# CASH FLOW RATIOS AS A PREDICTOR OF CORPORATE FAILURE

BY:

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REG NO. D/61/P/8598/2000

A MANAGEMENT RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS OF THE UNIVERSITY OF NAIROBI MASTER IN BUSINESS ADMINISTRATION

June 2007

## DECLARATION BY THE CANDIDATE.

I declare that this is my original research work and has not been submitted for degree in any other university.

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## DECLARATION BY THE SUPERVISOR.

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

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# ACKNOWLEDGEMENT

# DEDICATION

I dedicate this project to my entire family who have supported me materially and morally.

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## 1.0    INTRODUCTION

### 1.1    The Cash flow Statement In Financial Reporting

The primary objective of this study was to establish the usefulness of the cash flow ratios to predict financial failure. In other words whether the use of cash flow ratios derived from the cash flow statement had the potential to predict financial failure. An early warning of possible financial distress could thus ultimately help prevent subsequent failure.

Accounting may be defined as a service activity. a descriptive and analytical discipline. and an information system. Kieso and Weygandt (1992:3). describes the essential characteristics of accounting as the identification. measurement and communication to the interested parties of financial information about economic entities. Therefore. the primary objectives of financial reporting are to supply users of financial statements with information useful for effective economic decision – making (Opperman et al. 2003:21). Financial statements are the principal means through which financial information is communicated to those outside an entity.

Financial reporting has been one of the most widely discussed subjects in the accounting field since the early 90's.A continuous flow of publications criticized. commented. recommended and discussed the in adequacy of financial reporting. The users of financial statements made constant pleas to the accounting profession to enhance the usefulness of financial reporting. Financial reporting has evolved over time and United States of America (USA) seems to have contributed most towards financial reporting development.

The Financial Accounting Standard Board (FASB), appointed by the American Institute of Certified public Accountants (AICPA) in 1973, embarked on a line of publications that were later to become accounting standards. The first publication was called Statements of Financial Accounting Concepts (SFAC) No1 and was issued in 1978.In July 1989 the International Accounts Standard Committee (IASC) issued a document entitled framework for the preparation and presentation of financial statements. Many accounting bodies in other countries including Kenya accepted this framework. The primary objective of this framework is to provide information that is useful in economic decision making (Koch & Van der loan. 1992:2).

The cash flow statement is relatively new in accounting world. It was first published as an addition of balance sheet or as a source and application of fund statement. With the development of the accounting framework, the cash flow statement became an integral part of the financial statement and financial reporting.

### 1.1.2 The Development of an Accounting Framework for Financial Reporting.

The development of the accounting framework started with pressure from the users of financial statement to increase the quality and usefulness of financial reporting. Financial reporting was based on financial standards that may be seen as the means to account for certain business transactions. Each standard is a part of generally accepted Accounting Standards (GAAP) that serves as the accounting law of a country.

Accounting Standards may be defined as authoritative and are generally accepted as practical guidelines. They prescribe the recording and measuring of financial statements. The aim, therefore, is to enhance the usefulness of reported statements for economic decision-making purpose (Opporman, Booysen, Koens & Voster, 1995:2).

In an attempt to establish a foundation upon which financial accounting and reporting standards could be based. the accounting profession identified a set of objectives for financial reporting. These are necessary to provide information that is useful for assessing cash flow prospects. They also supply information about an entity's resources. claims to those resources and changes in those resources (Kieso & weygand. 1992:6). The FASB believes that accounting information can be useful in decision-making only if it is relevant. reliable and comparable (Horngren et al 1996:491)

The main criticism against accounting standard is that they were prepared without reference to an acceptable theoretical framework. To lessen this criticism and to maintain the initiative in setting of standards. the accounting profession in the USA initiated intensive research into the development of a conceptual frame - work (Opperman et al: 1995:2)

### 1.1.3   Developments of A Conceptual Frame Work in United States of America.

Shortly after inception in 1973. FASB began a project to develop a constitution that will define the nature and the function of financial accounting. This project provided a framework for the various accounting concepts and principles that are used to prepare financial statements (Horngren et al: 1996: 491). The FASB described its purpose for the conceptual frame work project as the establishment of a coherent system of interrelated objectives and concepts that are expected to guide the selection of events to be accounted for. the measurement of those events as well as the means of their summarization and their communication to interested users. The conceptual framework should enable investors. creditors and others to obtain increased understanding of and confidence in financial reporting.

A conceptual framework developed on these objectives would help narrow the range of acceptable accounting methods as well as promote increased comparability of financial information (Bernstein. 1989:44).

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A conceptual framework would, firstly be useful for standard setting that would build on and relate to an established body of concepts and objectives. The result would be a coherent set of standards and rules because they shared the same foundation. The framework should increase financial statement users understanding of and confidence in financial reporting, and it should enhance comparability among different financial statements. Secondly, new and emerging practical problems should be more quickly solvable by referring to an existing framework of basic theory.

The FASB believes that without conceptual underpinnings, measures provided by accounting and financial reporting are essentially matters of judgment and personal opinion. Therefore, more precise definitions in the framework are expected to narrow subjectivity, circumscribe the areas of applying judgments and provide a frame of reference for these judgments (Bernstein 1989:44).

In 1976, the FASB issued a three part discussion memorandum entitled Conceptual Framework for Financial Accounting and Reporting: Elements of Financial Statements and Their Measurement. It set forth the major issues to be addressed in establishing a conceptual framework that would be the basis for setting accounting standards and for resolving financial reporting controversies. Since the publication of the document, the FASB has issued numerous statements of financial accounting concepts in its project to develop a framework for financial reporting (Kieso & Weygandt, 1992:33). Although the concepts were issued individually they form a coherent system of interrelated objectives and concepts and are therefore, used collectively in financial reporting.


Most entities recognize the need for more uniform standards between countries as the objectives of financial reporting in one country may often differ from those in other countries. In addition the institutional structures between countries are often not comparable and strong tendencies are pervasive. Therefore, several organizations are working to achieve worldwide harmony in accounting standards. Chief among these organizations is international Accounts Standard Committee (I ASC). Since its creation in 1973, the same year as formation of FASB the IASC has had the support of accounting profession in USA, most British Commonwealth and other countries.

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As the IASC has no authority to require compliance with its accounting standards, it must rely on the cooperation by the various national accounting professions. However, since its formation, the IASC has succeeded in narrowing certain differences in international accounting standards

### 1.1. 4 The Development of Cash Flow Statement

Traditional measures of cash flows and working capital from operations were often highly correlated with earnings. Thus earlier studies have relied on alternative measurement of calculating cash flow such as net in come plus depreciation and amortization, and working capital from operations (Bowen, Burgstahler & Daley 1986:724; Aziz & Lawson, 1989:56).

A publication of FASB (1979: Par 8) maintained that decision makers form estimate of future cash flows by using earnings rather than cash flow data. Further more, it stated that historical earnings were superior to historical cash flow in predicting future cash flows on evidence from earlier studies on cash flows. Over the years, the cash flow statement had different names depending on what was deemed to be important. The sources and application of funds statement was first introduced in USA in 1973.It was supposed to be part of final annual statement either annexed to the balance sheet or presented separately. The financial statement had to be prepared according to GAAP. A statement had to be prepared from information contained in balance sheet, the income statement and notes to the financial statements. However, certain information not contained in those statements could be presented in the funds statement, for example, the net movement in long-term liabilities.

As part of the statement of source and application of funds, working capital variation was incorporated. This statement is an analysis of changes in working capital items. Increases and decreases in working capita have to be listed showing the networking capital to be disclosed in the funds statement.

The word funds was not defined so it was possible to prepare a funds statement where funds could either be cash or near cash or working capital or something of a similar nature. In practice, working capital was used as the basis to draw up the funds statement. Derived and applied funds statement included at least the following (Meskin, 1985 b: 914).

- Net income
- Specified fixed and other non-current asset disposal.
- Shares, loans and debentures proceeds
- Loan repayments and advance made.
- Net working capital reductions.
- Meeting of any loss.
- Specified fixed and other no-current asset acquisitions.
- Loan and debenture redemption.
- Tax liabilities.
- Dividend paid and proposed.
- Net working capital increases.

The main objection to the working capital concept of funds is that transactions that did not directly affect working capital were omitted from the statement. Therefore important information that affects changes in the resources of on entity was not included in the funds statement.

In 1985 many accounting bodies moved away from funds statements based on working capital to cash based statement. Such organizations recognized the need for statement of changes in financial position based on a cash flow basis. A statement prepared on a cash basis will produce additional information to the users of financial statements for investment, credit and other economic decisions (Jooste, 1997:50). Cash flow statement was to be a substitute and improvement on the funds statement. The new statement had to include taxes and dividends paid as well as obligations towards taxes and dividend proposed for the year (Jooste, 1997:50).

In the USA, the FASB adopted the statement of Financial Accounting Standard (SFAS) 95 in 1987 that mandated the statement of cash flow as an integral part of the financial statement. The statement of cash flow was designed to bridge the information gap between traditional accrual accounting and an understanding of the cash flow activities of an entity. A gap existed because accrual accounting failed to provide relevant information to assess the amount, timing and uncertainty of future cash flows. Its predecessor, the statement of changes in financial position (SCFP), had not specified the primary categories of cash flow activity and the term cash had not been defined. With SFAS95, the primary categories of cash flow are defined as operating, investing and financing. SFAS 95 also defines cash to include cash equivalents with maturities of 90 days or less, such as treasury bills, commercial paper and money market funds (Zeller & Stanko, 1994b:55). No fixed format was suggested for the preparation of cash flow information. The format depended on particular circumstances of the entity and logical hierarchy of what to disclose. However GAAP statement Accounting Standard (AC) 118 provides a standard guidance on preparing cash flow statement and what should be included in each of the components. Cash flow statement should show the following where applicable

- Cash generated by operations

- Investment income

- Non cash components of working capital changes

- Cash effects of finance costs and taxation

- Cash effects of dividends paid

- Cash effects of investing activities

- Cash effects of financing activities

### 1.1.5   Objectives of the Cash flow Statement

The objective of the cash flow statement is to supply information about the cash flow of an entity that provides users of financial statement with a basis to assess the ability of an entity to generate cash and cash equivalent and the needs of the entity to utilize those cash flows. The economic decisions that are taken by users require an evaluation of the ability of an entity to generate cash and cash equivalents, and the timing and certainty of their generation

### 1.1.6   The Use of Ratios in Analyzing Cash Flow Statement

Prior to the introduction of the new cash flow standards, traditional operating cash flow ratios were employed for financial analysis. The cash flow from operations had to be estimated from the statement of changes in financial position and suffered from inherent limitations of cash flow reporting not based on the cash flow statement. The primary categories of cash flow activities had not been specified and the term cash had not been defined. Therefore ratios lacked comparability over time and across entities (Zeller & Stanko, 1994b: 51).

The first ratio ever to be recorded was the current ratio that was used to measure liquidity. Ratios were originally developed as short-term credit analysis devices and can be traced as far back as the late 19$^{th}$ century. Since then analysts have developed many financial ratios that are widely used by practitioners and academics (Giacomino & Mielke, 1993: 55). With the requirement to prepare cash flow statement as part of financial reporting a need has arisen for cash flow ratios. Useful cash flow ratios may be derived from the cash flow statement. Operating cash flow ratio may also provide a more complete picture of an entity's ability to generate sufficient operating cash flow to service its debts, equity obligations and to finance asset acquisition (Zeller & Stanko, 1994b: 51)

If cash flow information is useful but unused, the logical conclusion is that analysts are not analyzing available data properly. While there is no general consensus on appropriate cash flow ratios, this study will explore the relative utility of newly derived cash flow ratios in financial analysis and will determine if the potential exist to predict financial failure.

## 1.2    STATEMENT OF THE PROBLEM

Analysts use ratios for financial analysis and to predict the financial variables of an entity. These ratios are grouped into liquidity, profitability, asset management and debt management categories. With the financial analysis of an entity, the cash flow ratios can be more reliable than balance sheet and income statement ratios. Balance sheet data is static since it measures a single point in time, which is the balance sheet date. The income statement, on the other hand contains many non-cash transactions. The cash flow statement, however, is dynamic. It records the changes in the other statements over a period and focuses on the cash available for operations and investments (mills and Yamamura, 1998: 53) whether cash flow ratios have predictive power is an empirical issue and the subject of these study

The networking capital, current and quick ratios are used to evaluate the liquidity of an entity but many authors (lee, 1982: Dambolena and Shulman, 1988; Stanko and Zeller, 1993; Mills and Yamamura, 1988) agree that these ratios are not enough for liquidity prediction. Financial distress will result when obligations cannot be met and there is no access to additional financing. Current and quick ratios can be positive and profits can increase, while at the same time an entity can be in severe financial distress. This was evident in the failure of W.T Grant (Largay and Stickey, 1980; Zeller and Stanko, 1994) and laker Airline (Lee, 1984). Cash flow studies show the value of cash flow ratios in contrast to income and balance sheet ratios in predicting financial failure. Many authors (Giacomino and Mielke, 1988, 1993; Carslaw and Mills, 1991, 1993 Stanko& Zeller 1993, Zeller and Stanko, 1994; b; Mills and Yamamura, 1998) also suggest that use of cash flow ratios can be useful, but if the information is not used, the users of financial statement will not be analyzing available data properly. Using ash flow statement requires that traditional ratios be re-explored and cash flow ratios be developed. The research question is:

Do cash flow ratios convey relevant and clear information about entity's corporate health?

## 1.3    OBJECTIVES OF THE STUDY

The objective of the study was to develop a cash flow model for predicting corporate failure.

## 1.4    SIGNIFICANCE OF THE STUDY

The motivation behind this study is derived from the fact that companies are going bankrupt even after announcing good profits and handsome dividends. ENRON in USA is a good example. What is expected of an investor. when a company shows a good income statement and healthy balance sheet today. only for it to go under tomorrow? There has risen a need to develop other tools to test more vigorously the corporate health of a company. The following group will find the study useful:

i.   Investors. managers. lenders. security analysts and credit rating agencies. To the above groups. cash flow information is important to help them advice their clients on the returns they expect from their investments.

ii.  Academicians and researchers. The result of the study will add to the body of knowledge in the field of finance proving beneficial to student of finance.

## 2.0    LITERATURE REVIEW

### 2.1    The Importance of Cash Flow Information to Predict Failure.

Cash flow ratios are useful for financial analysis. Income does not pay debt but cash does and the inability to service obligations as they become due will result in financial failure. It seems that Beaver (1966) was the first of many studies on bankruptcy prediction. Since then there has been a constant inflow of research on the topic. Research by Beaver (1969), Deakin (1972) and Blum (1974) considered the ability of financial ratios, and models developed from ratios, to predict financial failure. The initial studies calculated cash flow as net income plus depreciation and amortization. Later researchers (Largay and Stickey, 1980; Gombola and Ketz1983, Casey and Bartczak, 1984; 1985; Gentry and Newbold, 1985; Aziz and Lawson, 1989) focused on models of cash flows and called for a broader measure of cash flow, which was calculated as cash receipt from operations less cash disbursement for operations. Thereafter followed research on cash flow ratios calculated from the cash flow statement. (Giacomino and Milke, 1988, 1993; Carlsaw and Mills, 1991, 1993; Stanko and Zeller; Mills and Yamamura, 1988) that still continues.

Ball and Foster (1982) pointed out that previous empirical studies in bankruptcy prediction used an empiricism approach to justify the ratios chosen for the studies. The empirical findings tended to be sample specific and not capable of indicating the most likely predictor of financial failure.

This was noted by Gentry et al (1985) and to overcome this problem, cash based fund flow model (developed in 1972 by Helfert) was chosen as basis for their study of bankruptcy prediction. Cash flow was calculated as suggested by the FASB in its exposure Draft on reporting income, cash flows and financial position of business enterprises (FASB, 1981). FASB (1981) suggested cash flow from operators to be calculated as working capital provided by operations plus or minus changes in the non-cash working capital accounts except for short-term indebtedness. In a study by Laitinen (1994: 196) he points out that cash based and income plus balance sheet based ratios may lead to different classification schemes in failure prediction.

The primary objective of the study by Gentry et al (1985) was to test by assessing whether cash based funds flow ratios can adequately classify failed and non-failed entities and serve as an alternative to financial ratios computed using income and balance sheet statements. Their findings were that cash based funds flow ratios offered a viable alternative for classifying failed and non-failed entities.

Ohlson (1980: 110) found out that firm size was a significant negative predictor of bankruptcy, as bankrupt firms tend to be smaller than non-bankrupt entities. One point of concern raised by Ohlson was that if one employs predictors derived from statement that were released after the date of bankruptcy, then the evidence indicates that it will be easier to predict failure.

Largy and Stickney (1980) indicated that the net income plus depreciation depletion and amortization of W.T Grants was relatively steady until the year immediately prior to it demises. The cash flow from operations, on the other hand was negative in eight of the ten years prior to failure. Under similar circumstances, lee (1982) observed that although Laker Airways was in financial trouble three years prior to failure, the profit was increasing. In this regard, operating cash flow is a better indicator of financial failure than net income.

Aziz et al, (1988: 423) investigated bankruptcy prediction by using a cash flow model developed by Lawson (1971) it was found that all cash flow for non-bankrupt entity were consistently higher than for bankrupt entities. Over all, Aziz et al (1988) found cash flow model superior to other models and stated that it is likely to predict bankruptcy up to 5 years prior to the event

Sharma (2001) conducted research to provide a comprehensive review of the cash flow failure prediction literature since Beavers paper in 1966. Sharma (2001) concluded that cash flow information contains potentially significant content over income and balance sheet ratios for discriminating between bankrupt and non- bankrupt entities, particularly in the determination of profitability of bankruptcy.

## 2.2    Cash Flow Ratios to Predict Failure as suggested by various Authors

Beaver (1966) was the first researcher to stress the value of cash flow ratios to predicting financial failure. Cash flow was calculated as net income plus depreciation, depletion and amortization. The purpose of Beavers study (1966) was to predict financial failure.

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Beaver (1966) found it essential to include a cash flow model when predicting failure, as until then, cash flow ratios had not been tested.

Table 2.1: Cash flow as suggested by Beaver (1966)

| CASH FLOW RATIOS AS PREDICTORS OF FAILURE | | |
|---|---|---|
| NO | LIST OF RATIOS | DEFINITIONS |
| 1 | Cash flow to sales | Cash flow: |
| 2 | Cash flow to total assets | Net income plus |
| 3 | Cash flow to net worth | Depreciation, depletion |
| 4 | Cash flow to total dept | and amortization |
| SOURCE | Adapted from Beaver (1966) | |

In his study of failed and non-failed entities, Beaver (1966) concluded that the ability to predict failure was the strongest in the cash flow model. Accordingly, operating cash flow had the strongest ability to predict financial distress.

When analyzing the result, Beaver found that the failed entity had lower cash flows than the non-failed entities. The failed entities also had less capacity to meet obligations and they also tended to incur more debt than the non-failed entities.

Zeller and Stanko (1993, 1994a, b, 1997) developed cash flow ratios for the retail, hospital, transportation and manufacturing sector. These ratios provided relevant information to assess the amount, timing and certainty of future cash flows.

These cash flow ratios are shown in the table 2.2

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**Table 2.2:** CASH FLOW BY ZELLER AND STANKO (1994B)

| NO | LIST OF CASH FLOW | COMPONENTS |
|---|---|---|
| 1 | Cash flow to current debt | CFFO*/ Average current debt |
| 2 | Cash flow to interest coverage | CFFO*+ Interest & tax / Interest paid |
| 3 | Cash to total debt | CFFO* - Dividend / Total debt |
| 4 | Cash to operating income | CFFO*/ Operating Income |
| 5 | Cash flow to sales | CFFO* / sales |
| 6 | Cash flow to total assets | CFFO* / Total Assets |
| 7 | Cash flow to total debt | CFFO* / Total Debt |

* Cash flow from operations

Source: Adapted from Zeller and Stanko (1994b).

When comparing these ratios with ratios of authors previously discussed. it is evident that they agree on the importance of operating cash flow ratios to measure bankruptcy of a firm

When it comes to liquidity analysis. cash flow information is more reliable than balance sheet or income statements. Balance sheet data is static as it measures a single point in time and the income statement contains many non-cash allocations. In contrast the cash flow statement records the changes in the other statements and focuses on what shareholders really care about. cash available for operations and investments (mill and Yamamura. 1998:53)

The value of cash flow ratios was evident in the collapse of W T Grant ( Largay and Stickney, 1980) income and balance sheet ratio analysis did not reveal the severe liquidity problems that resulted in a bankruptcy filling. W T Grant showed positive current ratios as well as positive earnings while it had severe negative cash flow that rendered it unable to meet current debt and other commitments to creditors (Mills and Yamamura 1998:54)

According to Mills and Yamamura (1998), the major credit rating agencies use cash flow ratios prominently in their decisions. The cash flow ratios they find most useful are ratios to test the solvency and liquidity and those, which indicate viability of an entity as a going concern.

These ratios are shown in

**Table 2.3: Cash flow to measure corporate health**

| CASH FLOW RATIOS BY MILLS AND YAMAMURA (1998) TO MEASURE SOLVENCY LIQUIDITY AND VIABILITY AS A GOING CONCERN | | |
|---|---|---|
| NO | LIST OF SUGGESTED CASH FLOW | COMPONENTS |
| 1 | Operating cash flow ratio (OCF) | Cffo*/ current liabilities |
| 2 | Funds flow coverage ratio (FFC) | Earnings before interest and tax + depreciation and amortization / Interest + debt payment + preferred dividends |
| 3 | Cash current debt coverage ratio (CCDC) | Cffo* - cash dividends / Current debt |
| 4 | Capital expenditure ratio (CER) | Cffo* / Capital expenditure |

| 5 | Cash flow to total dept (CTR) | Cffo* / Total debt |
|---|---|---|
| 6 | Total free cash flow ratio (TFR) | Sum of net income + interest, depreciation, amortization, lease - Dividends and capital expenditure / Sum of interest, lease, rental and current portion of long term debt and lease obligation |
| 7 | Cash flow adequacy (CFA) | Earnings before interest, tax depreciation and amortization - Tax interest and capital expenditure / Average of debt maturities over next five years |

* Cash flow from operations

Source: - Adapted from Mills and Yamamura (1998)

The cash flow as suggested by Mills andYamamura . The researcher developed a model for measuring the corporate health of entities using these ratios

Largay and Stickey (1980) conducted a study on reasons for the failures of W.T. grant Company. W.T. Grant was the largest retailer in America when it filed for bankruptcy. The authors showed that a traditional ratio analysis using income statement and balance sheet would not pick up financial problems. The share prices high and dividends were paid regularly. However, a careful analysis of the entity cash flow would have revealed the financial problems as early as a decade before the collapse.

The profitability, turnover and liquidity ratios of W.T. Grant revealed down ward trends over ten years. The solvency ratios showed increased liabilities and virtually no cash was generated during ten years before bankruptcy. The entity also lost its ability to derive cash from operations and exhausted all possible liquid resources, relying heavily on outside financing. Cash flow was calculated as net income plus depreciation, which proved to be a very poor substitute for cash flow from operations. Although net income was stable and sales increased, the cash flow from operations was negative eight out of the ten years prior to bankruptcy. The authors clearly demonstrated the power of cash flow to reveal corporate health of an entity.

While Stickney and Largay used raw operating cash flow data, Yamamura and Mills used operating cash flow ratios to test the corporate health of two gaming companies in U.S.A i.e. Boomtown and Circus Circus. Gaming industry experienced a rapid growth in the period 1986 – 1996. However despite the boom, many gaming companies went bankrupt even after reporting profits in their financial statements. Mills and Yamamura could not understand how expanding and profitable entities could apply for bankruptcy. They wondered what was the value of income statement and balance sheet if they could not detect bankruptcy. They argued that if income statement and balance sheet ratio could not detect bankruptcy, then operating cash flow could.

Yamamura and Mills calculated income statement and balance sheet ratios to test for liquidity, solvency and liability for Boomtown and Circus Circus companies. The ratios calculated included profitability ratios, liquidity ratios (current and quick ratios) turn over ratios like account receivable, inventory turn over, total asset turn over. They also calculated slovenly ratios.

They found that all through and through, Circus Circus had weaker ratios than Boom town indicating that it had poorer corporate health hence had higher chances of financial failure than Boom town. They also calculated cash flow ratios for the two companies. The categorized ratios to test for liquidity, solvency and viability. To test for solvency they calculated operating cash flow ratio (OCF), Funds flow coverage ( FFC), cash interest coverage (CIC) , and cash debt coverage (CDC). To test for viability and going concern they used total free cash ratio (TFC), cash flow adequacy (CFA), cash to capital expenditure and cash to debt. When these ratios were compared, circus looked the stronger of the two. The cash flow ratios were showing Circus Circus to be financially healthy of the two. Later Boomtown applied for Bankruptcy and was taken over by another company. Operating cash flow ratios reveals Boomtown inc. was generating very little cash from operations. It was using debt for its expansion. They concluded that income statement and balance sheet ratios have little predictive power of company's corporate health. This conclusion was supported by Lee (1982) when he investigated the failure ofLaker Airways in USA.

Lee (1982) also showed that the failure of Lakers Air ways could also have been predicted by evaluating its cash flow. Lee (1982) evaluated the financial statements of Lakers Airways to provide a summary of the entity profitability and cash flow. It showed that it was cash flow, or its lack there of that caused the demise of Lakers Airways. In 1976, the entity contributed 100% of cash flow from operators. This figure fell to 25% in 1980. Borrowing increased and 47% of cash out flow was used to repay borrowing in 1976. In 1980, 74% of cash inflow was received from net barrowing that were spent on new aircrafts and not repayment of borrowing. Lee (1982) stressed the fact that no entities can survive if it cannot contribute to the majority of cash inflow needed to pay for capital investments, taxation, dividends and repayment of borrowing.

Casey and Bartezak (1984) disagreed with the power of cash flow ratios. They studied 290 companies, 60 of which had been declared bankrupt and found that operating cash flow data for a five year span could not discriminate between a healthy enterprise and one that would fall. Using multiple discriminant analysis and Altman z score, they used the model to classify entities either as failed or viable. They found that operating cash flow was less accurate a predictor of failure than a combination of six income and balance sheet based ratios.

Mossman et al (1988) did a study of bankruptcy models based on financial ratios, cash flow, stock returns and standard deviation models between 1980 and 1990. The variables of the model consists of operating, cash flow, investment cash flows, cash taxes, change in liquidity, net cash payments to lender, net cash payments to share holders all scaled down by book value of total assets. Using logic regression, it was found that the cash flow model, when considered in isolation, discriminates most consistently two to three years before Bankruptcy. Therefore, stakeholders might be particularly interested in cash flow variables as an early warning of potential difficulties.

Sharma (2001) conducted research on bankruptcy models and concluded that cash flow information contains potentially significant information content over balance sheet/ income statement in discriminating between bankrupt and non-bankrupt entities, particularly in determining the probability of bankruptcy.

## 2.4    Models used to Predict Bankruptcy

### 2.4.1   Multiple discriminant analysis (MDA)

MDA is a statistical technique used to classify an observation into one of several a priori grouping dependent upon the observation's individual characteristics. It is used primarily to classify and or make predictions in problems where the dependent variables appears in qualitative form, for example, male or female, bankrupt or non bankrupt.

After groups are established, data are collected for the objects in the groups: MDA in its most simple form attempts to derive a linear combination of these characteristics which "best" discriminates between the groups. If a particular object, for instance, a corporation has characteristics (financial ratios), which can be quantified for all of the companies in the analysis, the MDA determines a set of discriminant coefficients .When these coefficients are applied to the actual ratios: a basis for classification into one of the mutually exclusive grouping exists.

The discriminant function, of the form

$$Z = W_1 X_1 + W_2 X_2 + \ldots + W_n X_n$$

transform individual variable values to a single discriminant score or Z value, which is then used to classify objects where

$W_1, W_2, \ldots W_n$   discriminant coefficient

$X_1, X_2 \ldots X_n$   independent variable.

Once the values of discriminant coefficients are estimated, it is possible to calculate discriminant score for each observation in the samples, or any firm and to assign the observation to one of the groups based on this score. Assignments are made based upon the relative proximity of the firms score to the various group centroids. The accuracy of the model can be shown using coefficient chart as shown.

Predicted Group Membership.

**Table 2.4 : classification matrix**

| Actual group membership | Bankrupt | Non-Bankrupt |
|---|---|---|
| Bankrupt | H | $M_1$ |
| Non – Bankrupt | $M_2$ | H |

The actual group membership is equivalent to prior grouping and the model attempt to classify currently this firm.

The H's stand for current classification (HITS) and the M's stand for misclassification (MISSES). $M_1$ represent a type 1 error and $M_2$ a type 2 error. The sum of diagonal element equals to the total correct hits and when dividend by total number of firms classified yields the measurer of success of the MDA in classifying the firms: that is. the percent of firms correctly classified.

## 2.4.2    Logit Model

The logit model utilizes the coefficient of the independent variables to predict the probability of occurrence of a dichotomous dependent variable. Specifically, the technique weights the independent variables and creates a score for each company in order to classify it as failed or healthy. The function considered in logistic regression is called the logistic function and can be written as follows.

$$P_j t (Y = j) = 1/(1 + e^z) = 1 / \{1 + e^{-(b_0 + b_1 x_1 + b_2 x_2 + \cdots + b_n x_n)}\}$$

Where $P_j$ (t) probability of failure (1 for failed companies and 0 otherwise) for entity j : at end of year t.


e= exponential function

$b_1.b_2 \ldots\ldots\ldots$ bn = slope coefficients

$x_1.x_2 \ldots\ldots\ldots x_n$  predictor variables

P(t) is used to group entities as failed or non failed using logits. The following scholars have used logits in their scholarly work: Dambolena & Shulmen (1988) USA, AZIZ et al (1988) USA, Gilbert et al (1990) USA.


## 2.5    Conclusion From Literature Review.

It emerged from the literature reviewed that we do not have a generally agreed set of laws that can be used to measure corporate failure. The definition of failure is important, and different authors have used different models to predict corporate failure. Among the most popular method is MDA, which seems to have been overtaken by logic regression analysis (Logits). However, it appears that all previous studies on importance of cash flow ratios in determining corporate failure have concluded that they are important. Their main concern is the method to use between the existing ones but even those who have used different methodology i.e. MDA or Logit, the conclusions seem very close. That is, cash flows are important in predicting corporate failure.

# CHAPTER THREE

## 3.0 RESEARCH METHOD

## 3.1 INTRODUCTION

The primary objective of this study was to determine the usefulness of cash flow ratios to predict financial failure. In this regard, a list of cash flow ratios was selected for evaluation of cash flow statement. If an entity fails to generate enough cash flow from operations, it will be forced to increase borrowing or to dispose of capital investments to meet obligations. If this situation persists for a period of time, it will lead to financial distress and eventual failure.

Financial failure in this study ment the inability to cover obligations as it becomes due. According to Mossman et al (1998), bankruptcy will result if an entity has insufficient cash to attain additional financing. Altman and Spivak (1983) agree that the inability of an entity to generate enough cash from its operations may force the entity to borrow more money or to dispose of its productive assets or investments to meet its obligations. If this situation persists over an extended period of time, it may lead to financial failure. Altman and spivak (1983) and Mossman et al. (1988) have found that the inability to finance obligations out of internally generated funds is empirically testable. It has also been successfully used for investigating the usefulness of accounting information in other studies.

## 3.2 POPULATION

The population selected was composed of all companies listed in Nairobi stock exchange between 1999 and 2005. A total of 52 companies were listed during the period.

## 3.3 SAMPLE SELECTION – FAILED ENTITIES

Sample selected was composed of all entities de -listed or suspended from Nairobi stock exchange between1999to 2005. Entities were included in the sample if they satisfied the following conditions:

- The entity must have been traded on the Nairobi stock exchange.
- The entity must have been de-listed or suspended due to financial difficulties.
- The entity must had financial statements available from year 1999. the latest and
- The entity must not have belonged to finance. investment. banking. insurance or any other financial sector.

Six firms were found to have been delisted from NSE in this period.[refer to appendix3]

## 3.4 SAMPLE SELECTION – NON-FAILED ENTITIES

Non failed firms were list of all entities listed and traded in Nairobi stock exchange since years 2000 to June 2005. The firms were chosen randomly from industrial and allied sector. commerce and service and agriculture sector.

From all the companies analysed only 14 could meet the criterion specified above.

[Refer to appendix 3]

Entities in the public sector. transportation. investment (including property). unit trust. banking. insurance and finance were not included in the sample. According to studies (Beaver. 1966.72), financial institutions were excluded as their ratios and cash flows are always substantially different from those of other entity types even when they are in no danger of failure. Ohlson (1980: 114) also excluded financial institutions from a study on the prediction of bankruptcy as entities in the financial and investments industry are structurally different and have different bankruptcy environment.

## 3.5    DATA USED

The data used was the final accounts for the failed and non-failed entities for the period 1999 to 2005. Using the final accounts. financial ratios using cash flow statement was calculated. The final account was obtained from Nairobi stock exchange. from the companies themselves and from capital market authority. For each company the final accounts for two consecutive years was analyzed

## 3.6    RESEARCH MODEL

### 3.6.1    Multiple Discriminant Analysis (MDA).

The research I utilized multiple discriminant analysis to calculate z    score. which was used to classify entities as either bankrupt or non-bankrupt

This is a statistical technique used to classify an observation into one of several a priors grouping depending upon observations individual characteristic. It was used primarily to classify and or make prediction in problems where dependent variables appear in qualitative form e.g. male or female. bankrupt or bankrupt. The number of original groups can be two or more. After the groups were established. data was collected for the objects in the groups. MDA then attempted to derive a linear combination of these characteristics which "best" discriminates between the groups. If a particular object for instance a corporation had characteristic (financial ratios). which could be quantified for all the companies in the analysis. MDA determined a set of discriminant coefficients. When these coefficients were applied to the actual ratio. a basis for classification into one of the mutually exclusive grouping existed. When the above procedure was used. predictive ability was revealed.

### 3.6.2 Conceptual Model

$$Z = W_1 X_1 + W_2 X_2 + \ldots + W_n X_n$$

Where $W_1, W_2 \ldots W_n$ = Discriminant Coefficient

$X_1 X_2 \ldots X_n$ = Independent variable.

## Z = Discriminant score.

MDA was used because;

- MDA considers the entire profile of ratio common to relevant firms.

- Most statistics / data analysis of MDA utilize statistical package for social science (SPSS)

    and are easy to use.

The following were the variables used to develop the model:
i)      Dependent variable
Failed
Non-failed

We also  used binary code: non-failed coded 1 and failed coded 0

ii)      Independent variables: type of ratios

$X_1$ = OCF (Operating cash flow ratio)

$X_2$ = FFC (Funds flow coverage ratio)

$X_3$ = CCDC (Cash current debt coverage ratio)

$X_4$ = CER (Capital expenditure ratio)

$X_5$ = CTR (Cash flow total debt ratio)

$X_6$ = TFR (Total free cash flow ratio)

$X_7$ = CFA (Cash flow adequacy).

### 3.6.3   Actual Model

The actual model was a linear combination of the above ratios of independent variables. It was expected to be of the form;

$$Z = W_1 X_1 + W_2 X_2 + W_3 X_3 + W_4 X_4 + W_5 X_5 + W_6 X_6 + W_7 X_7$$

### 3.6.4   Estimation of the Parameter of the Model.

Statistical package for social science (SPSS) was used to analyze the data and estimate the parameters. If failed companies were coded as 0 and non-failed entities given a code of 1 the prediction of case was done using the Z score. If Z calculated was near zero than one, the case was classified as failed or code 0.

### 3.1  RESULTS EXPECTED

The results was shown in a classification chart or "Accuracy matrix", the chart was set up as follows

Predicted group membership

#### Table 3.1: Classification matrix

| Actual group membership | Bankrupt | Non-bankrupt |
|---|---|---|
| Bankrupt | H | $M_1$ |
| Non - Bankrupt | $M_2$ | H |

Once the value of discriminant coefficient were estimated, it was possible to calculate discriminant scores for each observation in the sample, or any firm, and to assign the observation to one of the groups based on this score. The essence of the procedure was to compare the profile of an individual firm with that of alternative groupings. In this manner the firm was assigned to the group it most closely resembles. The comparisons were measured by a chi — square value and assignments were made based on relative proximity of the firms score to the various group centroids.

The actual group membership was equivalent to the prior groupings and the model attempt to classify correctly these firms.

The H's stood for correct classification (Hits) and the M's stood for misclassification (misses). $M_1$ represented a type 1 error and $M_2$ a type 1 error. The sum of diagonal elements equals to the total correct 'hits' and when dividend by total number of firms classified yielded the measure of success of the percent of firms correctly classified.

The initial sample was tested using the Z score and classification matrix shown below.

Table 3.2 Classification matrix

| Actual | Predicted Group 1 | Predicted Group 2 |
|--------|-------------------|-------------------|
| Group 1 | X | 6 - x |
| Group 2 | Y | 14 - y |

The above table was turned into accuracy matrix by calculating the percentage accuracy of overall misclassification for the two groups. This gave overall accuracy of the model to predict failure.

Table 3.3-Accuracy matrix

| Number correct | Percent correct | Percent error | N |
|---|---|---|---|
| Type I    X | X/6 x 100 | $\frac{6 - x \times 100}{6}$ | 6 |
| Type II    Y | Y/14 x 100 | $\frac{14 - y \times 100}{14}$ | 14 |
| TOTAL   x+y | $\frac{x + y \times 100}{20}$ | $\frac{20 - (x+y) \times 100}{20}$ | 20 |

The above procedure was used to show the accuracy achieved in classifying firms as either bankrupt or viable using cash flow ratios.

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## 4.0 DATA ANALYSIS AND FINDINGS

### 4.1 Introduction

The chapter focuses on the tools we used to synthesis data collected. We specifically used multiple discriminant analysis techniques (MDA) to develop the prediction model. A statistical package for social scientists (SPSS) was used to analyse the data.

### 4.2 Data analysis

Data was analysed using SPSS statistic package software. The first basic step of data analysis was the identification of the two a priori groups i.e. failed and non-failed. Then the seven cash flow ratios were computed using excel and the final accounts of the two sets of companies. The mean of each ratio for each group of companies was then calculated. This was used to test whether there was a significant difference between the two groups of the companies

## Table 4.1 group statistics

**Group Statistics**

| Failure or success | | Mean | Std Deviation | Valid N (listwise) Unweighted | Valid N (listwise) Weighted |
|---|---|---|---|---|---|
| Failed | OCF | 01710 | .539562 | 11 | 11 000 |
| | FFC | -.30860 | 1 516377 | 11 | 11 000 |
| | CCDC | 01701 | 539384 | 11 | 11 000 |
| | CER | -4 10256 | 10 685227 | 11 | 11 000 |
| | CTR | - 00769 | 447075 | 11 | 11 000 |
| | TFR | - 60781 | 1 249953 | 11 | 11 000 |
| | CFA | - 37397 | 279829 | 11 | 11 000 |
| Non failed | OCF | 69937 | 644739 | 28 | 28 000 |
| | FFC | 1 36422 | 1 708090 | 28 | 28 000 |
| | CCDC | 44722 | 505254 | 28 | 28 000 |
| | CER | 3 52131 | 3 125266 | 28 | 28 000 |
| | CTR | 38444 | 409945 | 28 | 28 000 |
| | TFR | 20521 | 922226 | 28 | 28 000 |
| | CFA | 04519 | 269127 | 28 | 28 000 |
| Total | OCF | 50693 | 684626 | 39 | 39 000 |
| | FFC | 89240 | 1 805460 | 39 | 39 000 |
| | CCDC | 32588 | 544436 | 39 | 39 000 |
| | CER | 1 37099 | 7 004667 | 39 | 39 000 |
| | CTR | 27384 | 451621 | 39 | 39 000 |
| | TFR | - 02411 | 1 073699 | 39 | 39 000 |
| | CFA | - 07303 | 329520 | 39 | 39 000 |

This table provides group mean and standard dev. It shows the mean for the failed firms and the mean for the non-failed firms by groups and the overall mean.

The failed firms have mean OCF that was very close to zero with a high standard deviation. This was as per our expectation since any company that was in financial distress will be generating very little cash to finance operations. This was in contrast to the mean of the non-failed companies. If a company has a mean OCF of one we considered it viable.

FFC: These ratio shows whether a company can generate enough cash to meet interest and tax commitments. If a company has an FFC ratio of at least one (1) the company can meet its commitments. For failed firms. they have a mean that was negative. This was as per our expectation since a company that is in financial difficulties will always be in problem to meet its obligations as the fall due. For non-failed firms. FFC has a mean that was greater than one implying that they were able to meet interest and taxes as the fall due.

CCDC: cash current debt coverage. These showed company's ability to repay its current debt. Failed companies had a mean that was very close to zero. implying that most of them were just barely able to meet their debt obligations. We expected these because cash pays debts and if a company was not generating enough cash. then we expected this ratio to be low. For non-failed firms. mean of this ratio was positive and high. implying most of companies have ability to service the current debts.

CER: These ratio showed company ability to cover plant and equipment. A financially strong company was able to finance growth. The ratio measured capital available for internal investment. When this ratio exceeded one. the company had enough funds available to meet its capital investment with spare to meet debt requirements.

For failed firms, the ratio was very high and negative, implying that they were totally unable to finance growth internally. This was as per our expectation because a company in financial distress cannot get money to finance growth. However, the standard deviation was very high meaning that maybe some companies could finance growth from external sources. For non – failed firms, CER was positive and high implying that most could finance growth from internal sources.

**CTR:** Showed company ability to cover debt obligations. The ratio indicated the length of time it will take to pay the debt, assuming all cash flow from operations is devoted to debt repayment. The lower the ratio, the less financially flexible the company was and more likely that financial distress could arise in future. For failed firms, CTR was very small implying that chances of financial distress in future were quite real. Debt obligations could put a company in bankruptcy problems hence a company that does not repay debts will always be in trouble. For non-failed firm CTR was respectable though we expected it to be maybe one or above, however, the variability is quite high implying we had some firms, which have CTR greater than one.

**TFR:** The ratio measured company ability to meet future cash commitments. For failed firms, the mean was negative; implying that they could not be able to meet future cash commitments while the non-failed companies had a positive TFR implying most of them could meet future cash commitments

**CFA:** Measured cash flow adequacy of a company. Failed firms could not generate enough cash flow as expected but non-failed companies had negative cash flow. This was as expected.

In general the mean of the seven ratios for the two groups were significantly different as we expected. This was setting a good base for developing a model that can separate the two groups of companies.

The next step was to test for equality of group means. This was done by calculating the wilk's Lambda for the seven ratios. Wilk's Lambda was used to test which independent variable contributed significantly to the discriminant function. The smaller the variable wilk's lambda the more that variable contributed to the discriminant function. Wilk's lambda for the seven ratios are shown in the table below:

## Table 4.2: Test of equality of Group means

**Tests of Equality of Group Means**

|  | Wilks' Lambda | F | df1 | df2 | Sig |
|---|---|---|---|---|---|
| OCF | 794 | 9 623 | 1 | 37 | 004 |
| FFC | 822 | 8 035 | 1 | 37 | 007 |
| CCDC | 870 | 5 517 | 1 | 37 | 024 |
| CER | 754 | 12 084 | 1 | 37 | 001 |
| CTR | 843 | 6 874 | 1 | 37 | 013 |
| TFR | 881 | 5 005 | 1 | 37 | 031 |
| CFA | 664 | 18 746 | 1 | 37 | 000 |

From the table. Wilk's Lambda was significant by the F test for all variables. CFA. CER. OCF. FFC. at 99% confidence level and CCDC. CTR. and TFR at 95% confidence level. From the table the most significant variable to the model was CFA. CER. OCF. FFC. CTR. CCDC. and TFR respectively.

### 4.3    Summary of Canonical Discriminant function

The aim of the project was to develop a function that could be able to discriminate between two groups of companies i.e failed and non-failed.

In our case. the dependent variable was composed of two groups: one discriminant function was extracted from the data. The table below shows the eigen values. The larger the eigen value the more the variance in the dependent variable was explained by the function. Since the dependent in these case had only two categories (failed and non failed) there was only one discriminant function however. if there were more categories. we would had multiple discriminant function and the table below would have listed them in descending order of importance. The second column listed the percent of variance explained by each function. Third column is cumulative percent of variance explained. The last column was the canonical correlation. where the squared colerration was the percent variation in the dependent discriminated by the independent in discriminant analysis.

## Table 4.3  Eigen Values

| Function | Eigen value | % of Variance | Cumulative % | Canonical Correlation |
|---|---|---|---|---|
| 1 | value 1 217[a] | 100 0 | 100 0 | 741 |

a  First 1 canonical discriminant functions were used in the analysis

## 4.4  Testing significance of eigen values

We calculated Wilk's Lambda to test the significance of the Eigen value for each discrminant

function. In our case we had only one discriminant function and it was significant as shown below.

## Table 4.4: Wilk's Lambda

| Test of Function(s) | Wilks' Lambda | Chi-square | df | Sig |
|---|---|---|---|---|
| 1 | 451 | 26 675 | ? | 000 |

## 4.5  Standardized discriminant function coefficients

Standardized discriminate function coefficients served the same purpose as beta weight in

regression: they indicated the relative importance of the independent variables in predicting the

dependent.

## Table 4.5 Standardized Canonical Discriminant Function coefficient

| | Function 1 |
|---|---|
| OC | - 313 |
| FF | - 113 |
| CCD | 826 |
| CE | 504 |
| CT | 041 |
| TF | - 671 |
| CFA | 1 318 |

After the process of analyzing the data. the above coefficient was identified as the best to be used

to develop the cash flow model needed to classify companies.

As observed earlier. the most important ratio in predicting corporate failure was

CFA. It had a positive sign meaning it was positively related with failure. In total four ratios had

positive correlation with Z. They are CFA. CCDC. CER. and CTR. Three ratios had negative

correlation with Z. This were OCF. FFC. and TFR.

## 4.6 Model Development

The co-efficient development in the table above and the conceptual model shown earlier were used

to construct a model that was used to classify firms.

The conceptual model was of the form.

$Z = W_1X_1 + W_2X_2 \ldots + WnXn.$

Where $Z$ = Discriminant score.

$W_1 W_2 \ldots Wn$ = Discriminant Score

$X_1 X_2 \ldots Xn$ = independent variable

### 4.6.1 Actual Model

Our actual model constitutes seven independent variables. They were given as. -

$X_1$     =OCF

$X_2$     =FFC

$X_3$     =CCDC

$X_4$     =CER

$X_5$     =CTR

$X_6$     =TFR

$X_7$     =CFA

The weights (W1 W2 . . . W7) are as calculated in table 4.5 above. Substituting these variables in

the conceptual model we get the actual model.

$Z = -0.313X_1 - 0.113X_2 + 0.826X_3 + 0.504X_4 + 0.041X_5 - 0.671X_6 + 1.318X_7$

The above model was used to calculate Z score for each individual firm. The Z score was calculated by substituting the ratio of individual company in to the model. The classification rule was that if a company has a Z score greater than zero it was classified as healthy. Any company with Z score less than Zero were classified as failed.

[Refer to appendix 6]

From appendix 6 the firms were divided in to two groups i.e. failed and Non-failed. Using the Z score one year before failure. no firm was classified as Non-failed when the *apriori* group was a failed firm. for non-failed firm on the same period 3 firms were classified as failed when the *apriori* grouping was non-failed. Putting these in classified matrix we get.

**Table 4.7 1 year prior to failure**

| ACTUAL GROUP | PREDICTED FAILED | PREDICTED VIABLE |
|--------------|------------------|------------------|
| FAILED | 6 | 0 |
| NON FAILED | 3 | 11 |

**Source: Appendix 6**

When the information in table 4.7 was put in percentage. it gave the predictive accuracy of the model one-year prior to the failure.

The element in the off  diagonal gave information about the performance of the model.

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**Table 4.8 Accuracy Matrix**

| Type | Number Correct | Percent correct | Percent error | Number |
|------|----------------|-----------------|---------------|--------|
| Type I | 6 | 100% | 0% | 6 |
| Type III | 11 | 79% | 21% | 14 |
| Total | 17 | 85 | 15% | 20 |

Source: Table 4.7

The model was extremely accurate in classifying 85% of the total sample correctly. There was no type one error while type two errors was high at21%. The result was encouraging, but the obvious upward bias should be kept in mind and further validation techniques are appropriate.

### 4.6.2   Results two years to failure

We observed the discriminating ability of the model for the firm using data from two year prior to failure.

**Table 4.9 Classification table 2 year prior to failure**.

| | Predicted Failed | Non failed |
|------|------------------|------------|
| Failed | 5 | 1 |
| Non failed | 4 | 10 |

Source: Appendix 6

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**Table 4.10 ACCURACY MATRIX**

| TYPE | Number Correct | Percent correct | Percent error | Number |
|------|----------------|-----------------|---------------|--------|
| Type 1 | 5 | 80% | 20% | 6 |
| Type 2 | 10 | 71% | 29% | 14 |
| Total | 15 | 75% | 25% | 20 |

Source: Table 4.9

The prediction accuracy decreased to 75%. This was understandable because impending bankruptcy was more remote and the indications less clear. Nevertheless, 75 percent correct assignment was evidence that failure can be predicted two year prior to the event. Type 1 error had increased to 20% percent while type II error had increased to 29%. The model was extremely accurate.

### 4.6.3 Long – range predictive accuracy

The result for two years gave important evidence of the reliability of the conclusion derived from the sample of companies. An appropriate extension, therefore, would have been to examine the firms to determine the overall effectiveness of the discriminant model for longer period of time prior to failure. Several studies e.g. beaver and Merwin indicated that their analysis showed firms exhibiting failure tendencies as much as five years prior to the actual failure. Thus far, we have seen that bankruptcy can be predicted accurately for two years prior to failure.

# CHAPTER FIVE

## 5.0 Summary, Findings and Conclusions

## 5.1 Findings

The Z score was calculated for two consecutive years for each firm. This model was able to classify 85% of the cases correctly and 15 percent wrongly one year prior to failure. The predictive power of the model was 85%. This was consistent with earlier studies carried since signs of corporate failure will be apparent one year before failure occurs. Most ratios will pick out these problems at that point. However, the accuracy of the model decreased in the long – run One year prior to failure, type one error was zero while type two errors was 15 percent. These was surprising considering that what it meant was that the model was classifying more viable entities as failure. However, two year prior to failure type one error increased drastically relative to increase in type two errors. Many non-failed companies were classified as failed because may be they were in financial distress, whereby their ratios will be weak. Cash flow adequacy (CFA) ratio was revealed as the most significant predictor of failure followed by CCDC. However, it seems the reliability of the model diminished drastically two years prior to failure.

## 5.2 Summary and conclusion

The primary objective of the study was the development and testing of insolvency prediction model using cash flow ratios for Kenya public industrial firms. Even though several scholars have developed failure prediction models, most of them used USA & UK data. The model tried to use Kenyan data, because of the unique characteristics of the Kenya industries. Many scholars have agreed that each country has unique industrial characteristics, which make models developed in other countries not suitable for other countries. In the UK and other major industrialized countries, majority of failure prediction was conducted in the 70's and 80's using discriminant analysis and ignored cash flow data. Therefore, the need for a failure prediction model development using cash flow data from Kenya was important.

Our data consisted of 20 public firms. 6 failed and 14 none failed. They cover from the period 1988 to 2005. For each company. data for two years were used. A model including cash flow ratios was developed using the multiple discriminant analysis. The approach yielded high prediction results. The overall prediction power of the model was 85%. The type one error was at zero%. Type two error was at high of 15%. For type one error this was consistent with other models developed earlier by other scholars. Hence. we deduced that this model can be reliable alternative for insolvency prediction in practical application.

Moreover in contrast to prior's studies. our results indicate that cash flows play an important role in predicting failure.

In summary. the study extends prior studies in the following aspect. We examined the usefulness of operating cash flow in predicting corporate failure. However. a limitation of this and all prior failure prediction studies is that the models are not based on any economic theory in choosing those factors that predict failure. Even though it is evident that distressed prediction studies are mainly application driven. the development of a theoretical framework for failure prediction still remains.

## 5.3    Recommendations

This study does not suggest over looking balance sheet and income statement ratios. Cash flow ratios and balance sheet and income statement ratio should complement each other.


The critical need. cash interest and divided coverage ratios are short-term measure of liquidity and coverage. These ratios are cash flow indicator of liquidity and solvency about a company's ability to meet obligations beyond operating needs. Traditional activities and coverage ratios have many limitations. The debtors and creditors turn over or days to pay creditor or receive from debtors and time interest earned does not measure the ability to return funds to the creditors or investors. Specific indicators of cash flows are needs that are only provided by cash flow information.

Debt ratios will cover what the current and quick ratios missed. If debtors and inventory (stock piling) increases and cash decrease. it will not show in the current and quick ratios. If the current and quick ratios are less than one. cash flows from other activities will have to be used to cover critical current obligations. Therefore the debt ratio can be used as an additional measure of liquidity. but it is useful to measure in conjunction with current and quick ratios. A host of cash flow ratios from the cash flow statement are possible. Cash flow information is standardized in the cash flow statement internationally. In this regard. cash flow based ratios may become as useful complement to balance sheet and income statement ratios and the full potential of the cash flow statement will be utilized.

Cash flow statement can be useful to identify manipulation of cash. By comparing the component of operating cash flow it give further insight on the relationship between liquidity and financial distress. The reduction of inventory and receivables and the increase of payable may be a means to manipulate cash flow from operations. Selling of inventory without replacing it generates cash as well increasing creditors. However it is important to monitor cash flow. Small leaks of cash outflows can be spotted and plugged before they drain an entity's lifeblood. Gombola and Ketz (1987) agree that a cash flow analysis can be more revealing than a profitability analysis.

## 5.4 Areas for Further Research

This study used failed entities and evaluated them by means of suggested cash flow ratios to determine if the potential to predict financial distress exists. However, ratios in isolation are of little value. Bench marks can be developed for each ratio against which ratio of individual entities can be compared. The comparing of an entity to industry ratio or benchmark ratio will filter out common uncertainties and will leave behind only entity specific. In such an evaluation other entities in the industry will provide information about the specific performance of an entity. Research in this field had identified many other fields of research on which to embark. Beaver (1966) also found that large entities are less likely to fail than small firms. This is another assumption that will be interesting to research. Although the prediction of failure is one aspect of research on cash flows, financially strong entities can also be evaluated. Ratios can be used to evaluate corporate performance or to make relative performance evaluation. Retail entities can also be evaluated to determine the ability to pay.

Since the introduction of cash flow statements in financial reporting additional information has been made available. This reinforces the need for further research with the inclusion of cash flow data or the combination of cash flow data and accrual ratios. Our research used only cash flow data. Research using cash flow ad traditional ratios and comparison between these ratios is another research field.

The ratio suggested in this study should provide a starting point for further analysis and provide a foundation for further usage. To date there's little agreement on which ratios provide most relevant measures. Only time and experimentations with various measures will reveal which ratios best capture the quality of liquidity and financial flexibility of an entity.

The financial failure of an entity is an event that can produce substantial losses. Therefore, a model to predict potential financial failure as early as possible can serve as an early warning of distress and has the potential to reduce the risk of suffering and losses.

Accounting is plagued by the existence of alternative measurement methods. For many years accounting have been searching for criteria that can be used to choose the best measurement alternative. According to Beaver et al (1968: 675, 683) alternative accounting measurement are evaluated in terms of their ability to predict events of interest to decision makers. The measure with the greatest predictive power with respect to a given event is considered to be the best method for that particular purpose. Although there is always the possibility of unknown or untested measure that performs even better that the best measure tested it seems that Beaver et al (1968) are encouraging researchers to continue to search for methods to proof what they are trying to prove. There is always a possibility that another measure will be found to prove that is needed to be proved.

A potential area of theoretical research lies in the further conceptualization of a strong theoretical framework. This would ease the task of models specifications and could potentially bring some standardization in the research. An area of practical improvement is to introduce differentiations among industries and different periods. This could possibly assist in the explanation of whether the relationship between ratios and failure change overtime and whether this is the reason there no consensus on prescribed variables in bankruptcy prediction models.

## 5.5 Limitations of the Study

On of the limitation the study faced was the small number of companies listed in the Nairobi Stock Exchange. The stock markets in East Africa are generally small as compared to Europe and Asia. This gave the special problem of getting very few companies de-listed because of financial failure from Nairobi Stock Exchange. For the period studied only 10 companies had been de-listed and only six met our selection criteria. Other sock markets are big with hundreds of companies listed. It becomes very easy to get companies that are de-listed due to financial failure.

The second limitation of the study was failure by Nairobi Stock Exchange and Capital Market Authority to keep relevant and analyzed cash flow ratios for both the viable and failed firms. This is a serious shortcoming for the two organizations since similar studies to this one in other countries utilized data that have already been gathered and analyzed by similar organizations in their countries.

These are the only organizations with the capacity, manpower and mandate to analyze such high volume of data and keep them for industrial use. The researcher had to collect final accounts and calculate the ratio himself. This posed a great challenge to him ad wasted valuable time.

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## Appendix 1

Calculation of OCF: -

| | | | |
|---|---|---|---|
| Net Income | | | xx |
| Plus | : | Depreciation | xx |
| Equals | : | "Traditional" cash - flow | xx |
| Plus | : | Other expenses not affecting working Capital (e.g. deferred taxes) | xx |
| Less | : | Other revenues not affecting working Capital (e.g. equity earnings) | xx |
| Equals | : | Working capital provided by Operations | xx |
| Less | : | Increase in inventories | xx |
| Plus | : | Increase in accounts payable | xx |
| Plus | : | Increase in accrued liabilities | xx |
| Equals | : | Operating cash-flow OCF | xx |

SOURCE: ADAPTED FROM MILLS AND YAMAMURA (1998)

# Appendix 2

**Test for Liquidity and Solvency**

Operating cash-flow (OCF)

OCF = Cash-flow from operations

         Current liabilities

It shows the company's ability to generate resources to meet current liabilities.

Funds flow coverage (FFC)

FFC =        Earning before interest and taxes plus

       Depreciation and Amortization (EBITDA)

       Interest plus tax adjusted debt plus adjusted preferred

       Dividend

FFC show whether a company can generate enough cash to meet interest and tax commitments.

FFC ratio at least 1.0 the company can meet its commitments.

Cash interest coverage (CIC)

CIC =     Cash from operations and interest paid and capital

       Interest paid (short-term + long-term)

CIC measures company's ability to meet interest payments.

Cash current debt coverage (CCDC)

CCDC =    Operating and cash flow - cash dividends

       Current debt

Shows Company's ability to repay its current debt.

**Measures of Financial health**

Beyond question of immediate corporate solvency, we need to measure company's ability to meet on going financial and operational commitment and its ability to finance growth. How readily can the company repay or refinance its long-tern debt. Will it be able to maintain or increase its current dividend to shake-holders? How readily will it be able to raise new capital?

The following ratios can be used.

Capital expenditure       cash from operations

             Capital expenditure

B

This ratio will show company ability to cover plant and equipment. A financially strong company should be able to finance growth. The ratio measures capital available for internal investment. When this ratio exceeds 1.0, the company has enough funds available to meet its capital investment with spare to meet debt requirements. The higher the value, the more spare the company has to service and repay debt.

Total debt = cash-flow from operations

                 Total -debt

Shows company ability to cover future debt obligations. The ratio indicates the length time it will take to pay the debt, assuming all cash flow from operations is devoted to debts repayment. The lower the ratio, the less financial flexibility the company is and more likely that financial distress can arise in future.

Total Free Cash (TFC).

TFC  =  Net income + Accrued capitalized expense · depreciationand

          Amortization and operating lease and rental expenses less

          **Declared dividends and capital expenditure**

          Accrued and capitalized interest expenses, operating lease and

          Rental expenses, current portion of long term debts and current

          Portion of L-T lease obligations.

The ratio measures company ability to meet future cash commitments.

Cash-flow adequacy (CFA)

CFA = EBITDA - taxes paid- interest paid    capital expenditure

          Average annual debt maturities scheduled over next 5 years.

C

## Appendix 3

**DELISTED COMPANIES 1996 TO DATE**

2006

- Hutchings Biemers Ltd

- Uchumi Supermarkets

2003

- African Lakes

- E.A Packaging

2002

- Kenya National Mills

2001

- Theta group (Ordinary 1.00)

- Regent Undervalued Africa Fund (Ordinary $ 10.00)

- Pearl Drycleaner (Ordinary 5.00)

- Lonrho Motors E.A Ltd (Ordinary 5.00)

1999

- Ol pajeta Ranching (Ordinary 5.00)

1996

- Kenya Finance Bank (Ordinary 5.00)

- African Tours and Hotels (Ordinary 5.00)

## MAIN INVESTMENTS MARKET SEGMENT (MIMS)

### AGRICULTURAL

BROOKE BOND (K) LTD.

NORFOLK TOWERS, KIJABE STREET

HILL RD

$2^{ND}$ FLOOR

P.O BOX 42011

NAIROBI

REA VIPINGO LTD.

MADISON INSURANCE HOUSE UPPER

P.O BOX 17648

NAIROBI

KAKUZI LTD.

NEW REHANI HSE, WESTLANDS

P.O BOX 30572

NAIROBI

SASINI TEA&COFFEE

SASINI HSE, LOITA STREET

P.O BOX 30151

NAIROBI

UNILIVER TEA KENYA

NORFOLK TOWERS,2D FLOOR

P.O BOX 42011

NAIROBI

## COMMERCIAL AND SERVICES

CAR &GENERAL LTD.

NEW CARGENS HSE.. LUSAKA RD

P.O BOX 20001

NAIROBI


CMC HOLDINGS

CONNAUGHT HSE.LUSAKA RD

P.O BOX 30135

NAIROBI


HUTCHINGS BIEMER LTD

RALPH BUNCH RD.MILIMANI

P.O BOX 40408

NAIROBI

(CURRENTLY SUSPENDED)


KENYA AIRWAYS

AIRPORT NORTH RD.EMBAKASI

P.O BOX 19002

NAIROBI


MARSHALLS E.A LTD.

MARSHALL HSE. HARAMBEE AVANUE

P.O BOX39950

NAIROBI

TPS (SERENA) LTD.

WILLIAMSON HSE.4$^{TH}$ FLOOR

P.O BOX 48690

NAIROBI


NATION MEDIA GROUP

NATION CENTRE

P.O BOX 9010

NAIROBI

UCHUMI SUPERMARKETS LTD

UCHUMI HSE.AGAGHAN WALK

P.O BOX 73167

NAIROBI

(CURRENTLYSUSPENDED)

## INDUSTRIAL AND ALLIED

ATHI RIVER MINING

CHIROMO RD.WESTLANDS

P.O BOX 41908

NAIROBI

BOC KENYA LTD.

KITURI RD

P.O BOX 18010

NAIROBI

BAMBURI CEMENT LTD.

KENYA RE TOWERS.UPPER HILL

AREA

P.O BOX 10921.00100

NAIROBI

CARBACID INVESTMENT LTD.

COMMERCIAL STREET. INDUSTRIAL

P.O BOX 30564

NAIROBI

CROWN BERGER KENYA LTD.

LIKONI RD.INDUSTRIAL AREA

P.O BOX 78848

NAIROBI.

DUNLOP KENYA LTD.

KIJABE STREET

P.O BOX 30102

NAIROBI

E.A CABLES

KITURI RD.INDUSTRIAL AREA

P.O BOX 18243

NAIROBI

E.A PORTLAND CEMENT CO.LTD.

ATHI RIVER

P.O BOX 41001

NAIROBI

| | |
|---|---|
| E.A BREWERIES LTD | BRITISH AMERICAN TOBACCO KENYA LTD |
| TUSKER HOUSE.RUARAKA | LIKONI RD.INDUSTRIAL AREA |
| P.O BOX 30161 | P.O BOX 30000 |
| NAIROBI | NAIROBI |
| | |
| FIRESTONE (EA) LTD.(SAMEER GROUP) | KENYA POWER AND CO.LTD. |
| OFF MOMBSA RD. | STIMA PLAZA. PARKLANDS |
| P.O BOX 30429 | P.O BOX 30099 |
| NAIROBI | NAIROBI |
| | |
| KENYA OIL LTD. | MUMIAS SUGAR COMPANY |
| ICEA BUILDING.9$^{TH}$ FLOOR | ROYAL NGAO HOUSE.2$^{ND}$ FLLOR |
| P.O BOX 44202 | P.O BOX 57092 |
| NAIROBI | NAIROBI |
| | |
| TOTAL KENYA LTD. | UNGA GROUP LTD |
| CHAI HOUSE. KOINANGE STREET | NGANO HSE.. COMMERCIAL STREET |
| P.O BOX 30736 | INDUSTRIAL AREA |
| NAIROBI | P.O BOX 30096 |
| | NAIROBI |

H

# ALTERNATIVE INVESTMENTS MARKETS SEGMENT (AIMS)

A. BAUMANN AND COMPANY LTD.

BAUMANN. HAILE SELASSIE AVANUE

P.O BOX 40538

NAIROBI

CITY TRUST

KIRUNGII. RING ROAD WESTLANDS

P.O BOX 30029

NAIROBI

EEAGADS LTD.

C/O CITY REGITRARS.

KIRUNGI WESTLANDS

P.O BOX 30029

NAIROBI

EXPRESS KENYS LTD.

ECTVILLE. OFF ENTERPRISE RD.

P.O BOX 40433

NAIROBI

WILLIAMSON TEA KENYA LTD.

WILLIAMSON HSE

P.O BOX 42281

NAIROBI

KAPCHORUA TEA CO. LTD

WILLIAMSON HSE

P.O BOX 42281

NAIROBI.

LIMURU TEA CO.. LTD.

NORFOLK TOWER.

KIJABE STREET $2^{ND}$ FLOOR

P.O BOX 42011

NAIROBI

STANDARD NEWSPAPERS LTD.

LIKONI RD. INDUSTRIAL AREA

P.O BOX 30080

NAIROBI

DETERMINATION OF REQUIRED OUTPUT

| | COMPANY | YEAR | OCF | FFC | CCDC | CER | CDR | TFCR | CFA |
|---|---|---|---|---|---|---|---|---|---|
| 1 | KENYA NATIONAL MILLS | 2001 | -0 194 | 0 422 | -0 194 | -2 28 | -0 185 | 0 061 | -0 264 |
| A | | 2000 | -0 008 | -0 146 | -0 008 | -0 03 | -0 008 | -2 084 | -0 533 |
| 2 | PEARL DRY CLEANERS | 1999 | -0 227 | -3 983 | -0 228 | NIL | -0 225 | -4 374 | -0 473 |
| E | | 1998 | -0 144 | -3 802 | -0 144 | -24 38 | -0 141 | -2 653 | -0 367 |
| 3 | LONRHO MOTORS EAST AFRICA | 1999 | 0 065 | -0 310 | 0 065 | 2 29 | 0 055 | -1 065 | -0 581 |
| I | | 1998 | 1 404 | 0 395 | 1 403 | 3 96 | 1 062 | -0 618 | -1 011 |
| 4 | AFRICA LAKES | 2001 | -0 131 | -0 882 | -0 131 | -0 78 | -0 125 | -2 034 | -0 454 |
| O | | 2000 | -0 898 | -1 572 | -0 898 | -7 01 | -0 874 | 0 305 | -0 308 |
| 5 | EAST AFRICAN PACKAGING | 2002 | 0 081 | 1 627 | 0 081 | 2 73 | 0 080 | 0 118 | -0 013 |
| U | | 2001 | 0 122 | 1 686 | 0 122 | 4 82 | 0 122 | 1 459 | -0 010 |
| 6 | FIRESTONE EAST AFRICA | 2004 | 0 339 | 5 073 | 0 096 | 1 45 | 0 299 | 1 003 | 0 203 |
| I | | 2003 | 1 213 | 3 703 | 0 773 | 4 81 | 0 972 | 1 385 | 0 044 |
| 7 | EAST AFRICA BREWERIES LTD | 2004 | 1 522 | 4 879 | 1 077 | 2 76 | 1 079 | 1 467 | 0 532 |
| U | | 2003 | 0 726 | 6 891 | 0 358 | 4 56 | 0 532 | 2 678 | 0 829 |
| 8 | ATHI RIVER MINING | 2004 | 0 329 | 0 789 | 0 257 | 0 66 | 0 218 | -0 337 | -0 202 |
| A | | 2003 | 0 332 | 0 575 | 0 177 | 0 46 | 0 164 | -0 174 | -0 239 |
| 9 | TOTAL KENYA | 2005 | 0 270 | 0 288 | 0 199 | 2 30 | 0 160 | 0 010 | -0 035 |
| E | | 2004 | 0 151 | 0 412 | 0 078 | 2 55 | 0 100 | 0 005 | 0 029 |
| 10 | CMC HOLDINGS | 2004 | -0 040 | 0 888 | -0 048 | -1 26 | -0 035 | 0 417 | 0 027 |
| I | | 2003 | -0 014 | 0 893 | -0 023 | -0 25 | -0 012 | 0 281 | -0 015 |
| 11 | KENYA AIRWAYS | 2004 | 0 612 | 0 285 | 0 581 | 1 27 | 0 218 | -0 093 | -0 069 |
| U | | 2003 | 0 598 | 0 187 | 0 554 | 0 96 | 0 233 | -0 269 | -0 234 |
| 12 | MUMIAS SUGAR | 2004 | 0 616 | 0 883 | 0 492 | 9 66 | 0 300 | 0 450 | 0 309 |
| A | | 2003 | 0 220 | 0 157 | 0 185 | 9 32 | 0 124 | 0 149 | -0 116 |
| 13 | EXPRESS KENYA | 2004 | 0 139 | 2 535 | 0 139 | 0 31 | 0 132 | -3 070 | -0 390 |
| E | | 2003 | 0 089 | -0 059 | 0 089 | 0 88 | 0 075 | -0 446 | -0 228 |
| 14 | DUNLOP KENYA LTD | 2003 | 0 506 | 1 108 | 0 500 | 4 16 | 0 383 | 0 213 | 0 099 |
| I | | 2002 | 2 474 | 1 242 | 2 474 | 3 68 | 1 916 | -0 334 | -0 460 |
| 15 | REA VIPINGO | 2005 | 0 805 | 1 275 | 0 607 | 2 55 | 0 459 | 0 251 | 0 224 |
| O | | 2004 | 0 460 | 1 095 | 0 364 | 2 22 | 0 255 | 0 638 | 0 276 |
| 16 | BAMBURI | 2004 | 1 901 | 1 432 | 0 434 | 9 24 | 0 869 | 0 847 | 0 326 |
| U | | 2003 | 1 874 | 1 046 | 0 977 | 8 70 | 0 728 | 0 337 | 0 122 |
| 17 | UNILEVER TEA KENYA LIMITED | 2004 | 0 606 | 0 666 | 0 182 | 3 94 | 0 277 | 0 130 | 0 136 |
| I | | 2003 | 0 515 | 0 217 | 0 314 | 6 26 | 0 186 | -0 116 | -0 018 |
| 18 | KENYA POWER & LIGHTING COMPANY | 2005 | 0 532 | 0 510 | 0 498 | 3 05 | 0 333 | 0 151 | -0 005 |
| U | | 2004 | 0 238 | 0 378 | 0 238 | 0 86 | 0 138 | -0 117 | -0 104 |
| 19 | BRITISH AMERICAN | 2004 | 0 867 | 0 452 | -0 074 | 7 23 | 0 248 | 0 181 | 0 141 |
| A | | 2003 | 1 702 | 0 396 | 1 024 | 6 26 | 0 415 | 0 108 | 0 083 |
| 20 | UCHUMI | 2005 | -0 177 | -0 590 | -0 177 | -25 01 | -0 111 | -0 534 | -0 352 |
| E | | 2004 | 0 067 | -0 222 | 0 067 | 0 57 | 0 040 | 0 358 | -0 220 |

A

# Appendix 5

| COMPANY | YEAR | OPERATING CASHFLOW | CURRENT LIABILITIES | EARNING BEFORE INTERST AND TAX | DEPRECIATION | INTERESTS RECEIVED |
|---|---|---|---|---|---|---|
| KENYA NATIONAL MILLS | 2001 | 337,292 | 1735056 | -157990 | 259778 | 10528 |
|  | 2000 | -17492 | 2190851 | -308971 | 244366 | 8488 |
| PEARL DRY CLEANERS | 1999 | -9927123 | 43638776 | -17634734 | 3014815 | 0 |
|  | 1998 | -6162296 | 42898282 | -13809390 | 3893491 | 0 |
| LONRHO MOTORS EAST AFRICA | 1999 | 5929 | 91220 | -22335 | 5951 | 0 |
|  | 1998 | 43055 | 30664 | 16512 | 5259 | 0 |
| AFRICA LAKES | 2001 | -2039 | 15608 | -3940 | 1422 | 237 |
|  | 2000 | -7691 | 8568 | -1104 | 575 | 1728 |
| EAST AFRICAN PACKAGING | 2002 | 56008 | 692944 | 59327 | 28887 | 350 |
|  | 2001 | 74425 | 608338 | 52840 | 26933 | 812 |
| FIRESTONE EAST AFRICA | 2004 | 291734 | 860571 | 421309 | 185077 | 626 |
|  | 2003 | 556955 | 459277 | 248747 | 194306 | 1148 |
| EAST AFRICA BREWERIES LTD | 2004 | 5946489 | 3905915 | 7041897 | 732218 | 54934 |
|  | 2003 | 2502032 | 3444966 | 6075943 | 687458 | 169746 |
| ATHI RIVER MINING | 2004 | 215527 | 654617 | 186542 | 85204 | 0 |
|  | 2003 | 99991 | 301578 | 117517 | 62223 | 0 |
| TOTAL KENYA | 2005 | 1659512 | 6156647 | 1082446 | 224977 | 2291 |
|  | 2004 | 911797 | 6026038 | 1061826 | 193203 | 1285 |
| CMC HOLDINGS | 2004 | -126247 | 3120141 | 405073 | 78719 | 56260 |
|  | 2003 | -34207 | 2522845 | 354410 | 68899 | 62630 |
| KENYA AIRWAYS | 2004 | 4568 | 7468 | 2736 | 1224 | 51 |
|  | 2003 | 3733 | 6241 | 1018 | 853 | 53 |
| MUMIAS SUGAR | 2004 | 1122756 | 1824015 | 1294612 | 404114 | 159574 |
|  | 2003 | 514542 | 2337443 | -132483 | 432660 | 144939 |
| EXPRESS KENYA | 2004 | 54296 | 391699 | 36074 | 55506 | 0 |
|  | 2003 | 59639 | 671668 | -72064 | 61510 | 0 |
| DUNLOP KENYA LTD | 2003 | 49629 | 98072 | 30255 | 5971 | 1580 |
|  | 2002 | 61015 | 24662 | 4070 | 4606 | 665 |
| REA VIPINGO | 2005 | 195544 | 243005 | 216754 | 42046 | 14 |
|  | 2004 | 115261 | 250674 | 201302 | 40083 | 10 |
| BAMBURI | 2004 | 3761 | 1978 | 2718 | 680 | 18 |
|  | 2003 | 2819 | 1504 | 1830 | 673 | 5 |
| UNILEVER TEA KENYA LIMITED | 2004 | 565470 | 933294 | 523286 | 216109 | 5078 |
|  | 2003 | 314416 | 609941 | 85499 | 149477 | 5504 |
| KENYA POWER & LIGHTING COMPANY | 2005 | 5634277 | 10583627 | 1841303 | 1436661 | 159572 |
|  | 2004 | 2037554 | 8554160 | 856027 | 1518341 | 41173 |
| BRITISH AMERICAN | 2004 | 1520598 | 1753374 | 1737853 | 234571 | 8464 |
|  | 2003 | 2636161 | 1548948 | 1676470 | 225783 | 27889 |
| UCHUMI | 2005 | -388572 | 2191765 | -1078031 | 221482 | 0 |
|  | 2004 | 184574 | 2738824 | -629685 | 197408 | 6 |

| COMPANY | YEAR | DEBT REPAYMENTS | PREFERRED DIVIDEND | CASH DIVIDEND | TAX PAID | CAPITAL EXPENDITURE | TOTAL DEBT |
|---|---|---|---|---|---|---|---|
| KENYA NATIONAL MILLS | 2001 | 0 | 0 | 0 | 10219 | 147657 | 1825972 |
| | 2000 | 0 | 0 | 0 | 24583 | 571947 | 2309239 |
| PEARL DRY CLEANERS | 1999 | 0 | 0 | 11000 | 0 | 0 | 44076106 |
| | 1998 | 0 | 0 | 0 | 0 | 252750 | 43565610 |
| LONRHO MOTORS EAST AFRICA | 1999 | 4896 | 0 | 21 | 438 | 2587 | 107156 |
| | 1998 | 4146 | 0 | 21 | 1294 | 10883 | 40536 |
| AFRICA LAKES | 2001 | 1103 | 0 | 0 | -12 | 2614 | 16271 |
| | 2000 | 1116 | 0 | 0 | 79 | 1097 | 8804 |
| EAST AFRICAN PACKAGING | 2002 | 0 | 0 | 0 | 245 | 20541 | 699246 |
| | 2001 | 0 | 0 | 0 | 75 | 15436 | 612312 |
| FIRESTONE EAST AFRICA | 2004 | | | 208757 | 16509 | 201249 | 974154 |
| | 2003 | | | 201981 | 102106 | 115810 | 573252 |
| EAST AFRICA BREWERIES LTD | 2004 | 0 | | 1741445 | 1926499 | 2,155,245 | 5511917 |
| | 2003 | 1834945 | | 1270430 | 1543854 | 548153 | 4706515 |
| ATHI RIVER MINING | 2004 | | | 47000 | 43241 | 326702 | 986764 |
| | 2003 | | | 46500 | 36386 | 215634 | 611293 |
| TOTAL KENYA | 2005 | 0 | | 436439 | 379647 | 720943 | 10384647 |
| | 2004 | 0 | | 439182 | 368526 | 357854 | 9098988 |
| CMC HOLDINGS | 2004 | 21549 | 0 | 24280 | 110217 | 99919 | 3568440 |
| | 2003 | 175262 | 0 | 24280 | 163288 | 137474 | 2901254 |
| KENYA AIRWAYS | 2004 | 772 | 0 | 231 | 34 | 3593 | 20970 |
| | 2003 | 818 | 0 | 277 | 427 | 3876 | 15997 |
| MUMIAS SUGAR | 2004 | 0 | | 224529 | 5920 | 116235 | 3745232 |
| | 2003 | 230048 | | 81262 | 146719 | 55196 | 4156199 |
| EXPRESS KENYA | 2004 | 10000 | | 0 | 3052 | 176026 | 410729 |
| | 2003 | 14012 | | 0 | 5914 | 67611 | 799514 |
| DUNLOP KENYA LTD | 2003 | 17419 | | 549 | 1607 | 11939 | 129559 |
| | 2002 | 7138 | | 0 | 0 | 16571 | 31846 |
| REA VIPINGO | 2005 | 182983 | 0 | 48000 | 24610 | 76580 | 425988 |
| | 2004 | 202180 | 0 | 24000 | 6201 | 51918 | 452854 |
| BAMBURI | 2004 | 2348 | | 2903 | 848 | 407 | 4326 |
| | 2003 | 2366 | | 1350 | 950 | 324 | 3870 |
| UNILEVER TEA KENYA LIMITED | 2004 | 1109835 | | 395320 | 101056 | 143499 | 2043129 |
| | 2003 | 1081613 | 0 | 123052 | 62954 | 50259 | 1691554 |
| KENYA POWER & LIGHTING COMPANY | 2005 | 6355677 | 1930 | 363485 | 20372 | 1846965 | 16939304 |
| | 2004 | 6259702 | 1930 | 1930 | 7811 | 2371312 | 14813862 |
| BRITISH AMERICAN | 2004 | 4368513 | | 1650000 | 663975 | 210311 | 6121887 |
| | 2003 | 4807121 | | 1050000 | 724516 | 421342 | 6356069 |
| UCHUMI | 2005 | 1302304 | 0 | 0 | -9344 | 15536 | 3494069 |
| | 2004 | 1853731 | 0 | 0 | 0 | 321796 | 4592555 |

| COMPANY | YEAR | AMORTISATION | NET INCOME (PROFIT) | DIVIDEND DECLARED | LEASE AND RENTAL | LONGTERM DEBT | DEBT REPAYMENT | INTEREST PAID |
|---|---|---|---|---|---|---|---|---|
| KENYA NATIONAL MILLS | 2001 | 6897 | -113110 | | 0 | 90916 | 90916 | 166778 |
| | 2000 | 0 | -622763 | | 0 | 118388 | 118388 | 325178 |
| PEARL DRY CLEANERS | 1999 | 0 | -20902879 | | 341346 | 437330 | 437330 | 3233002 |
| | 1998 | 0 | -15789652 | | 1431338 | 667328 | 667328 | 1940694 |
| LONRHO MOTORS EAST AFRICA | 1999 | 0 | -59601 | | 0 | 15936 | 15936 | 36890 |
| | 1998 | 0 | -28481 | | 0 | 9872 | 9872 | 45301 |
| AFRICA LAKES | 2001 | 1181 | -3792 | | 0 | 663 | 663 | 853 |
| | 2000 | -521 | 9 | | 53 | 236 | 236 | 432 |
| EAST AFRICAN PACKAGING | 2002 | 0 | -2244 | | 0 | 6302 | 6302 | 47926 |
| | 2001 | 0 | 57909 | | 0 | 3974 | 3974 | 43342 |
| FIRESTONE EAST AFRICA | 2004 | 22 | 275171 | 139171 | | 113583 | 113583 | 5945 |
| | 2003 | 22 | 157194 | 69586 | | 113975 | 113975 | 5667 |
| EAST AFRICA BREWERIES LTD | 2004 | 186179 | 3849058 | 193787 | | 1606002 | 1606002 | 25463 |
| | 2003 | 2500333 | 1500008 | 218003 | 22258 | 1261549 | 1261549 | 82796 |
| ATHI RIVER MINING | 2004 | 3163 | 115998 | 0 | 3748 | 332147 | 332147 | 16249 |
| | 2003 | 4928 | 97106 | 9300 | 4120 | 309715 | 309715 | 11635 |
| TOTAL KENYA | 2005 | 7983 | 531561 | 0 | 0 | 4228000 | 4228000 | 345526 |
| | 2004 | 40277 | 577007 | 437663 | 0 | 3072950 | 3072950 | 67384 |
| CMC HOLDINGS | 2004 | 2142 | 262962 | 48560 | 0 | 448299 | 448299 | 98641 |
| | 2003 | 1686 | 176988 | 24280 | 3909 | 378409 | 378409 | 97255 |
| KENYA AIRWAYS | 2004 | 45 | 1302 | 346 | 0 | 13502 | 13502 | 561 |
| | 2003 | 40 | 400 | 231 | 0 | 9756 | 9756 | 460 |
| MUMIAS SUGAR | 2004 | 10833 | 791451 | 306000 | 0 | 1921217 | 1921217 | 15068 |
| | 2003 | 8231 | -215608 | 0 | 0 | 1818756 | 1818756 | 147035 |
| EXPRESS KENYA | 2004 | 274 | 4610 | 0 | 1076 | 19030 | 19030 | 17204 |
| | 2003 | 868 | -68151 | 0 | 0 | 127846 | 127846 | 36763 |
| DUNLOP KENYA LTD | 2003 | 3036 | 9233 | 0 | 0 | 31487 | 31487 | 3939 |
| | 2002 | 2913 | 5051 | 0 | 0 | 7184 | 7184 | 2144 |
| REA VIPINGO | 2005 | 121 | 124462 | 48000 | 11927 | 182983 | 182983 | 20105 |
| | 2004 | 122 | 128666 | 48000 | 198513 | 202180 | 202180 | 18284 |
| BAMBURI | 2004 | 40 | 1718 | 0 | 0 | 2348 | 2348 | 53 |
| | 2003 | 58 | 1067 | 653 | 0 | 2366 | 2366 | 82 |
| UNILEVER TEA KENYA LIMITED | 2004 | 19 | 360946 | 293250 | 0 | 1109835 | 1109835 | 190 |
| | 2003 | 19 | 62254 | 293250 | 0 | 1081613 | 1081613 | 2481 |
| KENYA POWER & LIGHTING COMPANY | 2005 | 55 | 1270273 | 24807 | 0 | 6355677 | 6355677 | 63919 |
| | 2004 | 55 | 457807 | 386362 | 0 | 6259702 | 6259702 | 19295 |
| BRITISH AMERICAN | 2004 | 4 | 1210194 | 450000 | 215 | 4368513 | 4368513 | 1 |
| | 2003 | 4 | 1140021 | 450000 | 219 | 4807121 | 4807121 | 6 |
| UCHUMI | 2005 | 2843 | -1227203 | 0 | 160277 | 1302304 | 1302304 | 144018 |
| | 2004 | 7877 | 698911 | 0 | 161456 | 1853731 | 1853731 | 60039 |

## Z-SCORE FOR FAILED FIRMS AND VIABLE FIRMS

| COMPANY | Original Failure Viable | YEAR | Z Scores | Predicted Failed Viable | Comments | |
|---|---|---|---|---|---|---|
| KENYA NATIONAL MILLS | Failed | 2001 | -1 77409 | Failed | Correct prediction | 1 |
| | Failed | 2000 | -1 21963 | Failed | Correct prediction | 2 |
| PEARL DRY CLEANERS | Failed | 1999 | -1 75263 | Failec | Correct prediction | 3 |
| | Failed | 1998 | -1 94720 | Failec | Correct prediction | 4 |
| LONRHO MOTORS EAST AFRICA | Failed | 1999 | -1 83471 | Failed | Correct prediction | 5 |
| | Failed | 1998 | -2 55240 | Failed | Correct prediction | 6 |
| AFRICA LAKES | Failed | 2001 | -1 02930 | Failed | Correct prediction | 7 |
| | Failed | 2000 | -3 23612 | Failed | Correct prediction | 8 |
| EAST AFRICAN PACKAGING | Failed | 2002 | -0 05923 | failed | correct prediction | 9 |
| | Failed | 2001 | 0 58780 | none failed | **Wrong prediction** | 10 |
| UCHUMI | Failed | 2005 | -3 56912 | Failed | Correct prediction | 39 |
| | Failed | 2004 | -1 16867 | Failed | Correct prediction | 40 |
| FIRESTONE EAST AFRICA | Non failed | 2004 | 0 10063 | Non failed | Correct prediction | 11 |
| | Non failed | 2003 | 0 15717 | Non 'ailed | Correct prediction | 12 |
| EAST AFRICA BREWERIES LTD | Non failed | 2004 | 2 56214 | none Failed | Correct prediction | 1: |
| | Non failed | 2003 | 2 40740 | None Failed | Correct prediction | 1. |
| ATHI RIVER MINING | Non failed | 2004 | -0 49706 | failed | **Wrong prediction** | 1: |
| | Non failed | 2003 | -0 91847 | failed | **Wrong prediction** | 1( |
| TOTAL KENYA | Non failed | 2005 | 0 18400 | Non failed | Correct prediction | 1 |
| | Non failed | 2004 | 0 37212 | Non failed | Correct prediction | 1 |
| CMC HOLDINGS | Non failed | 2004 | -0 37453 | failed | **Wrong prediction** | 1 |
| | Non failed | 2003 | -0 37695 | failed | **Wrong prediction** | 2 |
| KENYA AIRWAYS | Non failed | 2004 | 0 44785 | Non failed | Correct prediction | 2 |
| | Non failed | 2003 | -0 28862 | Non failed | Correct prediction | 2 |

| | | | | | | |
|---|---|---|---|---|---|---|
| MUMIAS SUGAR | Non failed | 2004 | 2 43198 | Non failed | Correct prediction | 23 |
| | Non failed | 2003 | 2 28456 | Non failed | Correct prediction | 24 |
| EXPRESS KENYA | Non failed | 2004 | 0 14022 | Non failed | Correct prediction | 25 |
| | Non failed | 2003 | -0 63688 | Non failed | Correct prediction | 26 |
| DUNLOP KENYA LTD | Non failed | 2003 | 1 17948 | Non failed | Correct prediction | 27 |
| | Non failed | 2002 | 1 10720 | Non failed | Correct prediction | 28 |
| REA VIPINGO | Non failed | 2005 | 1 64732 | Non failed | Correct prediction | 29 |
| | Non failed | 2004 | 1 39259 | Non failed | Correct prediction | 30 |
| BAMBURI | Non failed | 2004 | 1 49215 | Non failed | Correct prediction | 31 |
| I | Non failed | 2003 | 1 69583 | Non failed | Correct prediction | 32 |
| UNILEVER TEA KENYA LIMITED | Non failed | 2004 | 0 85790 | Non failed | Correct prediction | 33 |
| | Non failed | 2003 | 0 74110 | Non failed | Correct prediction | 34 |
| KENYA POWER & LIGHTING COMPANY | Non failed | 2005 | 0 64532 | Non failed | Correct prediction | 35 |
| | Non failed | 2004 | -0 11446 | failed | **Wrong prediction** | 36 |
| BRITISH AMERICAN TOBBACCO | Non failed | 2004 | 0 58535 | Non failed | Correct prediction | 37 |
| | Non failed | 2003 | 0 63447 | Non failed | Correct prediction | 38 |

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