CHAPTER 3

3. RESEARCH METHODOLOGY

3.1 SELECTION OF MEASURES

3.1.1 Altman's Z" score

The Altman's Z" score model consists of four financial ratios namely working capital to total assets, Retained earning to total assets, EBIT to total assets, and market value of equity to book value of total debt. See *Appendix A* for Altman's Z" Score formula, weight factor and classification. The weight factors were find using multiple discriminant analysis. For this model, Z" score value less than 1.23 indicates that a corporation is financially unhealthy, Z" score value greater than 2.90 indicates that a corporation is financially healthy, and the Z" score fall between 1.23 and 2.90 is in the "grey" area. The "grey" area is the zone of ambiguity. Corporation fall in this area is unable to be justified whether or not they are financially healthy or unhealthy. A description of the Z" score variables are shown in *Appendix B*.

Intangible assets such as goodwill concession rights and development rights were excluded from the total assets in computing Z" score. Working capital of variable X_1 is obtained from the formula of current assets minus current liabilities. Retained earnings of variable X_2 is the retained profits from Profit and Loss statement (P&L). Earning before interest and taxes (EBIT) of X_3 is the profits before interest and taxes[7] obtained from P&L. Market value of equity and book value of total debts of variable X_4 used are the shareholders' fund[8] and the total borrowings[9] from balance sheet statement respectively.

3.1.2 Tobin's Q

Tobin's Q used in this paper is the ratio of company's equity and debt to firm's assets. Firm with Q greater than unity is defined as firm that has

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[7] It excludes minorities interest and others exceptional items.
[8] Shareholders' fund includes share capital, share premium, reserves and retained earnings.
[9] Total borrowings include bank borrowings, loans, hire purchase liabilities, overdrafts, bank acceptances, bonds and lease/trade creditors. It excludes amount owning to associate companies or JV partners, and sundry and other creditors.

valuable growth opportunities (Better position to improve future performance). Firm with Q less than unity is defined as firm that has lower growth value (Caton, Goh and Donaldson, 2001). Formula of Tobin's Q is as below: -

$$\text{Tobin's Q} = \frac{\text{Company's Equity} + \text{Total Debt}}{\text{Firm's assets}}$$

Company equity used is similar to the book value of equity for Altman's Z" score. Also, total debt and firm's assets are similar to total debt and total assets of Z" score.

3.1.3 Economic Value Added (EVA)

Economic Value Added Cost of capital used in this study for construction firms are not the Weighted Average Cost of Capital (WACC)[10] of individual firm. A simplified cost of capital was used to evaluate the company's true profitability in EVA. It's the average of Base Landing Rate (BLR) for commercial banks and finance companies plus 1.5% of average risk premium, as proxy; see Table N1 in *Appendix N*. This is similar to the approach adopted by Leong and Chan (2001). EVA was calculated by subtracting the cost of capital from the ROCE.

3.1.4 Other financial ratios

Other financial ratios like cash flow to debts ratio, leverage, liquidity, tangible fixed assets growth, current ratio and profitability were used in determining the financial performance. Fixed assets used in this paper for percentage change in fixed assets is the market value of fixed assets. Current ratio used is the company's current assets to current liabilities ratio. Leverage is the ratio of total debts to total equity. Liquidity is the ratio of total current liabilities to total liabilities. Profitability used is the ratio of net earnings after

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[10] WACC is the weighted company's opportunity cost of capital based on its capital structure.

tax to common shareholders' fund (ROE) and operating profit[11] to capital employed[12] (ROCE).

3.2 SAMPLING METHOD

There are 36 and 16 companies listed on main board and second board in KLSE, respectively. A sample of 29 companies from the construction sector is selected, see *Appendix C*. 24 samples are corporations from main board and 4 samples are corporations from second board. In order to generate an overview of the construction sector, that is to collect an assets value of a sampling to be more than half of the total assets value of whole construction sector. Therefore, the convenience sampling method was used. More corporations from main board were selected to meet the quota of the desired sampling as they have greater assets compare to second board corporations.

Three periods of financial data were used in this paper to perform the comparison of financial ratios i.e. data before, during and after the financial crisis. The reference periods for pre-crisis, crisis and post-crisis are 1990-1996, 1997-1999 and 2000-2001 respectively. The crisis period is defined from 1997 to 1999 due to the delaying impacts in the construction sector. Year 2002 was not included for post-crisis as some of the corporations have not made their annual report available to the public while this research was carried out.

3.3 DATA COLLECTION PROCEDURE

Data used in this project paper are the secondary data from KLSE library, KLSE web site and Bloomberg web site library. Financial data collected for analysis are from balance sheet, cash flows, and profit & lost statement (P&L) of the companies' annual reports obtained from KLSE. The consolidated financial statements were used in this research paper rather than the companies' financial statements. This is because some of the listed construction companies are functioning as investment holdings companies in

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[11] Operating profits before interest and tax; excluding minorities interest, others exceptional items, and shares results from associated companies.

nature. Hence, analysing the consolidated financial statements is deemed more appropriate than the company financial statements. However, some consolidated financial statements have taken into account the financial data of non-construction based subsidiary companies.

Generally, the non-construction based subsidiary companies are the construction arm to their construction companies such as trading company of construction raw materials or trading company of construction machinery. A series of 12 years data is collected for the sampling companies. As mentioned in chapter 1.4, companies listed after 1996 were not selected for sample. For the selected companies that were listed after 1990 and before 1996, the collected data are the data from the year they were listed. Data before listing, in this case, is marked as "not listed" in this report.

3.4 DATA ANALYSIS TECHNIQUES

All data collected in this report will be analysed based on the formula of financial ratios. This study used the cross-ratio analysis technique. The compiled data of the financial ratios is crossed analysed to identify the trends and patterns of financial performance for construction firms and construction sector. Excel software was used for compiling the financial data for the periods of 12 years. Unrepresentative financial data were excluded to get more accurate results for the construction firms and construction sector.

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[12] Capital employed is the operating capital from balance sheet (shareholders' fund + borrowings).