An Analytical Approach of the Greek Economic Recession on Construction Industry; its Consequences and Future Perspectives of the Sector

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Abstract
This research aims to unfold the Greek recession's causes and consequences for the construction sector and the future perspectives of the sector. Based on literature review and relevant industry input, 31 attributes associated with construction industry and recession were identified for further investigation. A questionnaire survey with the participation of 80 engineers was conducted and the Exploratory Factor Analysis was used for the quantitative analysis of the responses. According to the analysis, the prevailing consequence of the economic recession is the high rate of unemployment among the engineers while the three most important causes are the instability of the tax system, the bureaucratic procedures in the administrative institutions and the low investments in the sector. Regarding the future prospects of the Greek construction companies, the findings demonstrate that these depend on the involvement in co-financed projects and their strategic orientation and involvement in foreign markets that are still developing in the area of infrastructure.

Keywords
Construction industry, economic recession

1. Introduction

The construction sector was for years a key factor in the development of the Greek economy. The economic recession that was spread throughout Europe and Greece as well, has affected the whole economy and especially the construction industry, where indicators show negative growth rates in the recent years.

The fact that the construction industry has been characterized by most of the economists as "barometer" of the economic growth throughout Europe, underlines the importance of this analysis. The participation of the industry in economic growth is huge both in terms of GDP and employment. More specifically for the Greek economy, investments in the construction sector were for a long time (1993-2007) 13% of the total GDP of the country (Chardouvelis, 2009).

The research initially aims to illustrate the extent to which the Greek construction sector activity has been affected. The understanding and presentation of the main reasons that led the industry in recession is another key issue of this paper as well as discussion of recovery prospects for the construction industry. To achieve the research objectives, a questionnaire was created tailored to the needs of the study and based on the literature review. The questionnaire was filled in by engineers mainly based on personal interviews

conducted by the authors. Useful conclusions can be derived regarding the results of the economic recession to the Greek construction industry and the possible solutions to this problem in the near future. Both endogenous and exogenous causes which influenced the course of the sector are identified and discussed.

2. Literature review

The economic recession that characterizes the economic climate in Greece has affected enormously the construction sector activity. According to the Association of Business Research for quality and development of construction (SEPAK) in collaboration with the Foundation for Economic and Industrial Research (IOBE), the Greek construction sector activity has fallen by 80% in the period of recession. This constitutes an international record, as there has not lately been another profession with a similar degree of recession. It is characteristic that all indicators related to construction followed negative rates making very obvious the economic gap between the period before the onset of the crisis and the period after the crisis. The consequences are strongly reflected by indicators such as total employment, building and construction activity in the country, the production index for construction and revenue trend and profitability of the industry, the real estate prices and the size of the Public Investment Program (PIP).

More specifically, the data of the Hellenic Statistical Authority (ELSTAT) in 2007 showed that there were 389.103 workers in the construction industry, while in 2015 there were only 154.981, noting a substantial reduction of 60%. In the same period (2007-2015), the construction production index presents an even higher, reduction record of 76%, as per the 2015 statistical report of the European Construction Industry Federation (FIEC). This is mainly due to a dramatic drop in building permits as well as the reduction of the Public Investment Program (PIP). Specifically, the number of building permits decreased from 35.746 in 2011 to 13.383 in 2014, according to data of the FIEC report, while public spending fell from 9.6 billion euro in 2009 to 6.8 billion euro in 2014, thus demonstrating the lack of both private and public construction activity in Greece.

According to the study published by the IOBE, the causes which contributed to the decline of the construction industry can be grouped into two broad categories: economic causes and regulatory and structural causes. As the most important economic causes are considered the low levels of investment, high unemployment and the tax system of the country. The most important regulatory and structural causes include bureaucratic obstacles as well as the existing building stock.

In order for the Greek construction companies and the Greek construction sector to survive, recovery solutions need to be urgently identified. It is a fact that construction companies are constantly involved in new geographic markets, seeking a greater share in the global construction market [Carrillo, 2001]. Considering the theory of Uppsala on a company's internationalization obstacles [Forsgren, 2002, Johanson & Vahle, 1977], the Balkan market in recent years shows a gradual development indicators and there lies opportunities for Greek companies to interfere and remain live. Another potential option is the West Asian market, which shows high construction activity indicators as well as Asia, which will continue to show healthy growth rates according to predictions [Bon & Crosthwaite, 2001].

Mergers and acquisitions as well as joint ventures are new forms of activity of companies worldwide and also a potential means for recovery for the Greek construction companies. Through these methods, the companies are able to establish themselves in the global market and to increase their competitiveness [Harrigan, 1988, Carrillo, 2001]. Co-financed projects, which are actually a partnership between the private and the public sector, are on the same wavelength in terms of prospects. Finally, the growth prospects of the construction industry can be significantly enhanced by the attraction of foreign direct investment (FDI) in the Greek market. Given the interdependence of the overall economy and the construction industry [Ofori, 2012], it becomes clear that the restoration of economic liquidity can lead to simultaneous recovery of the Greek construction industry.

3. Methodology

The economic downturn plaguing Greece is subject to daily involvement, study and analysis. More specifically, many surveys showing the current picture of the construction industry's decline have been presented. This study is an attempt to show beyond the numbers and percentages of statistics, the insights of engineers involved in the construction industry. This research is intended to investigate the perceived understanding and importance of the key attributes among engineers with respect to the main reasons that caused this recession in construction sector and the extent to which there are ways to reverse the climate.

Therefore, the questionnaire was designed to capture the current construction industry experiences. The questionnaire, consisting of 32 attributes 2 of those reflecting the respondents' profile (engineering discipline and years of experience) was distributed to 80 selected professionals, targeting a good mix of engineers of all disciplines with experience in the private and public construction sector. The 80 engineers surveyed were asked to evaluate the three parts of the questionnaire which included:

- 9 indicators of the construction industry
- 10 causes of the industry downturn
- 7 industry recovery prospects

The processing and analysis of data was performed using the software IBM Statistics 23 and was based on three main methods. Initially the Descriptive Analysis was used aiming at presenting through statistical measures the responses of respondents engineers. Then ranking was followed of the most critical attributes of each group based on the relative importance index (RII). Finally, the influencing attributes were reduced into factor groups, identifying the latent properties of each factor based on factor analysis.

4. Data Collection, Analysis and Results

In order to conduct the research and attain its objectives, a custom-tailored questionnaire was chosen for engineering professionals in all specialties. The collection of the responses was based on two methods: the questionnaires were either filled by the engineers at their workplace after a site visit or were returned completed via email.

The survey involved a total of 80 engineers who were separated into groups according to their years of work experience in Greece. Among the 80 engineers, 4 do not have work experience in Greece and represent 5.0% of the sample, 23 have work experience less than 10 years and represent 28.8% of the total sample, 21 engineers have 10-20 years of work experience each representing 26.3% of the sample, 15 have 21-30 years of professional experience and represent 18.8% of the sample and 17 have more than 30 years of work experience representing 21.3% of the total sample. Table 1 shows the classification of engineers according to their years of work experience.

Table 1: Respondents' Profiles

Years of work experience	Respondents (%)	Respondents
None	5.0	4
<10	28.8	23
11-20	26.3	21
21-30	18.8	15
>30	21.3	17

4.1 Descriptive Analysis

The responding engineers were asked to provide their objective opinions on the impact of specific indicators that were affected by the economic recession, the extent to which specific causes are responsible for the recession in the construction sector and the extent to which specific prospects can contribute to the recovery of the sector in the future. The evaluation was conducted on a five-point Likert scale from 1 (very low) to 5 (very high). Table 2 below presents the Descriptive Analysis Results of the responses of 80 engineers of the sample, through the questionnaire survey. The Statistical Package for Social Sciences IBM SPSS Statistics 23 software was used for both descriptive and factor analysis.

Table 2: Descriptive Analysis Results

	N	Mean	Mode	Variance	Range	Min	Max	Sum
Recession consequences								
1.Increase of unemployment rate	80	4.6500	5.00	0.332	3.00	2.00	5.00	372
2.Decrease of employment rate in the construction industry	80	4.5625	5.00	0.553	3.00	2.00	5.00	365
3.Decrease of construction production index	80	4.2875	4.00	0.587	3.00	2.00	5.00	343
4. Decrease of GDP participation in construction	80	4.0250	4.00	0.734	3.00	2.00	5.00	322
5.Decrease of building activity production index	80	4.3000	5.00	0.896	4.00	1.00	5.00	344
6.Decrease of number of building permits	80	4.1875	5.00	1.091	4.00	1.00	5.00	335
7.Decreases of investments in the housing market	80	4.0500	4.00	1.061	4.00	1.00	5.00	324
8.Decrease in property prices index	80	3.8375	3.00	0.872	4.00	1.00	5.00	307
9.Decrease of public investment program costs	80	3.9500	5.00	0.884	3.00	2.00	5.00	316
The causes								
1.Low investment	80	4.0000	4.00	0.684	3.00	2.00	5.00	320
2.High levels of unemployment	80	3.6250	3.00	1.098	4.00	1.00	5.00	290
3.The reduction in disposable income	80	4.0125	4.00	0.873	3.00	2.00	5.00	321
4.Rising mortgage rates	80	3.2500	3.00	0.975	4.00	1.00	5.00	260
5.Reducing the costs of the PIP	80	3.7500	4.00	0.772	4.00	1.00	5.00	300
6.The fall in property prices	80	3.1625	3.00	0.872	4.00	1.00	5.00	253
7.The real cost of construction	80	3.2500	4.00	1.127	4.00	1.00	5.00	260
8.The tax system	80	4.5500	5.00	0.580	3.00	2.00	5.00	364
9.Bureaucratic obstacles	80	3.4000	3.00	1.078	4.00	1.00	5.00	272
10.The existing building stock	80	3.3625	3.00	0.968	4.00	1.00	5.00	269
The prospects								
1.Search for new markets outside the Greek market	80	3.6875	4.00	0.724	3.00	2.00	5.00	295

2. Business activity in the Balkan Countries	80							
3. Business activity in Western Asia	80	3.2500	3.00	0.722	4.00	1.00	5.00	260
4.Search for ventures	80	2.9750	3.00	0.784	4.00	1.00	5.00	238
5.Search for mergers and acquisitions	80	2.8625	3.00	0.829	4.00	1.00	5.00	229
6.Attracting FDI	80	2.8750	3.00	0.896	4.00	1.00	5.00	230
7.Involvement in Co-financed projects	80	4.0250	4.00	0.961	4.00	1.00	5.00	322
		3.7125	4.00	0.537	3.00	2.00	5.00	297

Furthermore, one of the most widely used measures to determine the relative significance of the attributes is RII (Doloi, 2009). The RII score is a useful measure of relative positioning of a particular attribute perceived by the respondents on the raw dataset. The score provides a good indication on the relative merit on an attribute based on the frequency occurrence within the independently collected sample. The RII was evaluated using the following expression:

$$RII = \sum / A \times N \qquad (1)$$

in which *W* is the weight given to each factor by the respondents, ranging from 1 to 5; *A* is the highest weight = 5; *N* is the total number of respondents = 80.

Based on the equation (1), the RII for all the attributes were determined first for the recession results, the causes, and the prospects. The RII ranges from 0 to 1. Table 3 shows the calculated RIIs and ranking for 26 attributes in all the three categories. As it can be seen, unemployment rate followed by the employment rate in the construction sector and the building activity production index demonstrate a very high RII. These attributes are seen more heavily affected by the economic recession in Greece. The property prices index comes last in relation with the other eight attributes of the first group. Regarding the causes, the complicated tax system and its instability in the long term stands as the most important cause for the economic recession in the country. This fact coupled with the corruption in the public sector contributes to this phenomenon. The loss of credibility in the Greek Banks drove inevitably to low investment programs in public infrastructure works and private initiatives in the construction sector. Also, the bureaucracy in the administrative procedures plays an adverse role in attracting new investments in the sector. In order for the Greek construction companies to survive, they should find new markets and co-operate with local companies through joint ventures. Unfortunately, the Greek public institutions lack the ability to collaborate with the Greek construction companies and associations in the implementation of a global strategic plan for the dissemination of their technical knowledge abroad. There are projects that are essential, especially in the energy sector and tourism. The limited public resources impose that the companies should co-finance the construction works through collaborations with other construction companies and economic institutions such as the European Investment Bank (EIB).

Table 3: Attributes and their significance according RII

	RII	Ranking
Recession Consequences		
1.Increase of unemployment rate	0.930	1
2.Decrease of employment rate in the construction industry	0.913	2
5.Decrease of building activity production index	0.860	3
3.Decrease of construction production index	0.858	4
6.Decrease of number of building permits	0.838	5
7.Decreases of investments in the housing market	0.810	6
4. Decrease of GDP participation in construction	0.805	7
9.Decrease of public investment program costs	0.790	8
8.Decrease in property prices index	0.768	9
The causes		
8.The tax system	0.910	1
3.The reduction in disposable income	0.803	2
1.Low investment	0.800	3
5.Reducing the costs of the Public Investment Program	0.750	4
2.High levels of unemployment	0.725	
9.Bureaucratic obstacles	0.680	5
10.The existing building stock	0.673	6
7.The real cost of construction	0.650	7
4.Rising mortgage rates	0.650	8
6.The fall in property prices	0.633	9
		10
The prospects		
7.Involvement in Co-financed projects	0.743	
1.Search for new markets	0.738	1
2.Business activity in the Balkans countries	0.650	2
3.Business activity in Western Asia	0.595	3
5.Search for mergers and acquisitions	0.575	4
6.Attracting FDI	0.575	5
4.Search for ventures	0.573	6
		7

4.2 Factor Analysis

The factor analysis technique was used to reduce the attributes in the raw dataset into groups. The method of factor analysis is useful to define the multivariate relationship of the most critical factors in the group of survey characteristics [Doloi, 2013]. First step of factor analysis is to check the accuracy of research through the Kaiser-Meyer-Olkin (KMO) test and the Bartlett's test of sphericity. The KMO values range from 0 to 1, with 0.50 being the acceptance limit [Doloi, 2013]. For the three categories of the questionnaire, the KMO values were 0.869, 0.510 and 0.617 respectively, thus satisfying the requirement. Bartlett's test of sphericity was 380.943, 149.643 and 113.429 with associated probability 0.000 (<0.001) for the three categories of the questionnaire thus satisfying the requirements. The principal component analysis was performed in order to identify key players among the questionnaire factors with eigenvalues greater than 1 [Field, 2009]. The tables below present the results of the factor analysis for all the 3 parts of the questionnaire, which satisfy the criteria initially set. Two factors with total variance 66.397% were extracted to track the results of the recession, three factors with total variance 53.602% were extracted for the causes and finally three factors with total variance 71.143%. were exported for the prospects.

	Factor Loading							
	1	2	3	4	5	6	7	8
Recession Consequences								
Factor 1:								
Decrease of number of building permits	0.904							
Decrease of building activity production index	0.876							
Decrease of public investment program costs	0.860							
Decrease of construction production index	0.803							
Decrease of GDP participation in construction	0.773							
Decrease of employment rate in construction	0.760							
								53.979
Factor 2:								
Increase of unemployment rate		0.876						
Decrease of public investment program costs		0.591						
								12.417
				Total variance explained (%) :				66.397
The causes								

Factor 1:					
The reduction in disposable income	0.888				
High levels of unemployment	0.655				
Reducing the costs of the Public Investment Program	0.615				
					24.229
Factor 2:					
The tax system		0.874			
Low investment		0.772			
					16.083
Factor 3:					
Bureaucratic obstacles			0.824		
The fall in property prices			0.668		
					13.290
			Total variance explained (%) :		53.602
<u>The prospects</u>					
Factor 1:					
Search for ventures				0.883	
Search for mergers and acquisitions				0.837	
					32.521
Factor 2:					
Business activity in the Balkans countries				0.864	
Search for new markets				0.831	
Business activity in Western Asia				0.559	
					22.593
Factor 3:					
Attracting FDI				0.752	
Involvement in Co-financed projects				0.738	
					16.030
			Total variance explained (%) :		71.143

5. Concluding Remarks

Greece is experiencing one of the strongest attacks in its history. And as described above, the construction sector has presented a very deep recession. The building sector presented an important drop, but not only because of the results of the economic crisis but more as a combination of events. According to Economic Social Council of Greece (O.K.E., 2009) the building sector although has created many jobs and generally contributed to economic growth of the country, has reached its limits. The ownership for 2014 for Greece has reached the 80%, when in countries with high interest rate such Germany and Swiss the percentage of ownership is 44% and 35% respectively. The position of one of the four major banks in Greece (Eurobank, 2014) is that the future construction activity must not be based mainly on the demand of the residence, and other priorities should be placed.

Based on descriptive analysis, 31 selected attributes associated with the results, the causes and the prospects of the Greek construction economy were ranked using the relative performance index as perceived by the respondents. The sample contained 80 engineers from several disciplines with a range of years of experience in the sector.

The survey resulted in the identification of several useful conclusions for the Greek construction industry. The most important cause is the tax system, considering that it is a deterrent to any investment coupled with the general corruption that prevails in the public sector. Certainly, all the causes that caused this remarkable recession are not to be treated remotely but in conjunction with the general microeconomic and macroeconomic environment of the country.

The tax system governing the construction is one of the most important causes, a deterrent to any investment in conjunction with the general corruption that prevails in the public sector. Also, the "boom" of new houses without any future growth plan over the last decades drove to the stagnation of any demand since Greece holds one of the highest rations of home ownership in Europe.

As far the industry recovery prospects are concerned, attracting FDI was evaluated as the most promising for the sector. The financial liquidity is necessary for both the overall economy and the construction industry to return to recovery track. Significant growth prospects are also identified in the exploration of new markets in a global economy.

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