

**EMPIRICAL EVALUATION OF BANKRUPTCY MODELS ESTIMATED BY
UNIVERSITY OF NAIROBI MASTERS IN BUSINESS ADMINISTRATION
(MBA) STUDIES**


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D61/71592/2007**

**A MANAGEMENT RESEARCH PROJECT PRESENTED IN PARTIAL
FULFILMENT OF THE REQUIREMENT FOR THE DEGREE OF MASTERS IN
BUSINESS ADMINISTRATION (FINANCE) THE UNIVERSITY OF NAIROBI**

OCTOBER, 2012

DECLARATION


This management project is my original work and has not been presented for a degree in any other university.

Signed.......... Date...09/11/2012

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This project has been submitted for examination with my approval as university supervisor.

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DEDICATION

To my loving mother
Damaris Adhiambo Onguka

And

To my dear dad
Patrick Onguka Bungu.

ACKNOWLEDGEMENT

I acknowledge my parents Mrs Damaris Onguka. and Mr Patrick Onguka for being beside me all the way. Your support and encouragement has seen me this far.

I also acknowledge my supervisor Mr. Joseph Barasa who guided me throughout the research period. Your contribution to this research cannot be underestimated.

Finally, I thank the Almighty God for the gift of life. Thank you for being with me all through.

LIST OF ABBREVIATIONS

- CBK** – Central Bank of Kenya
- CMA** – Capital Markets Authority
- GDP** – Gross Domestic Product
- MBA** – Masters in Business Administration
- MDA** – Multiple Discriminant Analysis
- NN** – Neural Network
- NSE** – Nairobi Securities Exchange
- RPA** - Recursive Partitioning Algorithm
- RSA** - Rough Sets Analysis
- US** – United states of America

ABSTRACT

A contemporary threat to businesses today, despite their size and nature of operations is insolvency. The developments in the corporate environment highlight the importance of default prediction both in academia and industry. In developed countries, bankruptcy prediction models have been developed and are continually improved to match with the economic changes.

In Kenya, various bankruptcy prediction models have been proposed by Masters in Business Administration (MBA) students but they are not being widely used by the industry though there are reported cases of unpredicted bankruptcies as firms go under. This historical study tests the validity of six bankruptcy prediction models in a Kenyan context.

The population for this study consisted of all firms listed at the Nairobi Securities Exchange from 1970 to 2009. Of the business failure prediction models tested over a period of five years on ten failed and ten non-failed firms, three of the models had prediction of accuracy of above 80%.

Specifically, the models that incorporate profitability, leverage and liquidity ratios seem to be accurate predictors of business failure. There are however certain firms, that the models would classify in - accurately mostly because of environmental or firm specific factors. The findings also infer that specialized industry specific models like the insurance industry or banking industry models may not be applicable in general company bankruptcy prediction.

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CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

One of the most significant threats to many businesses today, despite their size and nature of operations, is insolvency. The recent bankruptcies of Lehman Brothers Holdings Inc, Enron and WorldCom have underlined the importance of default prediction both in Academia and in Industry.

Kenya has continued to experience increasing number of bankruptcy problems over the years since independence in 1963 as attached in Appendix II. According to statistics from the state law office, in the period between 1964 and 2009 there have been a total of 1585 bankruptcy cases which have been registered at the Attorney General's office in the department of official receiver. The estimated models by the University of Nairobi Masters in business Administration (MBA) are not being used in the industry to predict business failure, resulting in failure of these institutions translating to losses of billions of Kenya shillings. The availability of business failure prediction models which are not being used in the industry necessitates the need to test the effectiveness of the existing failure prediction models developed by MBA students with the possibility of using them in the industry hence the reason for the study and the topic.

In Kenya there are no adequate legislation and enforcement procedure in place within the Capital Markets Authority (CMA) and the Nairobi Securities Exchange (NSE), leading to massive falsification of financial reports, conspicuous dealings in the NSE and illegal collaboration of stockbrokers with the intention to defraud investors. This is based on the recent collapse of many stockbrokerage firms and consequent loss of investor confidence in the capital markets leading to tremendous loss of investor money and confidence throwing the country's capital markets into jeopardy.

During the Budget speech of 2009, a number of requirements regarding corporate governance of members of the NSE were proposed. Owing to the collapse of over six stock brokerage firms due to lack of sufficient capital, by 2010 December 31 investment

banks will be expected to have increased their capitalisation to KShs 250 million from the current KShs 30 million and stockbrokers from KShs 50 million from KShs 5million. Secondly, the members are expected to publish semi annual and annual statements in at least two daily newspapers with national circulation and display the audited accounts in a conspicuous position. Thirdly each firm was to be designated a compliance officer whose powers can even override that of the owner and the director. Stock brokers were to also take up of professional indemnity that is not less than five times their daily average turnover. In addition, business should seek regulatory approval before changes in shareholders, directors, chief executive and key personnel (CBK, 2009).

In response to the global financial crisis of 2007, The U.S. Federal Reserve and central banks around the world have taken steps to expand money supplies to avoid the risk of a deflationary spiral, in which lower wages and higher unemployment lead to a self-reinforcing decline in global consumption. A series of regulatory proposals were introduced in June 2009. The proposals address consumer protection, executive pay, bank financial cushions or capital requirements, expanded regulation of the shadow banking system and derivatives, and enhanced authority for the Federal Reserve to safely wind-down systemically important institutions, among others. In January 2010, the Volker rule limiting the ability of banks to engage in proprietary trading was introduced. The U.S. Senate passed a regulatory reform bill in May 2010, following the House which passed a bill in December 2009.

Research in default prediction has been conducted for many decades and a very large number of empirical studies has been established since the pioneering work (Beaver .1966,1968) and (Altman, 1968).The initial approach to predicting corporate failure has been to apply a statistical classification technique (usually discriminant analysis) to a sample containing both failed and non- failed firms. Examples of such studies are (Deakin 1972) and (Altman et al 1977). After that emphasis shifted toward Probit and Logit analysis.(Matin 1977) and (Ohlson 1980) were among the first to apply these techniques followed by (Wigniton 1980); (Zmeijewski 1984) ; (Zavgren 1985); (Aziz and Lawson 1989)and (Lennox 1999) . Other statistical techniques have also been introduces,

such as recursive partitioning (Frydman et al 1985), catastrophe theory (Gregory et al , 1991) ,multidimensional scaling (Mar Molinero and Ezzamel 1991), Neural networks (Tam and Kiang 1992), multinomial logit model(Johnsen and Melicher 1994), multicriteria decision aid methodology (Zopounidis and Doumpos 1999 and rough sets (Dimitris et al 1999).

In comparison to researches done and published in other parts of the world, most of Kenyan studies done are not published in the world renowned business journals but lying on library shelves hence the need for more research and publishing to ensure that business prediction models developed are being used in the industry.

1.2 Statement of the Problem

The prediction and prevention of financial distress is one of the major factors that should be analyzed in advance as an early warning signal and to avoid the high cost of bankruptcy. Bankruptcy involves costs for both the shareholders and stakeholders. From the firm's standpoint, bankruptcy includes direct and indirect costs. Direct bankruptcy costs are the tangible, out-of-pocket expenses of either liquidating or attempting a reorganization of the failing enterprise. These include bankruptcy filing fees and legal, accountant, and other professional service costs

In Kenya, various prediction models have been estimated by various scholars. This estimation process was based on a limited sample of firms. Kogi (2003) sampled 10 firms, Keige (1991) sampled 10 firms , Kamau (2007) sampled 9 firms , Kiragu (1991) sampled 10 firms and Ng'ang'a (2006) sampled 20 firms. This is a very small sample size as compared to similar studies done elsewhere. Altman (1968) applied a sample of 66 firms, Beaver (1966) applied a sample of 158 firms , Deakin (1972) applied a sample of 64 firms, Ohlson (1980) applied a sample of 2163, Edminister (1972) applied a sample of 84 firms ,Wilcox (1973) applied a sample of 104 and Gentry (1987) applied a sample of 66 firms. Besides the limited sample size, the estimated models in Kenya were validated on the in sample alone thus yielding nearly a perfect classification accuracy (Kogi 100%, Keige 100%, Kiragu 100% and Ng'ang'a 100%). This is extreme excellent model as

compared to Altman 95% and Ohlson 98%. Unlike the models estimated by scholars at the University of Nairobi, the other models are being applied in the industry. Since time has also elapsed since the estimation of the models in Kenya accompanied with changes in the economic environment, the predicting ability of the models may have been affected. These issues create a concern on the accuracy and relevancy of the prediction models estimated by MBA studies. Hence the need to validate the models using an out of sample data.

1.3 Research Objective

To validate/ test the University of Nairobi Masters in Business Administration estimated bankruptcy prediction models.

1.4 Significance of the Study

Accurate business prediction model will increase creditors' confidence in lending and also developing profitable business relationships. Banks and other financial institutions would also avoid lending money to businesses that will fail and thus never repay their loans. This will prevent business to losing money to uncredit worthy customers.

The external auditors will also face less threat of a possible law suit because they will be able to provide early warning signals about failing firms through the issuance of qualified audit opinions. External auditors will also know which companies not to audit so as to avoid reputation risk. Internal auditors on the other hand will be able to manage the risk profiles of their institutions accurate and recommend and ensure preventive measures are implemented to prevent sudden collapse of institutions.

Manufacturers would also know which businesses to partner with in the chain of production, so as to ensure timely delivery of services and goods to the customer. Manufactures would be able to predict business failure way in advance and hence change their strategic plans or search for other reliable strategic partners.

Timely identification of business failure would also assist regulatory bodies in ensuring that business failure is dealt with legally and illegal activities ,such as diluting debt holders claims by issuing common stock dividends prior to failure ,is avoided and bankruptcy costs minimized. This will also enable them to measure the stability of the firms and hence boost the market confidence in the regulatory bodies.

Reliable business failure prediction model will increase investors' confidence and this will increase stable economic growth. This is because investors will be able to predict with accuracy the companies which are "a going concern" and invest their money in them, hence high returns with minimal risk.

Add knowledge in the field of finance for academicians and researchers. Studies have been done in the University of Nairobi to estimate the business prediction models but the studies have not been published nor models validated. This will open avenues for more research work in the business failure prediction models applicable in Kenyan environment.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter discusses the theoretical models of bankruptcy, model validation theories and statistical models of bankruptcy. The statistical models of bankruptcy includes the local (Kenyan) models developed using local data and they include: Keige (1990); Kiragu (1990); Kogi (2003); Macharia (2003); Ng'ang'a (2006) and Kamau (2007).

2.2 Theoretical Framework

Theoretical models unlike statistical models and artificial intelligent expert systems model, which focus on firms symptoms on failure, they determine causes of failure. They focus on qualitative sources of failure, drawn mainly from information that could easily satisfy the theoretical argument of firm failure proposed by the theory. They are multivariate in nature and usually employ a statistical technique to provide a quantitative support to the theoretical argument (Aziz et al 1988).

2.2.1 Entropy Theory

It states that one way of identifying financial distress is to examine the changes in the structure of balance sheets, under the argument that firms try to maintain equilibrium in their financial structure. If a firm's financial statements reflect significant changes in the composition of assets and liabilities on its balance sheet it is more likely that it is capable of maintaining the equilibrium state. If these changes are likely to become uncontrollable in future, one can foresee financial distress in these firms (Theil, 1969; Levi, 1973 and Booth, 1983).

2.2.2 Gambler's Ruin Theory

In this approach, the firm can be thought of a gambler playing repeatedly with some probability of loss, continuing to operate until net worth goes to zero (bankruptcy). With an assumed amount of cash, in any given period, there is a net positive probability that firm's cash flows will be consistently negative over a run of periods, ultimately leading to bankruptcy (Scott, 1981).

2.2.3 Option Pricing Theory

It is based on economic theories of corporate finance option pricing theory (Black and Scholes, 1973 and Merton, 1973), whereby default is endogenously related to capital structure and the firm may default on its obligations if the value of its assets falls below a criteria level. McKinsey's Credit Portfolio view model uses a macro-economic approach to risk measurement (Wilson, 1997, 1998). Credit cycles follow business cycles closely, with the probability of default being a function of variables such as the unemployment rate, interest rates, growth rate, government expenses, foreign exchange rates and aggregate savings, so that a worsening economy should be followed by an increase in the incidence of downgraded security rating and default.

2.3 Empirical Literature Review

2.3.1 Multi Discriminant Analysis (MDA)

The development of bankruptcy prediction model started with the use of univariate analysis by Beaver (1966), followed by multivariate discriminant analysis (MDA) by Altman in 1968. Beaver (1966) univariate analysis used individual financial ratios to predict distress. By using 79 failed and non-failed companies that were matched by industry and assets size in 1954 to 1964, his results from the prediction error tests suggested that cash flow to total debt, net income to total asset and total debt to total assets have the strongest ability to predict failure. These ratios differed from the MDA model proposed by Altman (1968). By utilizing 33 bankrupt companies and 33 nonbankrupt companies over the period 1946 to 1964, five variables were selected on the basis that they did the best overall job in predicting bankruptcy. These were working capital to total assets, retained earnings to total assets, earnings before interest and taxes to total assets, market value of equity to book value of total debt and sales to total assets. Z-Score was determined and those companies with a score greater than 2.99 fall into the non-bankrupt group, while those companies having a Z-Score below 1.81 were in the bankrupt group. The area between 1.81 and 2.99 is defined as the zone of ignorance or the gray area. The cut-off index that made the most accurate prediction of bankruptcy one year before filing for bankruptcy was 2.675. The MDA model was able to provide a high predictive accuracy of 95 % one year prior to failure. For this reason, MDA model had

been used extensively by researchers in bankruptcy research (Altman, Haldeman and Narayanan, 1977; Apetiti, 1984; Izan, 1984, Micha, 1984; Shirata, 1998; Ganesalingam and Kumar, 2001). Some of the recent findings in Japan (Shirata, 1998) and Australia (Ganesalingam and Kumar, 2001) showed an accuracy rate of 86.14% and 81.7%.

2.3.2 Logit Analysis

Logit analysis was among the first methodological approaches to take over MDA in deriving ratio-based models for signaling corporate collapse (Ohlson, 1980). Logit analysis determines the probability that a company collapses within some pre-specified time period given that it belongs to some pre-specified population (Ohlson, 1980,). Logit analysis avoids a number of problems that are associated with MDA. First, it avoids the statistical requirement imposed by MDA on the distributional properties of the predictor variables, that is, the financial ratios. Specifically, this refers to two properties: that the variances of the financial ratios are equal for both groups of collapsed and non-collapsed companies, and that the financial ratios are normally distributed. Second, unlike MDA, the output of logit analysis is not a score that has little intuitive interpretive value. Instead, it is a probability, that is, a number between 0 and 1. A value close to 0 indicates a low probability of collapse and a number close to 1 indicates a high probability of collapse. The final logit model that was derived in Ohlson (1980) was based on a sample of 105 collapsed and 2058 non-collapsed companies. The final prediction model was based on 5 financial ratios. These ratios were collected over a 7-year period. The model generated a predictive accuracy of just over 96%. This was indeed a strong result, which spurred more interest in using logit analysis in signaling collapse.

2.3.3 Neural Network Analysis

NN analysis could be visualized as consisting of three 'layers': an input layer, an output layer and a hidden layer. Each layer, in turn, consists of 'nodes'. The nodes in the input layer are called input nodes, those in the hidden layer are called hidden nodes, and those in the output layer are called output nodes. Input nodes represent data that describe the variables being studied. In the context of ratio based modeling of corporate collapse each input node may refer to a particular financial ratio. Output nodes reflect possible known

outcomes. With regards to signaling corporate collapse two output nodes are necessary: one to represent the outcome of collapse and another to represent the outcome of non-collapse. It is the hidden nodes that play a crucial role in NN analysis. The analysis begins with no hidden nodes.

Hidden nodes are then introduced one at a time to improve the network's ability to categorise companies into collapsed and noncollapsed. This process is referred to as 'training'. The role of the hidden nodes is to unravel hidden structures in the data. This is achieved by assigning a numeric weight to each pair of two nodes from any layer. Each numeric weight reflects two aspects. First, it reflects the direction of the relationship between the two nodes. Second, it reflects the strength of the relationship between the two nodes. Thus, the network's knowledge about one node's influence on another is encoded in the connection weights. The training process terminates when 'convergence' is achieved; that is, when the introduction of an additional hidden node does not lead to more accurate classification of firms into collapsed and non-collapsed (Coats and Fant, 1993,).

2.3.4 Recursive Partitioning Algorithm (RPA)

In essence, RPA is a non-parametric technique based on pattern recognition. It requires four inputs: first, a data sample; second, a definition of group classifications; third, a specification of prior probabilities; and finally, an input that represents costs of misclassifications. In the context of ratio-based modeling of corporate collapse, these four inputs translate to the following: first, a data sample consisting of financial ratios; second, two groups: one for collapsed companies and one for non-collapsed companies; third, determination of the percentages of collapsed and non-collapsed companies in the chosen data sample; and finally the cost of misclassifying a collapsed company. Given those four input variables, RPA then generates a model in the form of a binary classification tree. In modeling corporate collapse, at times RPA outperformed MDA, whereas at other times MDA outperformed RPA (Frydman et al., 1985). Such inconsistencies in the results were most probably the reason behind the unpopularity of RPA as a suitable tool for signaling collapse.

2.3.5 Rough Sets Analysis (RSA)

RS analysis was put forward in (Pawlak, 1982) as an approach to handling imperfect data. It was founded on a principle that the universe is made of indiscernible objects called an elementary set. However, an elementary set could be either precise or rough; whereby, the latter falls within an upper approximation and a lower approximation of the former. These approximations would be presented in tabular form, called a decision table, where the rows in the table represent objects in a set. Decision rules would then be derived from the decision table concerning the objects in the table. Moreover, decision rules that are similar would belong to the same decision class. Accordingly, objects would match one of four situations: The object matches only one decision rule, the object matches more than one decision rule, but within the same decision class, the object matches more than one decision rule that are within different decision classes and the object does not match any of the decision rules. In the context of ratio-based models for signaling corporate collapse, an object is a company in the data sample, and a decision rule is whether to classify a particular company as collapsed or non-collapsed.

Given such a dichotomous classification of two mutually exclusive events, an object in the context of ratio-based prediction of corporate collapse can only match either one of two decision rules; whereby, each decision rule corresponds to one and only one decision class. Dimitras et al. (1999) were the first to use RS analysis in modeling corporate collapse. Overall, the classification accuracy of their RS-based corporate collapse prediction model stood at 71.1% when tested on data 1-year prior to collapse, and 55.3% when tested on data 2 and 3 years prior to collapse. On the other hand, the MDA-based model delivered an overall classification accuracy of 60.5% when tested on data 1-year prior to collapse, 55.3% when tested on data 2 years prior to collapse, and 57.9% when tested on data 3-years prior to collapse.

2.3.6 Keige's Model

Keige (1990) conducted a study with a population of limited companies in the register of registrar of companies any time between 1980 and 1990. The sample was 10 failed companies as they were the only companies with a complete set of data. These firms were

then matched with a similar firm which did not fail during the period. Data was collected from the annual accounts of the companies four years prior to the failure. The financial statements for two years prior to the failure were then adjusted for price level changes using the Gross Domestic Product (GDP) deflator. The GDP deflator index numbers were provided by the Central Bureau of Statistics.

He computed the following 19 ratios from the price-level adjusted financial statements: Current ratio; Quick ratio; Working Capital to Debt; Equity to Total Liabilities; Total Debt to Total Assets; Times interest earned; Fixed Charge coverage; Retained Earnings to Total Assets; Profit Margin on sales; Return on Total Assets; Return on Net worth; Inventory Turnover; Average Collection Period; Fixed Asset turnover ;Sales to Total Assets; Monetary Asset to Monetary Liabilities; Monetary liabilities to Total Assets; Monetary Assets to Total Assets; Change in monetary Liabilities (Year t to year t+1).

The ratios were selected on the basis of being common ratios or having been used in multi discriminant analysis business failure prediction related studies. The Multivariate Discriminant Analysis (MDA) was used to identify to identify ratios which can accurately discriminate between failed companies and non failed companies and statgraphics package was used for data analysis. To eliminate the ratios with a weak predictive power, a correlation test using a stratgraphics package was carried out and ratios with a correlation of more than 0.8 were identified and each case one of them eliminated from the sample. The final function was:

$$Z = -0.36716X_1 + 0.16603X_7 + 13.258X_8 + 2.82167X_{10} - 0.65541X_{11} + 0.011818X_{13} + 1.02299X_{15} - 2.72963$$

Where: X_1 =Current ratio; X_7 =Fixed charge coverage; X_8 =Retained earnings to total assets; X_{10} =Return on total assets; X_{11} =Return on net worth; X_{13} =Average collection period and X_{15} =Sales to total assets.

The model was validated, using the initial sample. It correctly classified all the failed firms in the sample, while 90% of the non failed firms were correctly classified. In addition, a holdout sample of 10 companies was used, containing two groups of failed

and non –failed companies. For this second sample, the model achieved an overall classification rate of 80% .A firm is considered failed in this model if it has a Z score of less than zero. From the analysis, stakeholders should pay attention to liquidity, leverage and activity ratios. However the model attained an overall correct classification of 95% in year one, which is similar to results obtained by Altman (1968). The study ranked the following ratios in the order of discriminating power, beginning with the best: Times interest coverage; fixed charge coverage; equity to total liabilities; quick ratio; current ratio; working capital to total debt; retained earning to total assets; change in monetary liabilities and total debt to total Assets.

The limitations of the study were: the ratios used to develop the model are only a few among a large number of possible ratios. Therefore it cannot be claimed that these are the best predictors, but are only a part of a possibility large group of predictors , the software package used had limitations as to the amount of data it could take .Thus the initial lotus worksheet on which the ratios were calculated had to be substantially reduced to fit into the data capacity of the statgraphics package and the matching sample of successful firms could not be strictly matched on stratified random sample basis for information on privately owned companies is not publicly available.

2.3.7 Kiragu's Model

Kiragu (1990) set out to develop a discriminant function for use in predicting failure in Kenya. The population of interest is those companies, registered with registrar of companies ; that went into receivership from 1980 to 1990.Data was extracted from annual accounts of these companies, for four years prior to year of receivership or liquidation.

The following ratios were calculated from the accounts, following the method used by Altman .These ratios were as follows: Current ratio; Quick ratio; Working capital to total debt; Equity to total liabilities; Total debt to total assets; Times interest earned; Fixed charge coverage; retained earnings to total assets; profit margin on sales; return on total

assets; return on net worth; Inventory turnover; Average collection period; Fixed assets turnover and Sales to total assets

The best predictive model using inflation adjusted accounting contained nine predicting variables and was as follows: With standardised coefficients

$$Z=4.13685X_1- 4.47006X_2+ 3.73863X_3- 6.88207X_4- 1.15254X_5-58.2441X_6 + 57.0336X_7 +3.07489X_8+2.09699X_9$$

a. With non standardised coefficients

$$Z=1.08738X_1-1.21347X_2+2.01913X_3-3.47857X_4-4.28099X_5-1.61507X_6+ 1.833389X_7 +20.4831X_8+3.58584X_9+4.12855$$

Where: Z, is the discriminant score; X1, is the current ratio; X2, is the quick ratio; X3, is the working capital to total debt; X4, is the equity to total liabilities; X5, is the total debt to total assets; X6, is the times interest earned; X7, is the fixed charge coverage; X8, is retained earning to total assets and X9, is change in monetary liabilities.

The model was validated by the confusion matrix and the findings of the study provide evidence that: Inflation adjusted accounting can be used for predicting failure. Secondly one should concentrate on the above ratios if there was need to forecast firm's survival and finally most firms in Kenya fail due to the poor funds flow management and unwise debt policies.

The limitations of the study were: the validation results from the confusion matrix are biased upwards because the same observations used to develop the model were used to test the model, the sample size used is small and therefore the model is not stable, it was not possible to calculate some ratios from the available financial statements owing to the fact that most companies give the minimum legal disclosures which have been found wanting, the study is constraint by the limitations of financial statements preparation as the financial ratios generated from financial statements cannot be better than data from which they are based and financial data is only one source of signal about corporate failure.

2.3.8 Kogi's Model

Kogi (2003) studies a population of companies in the register of registrar of companies in the period between 1992 - 2000. The population was divided into groups that had failed and those that had not failed. The sample was had 20 companies were studied in pair. The average asset range was restricted from KShs 300millions to 950 millions. There was no sampling of failed companies as only 10 companies had complete data. Some companies were excluded because they had no complete data. Secondary data collection method was used. Data was from the annual accounts for six years prior to failure. He computed 19 ratios .The ratios computed were: Profitability measures included,X1(Net profit/Sales),X2 Net profit/Net worth,X3 Net profit/Net working capital,X4 Net profit /Fixed assets and X5 Net profit/Total Assets; Activity and turnover ratios included, X6 Sales/Net worth, X7 Sales /Net working capital, X8 Sales /Inventory and X9 Cost of sales/Inventory; Liquidity Measures included,X10 Current ratio,X11 Acid test ratio,X12 Inventory /Net working capital and X13 Current debt/Inventory and Indebt ness Measures included,X14 Fixed assets/Net worth,X15 Current debt/Net worth,X16 Total Debt/Net worth,X17 Time interest earned,X18 Total debt/Net working capital,X19 Total Debt/Total Assets. The ratios were selected because they had been used elsewhere in business failure prediction studies, their reasonableness and general acceptability of the rations in relation to their intended use.

The statistical tool used was the Multivariate Discriminant analysis (MDA) since the, the criterion variable in dichotomy (failed and non- failed), makes discriminant analysis fairly appropriate. The “best” linear discriminant analysis was developed using step wise procedure. The predictor variables were the ratios and their standard deviations. The stability of ratios was measured by the standard deviation.

None of the Activity and turnover ratios was found to be critical in corporate failure prediction. The best prediction model attained was:

$$Z=0.13X_1+4.028X_5+0.216X_{13}+10.079X_{19}-4.083.$$

It attained 70% and 100% correct classification in 1 and in year 3 respectively. The findings were consistent with studies by Kiragu (1991), Kiege (1991) and Dambolena and Khoury (1980), who concluded that profitability and leverage were most crucial in predicting failure but differed with Altman (1968) who concluded that efficiency and profitability ratios were the most crucial and that liquidity ratios were not significant.

The limitations of the study were: the findings are limited as the sample size used was small, few ratios are significant and not all the ratios are independent in the sense that they could not be logically derived from other ratios without reference to the original figures, it was not possible to calculate some ratios from the available information. For example X9 (Cost of sales/Inventory) could not be computed from the sample because of lack of data on cost of sales. The matching of failed and non failed company could not be undertaken on stratified basis, as information on private owned companies is not publicly available and the study focused on financial analysis of corporate failure .Qualitative aspects such as company's strategy, age of the firm and quality of management were ignored which need to be considered in interpreting the results.

2.3.9 Macharia's Model

Macharia (2003) sets out to determine coefficients for the discriminant model using financial statement data and to test the validity of the discriminant model. The population was co-operative societies who have a loan accounts with co-operative bank of Kenya. The sample was 64 co-operative societies' accounts, 32 of which are performing and 32 non performing. Data was analysed using the multi-discriminant analysis model developed and a classification matrix was used to test the validity of the model.

A total of twelve ratios were used in the study .They included: Current asset ratio (Current assets/current liabilities);Return on assets ratio (ROA);Return on Equity ratio(ROE);Debt to equity ratio(D/Equity);Liabilities to total assets ratio(L/TA);Advances to deposits ratio(Adv/deposits);Expenses to income ratio(Exp/Inc);Income to fixed Assets ratio (Inc/Fixed Asset);Fixed assets to total assets

ratio(FA/TA);Current Assets to total assets (CA/TA);Cash/total assets(Cash/TA) and Working capital/total assets.

The debt equity ratio, advances to deposit ratio, expenses to income ratio and return to equity have the highest dispersion as measured by standard deviation .This was explained by wide differences between the minimum and maximum value of these ratios. Theoretically these ratios should be having the highest discriminating power.

The multi - discriminant model developed was

$$Z=V_1X_1+V_2X_2+V_3X_3.....V_n X_n.$$

Where: Z is the score on discriminant function, in this study, In either performing or non performing loan.

V_1 to V_n - the discriminant weights or co-efficient.

X_1 to X_n -the independent predictor variable.

The findings of the study indicate than reliance can be placed on the financial ratios used in this study to support performing and non-performing co-operative societies. The discriminant analysis model was 78% accurate. The limitation was that ratios used to develop the model are only a few in comparison to the numerous ratios available. They cannot be concluded as sole ratios that can help predict the performance of the societies.

2.3.10 Ng'ang'a's Model

Ng'ang'a' (2006) ascertains the indicators of business failure and to develop a business failure prediction model for insurance companies in Kenya. The research design was a census and the population of interest was all insurance companies which have operated in the insurance industry from January 1989 to December 2004.The sample was all insurance companies (failed and non-failed) during the period were subjects of the study.

On data analysis, secondary data was obtained from insurance companies' published annual financial statements over the period of study. Both qualitative and quantitative data was collected. Qualitative data (notes to the accounts) was used to discriminate

qualitative characteristics, which can predict financial distress. Quantitative data (balance sheet and income statement amounts) on the other hand was used to work out a number of financial ratios relevant to insurance business.

Using the SPSS program the following discriminant function was estimated:

$$Z=0.109X_1-8.45X_2+30.602X_3-4.409X_4+17.31X_5+7.94X_6-8.502;$$

Where: X_1 =current ratio, X_2 =retained earnings to total assets, X_3 =profit before tax/total assets, X_4 =sales/total assets, X_5 =book value of equity /to book value of total liabilities, X_6 =debt ratio, and a Constant =-8.502. Another model was developed using the general business operations only was derived as follows:

$$Z=-0.004X_1-0.8X_2+21.95X_3-5.41X_4+9.94X_5+2.5X_6-2$$

The study revealed that it is possible to classify failing and non-failing companies. The consistency of the results on status of the companies for a period of over five years and in at least 100% of the failed and 80% of the non failed companies implies that its possible to apply the MDA in developing a failure prediction model for the insurance industry in Kenya. The study further revealed that effective and efficient management is critical to the survival of an organization and that business failure has no clemency for size.

The limitations of the study were: the study developed a model for general insurance company but could not develop the one for life assurance, the features of these companies differ in terms of investment mix, capital structure requirements and provisions, the model did not consider other parameters like economic factors that may also affect business survival and research studies on financial distress in the Kenyan economy are limited in number. This limits the comparability of the results obtained, as the studies have to be modeled on those of developed economies.

2.3.11 Kamau's Model

Kamau (2007) attemptd to determine the usefulness of cash flow ratios to predict financial failure. The population was composed of all the 52 companies listed in the Nairobi Stock exchange between 1999 and 2005. The sample of failed entities composed of all entities de-listed or suspended from NSE Between 1999 to 2005. The firms were

randomly from industrial and allied sector, commerce and service sector and agriculture sector. Data used was the financial accounts for the failed and non failed entities for the period 1999-2005. The financial accounts were obtained from the NSE, CMA and the companies. Financial ratios using the cash flow statement was then calculated.

The multiple discriminant analysis (MDA) to calculate the Z score, which was used to classify entities as either bankrupt or non bankrupt. MDA was used because it considers the entire profile of ratio common to relevant firms and most statistics/data analysis of.

The model had seven ratios as the independent variables namely: X1= OCF (Operating cash flow ratio); X2=FFC(Funds flow coverage ratio); X3=CCDC(Cash current debt coverage ratio); X4=CER(Capital expenditure ratios); X5=CTR (Cash flow total debt ratio); X6=TFR (Total Free cash flow ratio); X7=CFA(Cash flow adequacy). The actual model was expected to be in the form:

$$Z=W_1X_1+W_2X_2+W_3X_3+W_4X_4+W_5X_5+W_6X_6+W_7X_7$$

The Statistical package for social science (SPSS) was used to analyze the data and estimate the parameters. Prediction of case was done by the Z score. If Z score was near zero than one, and then the case was classified as failed. The actual model was $Z=-0.313X_1-0.113X_2+0.826X_3+0.504X_4+0.041X_5-0.671X_6+1.318X_7$.

The Z score was calculated for two consecutive years for each firm. The model was able to classify 85% of the cases correctly and 15% wrongly one year prior to failure. Type I error was 0% while type II error was 15% meaning viable entities were classified as failure.

2.3.12 Conclusion

The year 1968 saw a major shift from univariate to multivariate methodological approaches to ratio-based modeling of corporate collapse. This was facilitated by the introduction of a new statistical tool called Multiple Discriminant Analysis (MDA). However, it did not take long before other statistical tools were developed. The primary objective for developing these tools was to enable deriving models that would at least do as good a job as MDA, but rely on fewer assumptions. With the introduction of new

statistical tools, researchers became pre-occupied with testing them in signaling corporate collapse. Among the ratio based approaches was Logit analysis, Neural Network analysis, Recursive Partitioning Algorithm and Rough Sets analysis. Regardless of which methodological approach was chosen, most were compared to MDA.

Table 1.1: Summary of Discriminant Analysis Models

Author	Period of study	Technological method	No. of variables included	No. of output variables	Level of accuracy
Altman (1968)	1946-1965	MDA	22	5	95%
Altman (1977)	1969-1975	MDA	27	7	96.2%
Ohlson (1980)	1969-1975	Logit model	9	9	98%
Keige (1990)	1980-1990	MDA	19	7	100%
Kiragu (1990)	1980-1990	MDA	15	9	100%
Kogi (2003)	1992-2000	MDA	19	4	100%
Macharia (2003)	Case study	MDA	12	12	78%
Ng'ang'a (2006)	1989-2004	MDA	6	6	100%
Kamau (2007)	1999-2005	MDA	7	7	85%
Nyamu (2010)	2004 - 2009	MDA	15	9	100%

The main weaknesses of MDA are that they assume linear relationship between variables, they are classification models, not predictive models with ordinal scores, and they do not attach relative importance to ratios and are not resistant to severe multicollinearity. The advantages are that they are multivariate in nature and gives continuous scoring.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

Methodology refers to a set of methods or procedures that will be used to carry out a research. It also refers to the rationale and the assumptions that underlie a particular study relative to the scientific method (Mugenda, 2003). The methodology has the research design, the data validation sample, data collection method and data analysis method.

3.2 Research Design

Historical research design was used where quantitative data from financial statements (balance sheet and income statement) was collected and used to validate all the estimated bankruptcy models by University of Nairobi Masters in Business administration. The models tested are: Kogi's, Keige, Kiragu, Ng'ang'a and Kamau's models.

3.3 Data Validation Sample

All entities de-listed or suspended from Nairobi Stock Exchange from 1970-2009 and a matching number of companies listed since 1970-2009. The matching number of listed companies was selected on a random basis depending on the availability of data from Capital Markets Authority.

3.4 Data Collection

Secondary data was collected from the annual published financial statements of the companies under study over the period of study. Both the quantitative and qualitative data were collected. Qualitative data was used to discriminate qualitative characteristics that can predict financial distress. Quantitative characteristics were used to test the University of Nairobi Master in Business Administration studies models developed by scholars. The data collected were from financial statements of companies listed in the Nairobi Stock Exchange from 1970 - 2009.

3.5 Data Analysis

Discriminant analysis models developed in Kenya were used to analyse the data. The discriminant functions formulated are in the form:

$$Z=A_1X_1+A_2X_2+A_3X_3+\dots\dots\dots +A_NX_N$$

Where:

Z=Discriminant score

A₁, A₂ ...A_N=discriminant coefficients

X₁, X₂ ...X_N=independent variables

Since the models have already been developed, there shall be no development of a statistical technique or the use of a statistical software package. The statistical formulas will be applied as developed.

The prediction models that have been developed in Kenya are Multivariate Discriminant Analysis models by Keige (1990), Kiragu (1990),Kogi (2003),Macharia (2003),Ng'ang'a (2006) and Kamau (2007).

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1 Introduction

The objective of this study was to validate/ test the University of Nairobi Masters in Business Administration estimated bankruptcy prediction models. The population for this study consisted of all firms listed at the Nairobi Securities Exchange from 1970 to 2009. Failed firms were considered to be those that had either been suspended or delisted from the NSE to date. They were only 10 firms during this period. Non-failed firms were all the entities listed in the NSE since the year 1999-2009. 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 companies analyzed in the study as non failed firms are symbolized as: KAKU- Kakuzi, 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. The companies considered as failed firms are: EAPL – East Africa packaging limited, KNM – Kenya national mills, DUN - Dunlop, BAUM – A Bauman, RUA – Reagent, PDC – Pearl, HBL – Hutchings Biemer Limited, USM – Uchumi Supermarket, THET – Theta group, LEA – Lonrho East Africa.

4.2 Altman's Model

The Z-score is a linear combination of 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 groupings (distressed and non-distressed).

The Altmans model formula applied: $Z' = 0.717T_1 + 0.847T_2 + 3.107T_3 + 0.420T_4 + 0.998T_5$ Where; $T_1 = (\text{Current Assets}-\text{Current Liabilities}) / \text{Total Assets}$, $T_2 = \text{Retained Earnings} / \text{Total Assets}$, $T_3 = \text{Earnings before Interest and Taxes} / \text{Total Assets}$, $T_4 = \text{Book Value of Equity} / \text{Total Liabilities}$ and $T_5 = \text{Sales} / \text{Total Assets}$

Table 4.1: Summary of Key Findings (Average Score for Five Years) Failed Firms

Firms	EAP	KNM	DUN	BAUM	RUA	PDC	HBL	THET	LEA	USM
Average Score	0.962	1.633	0.685	1.046	0.772	0.550	1.304	0.862	1.537	1.097
State	dis	grey	dis	Dis	dis	dis	dis	dis	grey	dis

Source: Author (2012)

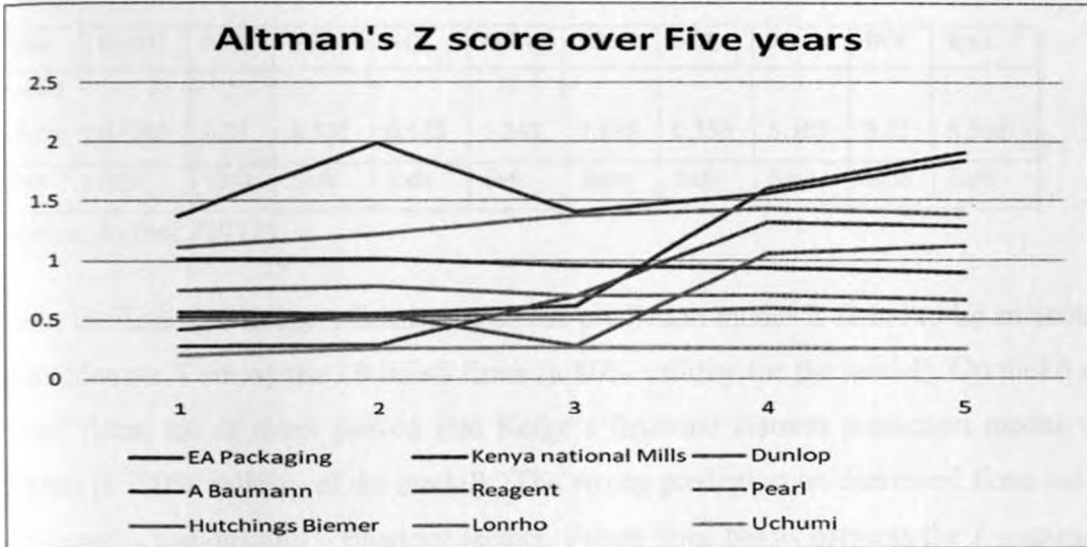
Table 4.2: Summary of Key Findings (average Score for five years) Non Failed Firms

Firms	KAKU	RVP	STL	KQ	MEA	NMG	SGL	SG	BOC	BAT
Average Score	1.290	2.01	1.548	1.833	4.160	3.10	1.080	2.014	1.46	1.281
State	Grey	Grey	Grey	grey	safe	safe	Dist	grey	grey	grey

Source: Author (2012)

From the findings, Edward Altman's financial distress prediction model is found to be an accurate prediction on 8 out of the 10 failed firms (a 80% validity for the model). On 10 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. The Z scores on the failed firms over five year period is presented below.

Figure One: Z – Scores for Failed Firms on Altman’s Model



Source: Author (2012)

4.2.1 Zones of Discrimination

$Z' > 2.9$ -“Safe” Zone, $1.23 < Z' < 2.9$ -“Grey” Zone, $Z' < 1.23$ -“Distress” Zone.

4.3 Keige’s Model

The Z score function applied herein was:

$$Z = -0.36716X_1 + 0.16603X_7 + 13.258X_8 + 2.82167X_{10} - 0.65541X_{11} + 0.011818X_{13} + 1.02299X_{15} - 2.72963$$

Where, X_1 =Current ratio; X_7 =Fixed charge coverage; X_8 =Retained earnings to total assets; X_{10} =Return on total assets; X_{11} =Return on net worth; X_{13} =Average collection period and X_{15} =Sales to total assets.

Table 4.3: Summary of Key Findings (Average Score for Five Years) Failed Firms

Firms	EAP	KNM	DUN	BAUM	RUA	PDC	HBL	THET	LEA	USM
Average Score	-1.71	-5.58	-1.20	-0.611	-0.44	-0.60	-0.85	-235.3	1.537	0.470
State	Dis	Dis	Dis	Dis	Dis	Dis	Dis	Dis	Safe	Safe

Source: Author (2012)

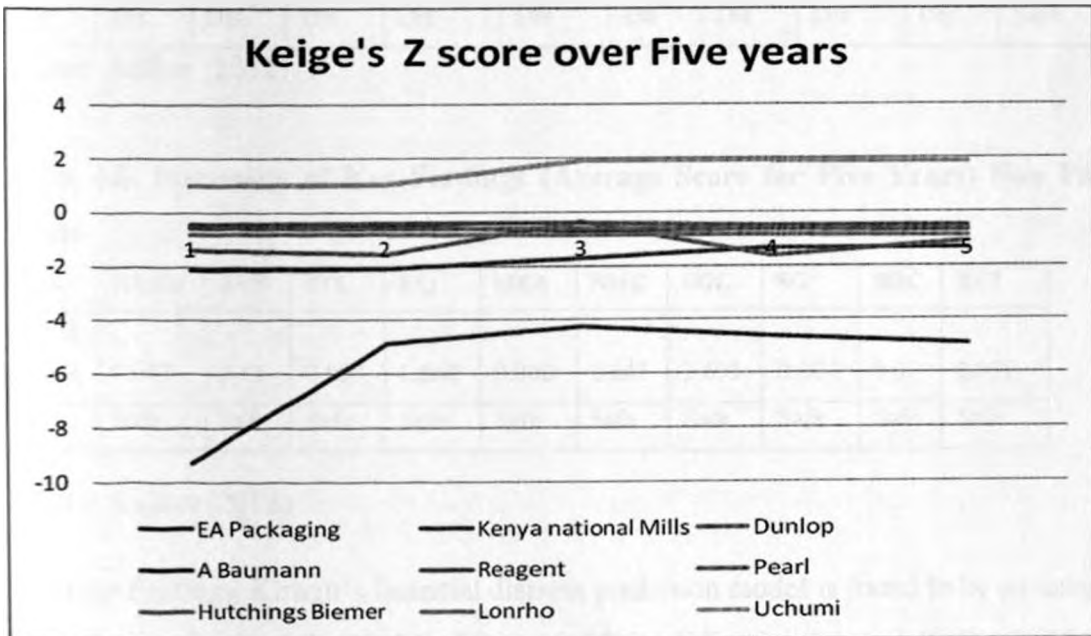
Table 4.4: Summary of Key Findings (Average Score For Five Years) Non Failed Firms

Firms	KAKU	RVP	STL	KQ	MEA	NMG	SGL	SG	BOC	BAT
Average Score	0.4702	0.21	5.930	0.578	5.248	1.638	0.355	5.305	3.22	5.590
State	Safe	Safe	Safe	Safe	Safe	Safe	Safe	Safe	Safe	Safe

Source: Author (2012)

From the findings, Keige’s financial distress prediction model is found to be an accurate prediction on 8 out of the 10 failed firms (a 80% validity for the model). On the 10 non-failed firms, all of them proved that Keige’s financial distress prediction model were correct (a 100% validity of the model). The wrong prediction on distressed firms may be attributed to various non – financial factors. Figure three below presents the Z – scores on failed firms over a five year period.

Figure Two: Z – Scores for Failed Firms on Keige’s Model



Source: Author (2012)

4.3.1 Zones of Discrimination

$Z' > 0$ -“Safe” Zone, $Z' < 0$ -“Distress” Zone

4.4 Kiragu’s Model

The model tested is as:

$$Z=1.08738X_1-1.21347X_2+2.01913X_3-3.47857X_4-4.28099X_5-1.61507X_6+1.833389X_7+20.4831X_8+3.58584X_9+4.12855$$

Where: X1 - is the current ratio, X2 - is the quick ratio, X3 - is the working capital to total debt, X4- is the equity to total liabilities, X5- is the total debt to total assets, X6- is the times interest earned, X7- is the fixed charge coverage, X8- is retained earning to total assets and X9- is change in monetary liabilities

Table 4.5: Summary of Key Findings (Average Score for Five Years) Failed Firms

Firms	EAP	KNM	DUN	BAUM	RUA	PDC	HBL	THET	LEA	USM
Average Score	-0.04	-0.12	-0.05	-1.659	-0.007	-0.64	-3.69	-0.004	-0.01	0.056
State	Dis	Dis	Dis	Dis	Dis	Dis	Dis	Dis	Dis	Safe

Source: Author (2012)

Table 4.6: Summary of Key Findings (Average Score for Five Years) Non Failed Firms

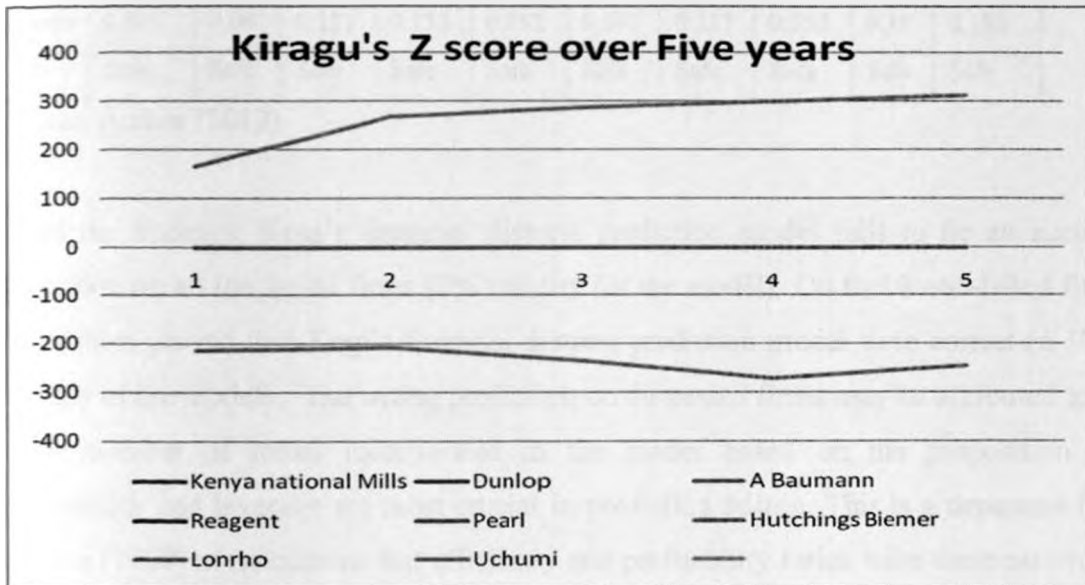
Firms	KAKU	RVP	STL	KQ	MEA	NMG	SGL	SG	BOC	BAT
Average Score	0.047	0.12	0.053	1.660	0.008	0.647	3.699	0.004	0.01	0.057
State	Safe	Safe	Safe	Safe	Safe	Safe	Safe	Safe	Safe	Safe

Source: Author (2012)

From the findings, Kiragu’s financial distress prediction model is found to be an accurate prediction on 9 out of the 10 failed firms (a 90% validity for the model). On the 10 non-failed firms, all of them proved that Kiragu’s financial distress prediction model were correct (a 100% validity of the model). The wrong prediction on distressed firms may be

attributed to other environmental factors not incorporated in the model. Figure four below presents the Z – scores for the failed firms over five years.

Figure Three: Z – Scores for Failed Firms on Kiragu’s Model



Source: Author (2012)

4.4.1 Zones of Discrimination

$Z' > 0$ -“Safe” Zone, $Z' < 0$ -“Distress” Zone

4.5 Kogi’s Model

The model considered for testing is as:

$$Z=0.13X_1+4.028X_5+0.216X_{13}+10.079X_{19}-4.083.$$

Table 4.7: Summary of Key Findings (Average Score for Five years) Failed Firms

Firms	EAP	KNM	DUN	BAUM	RUA	PDC	HBL	THET	LEA	USM
Average Score	0.337	0.089	0.142	0.135	0.137	0.13	0.104	13.213	0.043	0.099
State	Safe	Safe	Safe	Safe	Safe	Safe	Safe	Safe	Safe	Safe

Source: Author (2012)

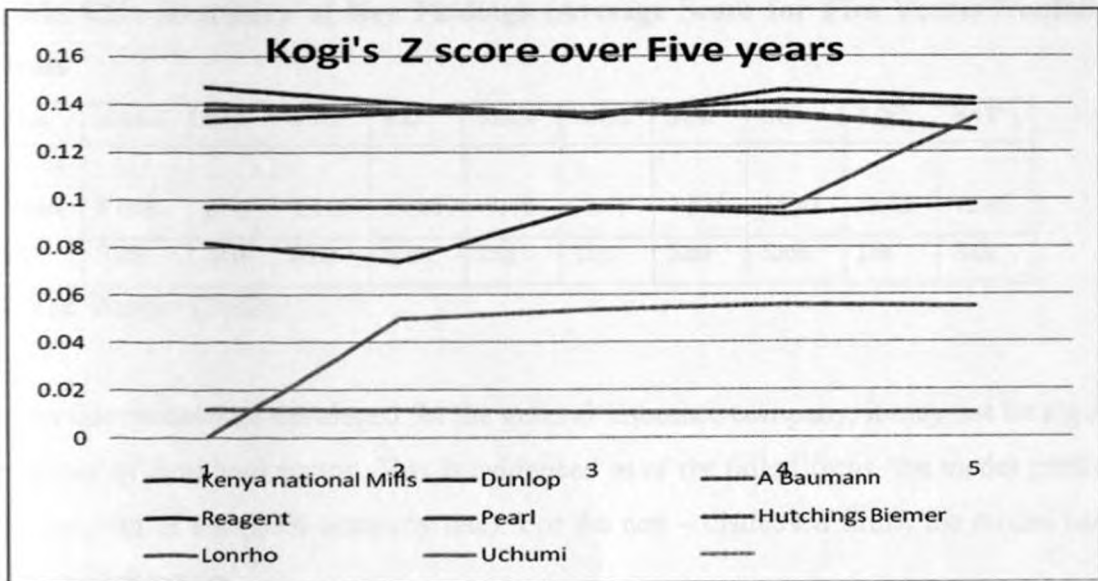
Table 4.8: Summary of Key Findings (Average Score for Five Years) Non Failed Firms

Firms	KAKU	RVP	STL	KQ	MEA	NMG	SGL	SG	BOC	BAT
Average Score	0.099	0.09	0.133	0.138	0.952	0.141	0.137	0.055	0.33	0.132
State	Safe	Safe	Safe	Safe	Safe	Safe	Safe	Safe	Safe	Safe

Source: Author (2012)

From the findings, Kogi's financial distress prediction model fails to be an accurate prediction on all the failed firms (0% validity for the model). On the 10 non-failed firms, all of them proved that Kogi's financial distress prediction model were correct (a 100% validity of the model). The wrong prediction on distressed firms may be attributed to the fewer number of ratios incorporated in the model based on the proposition that profitability and leverage are most crucial in predicting failure. This is a departure from Altman (1968) advancement that efficiency and profitability ratios were the most crucial and that liquidity ratios were not significant.

Figure Four: Z – Scores for Failed Firms on Kogi's Model



Source: Author (2012)

4.5.1 Zones of Discrimination

$Z' > 0$ -“Safe” Zone, $Z' < 0$ -“Distress” Zone

4.6 Ng'ang'a's Model

The study tests the following model:

$$Z=0.109X_1-8.45X_2+30.602X_3-4.409X_4+17.31X_5+7.94X_6-8.502$$

Where: X_1 =current ratio, X_2 =retained earnings to total assets, X_3 =profit before tax/total assets, X_4 =sales/total assets, X_5 =book value of equity /to book value of total liabilities, X_6 =debt ratio, and a Constant =-8.502

Table 4.9: Summary of Key Findings (Average Score for Five Years) Failed Firms

Firms	EAP	KNM	DUN	BAUM	RUA	PDC	HBL	THET	LEA	USM
Average Score	-2.45	5.429	0.601	1.400	0.961	1.78	9.691	-2227	18.69	8.654
State	Dis	Safe	Safe	Safe	Safe	Safe	Safe	Dis	Safe	Safe

Source: Author (2012)

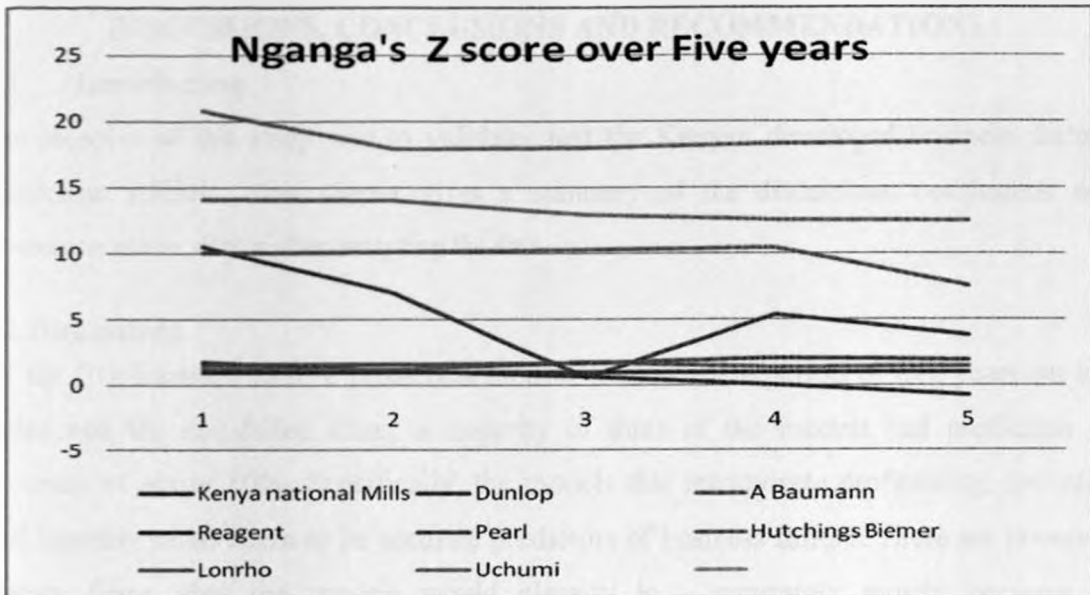
Table 4.10: Summary of Key Findings (Average Score for Five Years) Nonfailed Firms

Firms	KAKU	RVP	STL	KQ	MEA	NMG	SGL	SG	BOC	BAT
Average Score	8.654	27.0	9.116	39.85	-7.49	-5.61	7.525	35.41	-0.48	15.45
State	Safe	Safe	Safe	Safe	Dis	Dis	Safe	Safe	Dis	Safe

Source: Author (2012)

Since this model was developed for the general insurance company, it may not be a good predictor of firm bankruptcy. This is evidenced as of the failed firms, the model predicts just two out of ten (20% accuracy rate). For the non – distressed firms, the model has a 70% accuracy rate.

Figure Five: Z – Scores for Failed Firms on Nganga’s Model



Source: Author (2012)

4.6.1 Zones of Discrimination:

$Z' > 0$ -“Safe” Zone, $Z' < 0$ -“Distress” Zone

4.7 Summary of Analysis

This chapter tests five models using ten failed and other ten non failed firms. The models tested are: Altman’s model, Keige’s model, Kiragu’s model, Kogi’s model and Ng’anga’s model. For the non failed firms, Altmans’ model exhibit a 90% accuracy level, Keige’s model exhibit a 100% accuracy level, Kiragu’s model exhibit a 100% accuracy level, Kogi’s model exhibit a 100% accuracy levels and Ng’anga’s model exhibit a 70% accuracy level. On the contrary, for the failed firms, Altmans’ model exhibit a 80% validity level, Keige’s model exhibit a 80% validity level, Kiragu’s model exhibit a 90% validity level, Kogi’s model exhibit a 0% validity levels and Ng’anga’s model exhibit a 20% validity level. The low prediction levels are explained by choice of fewer ratios or choice of sample from specialized industry samples like the banking industry and the insurance industry.

CHAPTER FIVE

DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The objective of this study was to validate/ test the Kenyan developed business failure prediction models. This chapter gives a summary of the discussions, conclusions and recommendations drawn after analyzing the data.

5.2 Discussions

Of the five business failure prediction models tested over a period of five years on ten failed and ten non-failed firms, a majority of three of the models had prediction of accuracy of above 80%. Specifically, the models that incorporate profitability, leverage and liquidity ratios seem to be accurate predictors of business failure. There are however certain firms, that the models would classify in - accurately mostly because of environmental or firm specific factors.

The study also proves that specialized industry specific models like the insurance industry or banking industry models may not be applicable in general company bankruptcy prediction. One of the models that exhibit a 20% accuracy levels has a limitation of incorporating fewer ratios of firm performance that exclude other business performance parameters that explain firm failure.

5.3 Conclusions

Generally the Multiple discriminant analysis (MDA) models developed in Kenya have an accuracy level exceeding 80% of corporate failure prediction save for the industry specific models. In line with Altman's model, these locally developed models incorporate factors that affect local business that may have been omitted by the earlier scholars. These also include the factors that influence small business survival or failure.

At 90% levels of failure prediction, the Altman's model 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. Since Kiragu's model also exhibit similar

levels of accuracy on failure prediction, the role of environmental factors and firm setting should also be explained if further models.

Keige's model at 80% validity for failure prediction is significant. It is noteworthy that the wrong predictions on distressed firms may be explained by some extraneous non – financial factors that the firms face. Kogi's financial distress prediction model fails to be an accurate prediction on all the failed firms (0% validity for the model). The wrong prediction on distressed firms may be attributed to the fewer number of ratios incorporated in the model based on the proposition that profitability and leverage are most crucial in predicting failure. This is a departure from Altman (1968) advancement that efficiency and profitability ratios were the most crucial and that liquidity ratios were not significant.

Ngang'as model has a 20% accuracy rate. Though the model was developed for the general insurance industry, it may not be a good predictor of firm bankruptcy. It's prediction ability is therefore explained by the common ratios incorporated in the model that measure firm leverage, liquidity and profitability.

5.4 Limitations of the Study

The research data obtained from the NSE was purchased from the data vendors. This had cost implications on the researcher. The data used was mainly obtained from published financial statements which at times are window dressed and do not portray the true financial performance and position of the companies studied. The challenge with data availability in the short time of the study also made it impractical to compare the firms as peers in size or industry. The scarce research efforts on models validation in the Kenyan context was quite a challenge taken positively by the researcher.

5.5 Recommendations for Further Research

Having established that the Kenyan developed corporate bankruptcy models are generally accurate up to 80% in predicting corporate bankruptcy, there is need to incorporate non financial indicators that influence firm performance in the discriminant analysis. This should include the legal environment, the business environment and firm specific factors

like the management effect. Further studies should be directed towards developing industry and sector specific discriminant models that meet specific user needs like lenders and investors who give different weightings to various performance indicators depending on their risk appetite.

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APPENDIX I

COMPANIES LISTED IN THE NAIROBI STOCK EXCHANGE FROM 1970 TO 2009

A. BAUMANN & CO. LTD	EAST AFRICAN OXYGEN LTD
AFRICAN LAKES	EAST AFRICAN PACKAGING LTD
AFRICAN TOURS & HOTELS LTD	EAST AFRICAN PORTLAND CEMENT LTD
ARM BOND	EQUITY BANK
ATHI RIVER MINING	EXPRESS KENYA LTD
B.A.T. KENYA LTD	FIRESTONE EAST AFRICA LTD
BAMBURI PORTLAND CEMENT CO. LTD	GOERGE WILLIAMSON KENYA LTD
BARCLAYS BANK LTD	HOUSING FINANCE CO. LTD
BOC KENYA LTD	HUTCHINGS BIEMER LTD
BROOKE BOND LTD	I.C.D.C. INVESTMENT CO. LTD
C.M.C. HOLDINGS LTD ORD	JUBILEE HOLDINGS LTD
CAR & GENERAL (K) LTD	KAKUZI LIMITED
CARBACID INVESTMENTS LTD	KAPCHORUA TEA CO. LTD
CFC BANK LIMITED LTD	KENSTOCK LTD
CHANCERY INVESTMENT LTD	KENYA AIRWAYS LIMITED
CHANCERY INVESTMENT LTD	KENYA BREWERIES LTD
CITY TRUST LTD	KENYA COMMERCIAL BANK LTD
CROWN-BERGER LTD	KENYA ELECTRICITY GENERATING CO
DIAMOND TRUST OF KENYA LTD	KENYA FINANCE BANK LTD
DUNLOP KENYA LTD	KENYA HOTELS LTD
EAAGADS LTD	KENYA NATIONAL MILLS LTD ORD
EAST AFRICAN BREWERIES LTD	KENYA OIL COMPANY LTD
EAST AFRICAN CABLES LTD	KENYA ORCHARDS LTD
EAST AFRICAN DEVELOPMENT BANK LTD	KENYA POWER & LIGHTING CO. LTD
	LIMURU TEA CO. LTD
	LONRHO MOTORS
	MABATI ROLLING MILLS

MARSHALLS (E.A.) LTD
MOTOR MART GROUP LTD
MUMIAS SUGAR COMPANY LTD
NATION MEDIA GROUP
NATION PRINTERS & PUBLISHERS
NATIONAL BANK OF KENYA LTD
NATIONAL INDUSTRIAL CREDIT LTD
OL PEJETA RANCHING LTD
OLYMPIA CAPITAL HOLDINGS LTD
PAN AFRICA INSURANCE LTD
PEARL DRY CLEANERS LTD
PHILIP INTERNATIONAL LTD
REA VIPINGO PLANTATIONS LTD
REGENT UNDERVALUED ASSETS
AFRICA FUND
SAFARICOM LTD
SAMEER AFRICA LTD ORD
SASINI LTD
SCAN GROUP LTD
SERENA HOTELS
STANDARD CHARTERED BANK LTD
STANDARD GROUP LTD
STANDARD NEWSPAPERS GROUP
THETA GROUP LTD
TOTAL KENYA LTD
TPS EASTERN AFRICA
UCHUMI SUPERMARKETS LTD
UNGA GROUP LTD
UNILEVER TEA KENYA LTD
WILLIAMSON TEA KENYA LTD

Source:NSE

APPENDIX II*

INSOLVENT COMPANIES

YEAR	Liquidated companies	Winding up petitions	Total
1964	1	1	2
1965	1	1	2
1966	1	1	2
1967	0	1	1
1968	2	2	4
1969	2	2	4
1970	2	2	4
1971	4	4	8
1972	4	7	11
1973	3	2	5
1974	9	10	19
1975	7	6	13
1976	6	12	18
1977	9	13	22
1978	3	9	12
1979	5	16	21
1980	12	26	38
1981	15	26	41
1982	14	19	33
1983	17	44	61
1984	0	27	27
1985	2	36	38
1986	1	30	31
1987	3	39	42
1988	11	49	60
1989	9	36	45

1990	8	33	41
1991	16	45	61
1992	15	48	63
1993	14	49	63
1994	9	27	36
1995	17	29	46
1996	14	34	48
1997	19	51	70
1998	13	53	66
1999	16	53	69
2000	13	52	65
2001	7	61	68
2002	5	45	50
2003	7	49	56
2004	5	35	40
2005	1	40	41
2006	1	34	35
2007	3	20	23
2008	1	33	34
2009	3	43	46
Total	330	1255	1585

Source: State Law Office

APPENDIX III
MODEL ANALYSIS WORKSHEETS

Failed firms

Table One: 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
(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
(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
(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
(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
(sales / total assets)	0.7869	0.7869	0.727	0.7321	0.6916
Z score - Altman	1.0164	1.0134	0.955	0.9325	0.8932

Table Two: 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

Table Three: 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

Table Four: 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

Table Five: 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

Table Six: 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 liabilities)	0.0513	0.0547	0.0553	0.0573	0.0598
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

Table Seven: 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

Table Eight : 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/TA	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/ TA)	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

	172.269	173.539	174.829	178.368	198.357
(sales / total assets)	0.1085	0.1123	0.1137	0.1154	0.1265
Score	0.6216	0.2833	0.7982	1.2925	1.3119

Table Nine: 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
WC/TA)	0.2060	0.2118	0.1711	0.1477	0.1513
Retained earnings	139.425	138.450	126.265	122.245	121.673
Retained earnings/ total assets)	0.0504	0.052	0.0477	0.0478	0.0476
EBIT	11.256	11.785	31.319	26.789	25.678
EBIT/ 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
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
Sales / total assets)	0.7584	0.7869	0.6995	0.7034	0.6645
Score	0.9827	1.016	1.917	1.9103	1.8619

Table Ten : 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
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
Retained earnings/ total assets)	0	0.0493	0.0491	0.0485	0.0476
EBIT	654.358	246.032	237.387	286.276	287.368
EBIT/ 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
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
Sales / total assets)	0.2097	0.2592	0.256	0.2514	0.246
Score	0.8132	1.0799	1.0912	1.2514	1.251

Failed Firms
 Table Eleven: 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/ total assets)	0.0252	0.0251	0.0023	0.0236	0.0239
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

Table Twelve: 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
EBIT	187.257	197.540	199.968	198.657	197.547
C (EBIT/ 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 (BVE/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

Table Thirteen: 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

Table Fourteen: 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
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Table Fifteen: Marshalls 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

Table Sixteen: 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

Table Seventeen: 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

Table Eighteen: 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

Table Nineteen: 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

Table Twenty: 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

Table Twenty One: Other Models Analysis Work Sheet:

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	2661.97	2549.064	2456.356	2454.234
working capital/total assets	0.217	0.2122	0.1829	0.1496	0.1493
Retained earnings	129.425	128.45	116.265	112.245	111.673
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
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
book value of equity/ total liabilities	0.0523	0.051	0.05167	0.0587	0.0591
Sales	2098.76	2094.65	1853.145	1798.234	1697.365
sales / total assets	0.7869	0.7869	0.727	0.7321	0.6916
Z score- Altman	1.0164	1.0134	0.9550	0.9325	0.8932
Z score - Keige	-2.1151	-2.0630	-1.7020	-1.3394	-1.3361
Z score - Kiragu	-0.1623	-0.1658	-0.1824	-0.1947	-0.1919
Z score - Kogi	0.3506	0.3511	0.3483	0.3196	0.3152
Z score - Nganga	-2.8277	-2.8360	-2.2999	-2.2479	-2.0730

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
working capital/total assets	0.7844	0.4061	0.3376	0.363	0.4034
Retained earnings	168.958	167.789	169.602	171.784	173.865
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
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	1905	1792	1865.678
Book value of equity/ total liabilities	0.2494	0.3001	0.1436	0.1536	0.155
Sales	2946.239	2962.986	2900.858	2125.286	2948.256
Sales / total assets	0.0009	0.9063	0.8441	0.6156	0.8861
Z score- Altman	1.3754	1.9872	1.409	1.5627	1.8332
Z score - Keige	-9.301	-4.869	-4.252	-4.602	-4.924
Z score - Kiragu	-0.010	-0.013	-0.026	-0.023	-0.021
Z score - Kogi	0.082	0.074	0.097	0.094	0.098
Z score - Nganga	10.487	6.936	0.575	5.350	3.798

Dunlop

	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
working capital/total assets	0.2651	0.2902	0.0684	0.3265	0.2136
Retained earnings	79.738	84.06	76.162	82.642	81.479
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
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
Book value of equity/ total liabilities	0.0421	0.022	0.0793	0.0793	0.075
Sales	15.234	137.472	175.829	142.635	152.956
sales / total assets	0.0107	0.0958	0.1198	0.5671	0.717
Z score- Altman	0.4235	0.553	0.2779	1.054	1.114
Z score - Keige	-1.3915	-1.5730	-0.3645	-1.6366	-1.0836
Z score - Kiragu	-0.0232	-0.0212	-0.0852	-0.0190	-0.0282
Z score - Kogi	0.1470	0.1405	0.1344	0.1456	0.1423
Z score - Nganga	1.7929	1.1355	0.7287	0.0653	-0.7151

A Baumann

	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
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
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
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	57.98	64.389	61.276
Total liabilities	708.34	711.982	707.201	713.632	698.256
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
sales / total assets	0.099	0.0939	0.1103	0.1009	0.0987
Z score- Altman	0.5645	0.5514	0.6148	1.5956	1.9073
Z score - Keige	-0.5333	-0.5494	-0.6802	-0.6304	-0.6625
Z score - Kiragu	-0.0153	-0.0151	-0.0124	-0.0137	-0.0133
Z score - Kogi	0.1374	0.1374	0.1361	0.1344	0.1293
Z score - Nganga	1.2448	1.1899	1.7900	1.3663	1.4092

Reagent

	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
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
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
earnings before interest and taxes/ total assets	0.0097	0.01	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
book value of equity/ total liabilities	0.0916	0.0916	0.0941	0.09	0.0915
Sales	172.269	173.539	174.829	178.368	198.357
sales / total assets	0.1158	0.1201	0.1216	0.1236	0.1352
Z score- Altman	0.282	0.2867	0.6949	1.3122	1.285
Z score - Keige	-0.4270	-0.3977	-0.4084	-0.4892	-0.5041

Z score - Kiragu	-0.0738	-0.0775	-0.0746	-0.0664	-0.0654
Z score - Kogi	0.1330	0.1364	0.1364	0.1413	0.1397
Z score - Nganga	0.9682	0.9412	1.0052	0.9434	0.9494
Pearl					
	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
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
retained earnings/ total assets	0.0971	0.0958	0.0979	0.0939	0.09214
Earnings before interest and taxes	44.398	43.38	45.993	54.27	52.682
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	37.98	39.478	41.378
Total liabilities	693.899	685.378	687.201	689.479	691.379
book value of equity/ total liabilities	0.0513	0.0547	0.0553	0.0573	0.0598
Sales	61.357	62.48	63.422	65.394	67.379
sales / total assets	0.086	0.0863	0.0861	0.0886	0.0841
Z score- Altman	0.533	0.5332	0.5499	0.5897	0.5462
Z score - Keige	-0.5446	-0.5769	-0.6128	-0.6373	-0.6332
Z score - Kiragu	-0.0144	-0.0136	-0.0131	-0.0127	-0.0139
Z score - Kogi	0.1401	0.1375	0.1361	0.1363	0.1291
Z score - Nganga	1.6147	1.6139	1.6880	2.0829	1.9200
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
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
retained earnings/ total assets	0.1263	0.1289	0.1272	0.1304	0.1348
Earnings before interest and taxes	83.267	89.642	91.36	93.258	94.268
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
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
sales / total assets	0.2585	0.2735	0.25	0.2862	0.2915
Z score- Altman	1.115	1.2246	1.3722	1.4269	1.3818
Z score - Keige	-0.8262	-0.8328	-0.8704	-0.8710	-0.8906
Z score - Kiragu	-0.0031	-0.0031	-0.0031	-0.0031	-0.0050
Z score - Kogi	0.0970	0.0968	0.0963	0.0965	0.1343
Z score - Nganga	10.0287	10.1491	10.3001	10.4572	7.5202

Lonrho

	Amount in millions				
	2001	2000	1999	1998	1997
Working capital	569.998	563.801	453.203	377.453	386.456
Total assets	2767.287	2661.97	2649.064	2556.356	2554.234
working capital/total assets	0.206	0.2118	0.1711	0.1477	0.1513
Retained earnings	139.425	138.45	126.265	122.245	121.673
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
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
book value of equity/ total liabilities	0.054	0.0491	0.0457	0.07	0.045
Sales	0.054	0.0491	0.0457	0.07	0.045
sales / total assets	2098.76	2094.65	1853.145	1798.234	1697.365
Z score- Altman	0.7584	0.7869	0.6995	0.7034	0.6645
Z score - Keige	0.9827	1.016	1.917	1.9103	1.8619
Z score - Kiragu	-214.3367	-207.7978	-235.0807	-272.4687	-246.9341
Z score - Kogi	0.0118	0.0114	0.0107	0.0101	0.0101
Z score - Nganga	14.1108	14.0150	12.9460	12.5303	12.4651
Z score - Nganga	-2709.1778	-2636.1939	-1866.2884	-1956.8417	-1969.0578

Uchumi					
	Amount in millions				
	2005	2004	2003	2002	2001
Working capital	127.458	1160.253	1285.472	1273.456	1323.256
Total assets	3269.067	3436.761	3486.364	3553.367	3635.876
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
retained earnings/ total assets	0	0.0493	0.0491	0.0485	0.0476
Earnings before interest and taxes	654.358	246.032	237.387	286.276	287.368
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	2734.92	2725.356	2734.376	2825.897
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
sales / total assets	0.2436	0.2592	0.2559	0.2514	0.2460
Z score- Altman	0.2097	0.2592	0.256	0.2514	0.246
Z score - Keige	0.9827	1.016	1.917	1.9103	1.8619
Z score - Kiragu	164.9423	267.2368	288.1576	300.5195	313.1505
Z score - Kogi	0.0000	0.0499	0.0537	0.0556	0.0547
Z score - Nganga	20.8251	17.9393	18.0001	18.3029	18.3827
Z score - Nganga	21721.4495	4774.6886	3806.1344	4939.2545	4559.2773

Kakuzi					
	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
working capital/total assets	0.0503	0.5029	0.556	0.548	0.565
Retained earnings	401.365	397.24	238.726	134.764	338.35
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
earnings before interest and taxes/ total assets	0.0252	0.0251	0.0023	0.0236	0.0239
Book value of equity	1034	1128	936	903	933
Total liabilities	2225.21	2138.05	1080.44	1126.26	1245.4

book value of equity/ total liabilities	0.4647	0.5276	0.8663	0.8018	0.7492
Sales	1473	1385	1100	980	1298
sales / total assets	0.5509	0.505	0.39933	0.5433	0.5747
Z score - Altman	1.2913	1.287	0.947	1.4576	1.4724
Z score - Keige	0.5627	0.0497	0.5736	0.5801	0.5850
Z score - Kiragu	-0.1892	-0.0182	-0.0081	-0.0086	-0.0092
Z score - Kogi	0.1247	0.1200	0.0811	0.0814	0.0875
Z score - Nganga	2.0814	6.5056	12.6334	11.8668	10.1825

Rea Vipingo

	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
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
retained earnings/ total assets	0.2253	0.2184	0.1779	0.2458	0.2454
Earnings before interest and taxes	187.257	197.54	199.968	198.657	197.547
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	962.88	997.012	1002.345	998.456
book value of equity/ total liabilities	1.791	1.898	1.0572	1.9829	1.7506
Sales	1653.467	1672.49	1217.13	1765.7	1567.52
sales / total assets	0.8384	0.81145	0.6084	0.8884	0.7891
Z score - Altman	2.099	2.1132	1.5371	2.2638	2.0646
Z score - Keige	-0.2107	-0.2024	-0.2262	-0.2216	-0.2162
Z score - Kiragu	-0.1214	-0.1305	-0.1234	-0.1196	-0.1222
Z score - Kogi	0.0903	0.0883	0.0913	0.0919	0.0917
Z score - Nganga	28.3098	30.3755	17.1754	31.3911	27.7958

Sasini Tea

	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
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
retained earnings/ total assets	0.0333	0.034	0.0342	0.0354	0.0364
Earnings before interest and taxes	521.654	531.592	512.475	513.796	514.689
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	4134.49	4167.546	4165.648	4256.745
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
sales / total assets	0.1453	0.1488	0.1487	0.1519	0.1556
Z score-Altman	1.5266	1.5573	1.5285	1.5588	1.5677
Z score - Keige	-5.9000	-5.8911	-5.8883	-6.0756	-5.9000
Z score - Kiragu	-0.0544	-0.0532	-0.0537	-0.0512	-0.0526
Z score - Kogi	0.1298	0.1320	0.1324	0.1342	0.1383
Z score - Nganga	9.1948	9.3234	9.0171	9.0868	8.9572

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
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
retained earnings/ total assets	0.097	0.1052	0.10464	0.1042	0.1017
Earnings before interest and taxes	361.276	360.622	459.365	486.267	362.673
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
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
sales / total assets	0.2417	0.2324	0.2413	0.2401	0.2571
Z score-Altman	1.5828	1.7597	1.9195	2.0279	1.8767
Z score - Keige	-0.5812	-0.5773	-0.5730	-0.5724	-0.5877
Z score - Kiragu	-1.6765	-1.6551	-1.6769	-1.6611	-1.6288
Z score - Kogi	0.1381	0.1393	0.1396	0.1377	0.1359
Z score - Nganga	31.9985	39.3711	40.7829	44.0088	43.1055

Marshalls 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
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
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
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
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
sales / total assets	1.52558	1.52671	1.53785	1.53278	1.53087
Z score- Altman	4.15302	4.14942	4.18087	4.16342	4.15605
Z score - Keige	-5.2198	-5.2236	-5.2534	-5.2594	-5.2844
Z score - Kiragu	-0.0077	-0.0075	-0.0075	-0.0076	-0.0077
Z score - Kogi	0.9644	0.9418	0.9451	0.9528	0.9576
Z score - Nganga	-7.5698	-7.5137	-7.5405	-7.4591	-7.3958

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
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
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
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
book value of equity/ total	0.142594	0.13192	0.141382	0.149289	0.156332

liabilities					
Sales	21056.28	21094.7	21087.26	21076.26	21056.79
sales / total assets	2.575303	2.54232	2.53195	2.526748	2.520997
Z score- Altman	3.135918	3.09432	3.085198	3.088381	3.085186
Z score - Keige	-1.4968	-1.5020	-1.5043	-1.8417	-1.8489
Z score - Kiragu	-0.6954	-0.6949	-0.7023	-0.5695	-0.5750
Z score - Kogi	0.1431	0.1404	0.1408	0.1393	0.1404
Z score - Nganga	-5.7739	-5.8233	-5.6198	-5.4882	-5.3616

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
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
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
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
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
sales / total assets	0.25245	0.23244	0.24015	0.22877	0.22719
Z score- Altman	0.79975	0.95666	1.16447	1.16003	1.32018
Z score - Keige	-0.1669	-0.5773	-0.5724	-0.1927	-0.2691
Z score - Kiragu	-5.9605	-1.6519	-1.6578	-5.3606	-3.8618
Z score - Kogi	0.1404	0.1393	0.1377	0.1326	0.1360
Z score - Nganga	4.2657	6.2735	8.4306	8.2350	10.4211

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
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

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
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
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
sales / total assets	0.27035	0.2591	0.26071	0.27044	0.31687
Z score- Altman	1.93596	2.34692	2.41785	1.75663	1.61456
Z score - Keige	-5.2848	-5.2940	-5.3059	-5.3087	-5.3349
Z score - Kiragu	-0.0046	-0.0047	-0.0041	-0.0041	-0.0049
Z score - Kogi	0.0559	0.0554	0.0526	0.0529	0.0578
Z score - Nganga	32.1857	50.6285	53.4017	25.1881	15.6855

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
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
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
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
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
sales / total assets	0.48954	0.478	0.47495	0.5011	0.50287
Z score- Altman	1.44446	1.43646	1.44252	1.47469	1.48274
Z score - Keige	5.3129	-5.3485	-5.4072	-5.3260	-5.3660
Z score - Kiragu	0.0201	-0.0200	-0.0198	-0.0198	-0.0196
Z score - Kogi	0.3322	0.3318	0.3319	0.3410	0.3405
Z score - Nganga	-0.4973	-0.4325	-0.3661	-0.5224	-0.5853

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
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
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
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
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
sales / total assets	0.4982	0.50642	0.51537	0.52969	0.50208
Z score- Altman	1.25307	1.26893	1.28712	1.3063	1.28789
Z score - Keige	5.2908	5.5885	5.6543	5.6794	5.7388
Z score - Kiragu	0.0593	0.0577	0.0562	0.0557	0.0541
Z score - Kogi	0.1318	0.1295	0.1311	0.1354	0.1312
Z score - Nganga	15.5375	15.5012	15.4718	15.0330	15.7261