Eighth International Conference on Construction in the 21st Century (CITC-8)
"Changing the Field: Recent Developments for the Future of Engineering and Construction"
May 27-30, 2015, Thessaloniki, Greece

Financial Analysis and Comparison of Greek Construction Enterprises and Greek Materials Procurement Enterprises

Evangelia Manola
(Msc, Aristotle University of Thessaloniki,Thessaloniki,Greece)

Fotios Katsaros
(Msc, Aristotle University of Thessaloniki,Thessaloniki,Greece)

Georgios N. Aretoulis
(Lecturer, Aristotle University of Thessaloniki,Thessaloniki,Greece)

Glykeria P. Kalfakakou
(Professor, Aristotle University of Thessaloniki,Thessaloniki,Greece)

Abstract

This paper aims to present the financial status of companies in the Greek construction industry during the economic crisis as well as their effort in tackling the emerging issues. In order for that to be achieved, a financial analysis was conducted, based on the calculation of financial ratios. The selected enterprises for examination included four from the construction industry and four from the construction materials' industry. The examined ratios included: current ratio, quick ratio, return on net worth, net profit margin, gross profit margin and ratio of owners equity to total liabilities. The ratios were calculated for the years 2008 to 2011 on a quarterly basis. A significant problem the construction sector faces is liquidity due to the delay in obtaining revenues regarding the construction projects. Moreover, because of the high expenditure of related projects and due to the considerable cash discounts on tender offers in auctions, the profit margins decrease. On the other hand, the upward trend of the ratio of owners' equity to total liabilities illustrates that companies try to rely on their own funds and not on loans.

Keywords

Financial Analysis, Greek Constuction Companies, Financial Ratios, Construction Material Enterprises

1. Introduction

The current economic conditions in Greece illustrate the adverse financial status of the country, which has boomed not only because of the global financial crisis, but also because of causes stemming from the country, such as deficit (of GDP), high rate of inflation and unexploited natural resources. All sectors of economy have suffered and in particular the construction sector, which plays a crucial role in the national economy. A flourishing construction industry is proof of the economic development of a country and it can be a stepping stone of its evolution. However, while previously the construction industry occupied a significant percentage of GDP, nowadays this percentage has dramatically decreased. Large construction enterprises have the legal form of an "anonymous company" (Societe Anonym - S.A.) and are required to publish financial statements (Pappas, 1998; Sakellis, 2005; Williams, 2008; Tsaousoglou et al., 2013). These companies are required to publish their periodical financial statements, balance sheets, income statements and statements of cash flows. Apart from the shareholders and the

companies' owners, lenders, investors suppliers, customers, company personnel, financial analysts are also interested in these documents (Mentis, 2005; Needles & Powers, 2007; Pappas, 1998; Sakellis 2005; Williams et al., 2008). The company's efficiency is related to profits earned and the capital spent, in a fiscal year. One of the most widespread and comprehensive financial analysis methods is analyzing Financial Ratios (Altman, 1968; Balatbat et al., 2010; Palepu et al., 1997; Therios, 2002).

Therefore, due to the economic conditions, the financial analysis and the assessment of the performance of enterprises of construction industry is necessary. This analysis aims to identify correlations among various company performance indicators (such as FRs) in order to detect the strengths and weaknesses of the companies, to assess their viability and to make correct decisions based on economic and scientific criteria. Moreover, another target of the survey is the presentation of the financial status of Greek enterprises of Structural Industry and how they can cope with the deep economic recession of the last years. Hence, it is achievable to draw conclusions on the economic policies of the companies and on how it is possible to exploit potentials and promising opportunities.

The paper is organized as follows: literature review, description of methodology and data, implementation of financial analysis, presentation of research findings and finally conclusions and suggestions for future research.

2. Literature Review

The financial ratio analysis is one of the most common ways to examine the growth and the economic progress of companies in the construction industry in different countries, for example Korean companies by Kim et al. (2011), Australian companies by Balatbat M. (2010) or construction companies in Indonesia, Pamulu et al (2007) engineering enterprises in Malaysia, Sanusi et al. (2011).

Tsaousoglou et al. (2013), Chen (2012), Ng et al. (2011), Kim et al. (2011), Horta et al. (2012), Ocal et al. (2007), Abidali and Harris (1995) have all incorporated financial ratios in their research. Each researcher can use specific financial ratios and factors that can best represent the research objectives that they aim to accomplish for a certain amount of years. Liquidity and profitability ratios such as the current ratio and the net profit margin among others are used in several research studies (Ganesalingam and Kumar (2001); Wang and Lee (2008)); Ocal et al. (2007); Cinca et al. (2005); Niemann et al. (2008); Sanusi et al. (2011)).

Balatbat et al. (2011) aimed to provide some evidence, using time series financial ratios and performance indicators to assess the performance of publicly listed construction companies in Australia. Yeh (2011) employed the partial adjustment model with the generalized method of moments in order to examine the adjustment behaviour of capital structure in the construction industry within the context of Taiwan during the period 1982 to 2007. Adler and Smith (2009) discuss the way available managerial accounting processes facilitate the appropriate costing of projects. Shuang et al. (2011), proposed an early warning bankruptcy - possibility prediction model about China's construction companies. At the same time, Ng et al. (2011) used financial ratios and applied Zscore model as an approach to detect insolvent contractors.

The purpose of Su (2011) study was to develop an automatic expert model that provides practitioners with a prediction tool for the hedging of financial risks through the use of derivatives. Shuang et al. (2011), proposed a warning bankruptcy - possibility prediction model about China's construction companies.

Cinca et al. (2005) uses financial ratios in order to gain insight on the effects of the country and size of a company. On the other hand, multivariate statistical techniques are examined by Ganesalingam and Kumar (2001) in order to categorize companies according to their financial and distress status. Finally, Chan et al. (2005) with the help of financial ratios and Altman's distress model (Altman, 1968) made an effort to examine the financial viability of Hong Kong contractors.

3. Methodological Approach

The current paper aims at estimating the performance of companies in the Greek Construction Industry with the assistance of financial ratios. The companies considered were both Construction Enterprises and Materials Procurement Enterprises and an effort was made to examine the correlation between them. In order to conduct this analysis, companies registered in the Athens Stock Exchange were chosen. More specifically, priority was the selection of companies of equal size companies who cover a similar range of projects. Another criterion for the selection was the availability of the data of the specific company. Regarding the construction enterprises, four (A, B, C, D) of them belonging to the highest class (7th) of the Register of Contractors' Enterprises were selected (among eight total), whereas in regards to the materials procurement enterprises two cement materials producers (E, F) and two steel materials producers (G, H) were chosen.

The data used refer to the 2008-2011 year period on a quarterly basis and are published according to the International Accounting Standards either in the enterprises' websites either in the Athens Stock Exchange. The period which financial analysis was conducted starts from 2008 which is when the crisis in the construction industry first appears strongly and it is examined on a quarterly basis.

The financial analysis will be conducted with the assistance of Financial Ratios (FRs). Due to a great variety of FRs after an extensive literature review, the most suitable to the research ratios were selected. In this case the ratios that are calculated are liquidity ratios (current ratio, quick ratio), profitability ratios (return on net worth, net profit margin, gross profit margin) and viability and capital structure ratio (ratio of owners' equity to total liabilities). Liquidity is of considerable importance and should be examined, because liabilities tend to dramatically increase during an economic recession. Profitability ratios are essential to discover if the examined companies are dealing effectively with the financial crisis and are presenting any profits. The owners' equity ratio seemed useful to recognize whether a particular company relies on its own equity more than debt capital.

The analysis took place at first with the help of Microsoft Excel. The six Financial Ratios were calculated and tabulated for each enterprise (A, B, C, D, E, F, G, H) for the examined period on a quarterly basis and line charts were created to present the trend of each ratio for each company over time. The total averages of each ratio were calculated in order to identify and compare the status of each sector (Construction-Materials). This was shown by line charts where the trend of each sector is obvious.

The following step was the statistical analysis with SPSS to find any existing correlations between either ratio. The method used was crosstabs. With this method two or more variables are compared and the results are presented in a table matrix form, each cell of which contains every possible combination of correlation between the two variables. Three analyses took place. In the first one, the averages of the FRs from each construction company were cross-correlated with each other one from every construction company in the same order. So correlations between each FR could be recognized between the different construction companies. The same analysis took place also for the materials procurement enterprises. In the third analysis the first variable was the FRs from the construction sector and the second variable was the FRs from the materials sector to identify any correlations between the two sectors. After these analyses, only the results between 0.500 and 1.000 as well as -0.500 and -1.000 were noted and considered important to study. The methodology followed in the research study is displayed in figure 1.
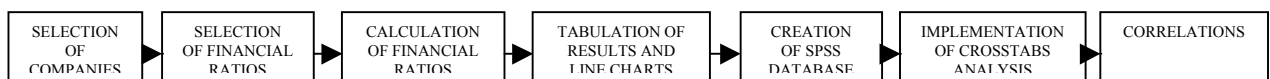
| SELECTION OF COMPANIES | SELECTION OF FINANCIAL RATIOS | CALCULATION OF FINANCIAL RATIOS | TABULATION OF RESULTS AND LINE CHARTS | CREATION OF SPSS DATABASE | IMPLEMENTATION OF CROSSTABS ANALYSIS | CORRELATIONS |

Figure 1: Overview of Research Methodology

4. Research Findings

Comparing the two sectors, it is obvious in figure 2, that the construction companies' current ratio is much lower than this of materials procurement enterprises. This indicates greater difficulty in meeting short-term liabilities. In contrast to the construction companies, which rely mainly on loans, materials

enterprises rely on their own funds. However, the fluctuations in the current ratio of materials procurement companies are more intensive due to the disposal of their stocks during these four years.

The fact that stocks consist a considerable part of the current assets, explains the smaller differences between the two sectors referring to quick ratio in figure 3. In general, the trends are similar to these of the current ratio.

It is evident in figure 4 that, both sectors and mainly the construction companies were influenced by the financial recession, as the net profit margin ratio shows significant reduction at the end of the period.

As far as the gross profit margin ratio is concerned, the construction enterprises present lower rates in figure 5, due to the fact that the cost of the production process is higher and the cost of public works is usually standard without great net profits. Examining these two ratios, it is apparent that, the profitability of the materials procurement enterprises entails a decrease of the profits of construction enterprises.
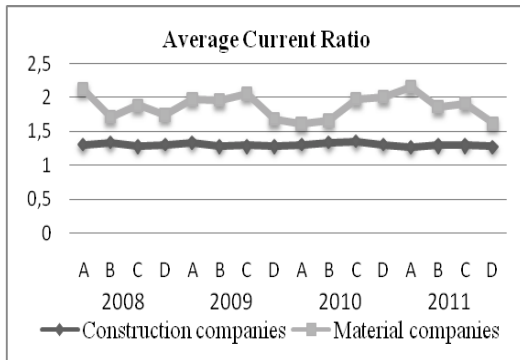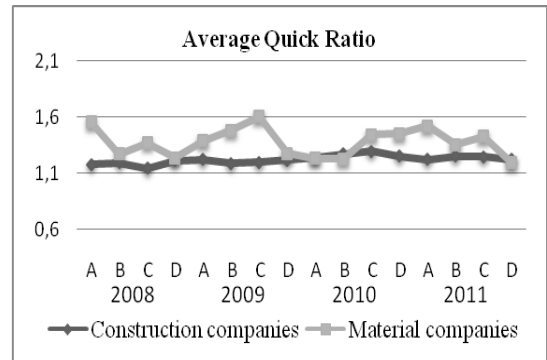

Figure 2: Average Current Ratio
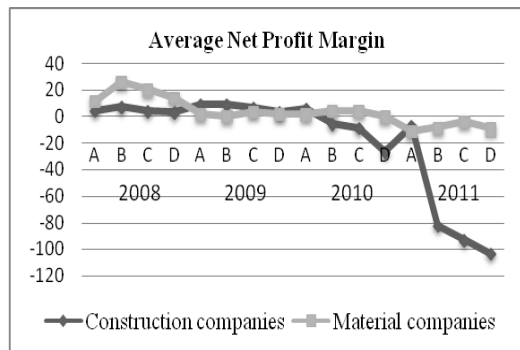

Figure 3: Average Quick Ratio

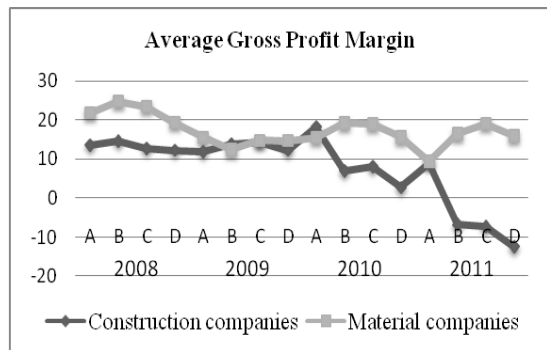**Figure 4: Average Net Profit Margin**
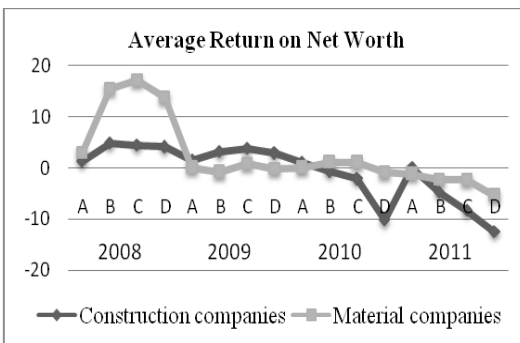

Figure 5: Average Gross Profit Margin

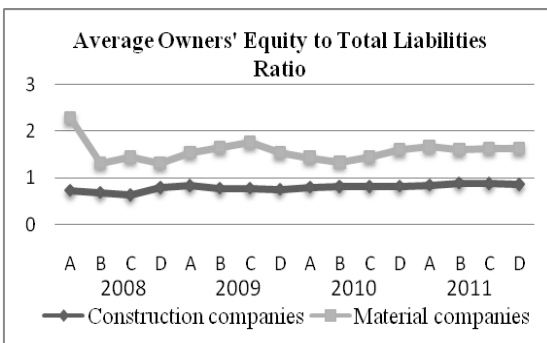**Figure 6: Average Return on Net Worth**

Figure 7: Average Owners' Equity to Total Liabilities Ratio

Regarding the return on net worth ratio, it is apparent in figure 6, that both sectors have been influenced by the financial crisis, as the higher rates are illustrated in 2008 and the lowest in 2011. This downward trend is explained by the decrease of construction activities.

Referring to ratio of owners' equity to total liabilities in figure 7, the construction companies present lower prices, because they rely on loans in order to construct the undertaken projects. Moreover the fluctuations in the ratio of materials procurement enterprises are the result of these companies' loans in order to update their technological equipment.

4.1 SPSS Analysis

With this method it is possible to compare two or more variables, and correlations between them can be discovered. The correlations studied were among the construction companies (A, B, C, D), among the materials companies (E, F, G, H) and also between the two groups of companies (A, B, C, D - E, F, G, H).

4.1.1 Construction companies correlations

The construction-engineering enterprises sometimes compete against one another in bidding for the same projects. Other times they can be found cooperating or using the same techniques and ways of funding. This fact helps in understanding the following two groups of results:

One company may be presented profitable and in better economic state (less debt, less reliance on debt capital) than a competitor company. This will have as a result negative correlations just like it was observed between B - C, but also between A - D and C – D in FRs like current ratio and gross and net profit margin.

Pairs of companies may be exhibiting joint positive correlations either by having profitable trends, which was observed between A – C or by both having non-profitable trends like companies B – D.

Also regarding the ratio of owners' equity to total liabilities, this ratio can reveal a company's policy on whether the company relies more on its own equity or tends to resort to loans in order to fund its projects. Therefore positive correlations of this indicator shows that firms follow similar policies like companies A, B, C or opposite ones (A, B, C in correlation to D).

Table 1: Correlations between construction companies

Construction Companies	Negative									Positive					
	B	C		A	D		C	D		A	C		B	D	
Correlation values between ratios	1	1	-0,775	4	4	-0,584	4	4	-0,855	4	4	0,613	3	1	0,663
	2	2	-0,732	4	6	-0,718	4	5	-0,679	5	1	0,587	3	3	0,746
	3	4	-0,726	6	6	-0,550	4	6	-0,800	5	2	0,520	3	4	0,746
	3	6	-0,745				6	6	-0,929				3	6	0,706

*: 1: Current Ratio, 2: Quick Ratio, 3: Net Profit Margin, 4: Gross Profit Margin, 5: Return on Net Worth, 6: Owners' Equity to Total Liabilities

4.1.2 Materials procurement companies correlations

Regarding the materials procurement companies the correlations that were discovered were mainly positive. This is due to the fact that they are affected in the same way by the building and engineering activity of the country and the given economic circumstances.

Table 2: Correlations between materials procurement companies

Material Companies	Cement			Steel			F	G		F	H		E	G	
	E	F		G	H		F	G		F	H		E	G	
Correlation values between ratios	3	3	0,772	3	6	0,911	3	1	0,719	3	3	0,733	3	1	0,726
	3	4	0,713	4	4	0,901	3	2	0,686	3	4	0,672	3	2	0,741
	3	5	0,757	4	5	0,956	5	5	0,581	6	6	0,625	5	5	0,672
	5	3	0,630	5	5	0,872									
	5	5	0,880	4	3	0,949									

Particularly, companies E and F which are cement producer companies displayed positive correlations between them in their FRs. The same was found between G and H which are steel producer companies.

Positive correlations were found between the two group of companies (cement (E, F) – steel (G, H)). The fact that cement products and steel products can be considered as complementary goods because they are both essential materials in most construction and engineering projects, can explain these positive correlations.

4.1.3 Construction companies - Materials procurement companies correlations

In regards to the examined companies several correlations (positive or negative) were observed either revealing upward trends of the financial indicators either downward trends between the companies of the construction sector and those of the materials sector.

Some significant findings are:

- Positive correlations were found between D and G where all of company's D FRs are positively correlated with company's G FRs liquidity ratios (e.g. Current ratio G – Current Ratio D: 0,883).
- Also positive correlations were observed between all of company's D FRs with profitability ratios of E and F. (e.g. Net Profit F – Gross Profit D: 0,771, Net Profit E – Gross Profit D: 0,658).
- Company C is negatively correlated to Companies E and F especially in their profitability and capital structure ratios H (e.g. Gross Profit C – Net Profit F: -0,932).
- Another positive correlation is between the return on net worth of company A and the same ratio as well as the net profit margin of companies G and H (e.g. Return on Net Worth A – Return on Net Worth G 0,689).
- Positive correlations are recognised between the profitability indicators of company B with companies E and F (e.g. Net Profit B – Net Profit F: 0,716).

The rest of the correlations between the construction companies and the materials companies are not very clear. Both negative and positive random correlations are found between them. This may be due to the given unfavourable economic conditions and to the fact that some enterprises are negatively affected in a greater way than others. In pursuance of more reliable results it is possible that a larger sample of examined firms is needed, in addition to the calculation of more Financial Ratios and a longer study period.

5. Conclusions

In the current research a financial analysis was conducted with the guidance of FRs, in order for the Greek construction industry's performance to be presented during the period of the deep financial crisis. Furthermore, the results of the construction enterprises and of the materials procurement enterprises were compared and correlated, in the interest of similar trends being detected.

In Greece, the construction sector economy had shown an enormous growth until 2004, contrary to the period after 2008, when the sector has illustrated a downward trend keeping pace with the trend of the national economy. A major problem of the domain is the limited liquidity, because the companies are

forced to loan, as the payment of public works shows vital delays. Hence, the enterprises are not consistent in their short-term liabilities.

The high competition among enterprises leads them to making great discounts in auctions of public works, which can explain the considerable reduction in company profit margin. In general, the construction companies have restricted profit margin, due to the fact that the cost of the public works is high and investments in fixed assets are required. Limited short-term profits and a low return of equity are reasonable. Furthermore, the financial recession of the Greek construction industry is evident by the fact that, the enterprises reduced the dividends to shareholders and in many cases dividends were not distributed at all.

Examining the financial analysis, it is apparent that companies were trying to increase the equity ratio to total liabilities in recent years, which is very beneficial, as they want to rely on their own funds and not on loans. Furthermore, the effort of the Greek construction industry to cope with the financial crisis is evident, by the fact that the companies either focus also on foreign markets (region of the Balkans) or either they extend the range of their activities beyond the construction sector, such as Real Estate and Renewable Resources.

Considering the companies of the construction sector and the companies of the material producers, which both together constitute the largest part of the construction industry, it is important to note that many correlations were observed between these two groups of companies. Firms from the construction sector need to cooperate with firms that are able to provide the necessary materials, in order to accomplish the completion of big construction projects. Due to the fact that both sectors greatly depend on the building activity of a country, it is obvious that during a period of economic crisis like the examined one, many positive correlations can be found between the financial indicators of a construction company and a materials procurement company. This is especially observed when the trends of the ratios are downward and when the ratios concerning profit are compared.

The sample of the selected enterprises was adequate, although the number of the examined construction companies was limited to four from a total of eight which belong to the highest class (7th) of the Register of Contractors' Enterprises. Also, from the materials procurement companies only cement material producers and steel material producers were selected at the expense of other kind of material companies. That entails that not all the construction sector of Greece is completely represented, which could be considered as limitation. Moreover, the time period under examination is governed by very specific economic conditions and no reliable conclusions can be drawn for other time periods. This also implies that the results of similar surveys in other countries cannot be compared directly with the presented results of the current analysis.

7. References

Abidali, A. F., and Harris, F. (1995). "A methodology for predicting company failure in the construction industry". *Journal of Construction Management and Economics*, Vol.13, No. 3, pp. 189-196.

Adler, T. R. & Smith, W. L. (2009), How organizational cost reporting practices affect project management: the issues of project review and evaluation. *International Journal of Project Organisation and Management*, 1(3), pp. 309 – 320.

Altman, E.I. (1968) Financial ratios, discriminant analysis and the prediction of corporate bankruptcy. *The Journal of Finance,* 23 (4), pp. 589-609.

Balatbat, M.C.A., Lin, C. and Carmichael, D.G. (2010) Comparative performance of publicly listed construction companies: Australian evidence. *Construction Management and Economics,* 28 (9), pp. 919-932.

Chan, J.K.W., Tam, C. M., and Cheung, R. (2005). "Monitoring financial health of contractors at the aftermath of the Asian economic turmoil: a case study in Hong Kong". *Construction Management and Economics,* Vol. 23, No. 5, pp. 451-458.

Chen, J.H. (2012). "Developing SFNN models to predict financial distress of construction companies". *Journal of Expert Systems with Applications*, Vol. 39, No. 1, pp. 823-827.

Cinca, C.S., Molinero, C.M. & Larraz, J.L.G. 2005, "Country and size effects in financial ratios: A European perspective", *Global Finance Journal*, vol. 16, no. 1, pp. 26-47.

Horta, I.M., Camanho, A.S., and Moreirada, C. J. (2012). "Performance assessment of construction companies: A study of factors promoting financial soundness and innovation in the industry". *International Journal of Production Economics*, Vol. 137, No. 1, pp. 84–93.

Kim, S., Lee, S., & Kim, J. (2011). Relationship between the financial crisis of Korean construction firms and macroeconomic fluctuations. *Engineering, Construction and Architectural Management, 18*(4), 407-422.

Mentis, G. (2005), Commercial Law. Athens, Greece: Hellen Press.

Ng, S.T., Wong, J.M.W., and Zhang, J. (2011). "Applying Z-score model to distinguish insolvent construction companies in China". *Journal of International Habitat*, Vol. 35, No. 4, pp. 599-607.

Niemann, M., Schmidt, J.H. and Neukirchen, M. (2008) Improving performance of corporate rating prediction models by reducing financial ratio heterogeneity. *Journal of Banking & Finance,* 32 (3), pp. 434-446.

Öcal, M. E. et al. (2007) Industry financial ratios—application of factor analysis in Turkish construction industry. *Building and Environment,* 42 (1), pp. 385-392.

Palepu, G. K., Bernard, L. V., & Healy, M. P. (1997). Introduction to Business Analysis & Valuation. Ohio, USA: Southwestern Press.

Pamulu, Muhammad Sapri, Kajewski, Stephen L. & Betts, Martin (2007) Evaluating financial ratios in construction industry: a case study of Indonesian firms. In Dewobroto, Wiryanto, Hardjasaputra,

Pappas, A. A. (1998). Financial Accounting – Theoretical & Practical Issues, Vol. Á. Athens, Greece: Mpenos E. Press.

Sakellis, E. (2005). International Accounting Standards based on Greek Accounting Plan. Athens, Greece: Sakellis Press.

Sanusi, Z. M. et al. (2011) Fraud and financial performance of construction and engineering firms. In: *Humanities, Science and Engineering (CHUSER), 2011 IEEE Colloquium on*, pp. 963-968.

Cinca, C., Molinero, C. and Gallizo Larraz, J.L. (2005) Country and size effects in financial ratios: A European perspective. *Global Finance Journal,* 16 (1), pp. 26-47.

Shuang, Q., Yuan, Y., Zhang, M. and Yu, D. (2011). "Bankruptcy prediction in construction companies via Fisher's Linear Discriminant Analysis", *Proceedings of International Conference on E-Business and e-government (ICEE 2011)*, Shanghai, IEEE, pp. 1-4.

Su, L. (2011). "A rule extraction based approach in predicting derivative use for financial risk hedging in construction companies", *Proceedings of International Conference on Information Management, Innovation Management and Industrial Engineering*, Shenzhen, IEEE, pp. 397 – 400.

Therios, G. (2002), Productivity & Performance in a Company Level. *Spoudai Journal, Piraeus University*, 52(3), pp. 133–155.

Tsaousoglou, P.A., Aretoulis, N. G., and Kalfakakou, P. G. (2013). "Forecasting the Trends of Financial Ratios of Greek Construction Companies", *International Journal of Data Analysis and Information Systems*, Vol. 5, No. 1, pp. 51–63.

Wang, Y. and Lee, H. (2008) A clustering method to identify representative financial ratios. *Information Sciences,* 178 (4), pp. 1087-1097.

Williams, J. R., Haka, S. F., Bettner, M. S., and Carcello, J. V. (2008), Financial & Managerial Accounting, New York, USA: McGraw-Hill.

Yeh, H-H. H. (2011), Adjustment behavior of capital structure over the business cycles: evidence from the construction industry of Taiwan. *Construction Management and Economics*, 29, pp. 329–340.