FIG Int. Congress 2010
11-16 April 2010

"Facing The Challenges – Building The Capacity"

Company Failure in the Construction Industry
A Critical Review and a Future Research Agenda

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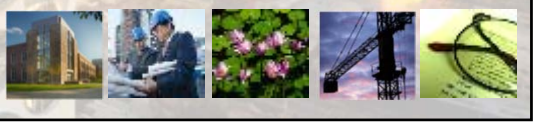

Contents

Background of the Study

Construction companies are particularly vulnerable because:

- Fragmented nature of the industry
- Excessive competition
- Low entry barrier
- High risk
- Unpredictable fluctuating construction volume

→ Companies must therefore evaluate performance regularly

Background of the Study (cont'd)

Failure of a construction company may cause

- Project delay
- Rippling effect to other companies

Selecting contracting firm is not heavily towards discriminating between solvent and potentially bankrupt firms.

→ Developers / Government to recognise any potential failing company at the earliest opportunities.

Background of the Study (cont'd)

Bankruptcy prediction is under-explored, although it's a critical research topic and has been studied extensively in accounting and financial sectors.

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Research Objectives

- To assess the recent trend of business failure in the Hong Kong construction industry and the common causes of failures;
- To identify the key variables determining the solvency of a company;
- To develop a prediction model to detect the impending insolvent company and estimate the chance of business failure in the construction industry;
- To verify the predictability and robustness of the developed prediction model.

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Research Framework

Literature Review
i. Common causes of failures in construction
ii. Variables determining solvency
iii. Prediction techniques

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Data Collection
i.Industry Trend
ii.Company Financial Data

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Models Building & Verification
-Logit Regression
-Artificial Intelligent Techniques

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Results and Conclusions

Literature Review

Company Failure in the Construction Industry

- Common Causes of Failure in Construction
- Techniques for Predicting Company Failure

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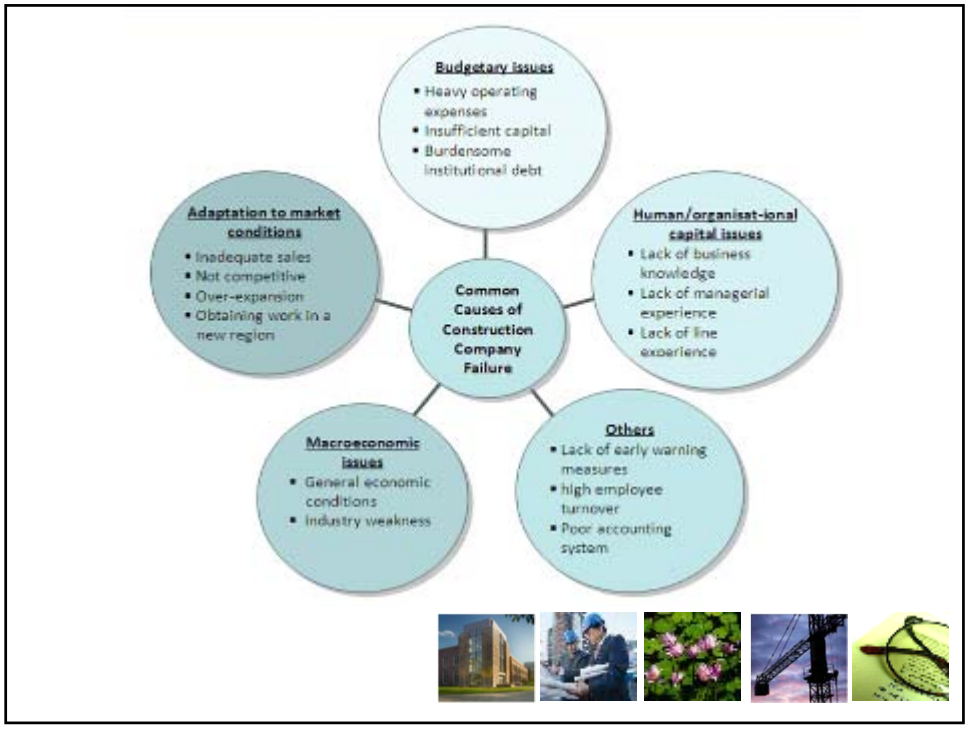


Predicting Techniques (1) – Ratio Analysis

Assess various financial ratios to unveil financial weakness of a company by benchmarking with a cut-off point :

- Liquidity ratios (e.g. current ratio): ability to meet its short-term commitments;
- Profitability ratios (e.g. ROA): overall performance / returns;
- Leverage ratios (e.g. gearing ratio): the extent to which a company is financed by debt and shareholders funds;
- Activity ratios (e.g. asset turnover): how well a company uses its resources

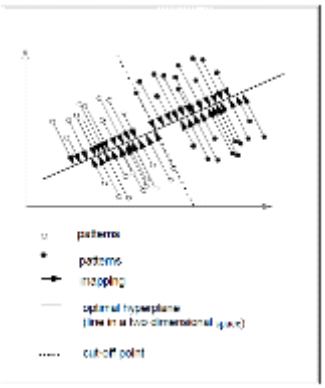
→ Relatively simple but rather an "early warning mechanism" of failure

Predicting Techniques (2) – Multiple Discriminant Analysis

A classification method that maximizes the distance between the means of the two classes while minimizing the variance within each class.

The discriminant function:

$Z_i = d_0 + d_1X_{i1} + d_2X_{i2} + \ldots + d_nX_{in}$



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Predicting Techniques (2) – Multiple Discriminant Analysis

A six-variable Z-score model was built based on a sample of 20 failed and 20 non-failed companies in the civil engineering sector of the UK.

$Z = 25.4 - 51.2X_1 + 87.8X_2 - 4.8X_3 - 14.5X_4 - 9.1X_5 - 4.5X_6$

where X_1 is the profit before interest and tax to net assets, X_2 is the profit before interest and tax to capital employed, X_3 is debtors / creditors, X_4 is current liabilities / current assets, X_5 is $\log_{10}$ days debtors, and X_6 is the creditors trend measurement.

A positive Z-score indicates a long-term solvency, while a company with a negative value was classified as a potentially failure.

→ Allow scoring of firms; but model has little intuitive interpretation.

Predicting Techniques (3) – Conditional Probability Models

Estimate the probability of failure conditional on a range of firm characteristics assuming certain probability distribution.

Logit regression:

$$P_1(X_i) = 1 / [1 + \exp - (b_o + b_1X_{i1} + b_2X_{i2} + \ldots + b_nX_{in})]$$

The logit regression model combines several company characteristics into a multivariate probability score, which indicates the company's vulnerability to failure.

→ Requires less assumptions than MDA, but sensitive to multicollinearity, outliers and missing values

Preliminary Findings

Company Failure in the Construction Industry

- Failure Rate in the HK Construction Industry
- Comparison of Financial Performance between Failing and Non-Failing Companies

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Data Collected

The construction companies are categorized by the Standard Industrial Classification Code (SIC) which include:

- 15: Building Construction General Contractors & Operative Builders
- 16: Heavy Construction Other Than Building Construction Contractors
- 17: Construction Special Trade Contractors

SIC	2005	2006	2007	2008	2009
15	1,828	1,852	1,868	1,863	1,854
16	601	604	605	602	599
17	13,541	13,761	13,912	13,999	13,977
Total	15,970	16,217	16,385	16,464	16,430

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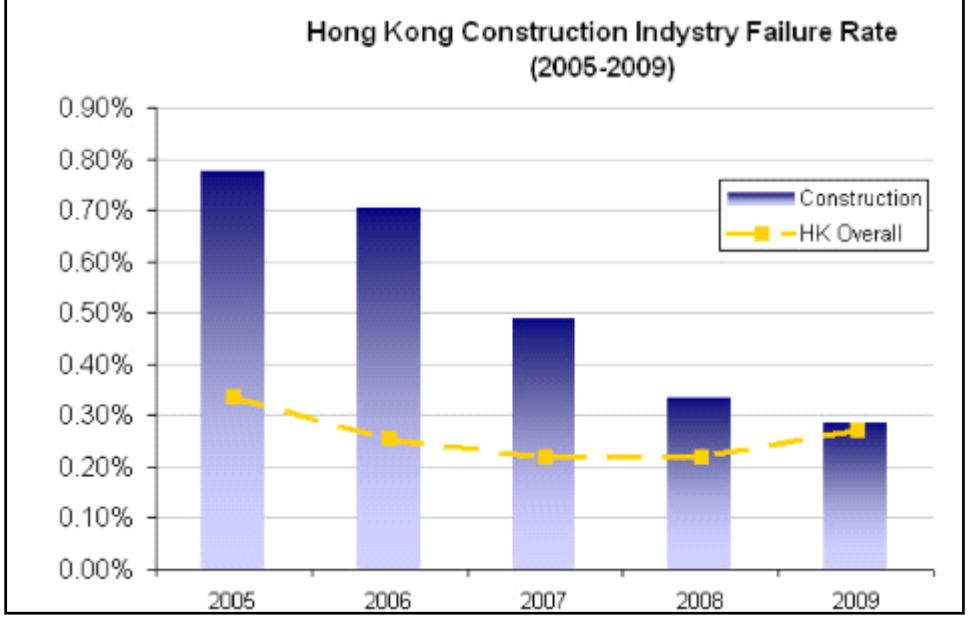
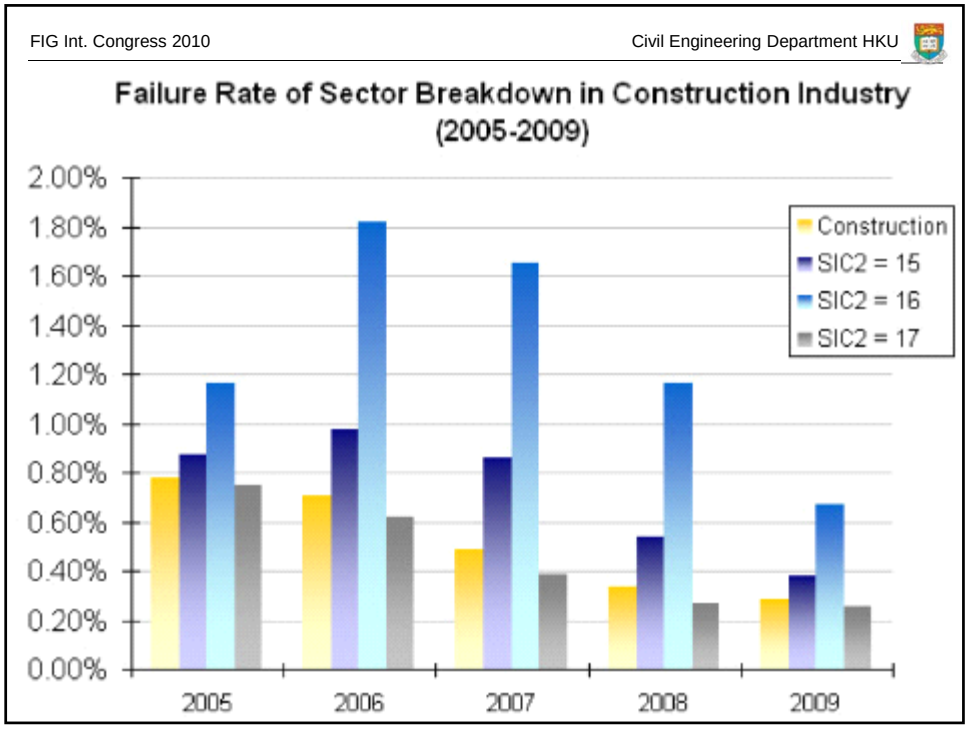
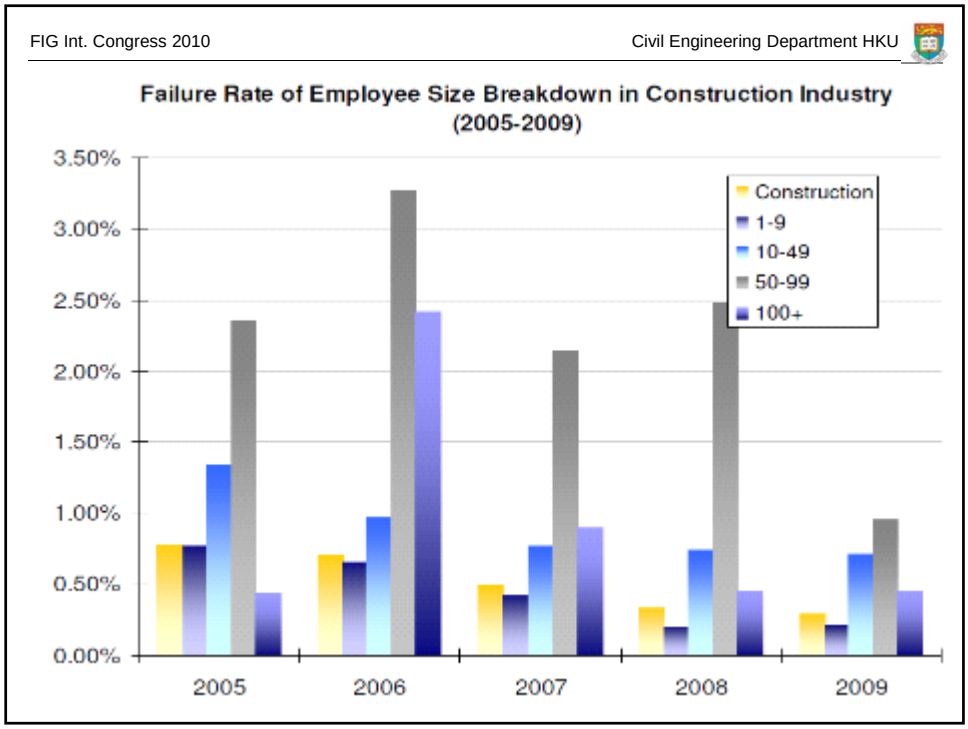



Failure Rate of Sector Breakdown in Construction Industry
(2005-2009)
2.00%
1.80%
1.60%
1.40%
1.20%
1.00%
0.80%
0.60%
0.40%
0.20%
0.00%
2005
2006
2007
2008
2009
Construction
SIC2 = 15
SIC2 = 16
SIC2 = 17


Failure Rate of Employee Size Breakdown in Construction Industry
(2005-2009)
3.50%
3.00%
2.50%
2.00%
1.50%
1.00%
0.50%
0.00%
2005
2006
2007
2008
2009
Construction
1-9
10-49
50-99
100+

Comparison of Financial Performance

Key Financial Ratios	5 Failed Companies		5 Solvent Companies	
	Range	*Average*	*Average*	*Range*
Retained Earnings / Total Assets	0.001-0.06	0.04	0.14	0.047-0.27
Turnover / Net Assets	0.32-2.0	0.92	5.64	2.64-8.97
Working Capital / Total Assets	0.2-0.66	0.40	0.29	-0.04-0.47
Current Liabilities / Net Assets	0.16-2.53	1.06	3.12	1.10-4.51

Research Significance

The models to be developed are anticipated to assess the solvency and predict the chance of business failure.

- Continuous monitor of a company's financial performance.
- Able to carry out "what-if" studies by adjusting specific variables.
- Support decision-makers to assess and identify the risk of business failure.
- Enrich the knowledge in the area of business failure by using intelligent techniques.

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END OF PRESENTATION

Thank you for your attention!

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