDP, but their total effect is rather small as a result of governmental expenses' cutting.

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