

# Critical financial variation of ratios between healthy and workout construction firms

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**Abstract:** As domestic recession has had an adverse impact on many Korean companies in Korea, financial soundness has become a critical issues. It is essential to identify financial risk factors to prevent workout as well as to improve the financial condition of domestic construction companies. Therefore, this study derived important management indicators and the financial ratios that belong to each indicator through a comparative analysis between healthy companies and workout companies with financial statement. As a consequence, key financial ratios are derived into 3 of 25 ratios; Equity Ratio in stability indicator, Total Asset Turnover Ratio in activity indicator, and Labor Equipment Ratio in productivity indicator. So, Korean construction firms are required close monitoring these critical financial ratios indicating variation between construction companies which have opposing statuses in finance in order to keep sound financial condition and increase productivity.

**Keywords:** Financial Ratio Analysis, Construction Performance Assessment, Workout, Bankruptcy Prediction, Key performance indicator

## I. INTRODUCTION

### A. Background and Purpose

As the world economy hit a major crisis in 2008, 45 of the top 100 construction firms underwent a period of management crisis in the form of a workout or legal management (Lee et al, 2009). The increasing percentage of constructions firms in companies under restructuring is a clear portrayal of the recession that the construction industry is suffering (Table 1). Therefore, in order to adopt to the changing management environment in times of such recession, it is necessary for the domestic construction firms to analyse their financial status and the trend of change through key financial factors to respond quickly to a workout and vitalize management.

This study has been done to extract key ratios to provide the decision makers with quick and accurate financial information and notify the firms their financial solvency in advance by identifying key ratios that affect the financial status of the domestic construction firms and analysing the key financial factors that correspond with the respective ratios.

TABLE I  
TRENDS OF CONSTRUCTION FIRMS' RESTRUCTURING

Year	2012			2013			2014		
Restructuring	C <sup>a</sup>	D <sup>b</sup>	Total	C	D	Total	C	D	Total
The number of restructuring firms	15	21	36 (100%)	27	13	40 (100%)	11	23	34 (100%)
Construction firms (including developer)	5	12	17 (47.2%)	14	6	20 (50.0%)	4	17	21 (61.7%)

<sup>a</sup>workout

<sup>b</sup>legal management

### B. Research Range and Suppositions

In an effort to establish the validity of the financial situation and of the study, the study was premised on the following four suppositions:

1) The firms whose ratings have been constantly on the rise for the past eight years from 2007 to 2014 are assumed to be in a sound financial state even if Civil Engineering Construction capacity assessments rankings have dropped before 2007 or shown no regular increscent change.

2) There is no difference in labelling between firms that voluntarily asked for a workout and have begun the workout process and the firms that received a credit rating of C through evaluation.

3) Since the analysis showed that the changes in financial ratios of workout firms had no regular pattern by the financial situation of the time, the firms that have begun the workout process were selected as a sample; although the time that the workout occurred in each firm was different from those of others.

4) Both Individual and Consolidated Financial Statements contain information that portray the firms' condition. Therefore, Consolidated Financial Statements were used in case of the absence of Individual Financial Statements.

## II. THEORETICAL STUDY

Studies of construction industry management analysis can be categorized into 1) studies on the survival factors (key performance indicators), 2) studies that analyse the management condition of the construction firm in accordance with the environmental changes in the construction industry, and 3) studies about developing bankruptcy prediction models. Most studies about

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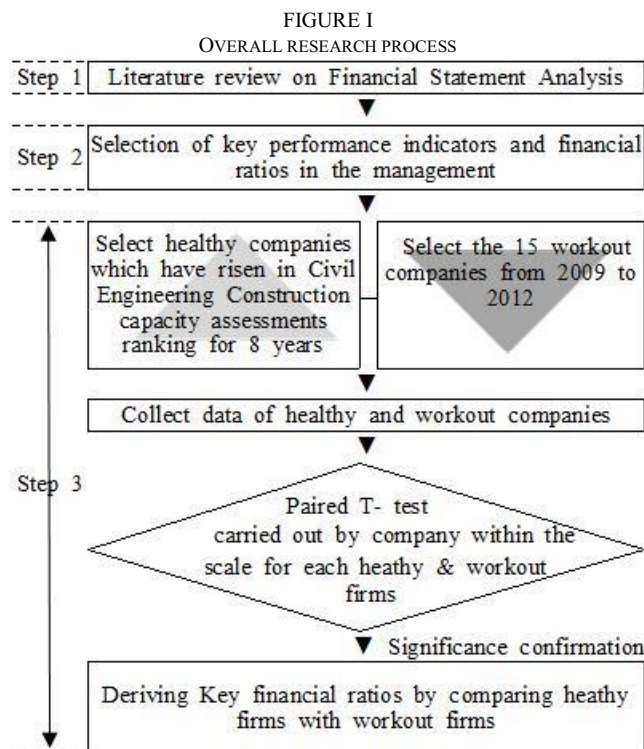
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evaluating the firm's financial soundness and predicting the possibility of bankruptcy through financial analysis have been done on the entire industry but not specifically on the construction industry. Therefore, in this study, workout firms have been selected as samples, differentiating itself from the existing studies on bankrupt firms that have already undergone legal management. Furthermore, this study compared workout firms to sound firms with a different approach from the existing studies by defining healthy firms based on Civil Engineering Construction Capacity Assessments rankings.

### III. RESEARCH METHOD

As for the research process, in step 1, candidates for analysis indexes about workouts in the construction industry based on the existing studies were selected (Figure 1). Then in step 2, valid financial factors were chosen from the indexes selected in step 1 through a statistical significance evaluation. Lastly in step 3, key ratios were derived from the extracted analysis indexes.



### IV. ANALYSIS OF FINANCIAL RATIOS

#### A. Paired Sample T-test

In order to test whether or not there is a difference in significance, depending on the size within the sample group, a paired sample t-test on the healthy or workout firms was carried out as a precedence. The result of the T-test for each group depending on each financial factor with [healthy firms and their response group] and [workout firms and their response group], both healthy group and workout groups had 3 out of 25 ratios with 95% significance. The result shows that there is no difference in

financial characteristics according to the size of the firm. The reason why the T-test, a comparison of ratios over the period of five years, showed that most factors have no significance is that both healthy firms and workout firms show similar trends over time regardless of the size of the firm.

#### B. Equal Variance Test and Independent Sample T-Test

An independent sample T-test was carried to test whether healthy firms and workout firms are different in certain financial ratios. According to Levene's equal variance test, 12 out of 25 factors showed the same distribution between healthy and workout firms, and 7 of the 12 showed 95% significance.

##### 1) Stability Indicator Analysis

The result shows that the workout firms have higher Debt Ratio than healthy firms, but as opposed to the healthy firms, workout firms have inconsistent Debt Ratios and a wide range of change showing instability, and the ratios have skyrocketed in the immediate two years on average before workout.

Debt Ratio is the percentage of owned capital out of the total sum of capital, and it is a representative index that measures the stability of a company. The higher the Equity Ratio, the more stable the firm because owned capital is internal funds that the company can manage without paying the financial expense (interest). Especially, a firm that has more equity capital than debt is considered stable. Though healthy firms have an Equity Capital Ratio of lower than 50%, their ratio has not had any significant change, but in case of the workout firms, their ratio increased a year before workout and plummeted. This trend portrays that in case of Equity Capital Ratio, the change in ratio is more important than the absolute ratio.

Non-current Asset to Stockholder's Equity and Fixed Liability is a concept that enlarged the concept of the Fixed Ratio to measure the stability of capital distribution expanding the range of capital invested in equity to long-term capital including owned capital and fixed debt. In other words, it is a ratio that measures the stability of the company's capital distribution by including fixed debt on top of equity, which from the company's perspective, is the least risky capital in terms of equity.

Total Borrowings to Total Assets is to measure a company's stability along with Debt Ratio and Equity Ratio. Also, when grasping the cash redemption capacity of a contract company, instead of looking at the Debt Ratio, it is reasonable to analyse the total borrowings to total assets, which measure the percentage of interest accruing debt out of total capital. The higher the total borrowings to total assets, the higher the financial cost and the lower the overall profitability of the company and, thus, the lower the stability. Its ratio of workout firms soared a year before workout up to about twice the ratio of healthy firms.

##### 2) Activity Indicator Analysis

Total Asset Turnover Ratio, which shows how many turnovers the total asset had in a year, is an index that also shows the firms' overall use of its total assets invested. So

far, its change is not consistent depending on the group, but most healthy firms show a high use relative to the total assets since their total assets have turned over at least once a year. On the other hand, workout firms had the average number turnovers a year of 0.78 over the five-year period which is 0.3 less than of the ratio of healthy firms.

### 3) Productivity Indicator Analysis

Productivity measures and evaluates the efficiency or performance of the company activity, and it serves as a standard that analyses the cause of occurrence and the rationality of performance distribution. Therefore, productivity index measures the efficiency of a firm and its management rationalization. Capital Intensity is a ratio of how much capital one employee has, and it serves as a sub-ratio of the Labor Equipment Ratio. When calculating the tangible fixed assets (tangible assets–assets under construction) by dividing into the number of employees, workout firms showed low Labor Equipment Ratio values which means they have a capital saving trait. The ratio of healthy firms tends to decrease, but their values are generally high. On the other hand, workout firms have a very low value which began to decrease 3 years ago.

TABLE II  
 IDENTIFIED KEY FINANCIAL RATIOS FROM COMPARATIVE ANALYSIS

No	KIP in finance	Determined factors
1	Stability	Debt Ratio, Equity Ratio, Non-current Asset to Stockholder's Equity and Fixed Liability, Total borrowings to total assets
2	Activity	Total Asset Turnover Ratio
3	Productivity	Capital Intensity, Labor Equipment Ratio

## V. CONCLUSION

Due to a recession in the construction industry, as a means to improve the current situation, the workout policy is being reinforced as an effort to vitalize the management of construction firms by measuring the credit rating. Before a workout breaks out, it is absolutely imperative for the company to clearly identify the current financial state based on key financial factors and its trend of change. Therefore, through a comparative analysis between healthy firms and workout firms, this study provided an outlook to understand the financial state of a pertinent company in its dynamic process by deriving key performance indicators in finance and the financial ratios.

A response sample t-test was done to see if the size of each company enabled differences to occur, but the result showed that the significance of the correlation between the size of a firm and its financial ratio was negligible. In order to run a comparative analysis on the financial ratio amongst sample groups regardless of the size, independent sample t-testing was conducted. As a result of the test, firms appeared to have risk in stability index, activity index, and productivity index.

Due to impaired capital, which may cause the misinterpretation of the consistent and quantitative financial ratio values by a negative value of total equity,

the financial values are exclude from key financial ratios if the total equity is the input value for equation. Therefore, when deriving the final key financial factors, Debt Ratio, Non-current Asset to Stockholder's Equity and Fixed Liability, Total Borrowings to Total Assets, and Capital Intensity which use the total equity were excluded. As shown in Table II, out of the 7 ratios derived from the result of the independent sample T-test, 3 final key ratios are derived as key financial ratios in order to identify the firm's soundness (Table III). Owned capital, total assets, sales, tangible assets, and assets under construction are the key factors in a financial statement.

TABLE III  
 KEY FINANCIAL FACTORS FOR SOUNDNESS OF CONSTRUCTION FIRMS

No	KIP in finance	Determined factors	Equation
1	Stability	Equity Ratio	Owned Capital/ Total Asset
2	Activity	Total Asset Turnover Ratio	Sales / Total Asset
3	Productivity	Labor Equipment Ratio	(Tangible Assets - Assets Under Construction) / Number of Employees

These key performance indicators in finance including liquidity can affect the management as well as other indicators like cash flow index or various non-financial factors are affecting the survival of a company. Therefore, it requires the development of a workout predicting model, applying various financial and non-financial factors.

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