EVALUATION OF APPLICABILITY OF ALTMAN'S REVISED MODEL IN PREDICTION OF FINANCIAL DISTRESS: A CASE OF COMPANIES QUOTED IN THE NAIROBI STOCK EXCHANGE

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Abstract

This study assesses whether Edward Altman's financial distress prediction model can be useful in predicting business failure in Kenyan. The population of this study is composed of all the companies listed in the Nairobi Stock exchange 1989 to 2008. Twenty firms are selected for the study: 10 firms that continue to be listed and 10 firms that were delisted in Nairobi stock exchange during period 1989 to 2008. The source of Secondary data is obtained from financial reports of these listed and delisted companies at the Nairobi Stock Exchange and the Capital Markets Authority.

This research study reveals that Edward Altman's financial distress prediction model is found to be applicable in 8 out of the 10 failed firms that were analyzed, which indicates a 80% successful prediction of the model. On the 10 non-failed firms analyzed, 9 of them proved that Edward Altman's financial distress prediction model was successful indicating a 90% validity of the model.

The study concludes that Edward Altman model of predicting financial failure of companies is a useful tool for investors in the Kenyan market

KEY WORDS: Financial Distress, Predictability, Altman Model

1.0 INTRODUCTION

There is a dire need for prediction of business failures since the results of business failure leads to heavy losses both financially and non-financially. Thus a model that could accurately predict business failure in time would be quite useful to managers, shareholders, the government, suppliers, customers, employees amongst other stakeholders. The prediction of business failure is an important and challenging issue that has served as the impetus for many academic studies over the past three decades. The widely applied methods to predict the risk of business failure were the classic statistical methods, data mining and machine learning techniques. Case Based-Reasoning (CBR) is an inductive machine learning method that can apply to diagnosis domain, classification, and enhanced some of the deficiencies in statistical models. Concerning attributes extraction and weighting approach could enable CBR to retrieve the most similar case correctly and effectively (Bryant, 1997).

O'Leary (2001) argues that Prediction of bankruptcy probably is one of the most important business decision-making problems. Affecting the entire life span of a business, failure results in a high cost from the collaborators (firms and organizations), the society, and the country's economy (Ahn, Cho, and Kim, 2000). Thus, the evaluation of business failure has emerged as a scientific field in which many academics and professionals have studied to find other optimal prediction models, depending on the specific interest or condition of the firms under examination.

Over the last 35 years, the topic of company failure prediction has developed to a major research domain in corporate finance. Academic researchers from all over the world have been developing a gigantic number of corporate failure prediction models, based on various types of modeling techniques. Besides the classic cross-sectional statistical methods, which have produced numerous failure prediction models, researchers have also been using several alternative methods for analyzing and predicting business failure. To date, a clear overview and discussion of the application of alternative methods in corporate failure prediction is still lacking. Moreover, frequently, different designations or names are used for one method.

Research has shown that most business failure is caused by bad or poor management (Ahn et al., 2000). This could be in the form of inexperienced management styles, fraud, and rapid technological changes amongst other variables. There are many forms of business failures. The first one is economic failure. This occurs when an organization is not able to generate revenue that would be sufficient enough to meet its costs. This normally leads to such a firm incurring losses.

Financial failure may take the form of bankruptcy or insolvency. Insolvency refers to where a firm is unable to meet its current obligations as and when they fall due. This happens when the current liabilities exceed the current assets. Bankruptcy on the other hand refers to where the total liabilities exceed the fair value of assets. Financial statements are normally used to gauge the performance of the firm and its management. The financial statements commonly used are profit and loss statement, balance sheet and cash flow statements. From the financial statements, various ratios can be calculated to assess the current performance future prospects of the concerned firm. Some of the ratios used include current ratio, quick ratio, and working capital to total debt, total debt to total assets, profit margin to sales and return on total assets (Ahn, 2000).

Perhaps the best way to avoid failure is to examine the myriad explanations for business failure. Many books and articles have focused on identifying reasons for failure as a remedy for prevention. Studies carried out by Altman (2003) used financial ratios to predict occurrence of bankruptcy and he was able to predict 94% correctly one year before bankruptcy occurred and 72% two years before its actual occurrence. Significant ratios identified by Altman with regard to bankruptcy prediction were working capital over total assets, retained earnings over total assets, earnings before interest and taxes over total assets, market value of equity over book value of total liabilities and sales over total assets.

Accurate business failure prediction models would be extremely valuable to many industry sectors, particularly financial investment and lending. The potential value of such models is emphasized by the extremely costly failure of high-profile companies in the recent past. Consequently, a significant interest has been generated in business failure prediction within academia as well as in the finance industry. Statistical business failure prediction models attempt

to predict the failure or success of a business. Discriminant and logit analyses have traditionally been the most popular approaches, but there are also a range of promising non-parametric techniques that can alternatively be applied.

Dimitras, Koksal, and Kale (2006) point out that after 30 years of research on this topic, there is no generally accepted model for business failure prediction that has its basis in a causal specification of underlying economic determinants. Because of the confusingly varied and restrictive assumptions (such as a large number of samples, normal distributed independent variables, and linear relationship between all variables) underlying these classic statistical models, there is need to recourse to alternative methods.

Prior empirical studies of failure have concentrated almost exclusively on financial ratio data, though other studies of failure usually cite managerial variables as being critical (Scherr, 2002). The usefulness of ratio-based business failure prediction models has been questioned. For example, El-Zayaty (2003) find ratio models to be poor predictors of bankruptcy: of 132 businesses predicted to fail, only 5 were discontinued over a five-year period. Storey et al. (2000) indicates that qualitative data can provide at least as good predictions as traditional financial ratios. In Kenya, Keige (1991) did a study on business failure prediction using discriminate analysis. Kiragu (1993) did another study on the prediction of corporate failure using price adjusted accounting data. Kogi (2003) did an analysis of the discriminant corporate failure prediction model based on stability of financial ratios.

Altman is known for the development of the Z-Score formula, which he published in 1968. The Z-Score for predicting Bankruptcy is a multivariate formula for a measurement of the financial health of a company and a powerful diagnostic tool that forecasts the probability of a company entering bankruptcy within a 2 year period. Studies measuring the effectiveness of the Z-Score have shown that the model has 70%-80% reliability. Altman's equation did a good job at distinguishing bankrupt and non-bankrupt firms. Of the former, 94% had Z scores less than 2.7 before they went bankrupt. In contrast, 97% of the non-bankrupt firms had Z scores above this level. This study is motivated by the need to have an alternative business failure prediction method in Kenya and has zeroed in on Altman Z-Score model.

The economic cost of business failures is relatively large. Evidence shows that the market value of the distressed firms declines substantially. The Kenyan corporate history is littered with a number of companies that have gone into bankruptcy but only a handful of companies have managed to come of out of it in sound financial health. At the moment a number of public and private companies among them Kenya Planters Co-operative Union KPCU (2010), Ngenye Kariuki Stockbrokers (2010), Standard Assurance (2009), Invesco Assurance (2008), Hutchings Beimer (2010), Discount Securities (2008), Uchumi Supermarkets (2006) and Pan Paper Mills (2009) are under statutory management (NSE, 2010). Hence, the suppliers of capital, investors and creditors, as well as management and employees are severely affected from business failures. The study would therefore like to predict financial distress using Altman's Z- Score model.

2.0 LITERATURE REVIEW

Business failure models can be broadly divided into two groups: quantitative models, which are based largely on published financial information; and qualitative models, which are based on an internal assessment of the company concerned. Both types attempt to identify characteristics, whether financial or non-financial, which can then be used to distinguish between surviving and failing companies (Robinson and Maguire, 2001)

2.1.1 Qualitative models

This category of model rests on the premise that the use of financial measures as sole indicators of organizational performance is limited. For this reason, qualitative models are based on non-accounting or qualitative variables. One of the most notable of these is the A score model attributed to Argenti (2003), which suggests that the failure process follows a predictable sequence:

Figure 2.1: Failure process

2.1.2 Quantitative models

Quantitative models identify financial ratios with values which differ markedly between surviving and failing companies, and which can subsequently be used to identify companies which exhibit the features of previously failing companies (Argenti, 2003). Commonly-accepted financial indicators of impending failure include: low profitability related to assets and commitments low equity returns, both dividend and capital poor liquidity high gearing high variability of income.

2.2.3 Edward Altman's Z – Score Model

Most credit managers use traditional ratio analysis to identify future failure of companies. Altman (1968) is of the opinion that ratios measuring profitability, liquidity, and solvency are the most significant ratios. However, it is difficult to know which is more important as different studies indicate different ratios as indicators of potential problems. For example, a company may have poor liquidity ratios and may be heading for liquidation. That same company's good profitability may undermine the potential risk that is highlighted by the poor liquidity ratios. As a result, interpretation using traditional ratio analyses may be incorrect.

Altman's 1968 model took the following form -:

$$Z = 1.2A + 1.4B + 3.3C + 0.6D + .999E$$

$Z < 2.675$; then the firm is classified as "failed"

WHERE A = Working Capital/Total Assets

B = Retained Earnings/Total Assets

C = Earnings before Interest and Taxes/Total Assets

D = Market Value of Equity/Book Value of Total Debt

E = Sales/Total Assets

Z=Overall index

2.3.4 Financial Ratios in Z score

The Z-score is calculated by multiplying each of several financial ratios by an appropriate coefficient and then summing the results. The ratios rely on working capital, total assets, retained, EBIT, market value of equity, net worth. Working Capital is equal to Current Assets minus Current Liabilities (Milkkete, 2001). Total Assets is the total of the Assets section of the Balance Sheet. Retained Earnings is found in the Equity section of the Balance Sheet. EBIT (Earnings before Interest and Taxes) includes the income or loss from operations and from any unusual or extraordinary items but not the tax effects of these items. It can be calculated as follows: Find Net Income; add back any income tax expenses and subtract any income tax benefits; then add back any interest expenses. Market Value of Equity is the total value of all shares of common and preferred stock. The dates these values are chosen need not correspond exactly with the dates of the financial statements to which the market value is compared (Milkkete, 2001). Net Worth is also known as Shareholders' Equity

2.4 Factors that lead to business failure

2.4.1 A company is financially distressed whenever its EBITDA is less than its interest expenses. Financial leverage involves the substitution of fixed-cost debt for owner's equity in the hope of increasing equity returns. Financial leverage improves financial performance when business financial prospects are good but adversely impact on financial performance when things are going poorly. As a result, increasing the ratio of debt to equity in a company's capital structure implicitly makes the company relatively less solvent and more financially risky than a company without debt. Capital adequacy relates to whether a company has enough capital to finance its planned future operations. If the company's capital is inadequate, then it must either be able to successfully issue new equity, or arrange new debt. The amount of debt a company can successfully absorb and repay from its continuing operations, is normally referred to as the company's debt capacity (Thynne, 2006).

2.4.2 Cash Flow

For many small and newly formed businesses, this is often the single most important reason for business failure. The problem arises when the money coming into the company from sales is not enough to cover the costs of production. It is important to remember that it is a case of having the money to be able to pay debts when the debts are due not simply generating enough revenue during a year to cover costs (Patrick, 2004).

2.4.3 Business Planning

Many new businesses will have to put together a business plan to present to the bank before it receives loans or financial help. The time and effort put into these plans is crucial for success. Bad planning or poor information on which the plan is based is likely to lead to difficulties for the firm. For example, if the firm plans to sell 2,000 units per month in the first year because it used only limited market research and ends up only selling 500 per month, it will soon be in serious danger of collapse (Chiritou, 2002).

2.4.4 Demand

Falling sales might be a sign that there might be something wrong with the product or the price or some other aspect of the marketing mix. Sometimes the fall in sales might be as a result of the competition providing a better product or service - in part the business can do something about this they have to recognize it in the first place (Moyer, 2006).

Changing tastes, technology and fashion can cause demand for products to fall - the business needs to be aware of these trends. Demand might fall for other reasons not in the firm's control. It might be due to a change in the economic climate of the country. If the economy is experiencing a downturn then maybe people may not have as much money to spend on the businesses products or services. The Bank of England may have increased interest rates and this has led to people cutting back their spending (Sipika and Smith, 2002).

2.4.5 Rise in costs or lack of control over costs

Costs of production can rise for a number of reasons. There may have been wage rises, raw material prices might have increased (for example the price of oil or gas) the business might have had to spend money on meeting some new legislation or standard and so on. In many cases, a

firm can plan for such changes and is able take them into account but if the costs rise unexpectedly, this can catch a firm off guard and tip them into insolvency (Kip, 2002).

2.4.6 Company image

To project a high profile image for the company by hiring expensive office space and a fancy logo and website will not do much to facilitate in the success of your business. In fact high overheads, because of expensive space and website maintenance costs, can drive you out of business very fast, because the golden rule for the success of any business is to keep overheads low especially at the start up time (Argenti, 2003). Diversifying customer base is an important factor in building the business. Being flexible enough to adapt to new trends and ideas is important to staying in business (Eidleman, 2003).

2.4.7 Uncontrolled Growth

Uncontrolled growth of the business can also cause it to fail if not handled appropriately. Obesity is a problem in business as it is in an individual's health. Proper planning must be in place even for business growth. Successful growth requires a professional management team, flexible organization, and proper systems and controls (Eidleman, 2003).

2.5 Empirical Literature

2.5.1 Altman Z-Score Model

Altman set out to combine a number of ratios and developed an insolvency prediction model - the Z–Score model. This formula was developed for public manufacturing firms and eliminated all firms with assets less than $1 million. This original model was not intended for small, non-manufacturing, or non-public companies, yet many credit granters today still use the original Z score for all types of customers. Two further prediction models were formulated by Altman (sometimes referred to as model 'A' and model 'B') to the original Z score (Altman, 1968).

The model 'A' z-score was developed for use with private manufacturing companies. The weighting of the various ratios is different for this model as well as the overall predictability scoring. In addition, while the original score used the market value of equity to calculate the

equity to debt formula, model ‘A’ used shareholder’s equity on the balance sheet. Model ‘B’ was developed for private general firms and included the service sector. In this statistical model, the ratio of sales to total assets is not used, the weighting on this model is different, and the scoring again, different. Although computerized statistical modeling would aid in determining the weighting of each ratio, common sense helps us understand the purpose of each ratio.

In its initial test, the Altman Z-Score was found to be 72% accurate in predicting bankruptcy two years prior to the event, with a Type II error (false positives) of 6%. In a series of subsequent tests covering three different time periods over the next 31 years (up until 1999), the model was found to be approximately 80-90% accurate in predicting bankruptcy one year prior to the event, with a Type II error (classifying the firm as bankrupt when it does not go bankrupt) of approximately 15-20% (Altman, 1968).

From about 1985 onwards, the Z-scores gained wide acceptance by auditors, management accountants, courts, and database systems used for loan evaluation (Eidleman, 2003). The formula's approach has been used in a variety of contexts and countries, although it was designed originally for publicly held manufacturing companies with assets of more than $1 million. Later variations by Altman were designed to be applicable to privately held companies (the Altman Z'-Score) and non-manufacturing companies (the Altman Z"-Score).

Altman's 1968 model took the following form -:

$$Z = 1.2A + 1.4B + 3.3C + 0.6D + .999E$$

$Z < 2.675$; then the firm is classified as "failed"

WHERE A = Working Capital/Total Assets

B = Retained Earnings/Total Assets

C = Earnings before Interest and Taxes/Total Assets

D = Market Value of Equity/Book Value of Total Debt

E = Sales/Total Assets

2.5.2 Altman's Revised Z-Score Model

Rather than simply inserting a proxy variable into an existing model to calculate the Z-Scores Altman advocated for a complete re-estimation of the model, substituting the book values of equity for the Market value in D. This resulted in a change in the coefficients and in the classification criterion and related cut-off scores. The revised Z score model took the following form :

$Z' = 0.717T_1 + 0.847T_2 + 3.107T_3 + 0.420T_4 + 0.998T_5$

Where:

T_1 = (Current Assets-Current Liabilities) / Total Assets

T_2 = Retained Earnings / Total Assets

T_3 = Earnings before Interest and Taxes / Total Assets

T_4 = Book Value of Equity / Total Liabilities

T_5 = Sales/ Total Assets

Zones of Discrimination:

$Z' > 2.9$ -"Safe" Zone

$1.23 < Z' < 2.9$ -"Grey" Zone

$Z' < 1.23$ -"Distress" Zone

2.5.3 Springate (Canadian)

The Springate model developed by Gordon Springate follows the procedure used by Altman. Springate selected four out of 19 popular financial ratios using step wise multiple discriminate analysis. The selected ratios distinguished between sound business and those that actually failed.

The springate model was used to test 40 companies and achieved an accuracy rate of 92.5%. Botheras (2000) tested the Springate Model on 50 companies with an average asset size of $2.5 million and found an 88.0% accuracy rate. The model was also used by Sands (2001) to test 24 companies with an average asset size of $63.4 million and found an accuracy rate of 83.3%. The Springate model takes the following form -:

$$Z = 1.03A + 3.07B + 0.66C + 0.4D$$

$Z < 0.862$; then the firm is classified as "failed"

WHERE A = Working Capital/Total Assets

B = Net Profit before Interest and Taxes/Total Assets

C = Net Profit before Taxes/Current Liabilities

D = Sales/Total Assets

2.5.4 Blasztk system (Canadian)

Blasztk system model is the only business failure prediction method that was not developed using multiple discriminate analysis. Using this system the financial ratios for the company to be evaluated are calculated, weighted and then compared with ratios for average companies in that same industry. An advantage of this method is that it does compare the company being evaluated with companies in the same industry (Bilanas, 2004).

2.5.5 Ca-score (Canadian)

This model was developed using step-wise multiple discriminate analyses. In this model thirty financial ratios were analyzed in a sample of 173 Quebec manufacturing businesses having

annual sales ranging between $1-20 million. This model has an average reliability rate of 83% and is restricted to evaluating manufacturing companies (Bilanas, 2004).

2.8 Local studies

Kiragu (1993) carried out a study on the prediction of corporate failure using price adjusted accounting data. He used a sample consisting of 10 failed firms and 10 non failed firms. Financial ratios were calculated from price level adjusted financial statistics. Discriminant model developed showed that 9 ratios had high corporate failure predictive ability. These ratios were times interest coverage, fixed charge coverage, quick ratio, current ratio, equity to total assets, working capital to total debt, return on investments to total assets, change in monetary liabilities, total debt to total assets. The most critical ratios were found to be liquidity and debt service ratios. The results were consistent with the finance theory relating to the firm's risk. The firm has to maintain sufficient liquidity in order to avoid insolvency problems. It also needs to generate sufficient earnings to meet its fixed finance charges. The results however differed from earlier studies done by Altman (1968) and Kimura (1980) who had concluded that liquidity ratios were not of any significance in bankruptcy prediction. Both had indicated that efficiency and profitability ratios were the most important.

Keige (1991) did a study on business failure prediction using discriminate analysis. He concluded that ratios can be used to predict company failure. However, the types of ratios that will best discriminate between failing companies and successful ones tend to differ from place to place. In Kenya current ratio, fixed charge coverage, return on earning to total assets, and return on net worth can be used successfully in predicting for a period up to 2 years before it occurs. Keige concludes that stakeholders should pay attention to liquidity, leverage and activity ratios.

The current study seeks to evaluate Altman revised model and determine whether it is necessary to come up with a more up to date model of predicting financial distress in Kenya. The studies preceding the current one have all concentrated on ratios independently and not trying to relate with the rest of the studies that have been carried out earlier. This study will change that approach and take revised Altman model to guide it in a bid to establish its applicability in prediction of financial distress in Kenya.

2.9 Conclusion

A look at studies done on prediction of financial distress (bankruptcy) indicates that the accounting data are able to predict the financial distress in the companies. We must however consider this point that there is no consensus about the kind of the financial ratios which are used in prediction of financial distresses. The yielded results have been according to different financial ratio and different methods of research. In this study Edward Altman's model is used to predict financial distress on companies that operate in Kenya.

3.0 DATA AND METHODOLOGY

The population for this study consisted of all firms at the Nairobi Stock Exchange in the Main Investment Market Segment from 1989 to 2008.Failed firms were considered to be those that had either been suspended or delisted from the NSE to date. They were only10 firms during this period. Non-failed firms were all entities listed in the NSE since the year 1989-2008. To fall under this study's category of non-failed firms, they must not have been suspended or delisted for the period under focus. The firms were chosen systematically chosen from commercial sector, service sector, agricultural sector, the industrial and allied sector. Entities in the banking sector, insurance and finance, unit trust, public sector, transportation, investment (including property), were not included in the sample.

Data was obtained from financial reports of the listed companies at the Nairobi Stock Exchange and the Capital Markets Authority. The secondary data was in form of current assets and liabilities, total assets, retained earnings, earnings before interest and taxes, book value of equity, and sales.

The Z-score is a linear combination of four or five common business ratios, weighted by coefficients. The coefficients are estimated by identifying a set of firms which had been declared bankrupt. These are matched by sample of firms which had survived, matching being done by industry and asset size. Five measures are objectively weighted and summed up to arrive at an overall score that then becomes the basis for classification of firms into one of the a priori groupings (distressed and non-distressed).

The Z-score formula: $Z' = 0.717T_1 + 0.847T_2 + 3.107T_3 + 0.420T_4 + 0.998T_5$

T_1 = (Current Assets-Current Liabilities) / Total Assets

T_2 = Retained Earnings / Total Assets

T_3 = Earnings before Interest and Taxes / Total Assets

T_4 = Book Value of Equity / Total Liabilities

T_5 = Sales/ Total Assets

Z' Score Bankruptcy Model:

$Z' = 0.717T_1 + 0.847T_2 + 3.107T_3 + 0.420T_4 + 0.998T_5$

Zones of Discrimination:

Z' > 2.9 -"Safe" Zone 1.23 < Z' < 2. 9 -"Grey" Zone

Z' < 1.23 -"Distress" Zone

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4.0 EMPIRICAC RESULTS

Five common business ratios weighted by coefficients were used to calculate the Z-score. The coefficients were estimated by identifying a set of firms which had been declared bankrupt and matched by sample of firms which had survived, with matching by industry and approximate size. Five measures were objectively weighted and summed up to arrive at an overall score that formed the basis for classification of firms into one of the a priori groupings (distressed and non-distressed).

The Z-score formula: Z' = 0.717A + 0.847B + 3.107C + 0.420D + 0.998E

The following zones of discrimination: Z' > 2.9 -"Safe" Zone, 1.23 < Z' < 2. 9 -"Grey" Zone and Z' < 1.23 -"Distress" Zone. All the companies which had a Z score below 1.23 were classified as companies in a distress zone, companies which had a Z score of between 1.23 and 2.9 were

classified as companies in a grey zone while those companies which had a Z score above 2.9 were classified as companies in a safe zone. In a distress zone there is a high probability of bankruptcy for a firm, in a grey zone there is uncertainty whether the firm be bankrupt or not, while in a safe zone there is a low probability of firm becoming bankrupt.

4.1 Failed Firms

EA Packaging

Table 4.1a: EA Packaging

	Amount in millions				
	2002	2001	2000	1999	1998
Working capital	578.998	564.801	466.203	367.453	366.456
Total assets	2667.287	2661.970	2549.064	2456.356	2454.234
A (working capital/total assets)	0.2170	0.2122	0.1829	0.1496	0.1493
Retained earnings	129.425	128.450	116.265	112.245	111.673
B (retained earnings/ total assets)	0.0485	0.0482	0.04561	0.0457	0.0455
Earnings before interest and taxes	11.256	11.785	31.319	26.789	25.678
C (earnings before interest and taxes/ total assets)	0.004	0.0044	0.0123	0.0109	0.0105
Book value of equity	428.453	417.543	401.507	398.367	394.325
Total liabilities	8189.098	8186.689	7770.427	6789.35	6676.53
D (book value of equity/ total liabilities)	0.0523	0.051	0.05167	0.0587	0.0591
Sales	2098.760	2094.650	1853.145	1798.234	1697.365
E (sales / total assets)	0.7869	0.7869	0.727	0.7321	0.6916
Z score	1.0164	1.0134	0.955	0.9325	0.8932

Kenya National Mills

Table 4. 1b: Kenya National Mills

	Amount in millions				
	2001	2000	1999	1998	1997
Working capital	2534.598	1327.458	1160.253	1253.267	1342.287
Total assets	3231.287	3269.097	3436.761	3452.279	3327.278
A (working capital/total assets)	0.7844	0.4061	0.3376	0.3630	0.4034
Retained earnings	168.958	167.789	169.602	171.784	173.865
B (retained earnings/ total assets)	0.0523	0.0513	0.0493	0.0498	0.0523
Earnings before interest and taxes	689.642	654.358	246.032	652.826	589.295
C (earnings before interest and taxes/ total assets)	0.2134	0.2002	0.0716	0.1891	0.1771
Book value of equity	321.678	315.113	273.492	275.263	289.267
Total liabilities	1289.908	1050.000	1905.000	1792.000	1865.678
D (book value of equity/ total liabilities)	0.2494	0.3001	0.1436	0.1536	0.1550
Sales	2946.239	2962.986	2900.858	2125.286	2948.256
E (sales / total assets)	0.0009	0.9063	0.8441	0.6156	0.8861
Z score	1.3754	1.9872	1.4090	1.5627	1.8332

Dunlop Kenya

Table 4.1c: Dunlop Kenya

	Amount in millions				
	1988	1987	1986	1985	1984
Working capital	378.274	425.804	100.323	446.484	295.725
Total assets	1426.87	1434.57	1467.28	1367.67	1392.58

A (working capital/total assets)	0.2651	0.2902	0.0684	0.3265	0.2136
Retained earnings	79.738	84.060	76.162	82.642	81.479
B (retained earnings/ total assets)	0.0559	0.0586	0.0519	0.06042	0.0585
Earnings before interest and taxes	72.473	76.897	15.187	74.548	73.763
C (earnings before interest and taxes/ total assets)	0.0508	0.0536	0.0103	0.0545	0.0529
Book value of equity	59.369	30.94	107.838	111.593	104.247
Total liabilities	1411.092	1403.629	1359.183	1407.274	1389.482
D (book value of equity/ total liabilities)	0.0421	0.022	0.0793	0.0793	0.0750
Sales	15.234	137.472	175.829	142.635	152.956
E (sales / total assets)	0.0107	0.0958	0.1198	0.5671	0.717
Z score	0.4235	0.5530	0.2779	1.054	1.114

A. Baumann & Co

Table 4.1d: A Baumann & Co

	Amount in millions				
	2007	2006	2005	2004	2003
Working capital	149.453	153.471	188.051	176.054	184.378
Total assets	746.456	750.348	756.182	776.456	804.275
A (working capital/total assets)	0.2002	0.2045	0.2487	0.2267	0.2292
Retained earnings	116.265	111.633	92.091	123.652	121.178
B (retained earnings/ total assets)	0.1558	0.1488	0.1218	0.1593	0.1507
Earnings before interest and taxes	37.238	36.813	45.993	39.864	41.379
C (earnings before interest and taxes/ total assets)	0.0499	0.0491	0.0608	0.05134	0.0514
Book value of equity	59.276	54.981	57.980	64.389	61.276
Total liabilities	708.34	711.982	707.201	713.632	698.256
D (book value of equity/ total liabilities)	0.0837	0.0772	0.0819	0.0902	0.0878
Sales	73.938	70.445	83.422	78.375	79.376
E (sales / total assets)	0.099	0.0939	0.1103	0.1009	0.0987
Z score	0.5645	0.5514	0.6148	1.5956	1.9073

Reagent Undervalued Assets Ltd

Table 4.1e: Reagent Undervalued Assets Ltd

	Amount in millions				
	2001	2000	1999	1998	1997
Working capital	117.269	109.367	112.323	134.367	138.375
Total assets	1487.367	1445.376	1437.286	1445.378	1467.334
A (working capital/total assets)	0.0788	0.0757	0.0781	0.0929	0.0943
Retained earnings	72.639	73.356	75.162	76.457	75.457

B (retained earnings/ total assets)	0.0488	0.0508	0.0523	0.0529	0.0514
Earnings before interest and taxes	14.384	14.454	16.187	17.368	18.582
C (earnings before interest and taxes/ total assets)	0.0097	0.0100	0.0113	0.012	0.0126
Book value of equity	124.268	125.276	127.838	129.457	131.367
Total liabilities	1356.368	1367.842	1359.183	1437.368	1436.367
D (book value of equity/ total liabilities)	0.0916	0.0916	0.0941	0.0900	0.0915
Sales	172.269	173.539	174.829	178.368	198.357
E (sales / total assets)	0.1158	0.1201	0.1216	0.1236	0.1352
Z score	0.2820	0.2867	0.6949	1.3122	1.2850

Pearl Drycleaners

Table 4.1f: Pearl Drycleaners

	Amount in millions				
	2001	2000	1999	1998	1997
Working capital	149.368	158.257	168.041	174.369	173.276
Total assets	713.278	723.647	736.182	738.378	801.279
A (working capital/total assets)	0.2094	0.2187	0.2283	0.2362	0.2162
Retained earnings	69.267	69.357	72.091	69.378	73.836
B (retained earnings/ total assets)	0.0971	0.0958	0.0979	0.0939	0.09214
Earnings before interest and taxes	44.398	43.380	45.993	54.270	52.682
C (earnings before interest and taxes/ total assets)	0.0622	0.0599	0.0625	0.0735	0.0657
Book value of equity	35.568	37.456	37.980	39.478	41.378
Total liabilities	693.899	685.378	687.201	689.479	691.379
D (book value of equity/ total	0.0513	0.0547	0.0553	0.0573	0.0598

liabilities)					
Sales	61.357	62.480	63.422	65.394	67.379
E (sales / total assets)	0.086	0.0863	0.0861	0.0886	0.0841
Z score	0.533	0.5332	0.5499	0.5897	0.5462

Hutchings Biemer

Table 4.1g: Hutchings Biemer

	Amount in millions				
	2002	2001	2000	1999	1998
Working capital	229.378	231.287	241.392	241.835	247.373
Total assets	528.256	534.598	545.367	546.378	543.368
A (working capital/total assets)	0.4342	0.4326	0.4426	0.4426	0.4552
Retained earnings	66.739	68.958	69.378	71.253	73.267
B (retained earnings/ total assets)	0.1263	0.1289	0.1272	0.1304	0.1348
Earnings before interest and taxes	83.267	89.642	91.360	93.258	94.268
C (earnings before interest and taxes/ total assets)	0.1576	0.1677	0.1675	0.1707	0.1735
Book value of equity	122.257	121.678	123.357	128.386	131.468
Total liabilities	287.356	289.908	292.369	294.383	496.379
D (book value of equity/ total liabilities)	0.4255	0.4197	0.4219	0.4361	0.2649
Sales	136.537	146.239	136.367	156.368	158.367
E (sales / total assets)	0.2585	0.2735	0.2500	0.2862	0.2915
Z score	1.115	1.2246	1.3722	1.4269	1.3818

Theta group

Table 4.1h: Theta group

	Amount in millions				
	2001	2000	1999	1998	1997
Working capital	119.269	129.367	122.323	134.367	148.375
Total assets	1587.367	1545.376	1537.286	1545.378	1567.334
A (working capital/total assets)	0.0751	0.0837	0.0796	0.0869	0.0947
Retained earnings	73.639	74.356	76.162	77.457	78.457
B (retained earnings/ total assets)	0.0464	0.0514	0.0495	0.0501	0.0500
Earnings before interest and taxes	14.384	14.454	16.187	17.368	18.582
C (earnings before interest and taxes/ total assets)	0.0090	0.0094	0.0105	0.0112	0.0119
Book value of equity	124.268	125.276	127.838	129.457	131.367
Total liabilities	1356.368	1367.842	1359.183	1437.368	1436.367
D (book value of equity/ total liabilities)	0.0916	0.0915	0.094	0.0900	0.0915
Sales	172.269	173.539	174.829	178.368	198.357
E (sales / total assets)	0.1085	0.1123	0.1137	0.1154	0.1265
Z score	0.6216	0.2833	0.7982	1.2925	1.3119

Lonhro EA Ltd

Table 4.1i: Lonhro EA Ltd

	Amount in millions				
	2001	2000	1999	1998	1997
Working capital	569.998	563.801	453.203	377.453	386.456
Total assets	2767.287	2661.970	2649.064	2556.356	2554.234

A (working capital/total assets)	0.2060	0.2118	0.1711	0.1477	0.1513
Retained earnings	139.425	138.450	126.265	122.245	121.673
B (retained earnings/ total assets)	0.0504	0.052	0.0477	0.0478	0.0476
Earnings before interest and taxes	11.256	11.785	31.319	26.789	25.678
C (earnings before interest and taxes/ total assets)	0.0041	0.0044	0.0118	0.0105	0.01
Book value of equity	428.453	417.543	401.507	398.367	394.325
Total liabilities	7989.098	8486.689	8770.427	5689.35	8776.53
D (book value of equity/ total liabilities)	0.054	0.0491	0.0457	0.07	0.045
Sales	2098.760	2094.650	1853.145	1798.234	1697.365
E (sales / total assets)	0.7584	0.7869	0.6995	0.7034	0.6645
Z score	0.9827	1.016	1.917	1.9103	1.8619

Uchumi Supermarket

Table 4.1j Uchumi Supermarket

	Amount in millions				
	2005	2004	2003	2002	2001
Working capital	127.458	1160.253	1285.472	1273.456	1323.256
Total assets	3269.097	3436.761	3486.364	3553.367	3635.876
A (working capital/total assets)	0.039	0.3376	0.3687	0.3584	0.3639
Retained earnings	0	169.602	171.267	172.368	173.268
B (retained earnings/ total	0	0.0493	0.0491	0.0485	0.0476

assets)					
Earnings before interest and taxes	654.358	246.032	237.387	286.276	287.368
C (earnings before interest and taxes/ total assets)	0.2001	0.0716	0.0681	0.0806	0.079
Book value of equity	1050	1905	2064	2146	2240
Total liabilities	3151.132	2734.920	2725..356	2734..376	2825.897
D (book value of equity/ total liabilities)	0.3332	0.6965	0.7576	0.7848	0.7927
Sales	796.298	890.858	892.263	893.263	894.365
E (sales / total assets)	0.2097	0.2592	0.256	0.2514	0.246
Z score	0.8132	1.0799	1.0912	1.2514	1.251

4.2 Non failed firms

Kakuzi Ltd

Table 4.2a: Kakuzi Ltd

	Amount in millions				
	2008	2007	2006	2005	2004
Working capital	-134.367	-7.975	-152.973	-156.283	-154.47
Total assets	2673.58	2742.44	2754.77	2854.37	2734.4
A (working capital/total assets)	0.0503	0.5029	0.556	0.548	0.565
Retained earnings	401.365	397.240	238.726	134.764	338.35
B (retained earnings/ total assets)	0.5101	0.1448	0.0867	0.0472	0.1237
Earnings before interest and taxes	-67.276	-68.776	6.452	67.252	65.374
C (earnings before interest and taxes/	0.0252	0.0251	0.0023	0.0236	0.0239

total assets)					
Book value of equity	1034	1128	936.0	903	933
Total liabilities	2225.21	2138.05	1080.44	1126.26	1245.4
D (book value of equity/ total liabilities)	0.4647	0.5276	0.8663	0.8018	0.7492
Sales	1473	1385	1100	980	1298
E (sales / total assets)	0.5509	0.505	0.39933	0.5433	0.5747
Z score	1.2913	1.287	0.947	1.4576	1.4724

Rea Vipingo Plantations

Table 4.2b: Rea Vipingo Plantations

	Amount in millions				
	2008	2007	2006	2005	2004
Working capital	67.453	64.875	69.211	71.345	69.543
Total assets	1972.21	2054.519	2000.672	1987.456	1986.375
A (working capital/total assets)	0.034	0.0316	0.0346	0.0359	0.035
Retained earnings	444.252	448.653	356.091	448.567	487.546
B (retained earnings/ total assets)	0.2253	0.2184	0.1779	0.2458	0.2454
Earnings before interest and taxes	187.257	197.540	199.968	198.657	197.547
C (earnings before interest and taxes/ total assets)	0.0949	0.0961	0.0999	0.0999	0.0994
Book value of equity	1725.78	1827.582	1054.003	1987.567	1747.857
Total liabilities	963.56	962.880	997.012	1002.345	998.456
D (book value of equity/ total liabilities)	1.791	1.898	1.0572	1.9829	1.7506
Sales	1653.467	1672.490	1217.130	1765.7	1567.52

E (sales / total assets)	0.8384	0.81145	0.6084	0.8884	0.7891
Z score	2.099	2.1132	1.5371	2.2638	2.0646

Sasini Tea Ltd

Table 4.2c: Sasini Tea Ltd

	Amount in millions				
	2008	2007	2006	2005	2004
Working capital	1606.678	1604.271	1603.564	1654.678	1606.865
Total assets	4758.786	4642.423	4656.654	4565.689	4465.567
A (working capital/total assets)	0.3376	0.3456	0.3444	0.3624	0.3598
Retained earnings	158.457	157.933	159.465	161.765	162.764
B (retained earnings/ total assets)	0.0333	0.0340	0.0342	0.0354	0.0364
Earnings before interest and taxes	521.654	531.592	512.475	513.796	514.689
C (earnings before interest and taxes/ total assets)	0.2597	0.2648	0.2554	0.2562	0.2568
Book value of equity	509.564	507.933	507.864	523.756	504.646
Total liabilities	4135.674	4134.490	4167.546	4165.648	4256.745
D (book value of equity/ total liabilities)	0.1232	0.1228	0.1218	0.1257	0.1186
Sales	691.464	690.791	692.586	693.534	694.649
E (sales / total assets)	0.1453	0.1488	0.1487	0.1519	0.1556
Z score	1.5266	1.5573	1.5285	1.5588	1.5677

Kenya Airways

Table 4.2d: Kenya Airways

	Amount in millions				
	2008	2007	2006	2005	2004
Working capital	161.374	160.587	159.374	159.256	163.366
Total assets	8093.562	7972.434	7982.257	8025.265	8124.267
A (working capital/total assets)	0.0199	0.0201	0.0199	0.0198	0.0201
Retained earnings	785.376	838.721	835.267	836.235	826.253
B (retained earnings/ total assets)	0.0970	0.1052	0.10464	0.1042	0.1017
Earnings before interest and taxes	361.276	360.622	459.365	486.267	362.673
C (earnings before interest and taxes/ total assets)	0.1799	0.1797	0.229	0.2426	0.1809
Book value of equity	1205	1206	1208	1309	1247
Total liabilities	7792.272	7770.427	7794.373	7682.263	7646.378
D (book value of equity/ total liabilities)	1.6393	2.0672	2.0636	2.2254	2.2854
Sales	1956.256	1853.145	1926.265	1927.257	2089.265
E (sales / total assets)	0.2417	0.2324	0.2413	0.2401	0.2571
Z score	1.5828	1.7597	1.9195	2.0279	1.8767

Marshalls East Africa

Table 4.2eMarshalls East Africa

	Amount in millions				
	2008	2007	2006	2005	2004
Working capital	1442.26	1443.14	1451.26	1452.69	1459.26
Total assets	468.365	469.104	467.252	469.256	471.245
A (working capital/total assets)	3.07936	3.07636	3.10594	3.09572	3.0966
Retained earnings	216.289	214.625	213.258	211.572	209.259
B (retained earnings/ total assets)	0.4618	0.45752	0.45641	0.45087	0.44406
Earnings before interest and taxes	52.356	51.163	51.264	53.246	53.987
C (earnings before interest and taxes/ total assets)	0.02607	0.02549	0.02556	0.02656	0.02694
Book value of equity	475.252	474.625	476.352	478.253	479.258
Total liabilities	4273.25	4174.48	4173.27	4227.25	4267.28
D (book value of equity/ total liabilities)	0.11122	0.1137	0.11414	0.11314	0.11231
Sales	714.527	716.188	718.562	719.264	721.415
E (sales / total assets)	1.52558	1.52671	1.53785	1.53278	1.53087
Z score	4.15302	4.14942	4.18087	4.16342	4.15605

Nation Media Group

Table 4.2f: Nation Media Group

	Amount in millions				
	2004	2003	2002	2001	2000
Working capital	417.556	418.777	419.356	511.264	513.268
Total assets	8176.234	8297.41	8328.465	8341.257	8352.567
A (working capital/total assets)	0.051069	0.05047	0.050352	0.061293	0.06145
Retained earnings	861.265	859.047	851.672	853.693	862.275
B (retained earnings/ total assets)	0.105338	0.10353	0.10226	0.102346	0.103235
Earnings before interest and taxes	262.256	260.467	259.246	257.235	256.245
C (earnings before interest and taxes/ total assets)	0.130606	0.12978	0.129235	0.128297	0.127867
Book value of equity	1182	1080	1167	1216	1289
Total liabilities	8289.265	8186.69	8254.256	8145.267	8245.263
D (book value of equity/ total liabilities)	0.142594	0.13192	0.141382	0.149289	0.156332
Sales	21056.28	21094.7	21087.26	21076.26	21056.79
E (sales / total assets)	2.575303	2.54232	2.53195	2.526748	2.520997
Z score	3.135918	3.09432	3.085198	3.088381	3.085186

Scan Group Ltd

Table 4.2g2: Scan Group Ltd

	Amount in millions				
	2008	2007	2006	2005	2004
Working capital	48.777	160.587	159.256	55.276	76.376
Total assets	8297.41	7972.43	8025.27	8734.66	8562.27
A (working capital/total assets)	0.00588	0.02014	0.01984	0.00633	0.00892
Retained earnings	859.047	838.721	836.235	839.254	836.365
B (retained earnings/ total assets)	0.10353	0.1052	0.1042	0.09608	0.09768
Earnings before interest and taxes	260.467	360.622	486.267	512.264	601.264
C (earnings before interest and taxes/ total assets)	0.12971	0.17968	0.24241	0.25549	0.30003
Book value of equity	1080	1206	1309	1024	1425
Total liabilities	8186.69	7770.43	7682.26	7926.26	8046.37
D (book value of equity/ total liabilities)	0.13192	0.1552	0.17039	0.12919	0.1771
Sales	2094.65	1853.15	1927.26	1998.26	1945.28
E (sales / total assets)	0.25245	0.23244	0.24015	0.22877	0.22719
Z score	0.79975	0.95666	1.16447	1.16003	1.32018

Standard Group

Table 4.2h: Standard Group

	Amount in millions				
	2003	2002	2001	2000	1999
Working capital	1453.14	1455.24	1458.37	1459.35	1467.25
Total assets	2649.1	2756.37	2735.36	2667.39	2563.38
A (working capital/total assets)	0.54854	0.52795	0.53315	0.54711	0.57239
Retained earnings	1024.63	1034.35	1018.34	1015.37	1021.25
B (retained earnings/ total assets)	0.38678	0.37526	0.37229	0.38066	0.3984
Earnings before interest and taxes	51.163	53.354	54.426	49.235	49.998
C (earnings before interest and taxes/ total assets)	0.02548	0.02658	0.02713	0.02456	0.02495
Book value of equity	774.625	1175.37	978.857	498.265	467.365
Total liabilities	374.479	376.276	298.265	299.626	412.272
D (book value of equity/ total liabilities)	2.06854	3.12368	3.28184	1.66296	1.13363
Sales	716.188	714.165	713.143	721.365	812.265
E (sales / total assets)	0.27035	0.2591	0.26071	0.27044	0.31687
Z score	1.93596	2.34692	2.41785	1.75663	1.61456

BOC Kenya

Table 4.2i: BOC Kenya

	Amount in millions				
	2008	2007	2006	2005	2004
Working capital	1452.69	1462.28	1478.25	1456.28	1467.29
Total assets	1469.26	1471.28	1472.27	1439.37	1438.26
A (working capital/total assets)	0.98872	0.99388	1.00407	1.01175	1.02018
Retained earnings	211.572	209.286	208.265	206.256	211.165
B (retained earnings/ total assets)	0.144	0.14225	0.14146	0.1433	0.14682
Earnings before interest and taxes	53.246	54.254	55.376	55.265	53.467
C (earnings before interest and taxes/ total assets)	0.02652	0.02703	0.02761	0.02756	0.02668
Book value of equity	478.253	474.262	481.259	479.263	478.253
Total liabilities	4227.25	4228.27	4231.22	4267.24	4256.78
D (book value of equity/ total liabilities)	0.11314	0.11216	0.11374	0.11231	0.11235
Sales	719.264	703.265	699.254	721.264	723.256
E (sales / total assets)	0.48954	0.478	0.47495	0.5011	0.50287
Z score	1.44446	1.43646	1.44252	1.47469	1.48274

British American Tobacco

Table 4.2j: British American Tobacco

	Amount in millions				
	2004	2003	2002	2001	1999
Working capital	1443.14	1524.27	1542.26	1549.26	1565.26
Total assets	4649.1	4767.27	4688.37	4567.38	4625.28
A (working capital/total assets)	0.31041	0.31974	0.32895	0.3392	0.33842
Retained earnings	214.625	224.267	226.377	234.365	223.263
B (retained earnings/ total assets)	0.04616	0.04704	0.04828	0.05131	0.04827
Earnings before interest and taxes	51.163	51.265	52.276	55.343	54.256
C (earnings before interest and taxes/ total assets)	0.02548	0.02554	0.02606	0.0276	0.02707
Book value of equity	4174.63	4176.36	4178.35	4167.38	4167.37
Total liabilities	4174.48	4175.15	4176.27	4263.36	4126.25
D (book value of equity/ total liabilities)	1.00003	1.00029	1.0005	0.97749	1.00996
Sales	2316.19	2414.26	2416.26	2419.28	2322.26
E (sales / total assets)	0.4982	0.50642	0.51537	0.52969	0.50208
Z score	1.25307	1.26893	1.28712	1.3063	1.28789

5.0 CONCLUSIONS

5.1 Summary of Key Findings (Average score for five years) on Failed firms

Firms	EAPL	KNM	DUNLOP	BAUM	RUA	PDC	HBL	THET	LEA	USM
Average Score	0.962	1.633	0.6845	1.046	0.772	.550	1.304	0.862	1.537	1.097
State	Dis	grey	dis	Dis	dis	dis	dis	dis	grey	dis

EAPL=East African Packaging

KNM= Kenya National Mills

Dunlop= Dunlop Kenya Limited

Baum= A Baumann and Company

RUA=Reagent Undervalued Asset Ltd

PDC=Pearl Dry cleaner

HBL=Hutchings Biemer

THET=Theta Group

LEA= Lonrho E.A. Ltd

USM=Uchumi Supermarket

dis=Distress

5.2 Summary of Key Findings (average Score for five years) on Non Failed firms

Firms	KAKU	RVP	STL	KQ	MEA	NMG	SGL	SG	BOC	BAT
Average Score	1.290	2.016	1.548	1.833	4.160	3.10	1.080	2.014	1.456	1.281
State	Grey	Grey	Grey	grey	safe	safe	Dist	Grey	grey	Grey

KAKU=Kakusi

RVP=Rea Vipingo Plantation

STL=Sasini Tea Ltd

KQ=Kenya Airways

MEA=Marshalls East Africa

NMG=Nation Media Group

SGL=Scan Group Ltd

SG=Standard Group

BOC=BOC Kenya

BAT=British American Tobacco Ltd

5.2 Conclusions

Edward Altman's financial distress prediction model is found to be an accurate prediction on firms quoted at Nairobi Stock Exchange. On 8 out of the 10 failed firms there is 80% validity for the model.On10 non-failed firms, 9 of them proved that Edward Altman's financial distress prediction model was correct a 90% validity of the model.

The wrong prediction may have been due to some other factors such as the reliability of data, smoothening of data by managers especially for those firms that failed eventually.

References

Ahn, B. S.,Cho, S. S., and Kim, C.Y. (2000)"The integrated methodology of rough set theory and artificial neural network for business failure prediction". *Expert Systems with Applications, 18*, 65-74.

Ahn, E. I.(2000) "Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy". *Journal of Finance, pp. 589-609*.

Aldrich, J.H. and Nelson, F.D.(2007) *Linear Probability, Logit and Probit Models*. Sage, Beverly Hills, California.

Altman, E.I.(2003) "Financial ratios, discriminant analysis, and prediction of corporate bankruptcy", *Journal of Finance, 23(4), 589-610.*

Argenti, M. (2003) *Financial ratios as predictors of failure, Empirical Research in Accountin*g: Selected Studies, University of Chicago, Chicago, Ill., 71-111.

Beaver, W H.(1968). "Market Prices, Financial Ratios, and the Prediction of Failure", *Journal of Accounting Research, Autumn, pp.179-192*.

Bilanas, A.F. and Harris, F. (2004) "A methodology predicting failure in the construction Industry", *Journal of Construction Management and Economics, 13(3), 189-196*

Botheras, C.F (2000)"The integrated methodology of rough set theory and artificial neural network for business failure prediction", *Expert Systems with Applications, 18, 65-74*.

Bruton, H., Wan, K. and Ahlstrom, A., (2003) "The effects of acquisitions on the market value of the banking sector: An empirical analysis from Greece", *European Journal of Scientific Research (EJSR), Vol. 24, Issue 3, 2008.*

Bryant, S. M. (1997). "A case-based reasoning approach to bankruptcy prediction Modeling." *Intelligent System Accounting, Financial and Management*, *6*, 195-214.

Burbank, C. (2005), "Boiled Frog Syndrome", *Management Today*, *No.March, pp.121-4*

Carrol, P. and Nelson, R. T. (2008), "How to Recognize and Avoid Organizations′ Decline,", *Sloan Management Review*, *No.Spring, pp.41-6.*

Charitou, J.K.W, Tam, C.M and Cheung, R. K. C (2000) "Construction firms at the crossroads in Hong Kong, Engineering", *Construction and Architectural Management, 12(2), 111-124.*

Charitou, K., (2002) "*How stock prices react to managerial decisions and other profit signaling events, in the Greek mobile telecom market?* ", 3rd International Conference on Applied Financial Economics, Samos island 2002

Chowdhory, B., Patterson, J. (2005), "Silver *Wheels Ltd", in Richardson B., J Patterson, A Gregory, S. Leeson (Eds)",* Case Studies in Business Planning, 2nd, Pitman, London,

Des Raj, (1972) "*The Design of Sample Surveys"*, McGraw Hill, 1972.

Dimitras,D., Koksal, A. and Kale, S. (2006) "Business failures in the construction industry, Engineering", *Construction and Architectural Management, 7(2), 120-132.*

Eidleman, E.B. (2007) "A discriminant analysis of predictors of business failure," *Journal of Accounting Research, Spring, Institute of Professional Accounting, Chicago, Ill., 167-*179.

El-Zayaty, W., (2003), "Financial Ratios as Predictors of Failure, Empirical Research in Accounting: Selected Studies, Supplement", *Journal of Accounting Research* 5, 71-127.

Keige, P. (1991). Business Failure Prediction Using Discriminate Analysis. Unpublished thesis, University of Nairobi.

Kip, A.F. (2002) A methodology for predicting company failure in the construction industry, PhD thesis, Loughborough University of Technology, Loughborough.

Kiragu, M. (1993). The Prediction of Corporate Failure Using Price Adjusted Accounting Data. Unpublished thesis, University of Nairobi

Kogi, S. (2003). An Analysis of The Discriminant Corporate Failure Prediction Model Based on Stability of Financial Ratios. Unpublished thesis, University of Nairobi

Kow, G.J., B.R Baliga., R.E Kidwell (2004), "Curing Sick Businesses: Changing CEOs in Turnaround Efforts", *The Executive*, *Academy of Management, Vol. VI No.3*

McCall, A.,A Guardia., M Newland, C Hargreaves, J Thynne (2006), *The Daily Telegraph*, No.6 November, pp.1

Milkette, R.O. (2001) "An empirical test of financial ratio analysis for small business failure prediction", *Journal of Financial Quantitative Analysis, Mar., University of Washington, Seattle, 1477-1493.*

Millihni, G. L.V., (2003) "Predicting the Possibility of Failure in a Canadian Firm". Unpublished M.B.A. Research Project, Simon Fraser University

Moyer, G, M Tuncan , M T Birgonul and I Dikmen (2006) E-bidding proposal preparation system for construction projects, Building and Environment, 41(10), 1406-

Nelson, P.M., D. C Mayes, P McKiernan. (2001), *Sharpbenders: The Secrets of Unleashing Corporate Potential*, Blackwell, Oxford

Nwanko, S, B Richardson, R Boyles (2007), *The Rise and Fall of Air Europe*, Sheffield Business School, Sheffield Hallam University,

Nwankwo, J.P, J. L Heskett (2003), *Corporate Culture and Performance*, The Free Press, New York, NY

O'Leary, E. G, (2001)"Business Failure Prediction and the Efficient Market Hypothesis" Unpublished M.B.A. Research Project, Simon Fraser University, November

Ohlson, J.A. (1980). "Financial ratios and the probabilistic prediction of bankruptcy." *Journal of Accounting Research*, Volume 18, Number 1, 109-31.

Patrick, S. and Ooghe, H. (2004) *35 years of studies on business failure: an overview of the classic statistical methodologies and their related problems*, The British Accounting Review, 38(1), 63-93.

Pretorius, W.H.,A Greve, B.L.T Hedberg (2008), "Responding to Crisis", in Mintzberg, H., Quinn, J.B. (Eds),*The Strategy Process*, 2nd, Prentice-Hall, Englewood-Cliffs, NJ, pp.785-93.

Richardson, M. (2004), "The Real Troubleshooters", *Intercity*, British Rail, November, pp.278

Robbins, A., and Pearce L., (2005). "Corporate Bankruptcy Prediction Models Applied to emerging Economies: Evidence from Argentina in the Years 1991-1998." *International Journal of Commerce and Management*, Volume 17, Number 4, 295-311.

Robinson, R.A. and M. G. Maguire (2001) "Top common causes of construction contractor failures", *Journal of Construction Accounting and Taxation, Jan/Feb 2003.*

Sands, E. G. L. V Gordon, Springate and V Turgut (2001) "*Predicting Business Failures*". CGA Magazine: pp. 24-27.

Sipika, C. and Smith, D. (2002), *From Disaster to Crisis – the Failed Turnaround of Pan-American Airlines*, Liverpool Business School, Liverpool, UK

Smith, A.and Graves K. (2005) "Empirical investigation of the business effects of announcements to share prices", *The Journal of Money, Investment and Banking, issue 2*,

Smith, T. I. and Mitroff, I. (2005), "Crisis Prone versus Crisis Avoiding Organizations: Is Your Company's Culture Its Own Worst Enemy in Creating Crises?", *Industrial Crisis Quarterly*, Elsevier, Amsterdam, Vol. 2 pp.53-63.

Springate, and Gordon L.V., (1978)."Predicting the Possibility of Failure in a Canadian Firm". *Unpublished M.B.A. Research Project*, Simon Fraser University.

Stead, K.,and Smallman A. (2000) "The Impact of Publicity and Press Announcements on Share Prices: An Empirical Study", *The Icfaian Journal of Management Research, vol. VII No 3, March 2008, pg 35-55.*

Taffler, C., (2001)," Alternative Financial Ratios as Predictors of Failure", *Accounting Review XLIII, 113-122.*

Thynne K. (2006), "Test of the Generalizability of Altman's Bankruptcy. Prediction Model," *Journal of Business Research, 53-61, 10, 2006*