# MODELLING THE USE OF Z SCORE RATIOS TO PREDICT BANKRUPTCY LIKELIHOOD OF SUGAR COMPANIES IN KENYA

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# Modelling the Use of Z Score ratios in Predicting Bankruptcy likelihood of Sugar Companies in Kenya

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## DECLARATION

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

Signature……. Date ……..

**Maurice Mwita Range**

This thesis has been submitted for examination with our approval as university supervisor.

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**JKUAT, Kenya**

## DEDICATION

This thesis is dedicated to my mother Sabina Maroa Range, my wife Alice Nelima my children Mirumbe, Bhoke and Range for their patience, encouragement and support toward the entire journey.

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## ABBREVIATIONS AND ACRONYMS

| | | |
|---|---|---|
| **ADC** | - | Agricultural Development Corporation |
| **AGM** | - | Annual General Meeting |
| **ANOVA** | - | Analysis of Variance of Overall Model |
| **BVE** | - | Book Value of Equity |
| **COMESA** | - | Common Markets for Eastern and Southern Africa |
| **DBK** | - | Development Bank of Kenya |
| **EBIT** | - | Earnings before Interest and Tax |
| **EPS** | - | Earnings per share |
| **FIFO** | - | First in First Out |
| **GDP** | - | Gross Domestic Product |
| **IAS** | - | International Accounting Standard |
| **IASCF** | - | International Accounting Standard Conceptual Framework] |
| **ICDC** | - | Industrial Credit Development Corporation |
| **IDB** | - | Industrial Development Bank |
| **IFRS** | - | International Financial Reporting Standards |
| **KIPPRA** | - | Kenya Institute for Public Policy and Research Analysis |
| **LIFO** | - | Last in First Out |

| | | |
|---|---|---|
| **M & M** | - | Modigliani and Miller |
| **MDA** | - | Multiple Discriminant Analysis |
| **MT** | - | Metric Tonnes |
| **RE** | - | Retained Earnings |
| **S. D** | - | Standard Deviation |
| **SD** | - | Sugar Directorate |
| **SPSS** | - | Statistical package for Social Sciences |
| **TA** | - | Total Assets |
| **TL** | - | Total Liabilities |
| **USA** | - | United State of America |
| **USD** | - | United State Dollars |
| **WC** | - | Working Capital |
| **KAM** | - | Kenya Association of Manufacturers |
| **MV** | - | Market Value |
| **MPS** | - | Market Price Per Share |
| **EBIT** | - | Earning before Interest and Tax |
| **RE** | - | Retained Earnings |
| **GDP** | - | Gross Domestic Product |

## OPERATIONAL DEFINITION OF TERMS

**Bankruptcy likelihood;** is defined as an organization that exhibits a situation where a company is no longer viable as a going concern in such a case, the company is no longer able to meet its financial obligation (Bhurnia & Sarkar, 2011)

**A private owned sugar company;** is a sugar company which the government does not control or own shares and neither does the company sells its shares to the general public and they included; Soin Sugar, Butali Sugar, Trans Mara Sugar and Kibos Sugar (Sugar Directorate).

**Altman's Z score**; The Z score is a criterion variable that is commonly applied in the study of corporate failure and bankruptcy likelihood (Bhunia & Sarkar; Burksaitiene & Mazintiene, 2011).

**Total Asset**; total assets can either be tangible such as property, plant and equipment or intangible such as intellectual property, patents or copy rights (Babalola, 2013).

**Bankruptcy**; refers to the inability of a business or firm to repay its outstanding debt or when the firm is unable to meet its obligations (Aliakbari, 2009).

**Book Value of equity**; is the ownership or the shareholders' investment in the company (Cornett *et al., 2012*). Book value of equity is recognized in the statement of financial position and is normally measured by the difference between total assets and total liabilities of a company and the higher the total assets the better the company since the low bankruptcy likelihood the company will be.

**Cash flow**; represents the cash inflows and cash outflows arising from a given period. It indicates analytical information of the operating, investing and financing activities of the business. It normally presents changes in working capital of the company within an accounting period (Gibson, 2011).

**Discriminant analysis**; is a quantitative model that uses data to predict the outcome based on grouping (Burksaitiene & Mazintiene, 2011). In the prediction of the bankruptcy likelihood, the linear model of discriminant analysis uses the same concept. This model incorporates specific financial characteristics and ratios to establish the probability of bankruptcy (Burksaitiene & Mazintiene, 2011).

**Earnings before interest and tax**; it represents the percentage of total sales left after deducting all normal operating expenses (Cornett *et al.*, 2012). High and increasing earnings before interest and tax are an indication that management is effective in controlling operating costs (Palenu & Healy, 2008

**Equity;** represents the net assets. It is simply the difference between the total assets (non-current plus current assets) less total liabilities (non-current liabilities plus current liabilities).The higher the value of equity in the company's statement of financial position the low the bankruptcy likelihood

**Financial statements;** are accounting records that provide information to the users about the performance of the business changes in performance and the position of the business as at a given date. Financial statements are prepared as if a company will continue in business and not go into bankruptcy (June, 2012).

**Gearing level**; is measured by the capital structure of a company which is a combination of debts and equity in the financing of a company's operations. The more the debt the company has, the more likely that it will not be able to service its debt a situation which will increase the bankruptcy likelihood (Palenu & Healy 2008). A company must therefore decide on what is the most efficient use of its debts and equity ratio (Palenu & Healy, 2008).

**Liabilities or debts**; are claims to the assets of the company that must be paid back. Normally they will include long term borrowings, short term borrowings, accounts payables, unpaid employees' salaries, unpaid taxes and long term debts such as bonds (Cornet *et al.,* 2012).

**Market value of equity**; this represents the current value of the company's outstanding common stock based on the current price of the outstanding shares. In other words it's the market capitalization of the company (Bhunia & Sarkar; Burksaitiene & Mazintiene, 2011).The more the market value the low bankruptcy likelihood the company will be.

**Net worth**; is defined as assets less liabilities. It is simple a measure of what the company is worth (Palenu & Healy, 2008). In addition for the purpose of this study the more the net worth the low bankruptcy likelihood the company will be due to more book value of equity.

**Public owned sugar companies** is a company that either sells its shares to the general public for example Mumias sugar company or a company that has part of its shares owned by the government and is being classified as a parastatal company and they includes; Mumias Sugar, South Nyanza Sugar, Miwani Sugar, Chemelil Sugar, Muhoroni Sugar and Nzoia Sugar (Sugar Directorate).

**Ratio**; is an expression of the relationship between two or more variables. Once the relationship is established, it forms a pattern which will be used for future planning and decision making processes. Petersen and Plenborg (2012) described financial ratio analysis as useful in evaluating a company's economic performance and financial health. They stated that financial ratios are important indicators of financial performance describing the level of company's profitability, growth and risk.

**Retained earnings**; are the percentages of net income not paid out as dividends they are reinvested in the firm or used to pay debts of the firm (Chasan, 2012).

**Sales**; represents the cash inflows generated by a company within a given accounting cycle or period. The different between sales and expenses represents the profit for efficiency or loss for lack of efficiency (Gibson, 2011).

**Total assets turnover**; is the expressed as sales divided by the total book value of assets (Cornett *et al., 2012*). The ratio measures how effective the company utilizes its assets (resources) to generate sales. A high sale in relation to the assets of the company is an indication of efficient utilization of assets to generate sales. A

low total assets turnover ratio will be an indication that the company has high chances of too many assets which are not efficiently utilized to generate sales which is likely to contribute to high bankruptcy likelihood (Palenu & Healy, 2008).

**Working capital**; is the difference between current assets and current liabilities (Burnia & Sarkar, 2011). The study used this ratio to classify Kenyan sugar companies into bankruptcy likelihood high or bankruptcy likelihood low since in the year in which the ratio was negative it was termed as bankruptcy likelihood high and in the year in which the ratio was positive it was termed as bankruptcy likelihood high. This is because this ratio is the only one that measures liquidity position of the company in the Altman's Z score ratios model.

## ABSTRACT

The sugar companies in Kenya contributes significantly in the country's economy by creating employment opportunities, production of sugar which is used for domestic, industrial consumption and for exports which enable the country to earn foreign income hence improving balance of trade. However, despite the important contributions that the sugar industry plays in the Kenyan economy, the bankruptcy likelihood of this sector is high. Research has hardly been done in predicting the bankruptcy likelihood of sugar companies. This study sought to bridge this gap by modelling the use of the Z score ratios in predicting the bankruptcy likelihood of sugar companies in Kenya. Specifically the study assessed the effects of working capital to total assets ratio, determined the influence of retained earnings to total assets ratio, established the effect of earnings before interest and tax to total assets ratio, examined the influence of book value of equity or market value of equity to total liabilities ratio and established the effect of sales to total assets ratios in predicting the bankruptcy likelihood of sugar companies in Kenya. This research was anchored on various theories including; liquidity preference, resource dependence, static trade off, pecking order and entropy theory. Descriptive research design was used in the study. The target population was the 12 sugar companies in Kenya as per Sugar Directorate year book 2016 which included both public owned and private owned sugar companies. The study adopted purposive sampling technique to collect primary data. An open and closed ended questionnaire was used to collect primary data from public owned sugar companies in Kenya. A data collection sheet was used to collect secondary data from public and private owned sugar companies in Kenya**.** Data was analyzed using SPSS and presented in form of figures and tables. The results of the study revealed that the following ratios are significant discriminators and predictors of the bankruptcy likelihood of sugar companies in Kenya; BVE or market value of equity to total liabilities, earnings before interest and tax to total assets, retained earnings to total assets and working capital to total assets. However, the study established that the ratio sales to total assets ratio was not a significant discriminator and predictor of the bankruptcy likelihood of sugar companies in Kenya. In addition, the results revealed that all the public owned sugar companies had high bankruptcy likelihood while on the other hand the private owned sugar companies' had a low bankruptcy likelihood during the period of the study. Consequently, the Z score ratios model was found to be a robust model in predicting the bankruptcy likelihood of sugar companies in Kenya. The study recommends adoption of the Z score ratios model as a utility predictor of bankruptcy likelihood of sugar companies in Kenya. This study has implications to policy since it establishes a versatile model of predicting the bankruptcy likelihood of sugar companies whose sustainability is pertinent in achieving the countries sustainable development agenda and economic growth. The study also contributes to the existing body of knowledge of extending the discourse of the application of the Z score ratios model in predicting bankruptcy likelihood by applying discriminant analysis. Additionally the findings of this study has implications to methodology because it employed descriptive research design unlike the other previous studies which used case study design which is subjective and not conclusive hence their findings cannot be generalized to other sugar industries in the sector.

# CHAPTER ONE

# INTRODUCTION

## 1.1 Background of the Study

Bankruptcy likelihood refers to the chances that a person, business or firm will likely not be able to repay its outstanding debt (Aliakbari, 2009). Bankruptcy likelihood has become a serious area in the field of finance because of its negative impact on the company's performance hence reducing the company's ability to exist (Khaliq, Basheer, Mohd, Thaker & Nurun, 2014). Company bankruptcy likelihood is said to be high when the company's current liabilities exceed the fair value of its current assets (Mohammed & Soon, 2012). Bhurnia and Sarkar (2011) describe company bankruptcy likelihood high when an organization exhibits a situation where a company is no longer viable as a going concern in such a case, the company is no longer able to meet its financial obligation. Bankruptcy likelihood high is a term in corporate finance used to indicate a condition when businesses or companies are unable to meet their obligation to creditors or meet them with difficulties thus leading eventually to bankruptcy.

In a more general and basic sense, bankruptcy likelihood high is a reduction in financial efficiency that results from a shortage of cash (Korteweg, 2007). It is a condition where firms' obligations are not met or are met with difficulties. This normal arise when a firm is disadvantaged by taking more debts in that it increases the risk of bankruptcy likelihood which is detrimental to equity and debt holders.

The extreme form of bankruptcy likelihood high is insolvency, which could be very expensive since it involves legal costs and may force a firm to sell its assets at distress prices (Gibson, 2011). Therefore, need to predict bankruptcy likelihood so that corrective action can be taken early to salvage those sugar companies that can be salvaged and liquidate those that cannot be salvaged. Alareeni and Branson (2013) asserts that most statistical failure prediction models have been developed and tested in developed countries such as USA and European countries and they have been rarely

applied in developing countries. The Altman Z-score is the most common statistical model used. This study focused on the use of the Z score ratios model to predict the bankruptcy likelihood of sugar companies in Kenya. The findings of this study is likely to provide information which will enable the various stakeholders to take early corrective action, which will include salvaging those companies which can be salvaged and liquidate those that cannot be salvaged (Brigham & Daves, 2010). It is worth noting that despite the remarkable role of the sugar industry in Kenyan economy such as the provision of employment opportunities, production of sugar for domestic and commercial consumption, generation of government revenue through taxes and boosting exports, the financial performance of the sector is wanting.

The sugar industry is supposed to play an important role in the Agricultural sector. The Agricultural sector according to the Deloitte report on Kenya economic outlook 2017, the sector where the sugar companies belongs is the most prominent, important and dominant industry. The industry accounted for over 26% of the gross domestic products (GDP), 20% of employment, 75% of the labour force and over 50% of the revenue from exports by the year 2016, hence; the need to salvage the industry. Possible chances of bankruptcy likelihood in the Kenyan sugar industry have triggered the need to privatize the government owned sugar companies in the light of salvaging the sector (the privatization commission of Kenya report, 2015). The Kenya National Assembly Eleventh Parliament (Third session-2015) report of the departmental committee on Agriculture, livestock and co-operatives on the crisis facing the sugar industry in Kenya agreed that one of the problem facing sugar companies in Kenya is high cost of production. Muhoroni and Miwani sugar companies have been put under receivership, Chemelil sugar is struggling with immature canes, while Nzoia and Mumias sugars are struggling to pay their debts (Sugar Directorate strategic plan, 2006-2010).

Further according to baseline study for sugar agribusiness in Kenya (2014), the government of Kenya is planning to privatize all government owned sugar companies since expansion of capacity cannot take off easily under the current financial situation. Muhoroni Sugar Company is under receivership, Chemelil Sugar Company is struggling

with immature cane supplies and Mumias Sugar Company is struggling to pay its debts. Therefore, there is need for a model that could predict the bankruptcy likelihood of companies in time, since this is likely be useful for lenders, customers, stockholders, different regulators, managers, suppliers, employees, government and other stakeholders. Altman (1968) moved significantly forward by developing a multiple discriminant analysis model (MDA) called the Z score ratios model with 5 key ratios. These ratios covers all key financial performance aspects of the company including; the gearing position, profitability, liquidity, efficiency and shareholders positions of the respective companies.

A reliable bankruptcy model with consistent predictive ability is essential in the today's Kenyan environment. Altman's Z score formula which uses various financial ratios to measure the financial health of a company and diagnose the likelihood that a company is likely to go bankrupt is therefore necessary in Kenyan environment. The users of financial statements are interested in analyzing and interpreting the financial statements in order to determine financial viability of a company for investment decisions and other resource allocation decisions (Fawad, Iqtidar, Shakir & Madad, 2014). Financial Viability is also used by shareholder to establish whether the firm has the ability to pay their expected rate of return and if there is likely to be capital gain. The Creditors of the firm are interested in determining the firm's debt paying ability. Assessment of the performance of a firm is also a matter of interest for other firms dealing with them. Petersen and Plenborg (2012) described financial ratio analysis as useful in evaluating a company's economic performance and financial health. They stated that financial ratios are important indicators of financial performance describing the level of a company's profitability, growth and risk.

Friedman and Miles (2006) stated that it is important for organizations to consider the interests of stakeholders because they affect the performance of the organization in various ways hence the need for this study so that the interests of the various stakeholders can be salvaged where possible. Mitchell and Cohen (2006) claim that stakeholders bear some risks as a result of their direct or indirect investment in a

particular organization. Whenever the interests and risks of the shareholders are not considered, agency problems may emerge which probably has the effect of reducing the financial performance of the organization and reduce the value of the discriminant Z score and increase the bankruptcy likleihood. This eventually leads to actual bankruptcy if corrective actions are not taken to salvage the company.

Simic, Kovac and Simic (2012) stated that corporate failure prediction is essential for the prevention or mitigation of negative economic fluctuations in a national economy. The risk of default is likely to be very high in companies that have their bankruptcy likelihood status high. This implies that the investors lose confidence in the company resulting in the company's failure. It is therefore important that all companies predict their financial health. By doing so, the company can remain in business due to early diagnosis of the problem and taking corrective action and the company's market value and profitability is likely not to be reduced by the present value of potential bankruptcy costs (Berk & De marzo, 2014). This prompts the need for a model that can be able to predict the bankruptcy likelihood for the prevention of negative economic fluctuations in a national economy (Simic, Kovac & Simic, 2012).

Altman's Z score model which is a multivariate formula which uses combinations of ratios to predict the likelihood that a company is bankrupt (Altman, 1968). Various researchers have also established that the Z score model is the most appropriate model used to predict bankruptcy likelihood (Bhurnia & Sarkar, 2011; Bhatt, 2012; Alkhatib & Bzour, 2011; Sitati & Odipo, 2009).Therefore, this study results is likely to assist decision makers and other stakeholders to evaluate sugar companies in Kenya regarding credit analysis, investment analysis and their going concern ability. This is because prior diagnosis of financial failure in Kenyan industry especially in the sugar industry is necessary due to increasing number of financial challenges in the sugar companies in Kenya Baseline study for agribusiness in Kenya (2014).

### 1.1.1 Global Perspective of Sugar Industries

The values in metric tonnes in Appendix X11 show the world sugar production for the six years period from 2009/2010 to 2014/2015. Asia is leading in terms of sugar production, South America is the second, Europe is third, N & C. America is fourth, European is fifth, Africa is the sixth and Ocean countries are the last sugar producers in the world. The values in Appendix X11 clearly shows that African sugar production where Kenya is included is relatively low and when the statistics are compared with African sugar consumption as shown in Appendix X111, it reveals that for all the six years Africa has been consuming more sugar than it produces, hence the need to boost the production of sugar in Africa region.

The values in Appendix X111 on world sugar consumption as per International Sugar Journal (ISJ's) World Sugar Outlook, 2015 indicates that Asia which is the largest sugar producer is also the largest world sugar consumption, European is second, South Africa is third, N & C America is fourth, Africa is fifth, European is sixth and the last is Ocean. Therefore, from the statistics in the two Appendixes (X11 and X111) it shows that the changes in African sugar production as a percentage of African sugar consumption for the six years period was as follows;

2009/2010 = 10,178/17,078 *100 = 59.7%

2014/2015 = 11,979/19,646 * 100 = 60.045

The above statistics clearly shows the need increase the African Sugar Production since over a period of six years the increase is relatively small 0.34% (60.04%-59.7%).

### 1.1.2 Globally Related Studies in Bankruptcy Likelihood

Alareeni and Branson (2013) stated that most statistical failure prediction models have been developed for and tested in developed countries such as the USA and European countries. Among the most common statistical models are the Altman Z-scores. Li and

June (2012) examined the accuracy of various Z-score models in predicting corporate bankruptcy from 2000 to 2010 in the United States. The study concluded that although the original Z-score model was developed for manufacturing firms, it performed equally well in predicting bankruptcy for non-manufacturing firms. Ramaratnam and Jayaraman (2010) analyzed and predicted the financial health of five selected companies in the Indian industry using Altman's Z-score. The study revealed that all the five companies were financially sound during the study period. Another study by Bhatt (2012) investigated the ability of three versions of the model for bankruptcy likelihood prediction in the Indian markets. The study was conducted on four selected companies that belonged to various sectors. The results proved that the model had a remarkable degree of accuracy in bankruptcy likelihood prediction.

Alkhatib and Bzour (2011) investigated the predictability of corporate bankruptcy of Jordanian listed companies using Altman Z score ratios model. The study included sample companies listed on the Jordanian stock exchange that were liquidated during the period 2000 - 2006. The study concluded that Altman Z score ratios model was a reliable tool for predicting the bankruptcy of Jordanian companies during the five years preceding bankruptcy. Additionally, Wang and Campbell (2010) studied data from Chinese publicly listed companies for the period 2000 to 2008 to test the accuracy of Altman's Z score ratios model in predicting failure of Chinese companies. All Altman's models were found to have significant predictive ability. Hence the need to apply the model in the context of developing countries likes Kenya especially in the sugar industry where limited research has been carried out using the model.

A study conducted by Tan (2012) on the effect of bankruptcy likelihood of Asian firms performance using regression analysis and using leverage proxy for bankruptcy likelihood high firms and the study found that bankruptcy likelihood high firms underperform. This is an indication that for any firm to perform better, and contribute to the economic growth of the country, it should be strong financially and bankruptcy likelihood low.

Mohammed and Soon (2012) applied the Altman's Z score ratios model in predicting bankruptcy likelihood and current ratio to assess the financial condition of 44 firms that were listed in the Malaysian Stock Exchange for the period of 2008 to 2010 and the study results concluded that the Altman's Z score model and the current ratio are good predictors of bankruptcy likelihood of firms.

Johnson and Kumbaro (2011) conducted a multiple discriminant analysis where a sample of 45 American firms that had filed for bankruptcy between 2007 and 2010. The study applied the Altman's Z score ratios model and the results of the study found out that the model is a good predictor of bankruptcy likelihood.

Youn and Gu (2007) carried out a study where the prediction of business failure in the Korean lodging industry were tested and concluded that Korean lodging firms should lower their reliance on debt financing and increase the efficiency in using existing assets to generate sales revenue where this was likely to increase profits, cash flows and net worth hence reducing the level of bankruptcy likelihood.

### 1.1.3 African Sugar Production and Consumption

For the six years' period, there has been a deficit of sugar averaging to 7,584 MT per year as shown in Appendix XV. In addition, as indicated in (Appendix XV) the key drivers for investment in the African sugar market was consumption, which is growing faster because from 2009/2010 to 2014/2015 African sugar production had increased by 17.7% (11,979-10,178/10,178*100%), while African sugar consumption had increased by 15.3% (19,646-17,038/17,038*100%) and African sugar production deficit had increased by 11.8% (7,667-6,860/6,860*100%) which can be attributed to the expanding population, rising incomes and increasing urbanization. Therefore, there is need to increase the production capacity of African sugar so as to fill the gap of African sugar deficit as shown in Appendix XV. Therefore assessing the bankruptcy likelihood of the sugar companies in Africa where Kenya is one of them, so that corrective action may be taken early to salvage those sugar companies in Africa which can be salvaged

and liquidate those that cannot be salvaged (Brigham & Daves, 2010). Various studies have been done in predicting bankruptcy likelihood in Africa.

Onyeiwu (2012) examined the applicability of the Multi Discriminant Analysis (MDA) to manufacturing companies in Nigeria. The study concludes that the application of multiple discriminant analysis was relevant and reliable to Nigerian environment. Olaniyi (2007) evaluated the susceptibility of Nigerian banks to failure with a view to discriminating between sound and unhealthy banks as a guide to investment decisions using First Bank and Trade Bank as case studies. The study concludes that the model measures accurately the potential of failure of unhealthy banks. A study carried by Pam (2013) in the banking sector of Nigeria focusing on two failed banks and two un failed banks revealed that liquidity, profitability, operating efficiency and total assets turnover which are key ratios of the Altman's Z Score model are crucial tools in establishing the strength of a financial institution.

Kidane (2004) did a study on predicting bankruptcy likelihood in IT and services companies in South Africa listed on the Johannesburg Security Exchange using the Altman Z score ratios model. The Altman model achieved correct classification rates of 74%. Appiah (2011) did a study on corporate failure prediction on listed firms in Ghana. The study examined the phenomenon of bankruptcy prediction from a developing economy perspective using the Altman's Z score ratios model. A sample of 15 non-failed and failed companies listed on the Ghana Securities Exchange, the author tested Altman (1968) model through a cross section of different firms with dataset of 2004 and 2005. The findings from the study were that Altman's Z score ratios are applicable in predicting bankruptcy in Ghana depending on the nature and size of the company.

Kalinda and Chisanga (2014) carried out a study on the sugar value chain: Where the growth, opportunities and challenges of the sugar sub sector in Zambia were investigated. The study employed a value chain approach and descriptive data analysis. The study concluded that Zambia is among the lowest cost producers of sugar globally. Growth in the sector has a great prosperity for economic development, diversification

and creating of employment. However the growth in the industry was being hindered by high transaction costs; including high fuel, electricity, transportation and costs of distributing has negatively impacted the industry.

Lake (2013) investigated the effect of financial risk on the profitability of commercial banks in Ethiopia by using Ordinary Least Square (OLS) for the period of (2000-2011).The results of the study established that credit and liquidity risk was significant and statistically, had a negative association with the banks' profitability. Sitati and Odipo (2009) assessed whether Edward Altman's bankruptcy likelihood prediction model can be useful in predicting business failure in Kenya. The target population was composed of all the companies listed in the Nairobi Securities Exchange for the period 1989 to 2008. Twenty firms were selected for the study; 10 firms that were still listed and 10 firms that had been delisted in Nairobi Securities Exchange during study period. The research study revealed that Edward Altman's bankruptcy likelihood prediction model was applicable in 8 out of the 10 failed firms that were analyzed, which indicates an 80% successful prediction of the model. Uchenna and Okelue (2012) applied Multi Discriminant Analysis Model (MDA) as proposed by Altman in 1968 to a group of failed and non-failed banks in Nigeria to ascertain if MDA is a reliable tool of predicting business failure in the Nigerian banking industry. The result shows that MDA is a reliable tool for assessing the financial health of banks.

### 1.1.4 Sugar Industry in Kenya

The sugar industry in Kenya is supposed to play an important role in the Agricultural sector. The deloitte report on Kenya economic outlook (2017) has shown that; the Agriculture sector in Kenya where the sugar companies belong is the most prominent, important and dominant industry. This is because by the year 2016, the sector accounted for over 26% of the gross domestic products (GDP), 20% of employment, and 75% of the labour force and over 50% of the revenue from exports (Deloitte report, 2017).

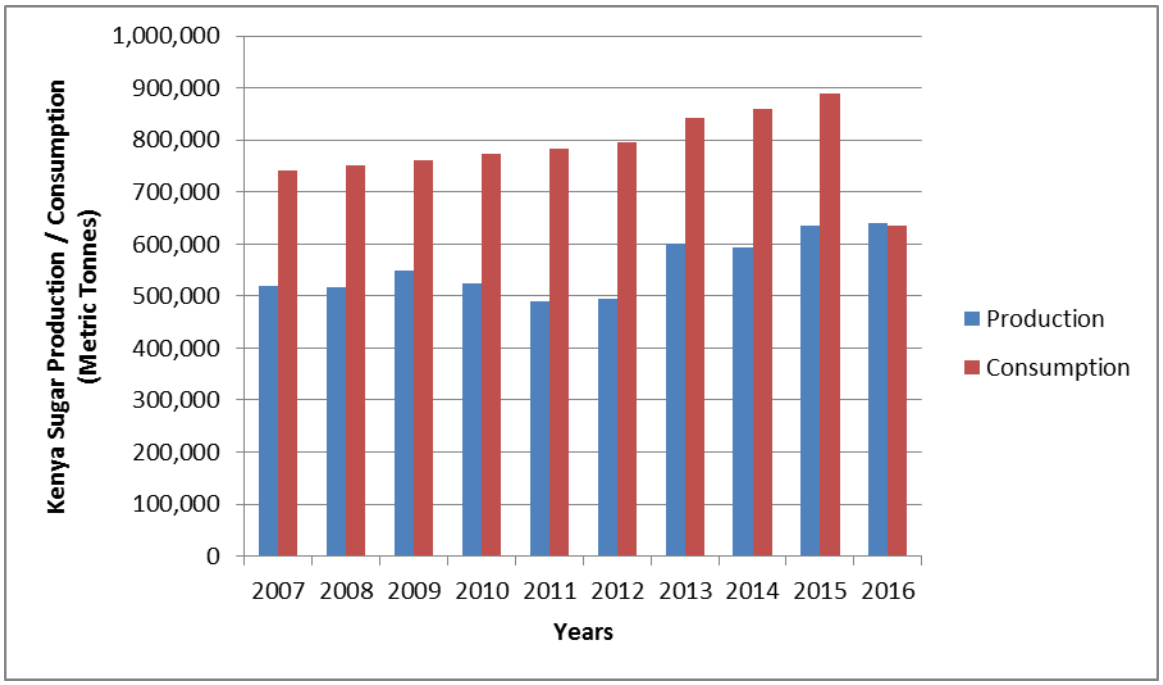
According to Sugar Directorate year book, 2016 and Privatization Commission of Kenya report, 2015 there are six public owned sugar companies in Kenya namely; Mumias sugar which was established in 1971 and the shareholding of the company is Government of Kenya 20% and other investors via stock exchange 80%. South Nyanza Sugar which was established in 1979 and is owned by the Kenya Government to the tune of 98.8%, ICDC 0.7%, Mehta Group 0.2% and IDB Capital 0.3%. Nzoia Sugar which was established in 1978 and the company are owned by the Kenya Government 97.93%, IDB Capital 0.94% and Five-Call Babcock 1.13%. Chemelil Sugar which was established in 1968 and the Kenya Government through ADC own 96.22% of its shares, DBK 1.42%.MinervaHoldings 1.42% and Kenya Shell Ltd 0.94%. Muhoroni Sugar which was established in 1964 and the company is owned by the Kenya Government to the tune of 82.8%, Mehta Group 16.9% and DBK 0.3%. Miwani Sugar which was established in 1922 and the company is 49% owned by the Kenya Government and Vanessa Associates 51%.According to Sugar Directorate year book 2016 there are six private owned sugar companies in Kenya namely; West Kenya Sugar Company, Butali Sugar Company, Kibos sugar and Allied Industries Limited, Trans mara Sugar Company, Sukari Industries Limited and Kwale International Sugar Company Limited.

Despite the remarkable role that the sugar industry play in our economy it is wanting that most of the sugar companies are experiencing financial problems, some are under receivership and others like Ramisi and Soin have so far closed their operations (Baseline study for sugar agribusiness in Kenya, 2014; Sugar Directorate, 2016). This has triggered the Privatization Commission of Kenya report (2015) which indicates that the Government of Kenya seeks to privatize a significant shareholding interest in five sugar companies in Kenya which include; South Nyanza, Miwani, Chemelil, Muhoroni and Nzoia backed by the believe that privatization is likely to assist in enhancing profitability and cash flows of the sugar companies. The Kenya National Assembly Eleventh Parliament (Third session-2015) report of the departmental committee on agriculture, livestock and co-operatives on the crisis facing the sugar industry in Kenya

agreed that one of the problems facing sugar companies in Kenya is the high cost of production.

On average the cost of producing a ton of sugar in Kenya was USD 870 compared to USD 350 in Malawi, USD 400 in Zambia, Swaziland and Egypt and USD 450 in Sudan and USD 300 in Brazil. Moreover, the market price per share of Mumias Sugar Company which is the only public quoted sugar company in the Nairobi Securities Exchange has been decreasing over the 10 years period of the study from kshs.29 in 2007 to kshs1.30 in 2016 (See Appendix VII). This is likely an indication that the shareholders of the company have no confidence with the company. Muhoroni and Miwani sugar companies have been put under receivership, Chemelil sugar is struggling with immature canes, while Nzoia and Mumias sugars are struggling to pay their debts as has been indicated by the Sugar Directorate strategic plan 2006-2010 and baseline study for sugar agribusiness in Kenya (2014). This necessitated the need to assess the performance of the sector and the going concern of the sugar companies in Kenya (Gibson, 2011). This is because if the continuity of these sugar companies is in doubt, meaning that bankruptcy likelihood is high then it is likely to lead reduction of gross domestic product, employment, difficulties in repaying the country debts and reduction of economic development therefore, this study sought to predict the bankruptcy likelihood of sugar companies in Kenya so that corrective actions can be taken to salvaged those that can be salvaged and liquidate those that cannot be salvaged (Brigham & Daves, 2010).

The tabulations as shown in Appendix XVI indicates that for all the years Kenya has consuming more sugar than it produces and the deficit has been filled through imports whereby from 2007 to 2016 imports had increased by 43.3% (334,109-230,011/230,011) *100, while exports had reduced by - 99.53% (98-20,842/20,842) *100 (Sugar Directorate, 2016) therefore, there is a need to assess and bankruptcy likelihood for the Kenya sugar companies so that mitigating factors can be instituted early to salvage the industry which will enhance efficiency and productivity hence increasing exports and reducing imports.




**Source: Sugar directorate, 2016**

**Figure 1.1: Kenya Sugar Production, consumption (Metric tonnes)**

Kenya sugar production versus consumption as indicated in figure 1.1 above shows that for all the years the consumption of sugar has been more than the production of sugar in Kenya. For example, in 2007 consumption was 70.2% of the production (520,404/ 741,190*100), while in 2015 it had increased to 71.5% of the production (635,674/889, 233*100). This calls for the need to evaluate the bankruptcy likelihood of sugar companies in Kenya and salvage those that can be salvaged (Brigham & Daves, 2010) for continuity production of sugar in Kenya which is likely to encourage economic development hence enabling the country to attain its vision 2030, achievement of the presidents big four agenda of 2018 and general economic growth in the country which is likely to increase the GDP hence making it easier to repay the national debt which has been increasing over the years as shown in table 1.3 below.

**Table 1.1: Company Market Share by National Sugar Sales (including imports)**

| | **Percentage (%)** |
|---|---|
| Mumias Sugar Company | 34 |
| West Kenya Sugar Company | 10 |
| Nzoia Sugar Company | 9 |
| South Nyanza (Sony) Sugar Company | 9 |
| Kibos | 5 |
| Muhoroni Sugar Company | 4 |
| Chemelil | 4 |
| Imports | 25 |
| **Total** | **100** |

**Source: SD, 2010, KIPPRA, 2010**

The report from the Sugar Directorate and KIPPRA 2010 on sugar company market share by national sugar sales (including imports) as shown in table 1.1 above, Mumias Sugar Company had the largest market share in terms of sugar sales of 34%, West Kenya sugar was second with 10%, Nzoia and South Nyanza Sugar each had 9%, Kibos had 5% and Muhoroni and Chemelil each had 4%, while 25% was imported. This meant that the public owned sugar companies accounted for 60% of the market share by national sales, while the private owned sugar companies accounted for 15% of the market share by national sugar sales while 25% was accounted by imports.

**Table 1.2: Company Market Share by Domestic Sugar Production (excluding imports)**

| | **Percentage (%)** |
|---|---|
| Mumias Sugar Company | 12.2 |
| West Kenya Sugar Company | 18.6 |
| Nzoia Sugar Company | 9.6 |
| South Nyanza (Sony) Sugar Company | 9.5 |
| Kibos Sugar Company | 12.2 |
| Chemelil Sugar Company | 3.6 |
| Muhoroni Sugar Company | 4.7 |
| Butali Sugar Company | 8.9 |
| Trans Mara Sugar Company | 9.0 |
| Sukari Sugar Company | 9.6 |
| Kwale Sugar Company | 2.1 |
| Soin Sugar Company | 0.0 |
| **Total** | **100** |

**Source: Sugar Directorate, Year Book 2016**

The Sugar Directorate year book 2016 report also indicates that West Kenya Sugar Company was the greatest domestic sugar producer with 18.6% as indicated in (table 1.2) above followed by Mumias and Kibos sugar companies which had a percentage domestic sugar production of 12.2% each. Nzoia and Sukari Sugar companies came third accounting for 9.6% each while the last was Kwale Sugar Company with a domestic sugar production of 2.1%. Soin Sugar was closed in 2015 and it had 0.0% of domestic sugar production. Therefore, from the statistics in table 1.2 above all the public owned sugar companies' domestic sugar production accounted for 39.6% and the private

owned sugar companies accounted for 60.4% of the domestic sugar production these was an indication that the production capacity of public owned sugar companies has decreased since in 2010 as per table 1.1 Mumias sugar was leading with 34% of the market share and there is need to increase their efficiency and productivity.

Additionally, according to KIPPRA (2010), Kenya sugar industry is being threatened by cheap imports from more efficient sugar producing countries due to high production costs locally which limits the profitability of sugar companies in Kenya. Odek, Kegonde and Ochola (2003) report show that the problems affecting the millers are due to inefficient factory operations, politics and the conditions under which the Chief Executive Officers are appointed. The performance of Kenya sugar sector has not been consistent. The production of sugar has fluctuated over the years in a manner that indicates deficiencies in strategic focus on factors such as improvements of skills, realistic company's strategic plans, poor maintenance policy, financial constraints, lack of prudent management and poor technological adoption rate.

Sitati and Odipo (2009) assessed whether Edward Altman's bankruptcy prediction model can be useful in predicting business failure in Kenya. The target population was composed of all the companies listed at the Nairobi Securities exchange from 1999 to 2008. Twenty firms were selected for the study: 10 firms that continue to be listed and 10 firms that were delisted in Nairobi stock exchange during period 1999 to 2008. The research study revealed that Edward Altman's bankruptcy prediction model was applicable in 8 out of the 10 failed firms that were analyzed indicating an 80% successful prediction of the model. 9 of the 10 non-failed firms proved that Edward Altman's bankruptcy prediction model was successful indicating a 90% validity of the model. They concluded that Edward Altman model of predicting financial failure of companies is a useful tool for investors in the Kenyan market.

Abdullah, Ahmad and Rus (2010) did a study on business failure prediction using multiple discriminant analysis. The study concluded that ratios can be used to predict company failure. However, the types of ratios that will best discriminate between failing

companies and successful ones tend to differ from place to place. In addition Abdullah, Ahmad and Rus (2010) conclude that stakeholders should pay attention to liquidity, leverage and activity ratios. A study by Mak'abongo (2013) on price and weather risk management practices in the sugar industry in Kenya concluded that price and weather risk management practices are not being applied in the sugar industry in Kenya. Both small scale and large scale sugar farmers have no instruments of managing price fluctuations and adverse weather affects. The case study conducted by Omete, Asakania and Amwayi (2015) on the impact of financial health and continuity of a firm. For the period of 2003-2011 established that the company was in grey area. A study by Kungu (2015) on creative accounting and financial bankruptcy using the Altman's model, a case study of Mumias Sugar Company for the period (2009-2013) established that the company bankruptcy likelihood was high for the period of the study.

**Table 1.3: Trends in Kenya Total Public Debt in (Ksh. Millions)**

| | **2011** | **2012** | **2013** | **2014** | **2015** | **2016** |
|---|---|---|---|---|---|---|
| Domestic Debt | 764,222 | 858,830 | 1,050,555 | 1,284,327 | 1,420,444 | 1,815,133 |
| External Debts | 722,888 | 763,971 | 843,562 | 1,138,505 | 1,423,252 | 1,796,198 |
| **Total Debts** | **1,487,110** | **1,622,801** | **1,894,117** | **2,422,832** | **2,843,696** | **3,611,331** |

**Source: National Treasury and Central Bank of Kenya Report, 2016**

Kenya's domestic debts consist of central bank borrowings, commercial bank borrowings and borrowings from non-financial institutions. In addition Kenya's external debt consists of bilateral borrowings, multilateral borrowings, commercial bank borrowings and supplier credits. Kenya's total debts for the last six years (2011-2016) had increased by 142.8% (3,611,331-1,487,110/1,487,110) *100 as per table1.8 above and the GDP had increased by 91% (6,585,000-3,447,694/3,447,694) for the same period as indicated in table 1.3 above hence the need to increase the GDP by boosting

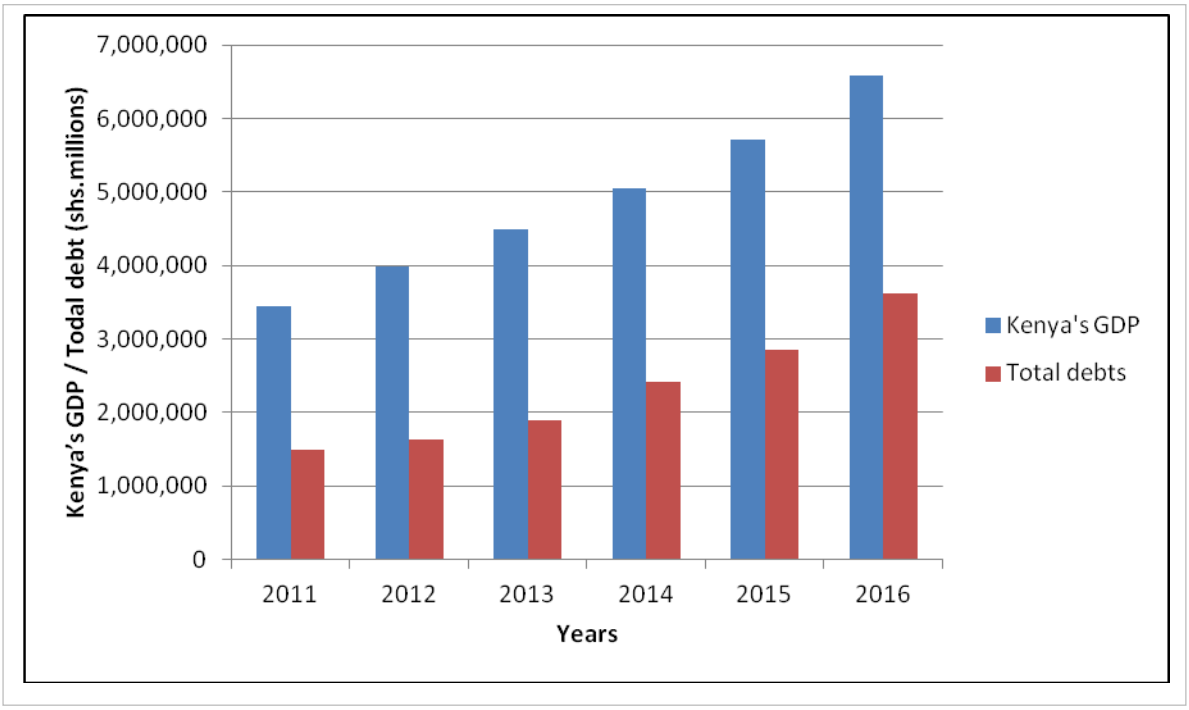
the manufacturing sector. The results of this study is likely to assist the stakeholders in taking corrective action that may boost the manufacturing sector and mitigate any negative economic fluctuations in the national economy as opined by Simic, Kovac and Simic (2012).

**Table 1.4: Kenya's GDP / Total Debts (Kshs millions)**

| Year | Kenya's GDP (Kshs millions) | Total debt as % of GDP |
|---|---|---|
| 2011 | 3,447,694 | 43.1% |
| 2012 | 3,990,412 | 40.7% |
| 2013 | 4,496,000 | 42.1% |
| 2014 | 5,044,236 | 48.0% |
| 2015 | 5,703,321 | 49.9% |
| 2016 | 6,586,000 | 54.8% |

**Source: National Treasury and Central Bank of Kenya Report, 2016**

The national treasury and central bank of Kenya report as shown in table 1.4 above gives Kenya's total debts /GDP for the year 2011 to 2016 which shows an increasing trends as the percentage had increased from 43.1% in 2011 to 54.8% in 2016 representing an increase of 11.7%. This is an indication that there is need to boost the production of the Kenya industries so that we can increase the GDP as a country, which is likely to enable the country to repay their debts this is in line with (Simic, Kovac & Simic, 2012; Rijken, 2011) who states that repayment of the country's debt will depend on the performance of the country's economy in terms of GDP.




**Source: National Treasury and Central Bank of Kenya Report, 2016**

**Figure 1.2: Kenya's GDP / Total Debts (Kshs; Millions)**

Kenya's GDP against total debts as indicated in figure 1.2 above clearly shows that both GDP and the total debts has been increasing over the years. As at June 2016, the total increase was recorded as 54.8% of the GDP indicating that there is need to reassess the performance of the Kenya manufacturing sector and boost them where possible. This is in line with the Government vision 2030 and 2018 big four agenda which is likely not to be fully released without boosting the Kenya manufacturing sector. In addition, this is in line with corporate failure prediction which is essential for the prevention or mitigation of negative economic fluctuations in a national economy (Simic, Kovac & Simic, 2012). Additionally, Chen (2011) describes that financial health prediction which is accurate will provide useful information to stakeholders such as stockbrokers, creditors, government officials, and even the general public in making economic decisions about the ability of the company to continue in business. Therefore, this study's finding is likely to assist various stakeholders including the management and other policy makers

of sugar companies in Kenya to evaluate the performance of the sugar companies in Kenya in order to increase efficiency and productivity.

### 1.2 Statement of the Problem

The sugar industry is an important sector in the country's economy as it contributes 15% of the country's gross domestic product (Baseline study for sugar agribusiness in Kenya, 2014).The performance of this sector has implications to not only to the sustainability of the sugar industry but also to the whole economy in terms of exports which improves balance of trade and production of sugar for both domestic and industrial production. Despite the crucial role that the sugar industry plays in the Kenyan economy the sector's bankruptcy likelihood is high since more sugar companies are experiencing financial challenges (Sugar Directorate Strategic Plan, 2006-2010), others like Muhoroni and Miwani sugar companies are under receivership (Baseline study for sugar Agribusiness in Kenya, 2014). Similarly others like Ramisi and Soin have closed their operations, Mumias, South Nyanza, Chemelil and Nzoia are struggling to pay their debts (Sugar Directorate Strategic Plan, 2006-2010).

All this worrying statistics indicates a sector characterized by bankruptcy likelihood high. Unfortunately research has hardly been done in predicting bankruptcy likelihood in the sugar sector in Kenya. The existing literature in the predicting bankruptcy likelihood done in peripheral areas revealed contextual, conceptual and methodological gaps. Contextually, research has been done in developed countries for example,(Li & June, 2012; Bhatt, 2012; Alkhatib & Bzour, 2011) which presents research findings which cannot be applicable in the Kenyan sugar industry because of differences in governance structures, social and economic conditions of different countries (Ooghe & Balcean,2007). Other studies done in Kenya were in other sectors for example, banking sector (Taliani, 2010; Kariuki, 2013), insurance sector (Chelunget, 2014; Ng'ang'a, 2006), Sacco's (Kinivo & Olweny, 2014), local authorities (Ntoiti, 2013) whose findings cannot be applied in the sugar industry because of differences in the regulatory systems.

Methodologically, studies done in the sugar industry in Kenya for example, (Kungu, 2015; Omete e t al., 2015) used case study design whose findings are subjective and cannot be used for generalization to other sugar industries in Kenya. Conceptual gap on the other hand exists because previous studies done by other researcher's present conceptual gaps arising from the use of non-financial factors to predict bankruptcy likelihood (Mak'abongo, 2013; Kegonde & Ochola, 2003; Akombo, 2010). Therefore, this study uses the Z score ratios model to predict the bankruptcy likelihood of sugar companies in Kenya this is because it is worth noting that despite the remarkable role of the sugar industry in Kenya such as the provision of employment opportunities, production of sugar for domestic and commercial consumption, generation of government revenue through taxes and boosting exports, the financial performance of the sector is wanting.

The possible chance of bankruptyc in the Kenya sugar industry has triggered the need to privatize the government owned sugar companies in the light of salvaging the sector (the Privatization commission of Kenya report, 2015). Additionally, the Kenya National Assembly Eleventh Parliament (Third session-2015) report of the departmental committee on Agriculture, Livestock and Co-operatives on the crisis facing the sugar industry in Kenya agreed that one of the problem facing sugar companies in Kenya is high cost of production. Therefore bankruptcy of the sugar industry in Kenya is assuming a worrying trend since Muhoroni and Miwani sugar companies have been put under receivership; Chemelil sugar is struggling with immature canes, while Nzoia and Mumias sugars are struggling to pay their debts (Sugar Directorate, 2016; Ministry of Agriculture, Livestock and fisheries, 2014), hence; the need for a reliable model to predict their viability of likelihood of bankruptcy (Bhurnia & Sarkar, 2011).

The prediction of bankruptcy likelihood is likely to assist various stakeholders including the government of Kenya in evaluating how to improve GDP against the country's debt since the debt has increased from 43.1% in 2011 to 54.8% in 2016 (As shown in table 1.4 above) against the GDP this is because repayment of the country's debt is likely to depend on the performance of it is country's economy (Simic, Kovac & Simic, 2012;

Rijken, 2011). Other policy makers the study is likely to provide them with information on the bankruptcy likelihood and how to mitigate the level of bankruptcy likelihood. Therefore there is need to assess the financial soundness of sugar industries because of the pertinent role they play towards sustaining economic development .The above reviewed studies, shows that the model has been extensively applied in predicting corporate failure in the Kenyan economy but little attention to the sugar sector hence the need of this study which covered a comprehensive view of all the public owned sugar companies (both quoted and unquoted) and more than 50% of the private owned sugar companies in Kenya. It is against this background that the current study was based.

## 1.3 Objectives of the Study

### 1.3.1 General Objective

The general objective of this study was to model the use of the Z score ratios to predict bankruptcy likelihood of sugar companies in Kenya.

### 1.3.2 Specific Objectives

1. To assess the effect of Working Capital to Total Assets ratio in predicting the bankruptcy likelihood of sugar companies in Kenya.
2. To determine the influence of Retained Earnings to Total Assets ratio in predicting bankruptcy likelihood of sugar companies in Kenya.
3. To establish the effect of Earnings before Interest and Tax to Total Assets ratio in predicting bankruptcy likelihood of sugar companies in Kenya.
4. To determine the influence of Book Value of Equity or Market Value of Equity to Total Liabilities ratio in predicting bankruptcy likelihood of sugar companies in Kenya.
5. To establish the effect of Sales to Total Assets Ratio in predicting bankruptcy likelihood of sugar companies in Kenya

## 1.4 Research Hypotheses

**$H_{01}$**: The ratio Working Capital to Total Assets has no significant influence in predicting bankruptcy likelihood of sugar companies in Kenya.

**$H_{02}$**: The ratio Retained Earnings to Total Assets has no significant contribution in predicting bankruptcy likelihood of sugar companies in Kenya.

**$H_{03}$**: The ratio Earnings before Interest and Tax to Total Assets has no significant influence in Predicting bankruptcy likelihood of sugar companies in Kenya.

**$H_{04}$**: The ratio Book Value of Equity or Market Value of Equity to Total Liabilities has no significant contribution in predicting bankruptcy likelihood of sugar companies in Kenya.

**$H_{05}$**: The ratio Sales to Total Assets Ratio has no significant influence in predicting bankruptcy likelihood of sugar companies in Kenya?

## 1.5 Significance of the Study

The achievement of the country's development will depend on the sustainability of the manufacturing sector which is pertinent in achieving the country's sustainable development and economic growth. The sugar industry is included in the manufacturing sector and this call for the need to predict bankruptcy likelihood of the industry so that policy makers and various stakeholders can take necessary actions to salvage those sugar companies which can be salvaged and liquidate those that cannot be salvaged which is in line with (Brigham & Daves, 2010).

### 1.5.1 Management of Sugar Companies in Kenya

The Z score ratios computed from the information gotten from the financial statements is likely to help the management of the sugar companies in assessing financial performance and financial position of their enterprises. This is likely to help them make

informed decisions such as how much funds the enterprise requires in order to carry out its operations effectively and evaluate their efficiencies in the use of the assets to generate incomes. This management are also likely to use the study results to influence policy in the areas of the management's ability to control cost of sales and other operating expenses in order to maximize firm value and cash flows of their companies. In addition they are likely to be assisted by this study to ensure that any bankruptcy likelihood signals that threaten the going concern ability of their firms are detected early and corrective measures taken or liquidate those which cannot be salvaged(Brigham & Daves, 2010). The results of this study is likely to assist management of newly formed sugar companies in Kenya by instituting proper policies and structures which are likely to ensure that bankruptcy likelihood is detected and prevented in advance for the interest of all the stakeholders to be preserved.

### 1.5.2 Financial institutions

The financial institutions are likely to analyze and assess the financial soundness of the enterprise to determine the ability of the enterprise to pay back the borrowed funds. Any decision to lend will be supported by sufficient asset base, increasing profitability, low gearing and sufficient liquidity of the enterprise, and with that the bankruptcy likelihood of any company being low will lead to granting of more credits by the financial institutions because of the low rate of default risk. Capital structure of a firm has a major effect on its performance since those firms which ignores bankruptcy costs and continues to borrow heavily may lead to increase in the gearing level of the firm and thus, lead to the increase in bankruptcy likelihood high due to reduction in profitability which also decreases cash flows.

### 1.5.3 Customers and Suppliers

The results of this study is likely to assist suppliers to assess whether the enterprise is financially sound so as to ensure steady supply of goods in future, this is especially vital in sugar company where the enterprise will depend on the continuing supplies of

sugarcane from the farmers. The customer is also likely to be interested with the enterprise's ability to continue existing as a going concern and maintaining its stability of operations. This study is also likely to help the customers assess whether the going concern ability of the sugar companies in relation bankruptcy likelihood and thus make decisions of alternative ways of getting the sugar products from the financially stable sugar companies for instance, where the results of the study revealed that company bankruptcy likelihood is high.

### 1.5.4 Employees and Potential Employees

Employees are likely to be interested in the enterprises ability to continue in business and its profitability. They will also be concerned with the ability of the enterprise to pay salaries and provide them with current and future benefits. In addition, they are likely to be interested in the enterprises' financial position and performance so as to assess the enterprise proposed, future expansion possibilities and career development opportunities. This study is likely to provide information to employees to evaluate the performance of their companies on whether the company is growing or collapsing and potential employees are likely to seek employment to well performing sugar companies.

### 1.5.5 Scholars and Researchers

The results of this study are likely to assist the scholars and researchers as a base for further research in the sugar industry in Kenya. The study will contribute to the existing body of knowledge of bankruptcy prediction in Kenya. It is also likely to motivate prospective researchers to replicate the study in other sectors of the economy and in other regions of the country. This is necessitated by the fact that very few studies have been done in this area of predicting bankruptcy likelihood in developing countries especially in Kenya despite the fact that many firms are under receivership and others are bankrupt.

### 1.5.6 Government and Regulatory Authorities

Sustainability of the sugar industry is pertinent in achieving the countries sustainable development including vision 2030 and fulfillment of the big 4 agenda. In addition economic development depends on the production of goods and services among other issues in the economy. The findings of this study is likely to assist the Government address shortcomings of sugar companies in Kenya by developing policies and regulations which are likely to assist in boosting production of goods and services which will in turn boost the GDP. In fact, one of the four big agenda of the Kenya government 2018 is to boost the manufacturing sector where sugar companies play a significant role. These findings is likely to assist the Government achieve this agenda by salvaging the sugar industry in Kenya especially those sugar companies which can be salvaged. The results of this study is also likely to assist the government of Kenya to align the country's gross domestic products with the countries debt which has been increasing as shown in table 1.4 and adopt strategies to increase the production of goods and services in the country which will enable the servicing of debt repayment. Finally, the results of this study is also likely to assist the regulatory authorities to decide on necessary regulatory measures to be instituted on certain sugar companies in Kenya so as to improve performance and efficiency utilization.

## 1.6 Scope of the Study

The study sought to model the use of Z score ratios to predict bankruptcy likelihood of sugar companies in Kenya. It sought to establish to what extent the Z score ratios (working capital to total assets, retained earnings to total assets, earnings before interest and tax to total assets, book value of equity or market value of equity to total liabilities ratio and sales to total assets) contributes in predicting bankruptcy likelihood of sugar companies in Kenya. There are five unlisted (unquoted) public owned Sugar companies in Kenya, one quoted public owned sugar company and six private owned sugar companies (As shown in Appendix V) and most of them are experiencing bankruptcy likelihood high especially public owned sugar companies.

The study applied purposive sampling technique to collect primary data from all the public owned sugar companies in Kenya. This was adopted by the study since there are 6 public owned sugar companies as per Sugar Directorate, 2016. The study applied the Altman's Z score ratio model where the five key ratios were modelled using discriminant analysis and the model was used in predicting bankruptcy likelihood of sugar companies in Kenya. The study categorized the sugar companies into those that are partly or fully owned by the government as public owned sugar companies which were 6 (As shown in Appendix V) in number. The study obtained both primary and secondary data from public owned sugar companies in Kenya while secondary data for the four private owned sugar companies was obtained from government agencies.

### 1.7 Limitations of the Study

Primary data was collected by the use of questionnaires. Nonresponse to the questionnaire was the limitation of the study which was mitigated by the research asking for clarifications for nonresponses and explaining the questions to the respondents where they did not understand. In other cases distortions in giving the information were a key challenge in data collection. This limitation was overcome by ensuring that the respondents were assured that the information provided will not be disclosed to any other person or party within and after the collection of data in order to safeguard the confidentiality principle which was possible because the researcher collected the data personally hence the respondent's believed since the assurance came from the researcher. In addition use of a letter of introduction from the university to assure the respondents that the information provided was for academic purpose only and was to be treated with confidentiality both during the data collection period and in future.

Secondary data from the financial statements was historical since the variables used in the computation of the Altman's Z score model are based on traditional financial data (Palenu & Healy, 2008). However, this limitation was mitigated by use of the Altman's Z score ratios model which is a combination of ratios measuring various aspects of financial performance ranging from liquidity, profitability, gearing, efficiency and

market value ratios (Slotemaker, 2008). Additionally, the study, also applied trend analysis which covered a period of 10 years for public owned sugar companies and 5-6 years for private owned sugar companies depending on when the sugar company was established. Trend analysis was necessary because it assisted the researcher to establish movements in financial ratios and changes in those movements over a period of time as opined by Kirkham (2012).

Finally the study was also hindered by the challenges of accessing sampled respondents financial statements from some of the sugar companies. This was because the target population included private owned sugar companies that have restrictions in accessing their financial information. However, this challenge was partly overcome by using introductory letter from the University, letter from NACOSTI and introductory letter from the Ministry of Agriculture which enabled the researcher to obtain financial information from government agencies.

# CHAPTER TWO

# LITERATURE REVIEW

## 2.1 Introduction

This chapter covers the theoretical review of the theories that the study was anchored on, conceptual framework, empirical review of past studies related to the study, research gap, critique of the existing literature and summary of literature review. The aim of this chapter was to sharpen the researcher's understanding in predicting bankruptcy likelihood of sugar companies in Kenya using Z score ratios model.

## 2.2 Theoretical Framework

Grant and Osanloo (2014) define a theoretical framework as a blue print or a guide for a researcher. In addition Dollinger (1999) points out that a good theory tells the users how things and events are related, which are likely to be external forces, uncontrollable and internal forces controllable. According to Sinclair (2007) it is the foundation upon which the research is constructed. Additionally, the theoretical framework consists of the principles constructs and concepts of a theory (Grant & Osanloo, 2014). This study was anchored on a number of theories as discussed below because they make research findings more meaningful and generalizable (Akintoye, 2015).

### 2.2.1 Liquidity Preference Theory

The liquidity preference theory states that the demand for money is not to borrow money, but the company should aim to remain liquid this is because if the company borrows more it will reduce profitability, cash flows and net worth due to high interest payment (Stewart, 2011), which in this study is likely to increase bankruptcy likelihood. The theory was developed by Keynes (1935), who believed that individuals and companies hold money for three main motives: Transactional motive which states that money is being held in order to be able to meet the day to day operational expenses of the individual or entity. The amount of liquidity required will depend on the level of

activities of the individual or entity; the higher the level of activities, the more money will be required. This study applied the independent variable working capital to total asset ratio to measure the liquidity of the sugar companies in Kenya, those companies which had negative, decreasing or lower working capital to total asset ratio were termed by the study as illiquid companies. This was in line with Petersen and Plenborg (2012) argued that a firm is likely not able to meet it is short term obligations as they fall due when it is not liquid and that liquidity is affected by the firm's ability to generate positive net cash inflows both in the short and long term.

Precautionary motive, which refers to the demand for liquid cash to enable the company meet it is unforeseen expenses. Sugar companies which had their earnings before interest and tax to total asset ratio, retained earnings to total asset ratio and book value of equity to total liabilities ratio increasing were seen by the study as having fulfilled the precautionary motive of holding cash and they were classified by the study as not bankruptcy likelihood low. Speculative motive which refers to the ability of the company to hold sufficient cash to take advantage of future changes in the market interest rates or security price changes. According to Keynes (1935) the more the interest rate the lower the speculative demand for money the lower the interest rate, the higher the speculative demand for money**.** It confirms the finding of Bhurnia and Sarkar (2011), who states that bankruptcy likelihood is high when the firm is experiencing financial problems such that it is cash inflows are in sufficient to meet its debt obligations.

In this study for those sugar companies which had positive and increasing working capital to total asset ratio (liquid), they were able to speculate and repay their loans which reduced their total liabilities, meaning that the ratio book value of equity to total liabilities ratio increased, hence increasing the value of discriminant Z score and reduced bankruptcy likelihood, they were also likely to borrow when the interest rate is low, which also reduced their total liabilities and increase the retained earnings, which is normal added to the book value of equity, meaning increasing the value of the discriminant Z score which reduced their bankruptcy likelihood (Stewart, 2011). This

theory therefore, supports the following independent variables; working capital to total assets ratio and book value of equity to total liabilities ratio. This is because the more liquid the company is the higher the working capital to total assets ratio which for the purposes of this study has the effect of increasing the discriminant Z score hence reducing bankruptcy likelihood. The more liquid the company is the less the borrowings which for this study had a likely impact of reducing total liabilities which in turn increase the value of the discriminant Z score and reduce bankruptcy likelihood.

### 2.2.2 Resource Dependence Theory

Resource dependence theory's basic assumption is that organizations survive by acquiring and maintaining resources from their environment (Hillman, Withers & Collins, 2009). Further Brettel and Voss (2013) argue that according to resource dependence theory, an organization is subjected to external control when it depends on its external environment for a big part of its key resources such as funding. In this study increased borrowings was likely to reduce the value of the discriminant Z score and increases bankruptcy likelihood due to increased interest payment which is likely to reduce profitability, cash flows and net worth. If a firm cannot obtain the proper mix of resources, it will eventually fail. Resources will be considered as valuable when they enable a company to formulate and implement strategies that improves its efficiency and effectiveness (Henry, 2011). Organizations can minimize the effects of external dependencies and thus increase their likelihood of survival by: selecting more profitable and controllable domains in which to do business (Pfeffer & Salancik, 1978).

Companies are required to obtain resources from the external environment however they are required to use it in a way that will reduce or increase their reliance in the external environment by using such actions as alliances and joint ventures (Hessels & Terjesen, 2010). In this study, effective use of the resources to generate more sales which is likely to have an effect of increasing profitability and retained earnings which are added to book value of equity and increase the discriminant Z score hence reduces bankruptcy likleihood. Resource based theory is geared towards explaining the internal sources of a

company's sustained competitive advantage and the more the competitive advantage the lower bankruptcy likelihood (Kraaijen-brink, Spender & Groen, 2010).

A firm's operating domains can play a vital role in its survival. In addition, Schimalensee (1985) found that industry effects account for more than 75% of the variance in company rates of return. Additionally, Pfeffer and Salancik (1978) argue that the presence of conflict in the organization's environment signifies a lack of ability to coordinate interdependent activities between organizations and its environment. In this study conflict between management of the sugar companies and stakeholders is likely to reduce profitability, cash flows and increasing agency problems which eventually are likely to lead to increased bankruptcy likelihood. Inability to coordinate such activities implies that the likelihood of the organization to achieve its desired outcomes (such as survival) is diminished hence increasing bankruptcy likelihood. Resource based theory puts a lot of weight on such resources that can positively contribute to achieving competitive advantage (Barney & Clark, 2007).

Competitive advantage is defined as creating more value for the customer, increased more value than other firms operating in the same sector which reduces bankruptcy likelihood (Barney & Clark, 2007). Resource dependence theory is based on the prediction that the company will continuously scan the environment and adopt strategic responses to better manage acquisition of resources (Johnson, 2009). Both internal and external resources are crucial for the company's strategic decision making but external resources are not under the control of the company as opposed to the internal resources. Therefore, the best strategies will be the combination of both resources by assessing the threats and opportunities and making the decisions according to the situations (Nemati *et al.,* 2010). Resource dependence theory appreciates the influence of external factors on companies. The management may act to mitigate against environmental uncertainty and dependence by using the resources effectively (Hillman, Withers & Collins, 2009). In this study management should utilize well the total assets (resources) which they have employed in the business to increase sales, profitability and cash flows that finally increase the discriminant Z score hence reducing the bankruptcy likelihood.

Companies can sometimes acquire resources under difficult situations and competition among them is based on achieving competitive advantage in terms of effectiveness in the use of the required resources which results into acquisition of more pooled resources (Klein, McGahan, Mahoney & Pitelis, 2011). Effective use of the resources had the impact of increasing the value of the discriminant Z score in this study and hence reducing bankruptcy likelihood due to increased sales, profitability, cash flows and net worth. Those companies that fail to continuously evaluate the quality, quantity and usefulness of their resources cannot effectively execute their mission, create value or respond to changes emerging in their environment (Fraczkiewicz-Wronka, 2013). Strategies of companies should be based on identifying stakeholders' expectations and finding out what resources the company should acquire so that highest stakeholders' value can be created (Bryson, Acermann & Eden, 2007).

Another source for potential conflict in inter-organizational fields may result from dynamic or unstable environments (Dess & Beard, 1984) which may change competitive conditions giving rise to temporary periods of resource scarcity and force unsuspecting firms into bankruptcy likelihood high. This theory supports the following independent variables; working capital to total assets, earnings before interest and tax to total assets, book value of equity to total liabilities and sales to total assets ratio because the more the resource the company has, the more the total assets and retained earnings the company is likely to have which in turn will be added to book value of equity and hence increasing the internal borrowing power thus reducing the financial risk of the company by increasing the discriminant Z score value. Werner felt (2011) used resource based theory in his journal on the use of Resources in Resource Acquisition and established that firm's cost of acquiring a new resource and or the value it can generate with this resource depends on the resources already possessed by the firm. In this study the more the resources in terms of total assets the sugar company had, and if properly utilized the more the sales, profitability, cash flows and the lower bankruptcy likelihood.

### 2.2.3 The Static Trade off Theory: STT

Static trade off theory (STT) was first suggested by Myers (1984) and emphasizes a balance between tax saving arising from debt, decrease in agency costs, bankruptcy costs and bankruptcy likelihood (Oruc, 2009). The theory suggests that there is an optimal capital structure which maximizes the value of the firm in balancing the costs and benefits of an additional unit of debt are characterized as models of trade off. Sheikh and Wang (2010) assert that trade off theory expectations is to choose a target capital structure that will maximize the value of the firm by reducing the costs of prevailing market imperfections. The theory makes an assumption that; each source of funds has its own costs and returns and these are related to the firm's earning capacity, its business and insolvency risks (Awan & Amin, 2014). Therefore, a firm which is likely to save more tax will use more debts to finance its business and the costs of bankruptcy likelihood and benefit from tax shield should be balanced so that costs of debts does not increase bankruptcy likelihood (Chen, 2011).

Narayanan (2008) optimal capital structure of the company is a situation where the cost of capital is minimized and the value of the company maximized. Firm's performance is mostly determined by its capital structure. Whenever a company borrows heavily in order to take advantage of tax benefits, it should consider excessive interest costs thereon. Therefore, when the company diverges from an appropriate capital structure, its bankruptcy costs and interest payment costs will outweigh the tax benefits related with the tradeoff between debt and equity and hence increase bankruptcy likelihood. Zeitun and Tian (2007) argue that capital structure of the company has a major effect on the company's performance and overlooking bankruptcy costs may lead companies to borrow heavily which is likely to result into more debts in the company's capital structure hence increasing bankruptcy likelihood since it is likely to reduce profitability, cash flows and net worth leading to reduction in the value of book value of equity to total liabilities ratio and reduce the value of discriminant Z score. The trade-off model can be secondly categorized into model of trade-off which is again connected to the bankruptcy costs and agency costs.

Trade off models related to bankruptcy costs Baxter (1967) showed that the costs incurred by bankruptcy likelihood high companies have been identified as non-trivial and could pay off the tax advantages of debt financing. Whereas it is advantageous for a company to use debt in its capital structure in form of tax shield savings, higher levels of debt may also expose the company to risks of bankruptcy due to the increased gearing level which will reduce profitability, cash flow and net worth (Stewart, 2011). The prediction of the trade-off theory is that the optimal capital structure exists and is determined by the achievement of balance between tax benefits and costs of debt, considering other variables remaining constant. Companies substitute debt with equity or equity with debt until the value of the firm is maximized. This is the original static trade-off theory, which is derived from not taking into account the imposition and the nullity of bankruptcy costs in the theory of Modigliani and Miller (1963). This theory supports the following independent variables, retained earnings to total assets, market value of equity to total liabilities and book value of equity to total liabilities. This is because firms with more debts is likely to results into increased interest payment obligations which will reduce profitability, cash flows and net worth hence increasing bankruptcy likelihood (Stewart, 2011).

Trade off models related to agency costs Jensen and Meckling (1976) based their model on the common knowledge that debt had been widespread before the existence of subsidies tax on interest payments. Therefore, given positive bankruptcy costs, they argue that there must be other important determinants of capital structure that have not been identified. This is because according to the subject of capital structure, two agency conflicts will be identified: the first kind of conflict between shareholders and managers and the second between shareholders and creditors. The relevance of this theory in this study was that more debts was likely to increase interest payments which lead to reduced profitability, cash flows, net worth and increase agency problem due to increased agency problems, hence reducing the value of the discriminant Z score and increases bankruptcy likelihood (Stewart, 2011).

### 2.2.4 Pecking Order Theory

Pecking order theory of capital structures developed by Myers (1984) states that firms have a preferred hierarchy for financing decisions. Firms will borrow instead of issuing equity if it's internal funds are not sufficient to fund capital expenditure since borrowing increases the total liabilities and interest payment obligations which reduces profitability, eventually increases bankruptcy likelihood due to reduction in the ratio book value of equity or market value of equity to total liabilities which has a final effect of reducing the 'discriminant Z score. The highest preference is to use internal financing before resorting to any form of external borrowings.

Capital structure is concerned with how to finance the business operations at optimum costs that is likely to increase the value of the firm (Sheikh & Wang, 2010). In addition Mutairi (2011) argues that capital structure is the relative proportion of debt and equity used to finance the business. In addition Mostafa and Boregowda (2014) states that there are two main sources of firm's financing mainly internal financing that is composed of majorly retained earnings and external financing which is made up of debt or issue of equity.

The theory advocates for a negative relationship between profitability and debt ratio. According to the tradeoff theory and pecking order theory, firms with, high total assets in relation to debt ratio are associated with lower costs of bankruptcy, since tangible assets are less likely to be subjected to a big loss of value in case of bankruptcy (Drobertz *et al.,* 2013). In addition it will be an indication that most of the company's total assets are financed by internal funds rather than an external fund leading to bankruptcy likelihood being low. Internal funds also incur no flotation costs and require no additional disclosure of financial information that may lead to a possible loss of competitive advantage. If a firm must use external funds, the preference is to follow a certain order of financing sources: debt, convertible securities, preferred stock, and common stock (Myers, 1984). This order reflects the motivations of the financial manager to retain control of the firm, reduce the agency costs of equity, and avoid

negative market reaction to an announcement of a new equity issue. The amount of debt is likely to reflect the firms' cumulative need for external funds.

A firm's capital structure is the product of its financing requirements over a period of time and its decisions to minimize adverse selection costs (Drobetz *et al.,* 2013). The pecking order theory prioritizes financing sources in order of the degree they are affected by information symmetry. Firm's prefer retained earnings as their main source of funds, then debt and the last one is external equity financing. Firms issue new shares only if they have extra profitable investments that cannot be postponed or financed by debt or if the top managers believe that the shares are overvalued (Alzomaia, 2014). The theory has two key assumptions about financial managers; the first of these is that a firm's financial managers know more about the company's proposed earnings and future growth opportunities which are available than outside investors. There is a strong desire to keep such information proprietary. The use of internal funds prevents managers from making public disclosures about the company's investment opportunities and potential profits to be realized from investing in them.

The second assumption is that managers will act in the best interests of the company's existing shareholders. The managers may even forego a positive net present value project if it would require the issue of new equity, since this would give much of the project's value to new shareholders at the expense of the old (Myers & Majluf, 1984). This theory supports the following independent variables; retained earnings to total assets, market value of equity to total liabilities, book value of equity to total liabilities and retained earnings to total assets because the firm with high levels of internal financing is likely to be free from bankruptcy likelihood high. This is because internal financing is likely to reduce interest payments which will increase the book value of equity hence reducing the bankruptcy likelihood by increasing the value of discriminant Z score.

Frank and Goyal (2008) used the Pecking order theory and established a negative relationship between profitability and debt which were in line with the pecking order

theory. (La Rocca, Cariola & La Rocca, 2011) also used the pecking order theory and concluded that companies prefer utilizing internal funding than external funding because internal funding is obtained at minimum costs. The study found this theory relevant to the study because any company which financed its total assets mostly by external borrowing it is likely to result into more payment of interest (servicing the debts) this in turn reduces profitability, cash flows and net worth which reduces the value of discriminant Z score thus, increasing the bankruptcy likelihood due to reduction in the value of the discriminant Z score.

### 2.2.5 Entropy Theory

Entropy theory is also referred to as the statement of financial position decomposition measure theory (Aziz & Dar, 2006). The theory is based on the fact that it is practical to identify the potential risks of bankruptcy likelihood of a firm by carefully analyzing the amount of changes in their statement of financial position and income statement (Aziz & Dar, 2006). It uses both the Univariate analysis (UA) where one ratio is analyzed and multiple discriminate analyses (MDA) where many ratios are analyzed at the same time in analyzing the changes in the structure of the statement of financial position (Slotemaker, 2008). In addition univariate analysis is the use of single accounting based ratio as an indicator of predicting bankruptcy likelihood (Natalia, 2007).

The ratios the study computed and analyzed were;

$x_1$ = Working Capital to Total Assets

$x_2$ = Retained Earnings to Total Assets

$x_3$ = EBIT to Total Assets

$x_4$ = Book Value of Equity or Market Value of Equity to Total Liabilities

$x_5$ = Sales to Total Assets Ratio

Each of the above ratios were analyzed for the last ten years (2007-2016) for public owned sugar companies and for four to six years (2010-2015) for private owned sugar companies, depending on when the private sugar company was established. When the above ratios are combined to get one value like in the case of the Z score value it is referred to as multiple analysis (Slotemaker, 2008). This is what the study applied in order to establish the status of the bankruptcy likelihood for sugar companies in Kenya. The sugar companies were classified into two categories.

The bankruptcy likelihood low composed of those years where the company was free from bankruptcy likelihood and bankruptcy likelihood high consisted of those years where the company was not free from bankruptcy likelihood. The average discriminant Z score values of bankruptcy likelihood high and bankruptcy likelihood low were tabulated by the study to get a cut-off value that was used to classify sugar companies as either bankruptcy likelihood high or low. Various studies have used the Entropy theory (Monti & Moriano, 2010; Aziz & Sayari, 2013; Sun & Li, 2008) on their empirical review for related studies. This theory was found relevant to the study because the discriminant Z score values for the ten years for public owned sugar companies and five to six years for private owned sugar companies were derived for each of the years by carefully computing and analyzing the amount of changes in five key ratios of the Altman's Z score model. Data was obtained from the company's statements of financial position and income statement with the aid of data collection sheet. This theory supports all the Altman's Z score ratios (independent variables) because the changes in all this ratios over the years of the study impacted either positively or negatively on the assessment of bankruptcy likelihood of sugar companies in Kenya. This is because an increase in incomes is likely to increase the value of the discriminant Z score and reduce bankruptcy likelihood due to increased profitability, cash flows and net worth, while on the other hand an increase in expenses is likely to reduce profitability, cash flows and net worth hence reducing the value of discriminant Z score which in turn increases the bankruptcy likelihood of the company.

## 2.3 Conceptual Framework

According to Young (2009), a conceptual framework is defined as a diagrammatical representation of variables that indicate the relationship between dependent variable and independent variables. In this study, the conceptual framework has looked at the relationship between the Z score ratios (independent variable) and bankruptcy likelihood (dependent variables) of sugar companies in Kenya. In addition, Camp (2001) defines a conceptual framework as a structure that the researcher believes can best explain the natural progression of the phenomenon being studied. Additionally, the conceptual framework presents an integrated way of investing a problem under study (Lichr & Smith, 1999). Further a conceptual framework describes the relationship between the main concepts of the study it is given in a more logical structure to provide a picture or visual display of how ideas in a study are related to one another (Grant & Osanloo, 2014). A conceptual framework is the simplest way in which the researcher presents the asserted remedies to the problem being studied ((Lichr , Smith & Akitonye, 2015).

Conceptual frameworks possess ontological, epistemological, and methodological assumptions, and each concept within conceptual framework plays an ontological or epistemological role. The ontological assumptions relate to knowledge of the "way things are," "the nature of reality," "real" existence, and "real" action (Guba & Lincoln, 2005). The epistemological assumptions relate to "how things really are" and "how things really work" in an assumed reality (Guba & Lincoln, 2005). The methodological assumptions relate to the process of building the conceptual framework and assessing what it can tell us about the "real" world.

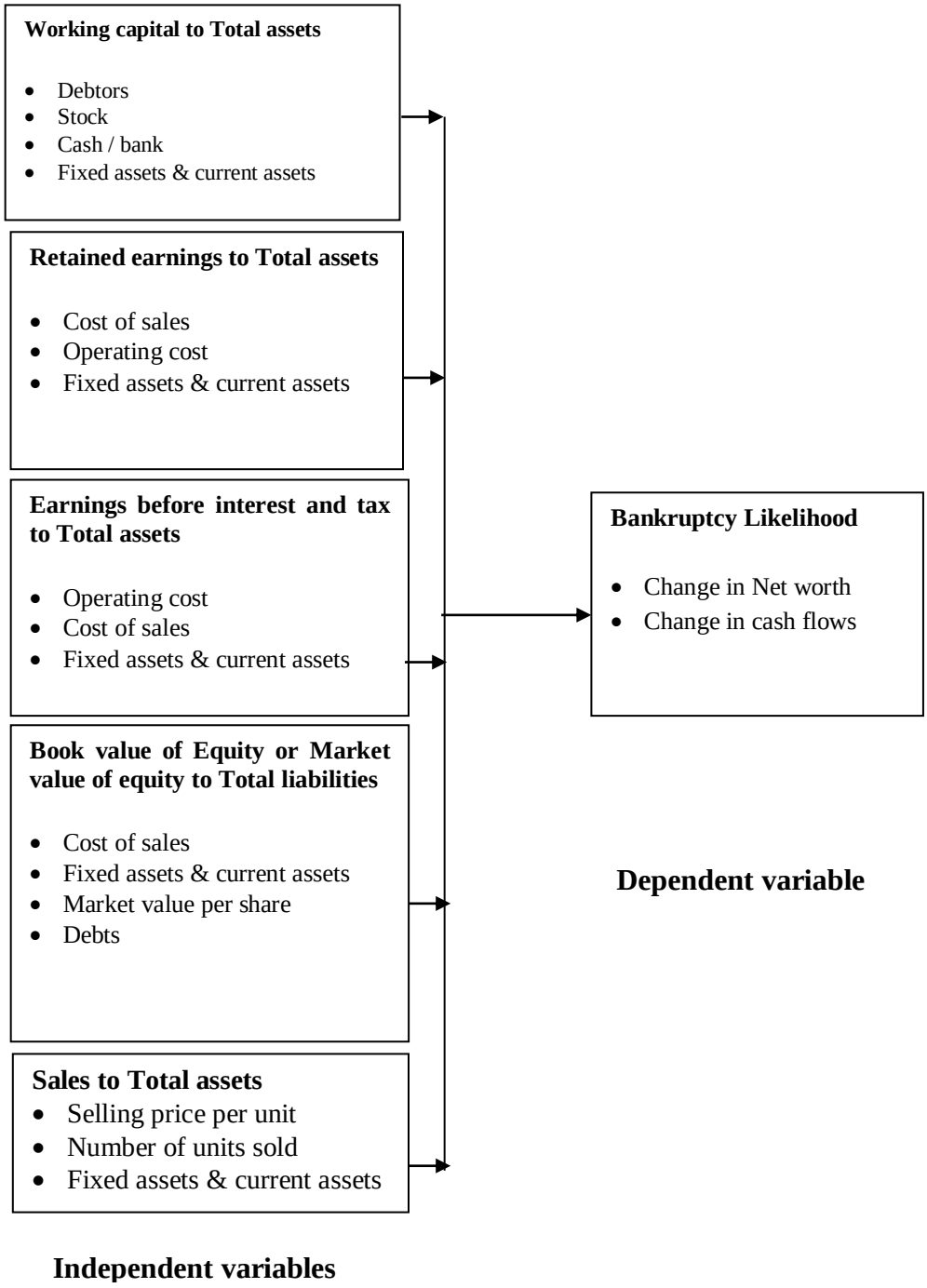



**Figure 2.1: Conceptual framework**

### 2.3.1 Use of Working Capital to Total Assets Ratio

Working capital is the difference between current assets (inventory, debtors, prepayments and cash) and current liabilities (account payables, short term loans, wages payable and tax dues).The presence of positive adequate working capital is an indication of short solvency. In addition it will be an indication that the company is likely to meet its short term obligations (Bhurnia & Sarkar, 2011).

According to Baker (2012) one of the financial tools that is widely used in analyzing and evaluating the financial statements is ratio analysis. This analysis not only assists in the evaluation of the company's performance but also gives room for effective comparison of the performance of the company from one period to another and also with those of similar companies. Working capital is a company's current assets less its current liabilities and measures a company's efficiency and its short-term financial health. Petersen and Plenborg (2012) state that a firm will not be able to meet its short term obligations when they fall due, if it is not liquid. Liquidity is affected by the firms' ability to generate positive net cash inflows in both the short term and long term.

Additionally, according to corporate finance and investment decisions and strategies by Chan (2012), working capital refers to current assets less current liabilities hence its alternative name of net proposed asset. Current assets include cash, marketable securities, debtors and stocks. Current liabilities are obligations that are expected to be settled within the period of one year", they include; creditors and accruals. Long term investment and financing decisions give rise to future cash flows which when discounted by an appropriate cost of capital, determine the market value of a company. However, such long term decision will only result in the expected benefits for a company if attention is paid to short term decision regarding current assets and liabilities. Current assets and liabilities are assets and liabilities with maturities of less than one year which need to be carefully managed so that the company can be able to meet its short term obligations when they fall due.

Positive working capital implies that the company is able to meet its short term obligations when they fall due. Negative working capital denotes the inability of a company's current assets in meeting its short term liabilities when they fall due which ultimately forces it into bankruptcy (Stewart, 2011). Companies with healthy positive working capital on the other hand are not expected to have problems in paying their bills. If a firm is experiencing operating losses, its current assets will be shrinking in relation to total assets. Sahut and Mili (2011) assert that poor management of short term liquidity leads to increased bankruptcy likelihood of institutions. Altman (1968) working capital to total assets ratio is the best indication of ultimate discontinuation of a firm. This study used this ratio to categorize sugar companies into bankruptcy likelihood low (0) in any year where the ratio was positive and bankruptcy likelihood high (1) in any year where the ratio was negative. Liquidity ratios measure the ability of the firm to settle its short term obligations when they fall due. The higher the ratio the better liquidity the firm is and the higher the gearing the less the liquidity the firm due to high interest payment and other related obligations which reduces the liquidity (Stewart, 2011). This implies that highly geared companies should reduce the risk bankruptcy likelihood high which leads to actual bankruptcy eventually (Loncan & Caldeira, 2014).

Waston and Head (2010) argued that "maintaining appropriate working capital is not just important in the short term but in the long-term business operation also. Appropriate liquidity is needed to ensure the survival of the business in the long term. Even a profitable company may fail if it does not have adequate cash flow to meet its liabilities. Meade and Gormley (2006) argue that the working capital needs of a particular business are likely to change over time as a result of change in the commercial environment. This implies that working capital decisions are rarely one-off decisions but continuous decisions. Managers must try to identify changes in attempt to ensure the level of investment in working capital is appropriate in the circumstance. In addition to changes in the external environment, changes arising within the business such as changes in production methods resulting perhaps, in a need to hold less stock and changes in the

level of risk that managers are prepared to take could alter the required level of investment in working capital.

The level of working capital required by a company is affected by the following factors: the nature of the business (Altman, 1968) for example manufacturing companies need more inventory than service companies, uncertainty in supply deliveries which require that extra inventory needs to be carried in order to cover fluctuations, the overall activity of the business (as output increases receivables inventory all tend to increase), the companies credit policy (the tighter the company's policy the lower the level of receivables), the length of the operating cycle (the longer it takes to convert material into finished goods into cash the greater the investment in working capital).

The company that has insufficient working capital is likely to suffer from the following; Inability to adapt or respond to opportunities without readily available cash, manager cannot buy a cheap line of raw material at a special offer or reorganize production line to include a new product through innovation and trade discounts. If there is insufficient working capital to finance large stocks, large orders cannot be placed at favorable prices, cash discounts-suppliers may not offer a cash discount for early payment (Waston & Head, 2007). If a company has insufficient working capital, it may not be able to take advantage of the cash discount which will also increase its bankruptcy likelihood due to paying more as opposed to when the firm has adequate working capital it will be able to service its short term obligations (Bhurnia & Sarkar, 2011; BurkSaitiene & Mazintiene, 2011).

Total assets refer to the sum of all the resources controlled by the entity as a result of a past event from which are expected to generate future inflows of economic benefits to the entity (IASCF). The more the total assets, the more the working capital the entity is supposed to have. If total assets are increasing and working capital is constant or decreasing this is likely to increase the chances of the entity bankruptcy likelihood since it will reduce the Z score value (Altman, 1968). Therefore, the management of the firm should maintain appropriate mix of working capital to total asset ratio depending on the

size of the company and how long the company has been in existence. If this ratio is decreasing or when the working capital is insufficient, then it will increase bankruptcy likelihood due to its effect of reducing the value of discriminant Z score.

The sub-variables in this independent variables includes; Debtors, Stock, Cash, Creditors, fixed assets and current assets. When debtors, cash and stock are increasing but total assets remaining the same or decreasing, the liquidity position of the company will be good which will increase profitability, cash flows and reduce agency problems hence increase the value of the discriminant Z score ratios model and thus the likelihood of the company being bankrupt will low. An increase in creditors, accruals and other obligations of the company indicates that the company is illiquid which eventually reduces the value of the discriminant Z score value thus increasing the likelihood of the company going into bankruptcy. When total assets (fixed and current assets) are increasing and the increase is not proportional with the increase in debtors, stock and cash, it is likely to reduce the value of the discriminant Z score ratios model due to reduction in the ratio working capital to total assets which will increase bankruptcy likelihood because it will be a sign that the company is investing more in fixed assets than current assets (Altman, 1968).

### 2.3.2 Use of Retained Earnings to Total Assets Ratio

The portion of the company's net income that is reinvested into the company for future expansion and growth is referred to as retained earnings (Bhurnia & Sarkar; BurkSaitiene & Mazintiene, 2011). Retained earnings are important aspects of the Altman's Z score model because; it measures the company's overall profitability over time (Gibson, 2011). The retained earnings of a company are the percentage of net earnings not paid out as dividends (Chan, 2012). They are reinvested in the firm or used to pay the debt of the firm. Retained earnings are calculated as follows: beginning retained earnings + net income (new loss) – dividend paid. Retained Earnings are retained profits that the company does not pay as dividends but sets aside for future expansion (Horkan, 2014).

According to (Pranowo *et al., 2010*) a company's efficiency measures how efficiently the company utilizes its assets to generate returns. Those sugar companies which are able to utilize well their assets to generate returns are more likely to have high profitability, cash flows, reduction of agency problems and increase retained earnings which will reduce external borrowings and hence reducing the bankruptcy likelihood. The ratio of retained earnings to total assets helps to measure the extent to which a company relies on debt because a company with high debts will have low retained earnings due to high payment of interests (Stewart, 2011). This also gives an indication that the total assets of the company are mostly financed by debt capital. The lower the ratio, the more a company is funding its asset by borrowed funds instead of retained earnings which again increases bankruptcy likelihood because the firm will not be able to meet its debt obligations as and when they fall due (Altman, 1968). When deciding on the retention policy of the company it is important that the managers consider that shareholders and other stakeholders supply capital to the company only because they have expectations of eventually receiving payouts from the company in the form of dividend payment, capital appreciation or interest (De Angelo & De Angelo, 2007).

Retained earnings to total assets ratio therefore measures the ability of the firm to accumulate earnings using its assets (Gibson, 2011). The more the retained earnings the company has, more the investments (Campbell, Hischer & Ssikggi, 2012). Firms with more total assets, low retained earnings will be an indication that the firm is not utilizing well its total assets to generate revenues a sign of in effective management or the total assets may be overstated or they may have become obsolescent. Therefore, the higher the ratio the better as it is an indication that the firm is capable of accumulating earnings. Retained profits or earnings have the advantage to the firm by making capital available for future growth (Altman, 1968). Improvements and expansion are expensive but necessary for the firm to remain competitive. Firms need to search for market segments within the industry that offer opportunities to capture market value which increase sales, profitability and cash flows hence, increasing the value of the discriminant Z score resulting into reduction in the bankruptcy likelihood. Identifying these areas takes time

and resources as they need to identify which products and services will deliver exceptional value and fulfil market gap. Designing new products and services require research and development and these costs can be quite high but if appropriately done, will increase the value of the firm due to increased sales and profitability hence reducing bankruptcy likelihood which will be possible if funded by retained earnings. Bigger and old firms can survive during periods of bankruptcy likelihood high than smaller and younger firms due to accumulation of larger retained profits which can be used to finance the business internally at low costs (Ooghe & Prijcker, 2008).

Miller and Modigiliani (1963) state that in a perfect capital market, the dividend policy does not matter thus the value of a company will depend on real economic considerations such as earnings and investments and not the manner in which the return from assets is distributed that is dividend payments and capital gains. Although several researchers have presented reasons to believe that investors are not indifferent between cash dividends and capital gains, empirical evidence to date is still inconclusive for rejecting Miller and Modigiliani (1963) proposition. Researchers have incorporated the advances in portfolio theory and efficient market theory to describe the rational investor and rational management (Goedhart, Koller & Wessels, 2010). According to these theory rational managers operating in an efficient market will pursue a "passive residue" dividend policy. The company should have a preference for reinvesting the profits generated instead of declaring dividends as long as the expected return on reinvestments is greater than the company's capitalization rate. However, companies should also understand and appreciate that investments with higher returns are riskier (Taleb, 2007). In this study higher returns increases profitability, cash flows, and net worth and reduces the agency problem resulting to high discriminant Z score hence reducing the bankruptcy likelihood. Several surveys have been undertaken to determine the rationale for the dividend policies pursued by companies. De Angelo and De Angelo (2007) indicates that managers tend to change dividends primarily in response to unanticipated and non-transitory changes in their firms' earnings and that they are guided by target payout ratios in making those changes. There is also evidence that managers take into

consideration the desires of stakeholders as well as the long-term well-being of the company. A company's dividend policy and its retention policy are two sides of the same coin because by definition, what a company does not distribute as dividends is retained in the business. Stakeholders can only enjoy extra dividends now at the expense of dilutions of future returns necessitated by a further issue of capital to finance investments, or to forego dividends now and have offsetting increased returns in the future (Thomson & Walsh, 1967).

Therefore, retained earnings represent deferred dividends which are the earnings the company reinvests for the long-term benefit of stakeholders. Rational managers can maximize the stakeholders' wealth by distributing the company's earnings as dividends, unless the invested funds will raise the company's share price by more than the corresponding dividend payment. The more the retained earnings the company has the more its assets will be financed internally rather than externally (Kasilingam & Jayabal, 2012). This finally affects the leverage of the company. According to Narayanan (2008) when a firm raise too much capital through equity issues, it could be interpreted as a signal to the market that it does not have sufficient reserves or cash flows, and this could result in the under-valuation of the firm's shares. When investments are financed with external equity the share prices of the firm sometimes fall. Therefore, it is better to build up reserves so that a high proportion of capital needs can be done through internal sources. In this study it had an effect of increasing the EBIT and BVE which resulted into increasing the value of the discriminant Z score and reduces the bankruptcy likelihood.

Altman (1968) states that a young firm will usually display a very low retained earnings to total asset ratio as it has not had the time to build up the cumulative profits hence "the incidence of failure is such higher in a firm's earlier years". The study conducted by Dun and Bradstreet Corporation (1994) established that approximately 50 percent of all firms that failed did so in the first five years of their existence. Therefore the management of the firm should ensure that they are efficient in utilizing the total assets employed in the firm to generate retained earnings. A history of profitable operations

and reduced debt is a sign of a firm that retains earnings or re-invests operational profits and hence the bankruptcy likelihood for such a company will be low (Altman, 1968).

The sub-variables in independent variables includes; cost of sales, operating costs, profits, dividends, fixed assets and current assets. When cost of sales and other operating costs are increasing and sales are not increasing in the same proportion it will reduce profitability, cash flows and net worth hence increasing bankruptcy likelihood. When profits of the company are increasing and dividends remain the same, retained earnings will increase and hence increasing the value of Z scores ratios. This will finally reduce the level of bankruptcy likelihood. When retained earnings remains the same and fixed assets and current assets are increasing, the value of discriminant Z score reduces as this implies that the increase in assets are not generating more profits thus increasing the level of bankruptcy likelihood.

### 2.3.3 Use of Earnings before Interest and Taxes to Total Assets Ratio

Earnings before interest and tax (EBIT) to total assets ratio assess a firm's ability to generate profits from its assets before deducting interest and taxes the ratio is in the category of profitability ratios which are normally used as a measure of management efficiency in using its assets (resources) to generate revenues (Pervan, Pervan & Vukoja, 2011). This is because a firm's ultimate existence is based on the earnings power of its assets, this ratio appears to be particularly appropriate for studies to do with corporate failure. An increase in efficiency ratio is a sign of either reduction in cost or increase in revenues which will reduce bankruptcy likelihood (Taylor, 2008). The earnings before interest and tax to total assets of a company shows the total sales proportion of total assets left after deducting all normal operating costs (Cornett *et al.*, 2012).A high earnings before interest and tax to total assets shows a company that is effective in controlling operating costs (Palenu & Healy, 2008) which in this study had an effect of increasing profitability and cash flows hence reducing bankruptcy likelihood.

Altman (1968) states that this ratio represents profitability of the company's assets to generate sales and ability of the management to reduce costs which will reduce or increase bankruptcy likelihood depending on the management efficiency and ability to reduce costs. De Angelo and De Angelo (2007) assert that when deciding on the retention policy of the company it is important that the managers consider that shareholders supply capital to the company only because they have expectations of eventually receiving payments from the company in either dividends or capital appreciation. Therefore, the management should utilize well its total assets to maximize EBIT for the benefits of three key stakeholders the firm has; lenders (interest and principal, government (taxes) and shareholders (dividends). Any change in the EBIT should be considered further to establish if they are in line with the changes in gross profit margin and also in line with changes in sales revenue

The more the total assets the firm has, the more the earnings it is expected to generate and vice versa. However, other factors such as the size of the firm, the industry in which the firm is operating and the age of the firm need to be considered. If the ratio is decreasing and the assets are constant or increasing it may be more prudent to sell some of the assets and invest the funds in other viable projects available. If a company acquires additional assets EBIT should increase over a period of time because if EBIT remains the same it is likely to imply that the additional assets acquired did not add value to the company. When the ratio is low or decreasing, it will be an indication of bankruptcy likelihood high (Altman, 1968). According to Ooghe and Prijcker (2008), bigger firms can survive during periods of bankruptcy likelihood than smaller firms due to accumulation of larger retained profit which will be used to finance it is projects and hence reducing interest payment and other costs which will reduce bankruptcy likelihood (Stewart, 2011).

The lack of a correlation between company earnings and share prices has serious financial implications for listed companies (Ball, 1987) and this may explain the reason as to why the market price per share of Mumias Sugar Company had decreased from Kshs 29 in 2007 to Kshs 1.30 in 2016 (See Appendix VII) due to negative retained

earnings which increased interest payments because of high leverage resulting from more external borrowings (Stewart, 2011). In addition there is a linkage between bankruptcy prediction and technical efficiency (Hwang, Chung & Chu, 2011).

Therefore, management of the firm should ensure that the firms' total assets generate EBIT that is sufficient to ensure continuity of the firm moving forward because if this ratio is decreasing it will increase the level of bankruptcy likelihood (Altman, 1968). The sub-variables in this independent variable includes; cost of sales, operating cost, profits, fixed assets and current assets. When cost of sales and operating costs are increasing and sales are not increasing in the same proportion this will reduce profitability, cash flows, and net worth which has an effect of reducing the value of the discriminant Z score hence increasing bankruptcy likelihood of sugar companies in Kenya. When total assets are increasing and profits remaining the same or reducing this will reduce the discriminant Z score which will increase bankruptcy likelihood since it will imply that the increased assets which resulted into cash out flows did not result into generation of extra profits.

### 2.3.4 Book Value of Equity or Market Value of Equity to Total Liabilities Ratio

Book Value of equity is defined as the ownership or the shareholders' investment in the company (Cornett et al., 2012). Book value of equity is recognized in the statement of financial position and is normally measured by the difference between total assets and total liabilities of a company and the higher the total assets the better the company since it will mean that total assets are financed more by internal funds a situation which is likely to reduce gearing and increase profitability, cash flows and net worth hence reducing the likelihood of bankruptcy. Total liabilities are the summation of proposed obligation of the entity arising from past events from which there is expected to be future outflows of economic benefits from the entity (IASCF). Book value of equity to total Liabilities ratio was used for those sugar companies which were not quoted Altman (2002). One way of determining whether a stock is a good investment, or not is to establish if the company is worth at least the value of all of the outstanding stock at

proposed market prices. Most measures of company worth are based on the net value of its assets = total assets-total liabilities.

Most companies are worth more than the sum of their net assets. This is because when a company buys another company usually measured by its assets market price if it is available, over its net assets. Goodwill cannot really be measured reliably and it is excluded (Bhurnia & Sarkar, 2011). Net assets value=total assets-intangible assets-total liabilities-equity with prior claim or it can also be computed as:

Net assets value = Paid up Capital +Retained Earnings + Capital Reserves +Surplus created by revaluation of fixed assets. Increase in the cost of debts will most likely lead the company to be financially overstretched due to high payment of interest on obligations which reduces profitability, cash flows and net worth hence leading to bankruptcy likelihood high (Frank & Goyal, 2008). Firms which are highly geared are likely to experience bankruptcy likelihood high than lowly geared firms because of high payment of interests and other financial obligations (Stewart, 2011).

Klammer (2011) asserts that the use of debt by a firm is one way of improving the performance of the firm if used properly and put into productive units. Stewart (2011) states that if the firm is paying out interests and other costs than it is receiving, its level of bankruptcy likelihood will be high. Firms apply a mixture of debt capital and equity capital in different ratios in order to maximize the value of the firm (Abor, 2007). Increased cost of debt will make the company to be financially overstretched due to high payments of interest which will reduce profitability and cash flows and hence lead to bankruptcy likelihood high (Frank & Goyal, 2008). According to Narayanan (2008), optimal capital structure of the firm is where the cost of capital is minimized and the value of the firm maximized since firm's performance is mostly determined by its capital structure. Zein and Tian (2007) argue that capital structure of the firm has a major effect on the firm's performance and overlooking of bankruptcy costs may lead firms to borrow heavily and lead to high debt in the firm's capital structure which will

increase bankruptcy likelihood due to high interest payment and other related costs (Stewart, 2011).

The difference between market value and book value depends on various factors such as the company's industry, the nature of a company's assets and liabilities, and the company's specific attributes (Altman, 1968). There are general two assumptions about the relationships between book value and market value. When the book value of equity is greater than the market value the financial market values of the company are less than its stated value or net worth. This implies that the market has lost confidence in the ability of the company's assets to generate future profits and cash flows. In other words, the market doesn't believe that the company's worth the value on its books. The market value is greater than the book value of equity it may be an indication that the market has assigns a higher value to the company due to the earnings power of the company's assets. In addition consistently profitable companies will have market values greater than book values. Book value equals market value implies that the market sees no compelling reason to believe that the company's assets are better or worse than what is stated in the statement of financial position. It is important to note that on any given time, a company's market value will fluctuate in relation to book value depending on the earning power of the company (Frank & Goyal, 2008). Additionally, for this study, the book value and market values of Mumias Sugar Company which was the only quoted Sugar Company were compared for the ten years of the study (See Appendix VII) which was an indication that the market had lost confidence with the company since the BVE to MV ratio had increased from 0.564 in 2007 to 3.870 in 2016.

$$\frac{P}{B}\ ratio = \frac{Market\ Price\ per\ Share}{Book\ Value\ per\ Share}$$

If the ratio is more than 1 the market will have assigned a higher value to the company due to the earning power of its assets which will also reduce the level of bankruptcy likelihood (Altman, 2002).

When total debts (total liabilities) are increasing and fixed assets plus current assets remaining the same or decreasing, the lower the discriminant Z score ratio and the higher the bankruptcy likelihood (Altman, 1968). The use of debt is one way of improving the performance of the firm if put into productive units which will increase profitability, cash flows and net worth (Klammer, 2011). If the firm is paying out interests and other costs than its receiving, then its level of bankruptcy likelihood will be high (Stewart, 2011). Firms apply a mixture of debt capital and equity in different ratios in order to maximize their value of the firm (Abor, 2007).

The sub-variables in these independent variables includes; fixed asset, current assets, profits, cost of sales, operating costs and debts. The book value of equity = total fixed assets plus total currents minus total debts (total liabilities). The higher the book values of equity the higher the discriminant Z score and the low level of bankruptcy likelihood. When cost of sales and operating expenses are increasing and sales are not increasing in the same proportion it has an effect of reducing profitability due to reduced book value of equity and increases bankruptcy likelihood of the company (Stewart, 2011).

Altman (2002) defines the market value of equity, or market capitalization as a summation of both preferred and common stock, the primary estimator of a firm's worth suggests that price changes may foreshadow pending problems if a firm's total liabilities exceed its market value of equity. Equity is defined as the net residual after deducting total liabilities from total assets (IASCF). According to IASCF liabilities are defined as present obligation of the entity resulting from a past event from which is expected to generate future outflows of economic benefit from the entity. A higher gearing ratio is likely to increase borrower security charges and claim on firm's cash flows which will reduce profitability and net worth and increase the level of bankruptcy likelihood (Saunders & Cornett, 2011).

Addae *et al.* (2013) assert that firms should be able to make decisions on gearing positions that will maximize the firm's value and reduce the possibility of bankruptcy likelihood. Optimal capital structure of the firm is where the cost of capital is minimized

and the value of the firm maximized (Narayanan, 2008). A firm's performance is mostly determined by its capital structure. A firm should weigh the tradeoff between the interest payments of debts and equity when deciding to borrow heavily in pursuit of taking advantage of tax benefits. Therefore, when the firm diverges from an appropriate capital structure its bankruptcy likelihood costs and interest payments costs will outweigh the tax benefits related with the tradeoff between debt and equity and hence increase bankruptcy likelihood. Zeitun and Tian (2007) argue that capital structure of the firm has a major effect on the firm's performance and overlooking of bankruptcy likelihood costs may lead firms to borrow heavily and lead to high debts in the firm's capital structure which will increase the level of bankruptcy likelihood.

Petersen and Plenborg (2012) states that when determining financial gearing ratios and market values are available, they should be used instead of using book values. Since the market values nearly approximate the realizable values and the users of financial information will not be misled. If the market value of equity is higher than the book value, then it will be an indication that shareholders have confidence with the company and vice versa (See Appendix XII) where the BVE to MV ratio of Mumias sugar company had increased from 0.564 in 2007 to 3.870 in 2016 an indication that the market has lost confidence with the company. According to Altman (1968) the ratio market value of equity to total liabilities measures how much the firm's assets can decline in value (measured by market value of equity) before the liabilities exceed the asset and the firm becomes insolvent". Market capitalization of a firm is an indication of the market confidence in a company's financial position. The higher market capitalization the company has the higher the likelihood that the firm will survive going forward for the foreseeable future. A high value is an indication that a firm finances its growth by equity and a low value is an indication that the firm finances its growth by liabilities (borrowings) which will increase the level bankruptcy likelihood. The computation of the ratio was possible for those sugar companies which are quoted (Mumias Sugar Company in this case) in the securities exchange. For public owned sugar companies which were not quoted and private owned sugar companies, it was

difficult in establishing the market value of shares thus the study used book value of equity to total liabilities ratio (Altman, 2002).

Investors are aware of the potential financial difficulties related to leveraged firms. Consequently, investors worry about the costs of bankruptcy, something that is believed to be reflected in the proposed market value of the firm. Even if the firm is not proposed as bankruptcy likelihood high, investors include the potential for future possibilities into their assessment of the market value. Thus if there is a possibility of bankruptcy likelihood high, the firm's proposed market value is reduced by the present value of these potential bankruptcy likelihood costs (Berk & De Marzo, 2011). Therefore, the management of the firm should ensure that market value of equity and book value of equity are maximized and total liabilities are minimized so that market value of equity to total liabilities can have a positive effect on the overall discriminant Z score values which will reduce bankruptcy likelihood. The sub-variables in this independent variables includes; the market value per share, number of shares and debts; when the market value per share increases or the number of shares increases this had an effect of increasing the market value of equity which lead to increasing the value of the discriminant Z score value and assuming the total liabilities remaining the same the level of bankruptcy likelihood was low.

### 2.3.5 Use of Sales to Total Asset Ratio

According to IAS18 sales refer to the gross inflow of economic benefits to the entity resulting from a past event but arising from the ordinary course of the business activities and relates to a given time period. Sales are measured at the fair value of the consideration received or receivable. Nweze (2011) states that total assets turnover measure the level of capital investment relative to the sales volume so that when levels of capital investment increases, sales volume should increase. It therefore measures how effective the management of the firm utilizes it is total assets to generate sales. Wright (2006) argues that performance of the company will depend on the company's capability of achieving its goals by properly utilizing its resources in an efficient and effective

manner and for the purposes of this study those sugar companies which utilized well their total assets (resources) to generate sales were able to increase their profitability and cash flows which reduces the level of bankruptcy likelihood.

The ratio of sales to total assets, more commonly referred to as assets turnover it measures the amount of sales generated by a company for every shilling's worth of its assets. In other words, asset turnover is an indication of how effective the company uses its assets to generate sales. Ezeamma (2010) indicate that total asset turnover is a ratio that measures the number of times the value of assets is utilized by the firm to generate sales. Higher asset turnover ratio is better as low or falling asset turnover ratios can signal a failure by the company to expand its market share or ineffective use of its assets to generate sales. This results into low profitability, cash flows and net worth which lead to increased bankruptcy likelihood. Cornett, Adair and Nofsinger (2012), who assert that gross rate in revenue is the percentage increase in revenues which for the purposes of this study will increase profitability and cash flows and on assumptions that costs and other operating costs increased at a lower rate it will reduce bankruptcy likelihood since it will results to higher book value of equity and earnings before interest and tax.

Ball (2013) asserts that investors feel that they are disadvantaged if the company revenues or sales are not increasing as this denotes the inability of the company they are dealing with in paying them interest and capital obligations in the future. The effect of this in the study is that it reduces the (sales to total assets ) ratio which leads to an increase in the level of bankruptcy likelihood because sales reduction has an impact of decreasing EBIT and BVE which reduced the value of the discriminant Z score and hence increasing the bankruptcy likelihood. Poghosyan and Cihak (2009) argue that inadequate capitalization, poor asset quality and insufficient earnings are key factors contributing to bankruptcy likelihood high.

Pandey (2010) argues that total assets turnover ratio indicates the firm's ability to generate sales by use of all its financial resources committed to total assets. Therefore, management of firms should utilize well their assets to generate sales so as to maximize

the value of sales. This is likely to have a positive impact on the overall discriminant Z score ratio values because of increased EBIT and BVE with the assumption of cost of sales and other operating expenses remaining the same or increasing at the same proportion as sales. This will finally lead to reduction in the bankruptcy likelihood. If the company acquires more assets over a period of time the acquired assets are supposed to increase the sales of the company but if sales does not increase as a result of the acquisition of assets, then it will be an indication that the extra assets were not productive or the assets are under-utilized. Companies should therefore not shift sales from one period to another or record fictitious sales in any period as this will overstate the sales thus, showing a higher value of this ratio and hence increasing the discriminant Z score ratio values which may lead to classifying failing companies as non-failing.

Armstrong (2010) states that the key drivers for the growth of any company is to encourage creativity and innovation which means companies should encourage the flows of information and shared learning among its employees and this will increase sales, profitability and cash flows hence decrease bankruptcy likelihood. The sub-variables in these independent variables include; selling price per unit, number of units sold fixed asset and current assets. When selling price per unit and number of units sold are increasing and fixed assets and current assets remaining the same or not increasing at the same rate as that of selling price per unit and number of units sold, then the company will be effectively using its fixed assets to generate sales ( Stewart, 2011). With assumption that the cost of sales and other operating expenses were appropriately controlled, the EBIT and the BVE increase thus improving the value of the Z score ratios. This ultimately reduces the level of bankruptcy likelihood (Altman, 1968). Hwang, Chung and Chu (2011) argue that there is a linkage between bankruptcy likelihood prediction and technical efficiency this is because when technical efficiency is low or reducing it is likely to lead to bankruptcy likelihood high. This is because in this study reduction of technical efficiency reduces profitability, cash flow and net worth and hence increases bankruptcy likelihood of sugar companies in Kenya.

### 2.3.6 Bankruptcy Likelihood

Bankruptcy is defined as the inability of a person business or firm to repay its outstanding debt (Aliakbari, 2009). Identification of early warning signals in bankruptcy likelihood high companies can assist management to make prudent investment decisions and implement preventive actions to safeguard the company. Telmoudi *et al.,* (2011) stated that early prediction of bankruptcy likelihood may avoid high social costs affecting stakeholders. Firms are always willing to find a counter measure for undesirable situations where bankruptcy likelihood plays an increasingly important role because it has a significant impact on the profitability, cash flows, and net worth of business units and hence affecting the various stakeholders. Prediction of bankruptcy likelihood serves to provide stakeholders with a timely early warning signal for taking corrective action.

Simic, Kovac and Simic (2012) state that corporate failure prediction is essential for the prevention or mitigation of negative economic fluctuations in a national economy since bankruptcy reduces productivity and lowers the gross domestic products which reduces the countries borrowing powers and the ability to repay it is national debts. This is because in an economy such as Kenya, manufacturing where sugar industry is included, is among the big four Agenda of the government 2018.

The bankruptcy likelihood of sugar companies in Kenya was predicted using Altman (1968) discriminant Z score ratios which incorporated the following independent variables; $x_1$=working capital to total assets ratio, which measures how liquid the company is in relation to it is total assets the high the ratio the low likelihood that the company will go into bankruptcy. Previous studies have revealed that working capital is not just important in the short term but even for the long term survival of the business (Waston & Head, 2007).

$x_2$= retained earnings to total assets ratio which measures, how effective the company uses its total assets to generate retained earnings. A young company will usually display

low retained earnings to total assets ratio as it has not had the time to build up cumulative profits hence the incidence of failure is such higher in a firm's earlier years Altman (1968). This is because the company will finance it is business with external borrowings which will increase interest payments and other costs (Stewart, 2011) and increase bankruptcy likelihood due to reduced profitability, cash flows and net worth.

$x_3$=earnings before interest and tax to total assets ratio, measures how effective the company utilizes its total assets to generate profits. Altman (1968) states that the higher the ratio the higher the discriminant Z scores ratios thus decreasing the likelihood of the company going into bankruptcy. For the purposes of this study those sugar companies which were able to control cost of sales and other operating expenses were able to maximize the EBIT and their bankruptcy likelihood was low.

$x_4$=market value of equity to total liabilities or book value of equity to total liabilities ratio measures how much the firm's assets can decline in value (measured by market value of equity) before the liabilities exceed the assets and the firm becomes insolvent. The computation of the ratio was possible for Mumias Sugar Company which was the only quoted Sugar Company in the Stock Exchange. The other public owned and private sugar companies the study used the book value of equity to total liabilities ratio (Altman, 1968).

$x_5$=Sales to total assets ratio . The ratio measures how effective the company uses its total assets to generate sales. The higher the ratio the higher the Z scores ratio and thus the lower the bankruptcy likelihood. This was necessitated by for those sugar companies which were able to control cost of sales and other operating expenses in order to maximize profitability and cash flows (Stewart, 2011) increase in sales which resulted to the increase in profits and retained earnings thus increasing the Z score value due to high value of BVE to TL ratio and EBIT to TA ratio hence reducing the bankruptcy likelihood.

The first sub-variables in this independent variable include; change in net worth which is the difference between total assets and total liabilities (Palenu & Healy, 2008). The bankruptcy likelihood of the company continues to increase as the total liabilities changes and exceed the total assets an indication that total assets will mostly be financed by debts which has an effect of reducing profitability and cash flows due to high interest payments (Stewart, 2011) and hence increasing bankruptcy likelihood. The second sub-variable is change in cash flows which provide information on cash flows into and out of a company within one complete financial accounting period. If the cash inflows changes and become more than the cash outflows the company will be said to be liquid (Ibara, 2009). In addition, a company with increasing sales, reduction of costs and other operating expenses has an effect of increasing net worth (debtors) and cash and hence increasing the value of the discriminant Z score which in turn reduces the bankruptcy likelihood of the company.

The study by Amuzu (2010) established that cash flow ratios of listed Ghanaian companies are more effective in determining enterprises' effectiveness and competitiveness because they present market dynamics and examination of actual returns on assets and equity. In this study positive and adequate working capital to total assets ratios, positive earnings before interest and tax to total assets ratios, positive retained earnings to total assets ratio and book value of equity to total liabilities ratio of above 0.50 were considered as good determinants of profitability cash flows positions and net worth which reduced bankruptcy likelihood.

### 2.4 Empirical review

Aliakbari (2009) bankruptcy is defined as the inability of a person business or firm to repay its outstanding debt. Identification of early warning signals of bankruptcy likelihood in companies can assist managers to make prudent investment decisions and implement preventive measures to safeguard the company. Telmoudi *et al.* (2011) state that early prediction of bankruptcy likelihood may avoid high costs affecting stakeholders. Firms are always willing to find a counter measure for undesirable

situations where bankruptcy likelihood plays an increasingly important role because it has a significant impact on the profitability and cash flows of business units. Simic, Kovac and Simic (2012) argues that corporate failure prediction is essential for the prevention or mitigation of negative economic fluctuations in a national economy.

Johnson and Kumbaro (2011) conducted a multiple discriminant analysis where a sample of 45 American firms that had filed for bankruptcy between 2007 and 2010 were selected. The study applied the Altman's Z score ratios model and the results of the study found out that the model is a good predictor of bankruptcy likelihood.

Li and June (2012) examined the accuracy of various Z-score models in predicting corporate bankruptcy from 2000 to 2010 in the United States. The study concluded that although the original Z-score model was developed for manufacturing firms, it performed equally well in predicting bankruptcy for non-manufacturing firms. Fitscherin and Pillania (2012) study on Indian industries showed that financial viability may be evaluated using management accounting principles that are implied to maintain the effectiveness in cost systems and distribution systems since they are the main elements of factory costs. Where for this study, those sugar companies which were able to control cost of sales and other operating expenses they were likely able to increase their profits, cash flows net worth and reduce agency problems which in turn reduced the level of bankruptcy likelihood.

Bhatt (2012) investigated the ability of three versions of the model for bankruptcy likelihood prediction in the Indian markets. The study was conducted on four selected companies, belonging to various sectors. The results proved that the models have remarkable degrees of accuracy in bankruptcy likelihood prediction. Alkhatib and Bzour (2011) investigated the predictability of corporate financial failure of Jordanian listed companies using Altman Z score ratios model. The study included sample companies listed on the Jordanian securities exchange that were liquidated during the period 2000 to 2006. The study concluded that Altman Z score ratios model was a reliable tool for predicting the bankruptcy of Jordanian companies during the period of study. Rijken

(2011) argued that the country's risk of default on its sovereign debt can be assessed by an analysis of the default chances of its industry sector. This study has been carried out in sugar companies in Kenya for the extension of prediction of bankruptcy likelihood of sugar companies in Kenya.

A study carried by Pam (2013) in the banking sector of Nigeria focusing on two failed banks and two un failed banks revealed that liquidity, profitability, operating efficiency and total assets turnover were key ratios of the Altman's Z Score model are crucial tools in establishing the strength of a financial institution.

Rayan (2010) did a 10 year study for companies in Johannesburg Stock Exchange, South Africa with an intention of establishing the correlation between financial liquidity and the company's possibility of bankruptcy. The study used debt-equity ratio as a measure financial liquidity. The results revealed a negative relationship between use of debt-equity and bankruptcy likelihood meaning, that the more the debt the more the level of bankruptcy likelihood.

Mohammed & Soon (2012) applied the Altman's Z score ratios model in predicting bankruptcy likelihood and current ratio to assess the financial condition of 44 firms that were listed in the Malaysian Stock Exchange for the period of 2008 to 2010 and the study results concluded that the Altman's Z score model and the current ratio are good predictors of bankruptcy likelihood of firms.

Wang and Campbell (2010) studied data from Chinese publicly listed companies for the period 2000 to 2008 to test the accuracy of Altman's Z score ratios model in predicting failure of Chinese companies. Altman's model was found to have significant predictive ability. Youn and Gu (2007) tested the prediction of business failure in the Korean lodging industry and concluded that Korean lodging firms should lower their reliance on debt financing and increase the efficiency in using existing assets to generate sales revenue. Cheluget (2014) did a study to establish the determinants of bankruptcy likelihood in insurance companies in Kenya. The study established that the average

insurance industry was distressed over the period of the study which was from 2005 to 2012 and the study concluded that the average Kenyan insurance industry was bankruptcy likelihooded for the period of the study. Ntoiti (2013) did a study to find out the determinants of financial failure facing local authorities in service delivery in Kenya. The study concludes that financial management of local authorities in Kenya is poor and ineffective which led to the financial failure being witnessed in local authorities in Kenya.

Pranowo *et al.* (2010) studied financial failure companies listed in the Indonesia stock exchange for the period (2004-2008).The results of the study revealed that financial decline in the financial ratios was most key in determining financial failure for Indonesia public companies. The results indicated that the number of declining companies had cash flow problems which were increasing over the years. The study revealed that the more the number of times financial failure was high the more the decline in the financial ratios. The study recommended to the management to control their financial performance in order to check and balance the bankruptcy likelihood of their respective companies.

Onyeiwu (2012) examined the applicability of the Multi Discriminant Analysis (MDA) to manufacturing companies in Nigeria. The study concludes that the application of multiple discriminant analysis was relevant and reliable to Nigerian environment. Olaniyi (2007) evaluated the susceptibility of Nigerian banks to failure with a view to discriminating between sound and unhealthy banks as a guide to investment decisions using First Bank and Trade Bank as case studies. The study concludes that the model measures accurately the potential of failure of unhealthy banks. Chen (2011) describes that financial failure prediction which is accurate is likely to provide useful information to stakeholders such as stockbrokers, creditors, government officials, and even the general public in making economic decisions about the ability of the company to continue in business. Therefore, this study's finding will assist various stakeholders including the government and the management of sugar companies in Kenya to evaluate

the performance of the sugar companies in Kenya in order to increase efficiency and productivity.

Kidane (2004) did a study on predicting financial failure in IT and services companies in South Africa listed on the Johannesburg Security Exchange using the Altman Z score ratios model. The Altman model achieved correct classification rates of 74%. Appiah (2011) did a study on corporate failure prediction on listed firms in Ghana. The study examined the phenomenon of bankruptcy prediction from a developing economy perspective using the Altman's Z score ratios model. A sample of 15 non-failed and failed companies listed on the Ghana Securities Exchange, the author tested Altman (1968) model through a cross section of different firms with dataset of 2004 and 2005. The findings from the study were that Altman's Z score ratios are applicable in predicting bankruptcy in Ghana depending on the nature and size of the company.

Lake (2013) investigated the effect of financial risk on the profitability of commercial banks in Ethiopia by using Ordinary Least Square (OLS) for the period of (2000-2011).The results of the study established that credit and liquidity risk was significant and statistically, had a negative association with the banks' profitability. Sitati and Odipo (2009) assessed whether Altman's financial failure prediction model can be useful in predicting business failure in Kenya. The target population was composed of all the companies listed in the Nairobi Securities Exchange for the period 1989 to 2008. Twenty firms were selected for the study; 10 firms that were still listed and 10 firms that had been delisted in Nairobi Securities Exchange during study period. The research study revealed that Edward Altman's financial failure prediction model was applicable in 8 out of the 10 failed firms that were analyzed, which indicates an 80% successful prediction of the model. Uchenna and Okelue (2012) applied Multi Discriminant Analysis Model (MDA) as proposed by Altman in 1968 to a group of failed and non-failed banks in Nigeria to ascertain if MDA is a reliable tool of predicting business failure in the Nigerian banking industry. The result shows that MDA is a reliable tool for assessing the financial health of banks.

Kalinda and Chisanga (2014) carried out a study on the sugar value chain: Where the growth, opportunities and challenges of the sugar sub sector in Zambia were investigated. The study employed a value chain approach and descriptive data analysis. The study concluded that Zambia is among the lowest cost producers of sugar globally. Growth in the sector has a great prosperity for economic development, diversification and creating of employment. However the growth in the industry was being hindered by high transaction costs; including high fuel, electricity, transportation and costs of distributing has negatively impacted the industry.

Mak'abongo (2013) did a study on price and weather risk management practices in the sugar industry in Kenya. The study concludes that price and weather risk management practices are not being applied in the sugar industry in Kenya. Both small scale and large scale sugar farmers in Kenya have no instruments of managing price fluctuations and adverse weather effects. Market deviations such as futures, forward contracts and options as well as weather index insurance were still not available in the Kenyan markets. The study reveals that if the instruments were available provided they did not attract extra costs; the farmers would be willing to use them. Adverse weather conditions are a serious threat to the farmers in the sugar industry and need to be managed well due to its major impact to sugarcane crop leading to a reduction in yield and income.

Akombo (2010) did a study where the sugar industry in Kenya competitiveness was analyzed using Porters Diamond Model and the study concluded that reliable supply of cane and raw material was the major challenge with the majority of 78% of the sugar companies being affected, transportation costs was also one of the factor that was cited as making the sugar companies in Kenya un competitiveness.

Odek, Kegonde and Ochola (2003) and COMESA (2007) reports show that the problems affecting the millers are due to inefficient factory operations, politics and the conditions under which the Chief Executive Officers are appointed. The performance of Kenya sugar sector has not been consistent. The production of sugar has fluctuated from year to year in a manner that indicates deficient in strategic focus on factors such as

improvements of skills, realistic company's strategic plans, poor maintenance policy, financial constraints, lack of prudent management, and poor technological adoption rate. This had an effect to the current study of reducing profitability, cash flows, net worth and increasing agency problems which increases the financial failure.

Omete, Asakania and Amwayi (2015) studied the impact of financial health and continuity of a firm using Mumias Sugar Company as case study for the period (2003-2011). The study establishes that the company was in grey area, and this was a sign of bankruptcy likelihood high. Kungu (2015) did a study on creative accounting and financial failure using the Altman's model where Mumias Sugar Company was used as the case study for the period (2009-2013). The study established that the company bankruptcy likelihood was high.

### 2.5 Critique of the Existing Literature

Li and June (2012) examined the accuracy of various Z-score models in predicting corporate bankruptcy from 2000 to 2010 in the United States, where the study established that the Z score ratio model was valuable in predicting corporate bankruptcy for both manufacturing and non-manufacturing companies. Fitscherin and Pillania (2012) carried a study in Indian industries and established that financial viability may be evaluated using management accounting principles that implied to maintain the effectiveness in cost systems and distribution systems because they are the main elements of factory costs. Bhatt (2012) investigated the ability of three versions of the model for corporate failure prediction in the Indian markets and the study found out that the Z score ratios model has a remarkable degree of bankruptcy prediction. Alkhatib and Bzour (2011) investigated the predictability of corporate bankruptcy of Jordanian listed companies using Altman Z score ratios model and the findings were that the Z score model is a reliable tool for predicting bankruptcy. Wang and Campbell (2010) studied data from Chinese publicly listed companies for the period 2000 to 2008 to test the accuracy of Altman's Z score ratios model in predicting failure of Chinese companies where the Altman's models was found to have significant predictive ability.

Most of these previous studies were carried out in developed and emerging countries such as U.S.A, Pakistan, Japan, China and India, while this current study has been carried out in Kenya sugar companies, which is a developing country. This is because the economic, social, technology, governance structures and financial reporting structures of developed and developing countries differ to a great extent (Ooghe & Balcean, 2007). Similarly, the previous studies mostly considered manufacturing quoted sugar companies, while the current study considered both quoted and unquoted manufacturing sugar companies that are public owned company together with private owned thus the use of book value of Equity other than the market value of Equity for unquoted sugar companies.

In addition studies done in the Kenyan sugar industry (Omete *et al.,* 2015) on the impact of financial health and continuity of a firm using Mumias Sugar Company as the case study for the period (2003-2011) established that the company was in grey area meaning it has to be treated with cautious since anything like bankruptcy likelihood high can happen. The study by Kungu (2015) on creative accounting and financial failure using Altman's Z score ratios model on Mumias Sugar Company as the case study for the period (2009-2013) established that the company possibility of failing was high. A review of these studies show that there was a great need in taking a comprehensive view of all the public owned sugar companies and more than 50% of the private owned sugar companies in Kenya, since most of them had concentrated on case studies alone, such as Mumias sugar company which is subjective and not conclusive since the findings of the studies cannot be generalized to the whole sugar industry.

Odek, Kegonde and Ochola (2003) and COMESA (2007) reports show that the problems affecting the millers are due to inefficient factory operations, politics and the conditions under which the Chief Executive Officers are appointed. A study by Mak'abongo (2013) on price and weather risk management practices in the sugar industry in Kenya show that price and weather risk management practices are not being applied in the sugar industry in Kenya. While on the other hand this current study has considered both primary and secondary data for public owned sugar companies and secondary data for

private owned sugar companies in Kenya and extended this by linking bankruptcy likelihood with the performance of the economy.

Sitati and Odipo (2009) did a sample survey of all the companies listed in the Nairobi Securities Exchange for the period 1989 to 2008, Mamo (2011), Taliani (2010) and Kariuki (2013) did studies of financial failure of the banking sector in Kenya using the Z score model where the results of the study established that the model is appropriate with over 80% predictive ability. Kinivo and Olweny (2014) did a study on financial performance of Sacco's using the financial statements of Sacco's from 2008-2013 the results of the study found that the model is a reliable predictor of financial failure of Kenyan Sacco's. This study targeted all the sugar companies in Kenya, both quoted and unquoted public owned and private owned because the foregoing findings cannot be generalized in the sugar industry because of differences in regulatory framework and industry practices. Finally, this current study has linked the bankruptcy likelihood to the Kenyan total debts and gross domestic products and why it is necessary for the government of Kenya to intervene and salvage the sugar industry in Kenya where necessary as shown in table 1.4. Increase in Kenya's sugar production is likely to increase the GDP, which may enable the country to repay its debt that has been increasing in comparison with the GDP as indicated in table 1.4

## 2.6 Research Gap

An analysis of the foregoing literature review has revealed that there exists a contextual methodological and conceptual research gaps on the use of Z score ratios model to predict the corporate failure of companies especially in developing countries like Kenya. Contextually, Li and June (2012) examined the accuracy of various Z-score models in predicting corporate financial failure from 2000 to 2010 in the United States and the study established that although the original Z-score model was developed for manufacturing firms, it performed equally well in predicting financial failure for non-manufacturing firms. Other studies that were done in developed countries using Altman's Z score ratio model include countries such as Indian and China by Fitscherin

and Pillania (2012) and Wang and Campbell (2011).All the studies found the Altman's Z score ratios models to have significant predictive ability.

This study differs contextual from the above previous studies (Li & June, 2012; Fitscherin & Pillania 2012; Wang & Campbell, 2010) were carried out in developed and emerging countries such as the United State of America, India and China. It is worth noting that the governance structures, social, economic conditions and financial reporting procedures of developed and emerging countries are different from developing countries like Kenya. These factors may potentially weaken the classification performance of the model in other countries outside the country in which the model was originally developed and applied (Ooghe & Balcean, 2007). The previous studies also applied the model on quoted companies while the current study applied the model on both quoted and un-quoted sugar companies in Kenya a gap which this current study has filled. Similarly in Kenya studies done present a contextual gap because most of them focused on other sectors such as Banking, Sacco's, Insurances and Municipal councils. Mamo (2011), Taliani (2010) and Kariuki (2013) carried out studies on financial failure of the banking industry in Kenya using the Z score ratios model where they established that the model was appropriate in Kenyan industry with over 80% correct classification. Kinivo and Olweny (2014) carried out a study on financial performance of Kenya Sacco's using the financial statements of Sacco's from 2008-2013 and established that the model was a reliable predictor of financial failure in Kenya Sacco's

Cheluget (2014) did a study on financial failure in insurance companies in Kenya using profitability, liquidity, efficiency and leverage ratios the study, established that the average insurance industry in Kenya was distressed over the periods of the study, which was (2005-2012). Ng'ang'a (2006) conducted a study on financial failure of insurance company in Kenya using the Z score model and concluded that the model was appropriate to Kenyan insurance companies since it yielded up to over 80% correct classification one year prior to failure. Kipruto (2013) and Shisia *et al.* (2014) used the Z score model to predict financial failure in Uchumi supermarket and the study revealed that the Z score model was capable of predicting financial failure up to over 90% one

year prior to failure. Ntoiti (2013), conducted study to determine the financial failure facing local authorities in service delivery in Kenya and concluded that financial management of local authorities are poor and ineffective, which lead to possibilities of financial failure being witnessed in local authorities in Kenya therefore the foregoing studies indicates a contextual gap due to differences in the regulatory systems in various industries a gap which has been filled by this study which was carried out in the sugar industry.

Similarly, studies by (Kungu, 2015; Omete *et al.,* 2015) presents a methodological gaps because (Omete *et al.,* 2015) in their study on impact of financial health on continuity of a firm used the Z score ratios to evaluate the financial health of Mumias sugar company for the period 2003 to 2011 and concluded that the chances of the company falling to grey area (area of caution) were very high similarly Kungu (2015) did a case study on detecting creative accounting and financial failure using the Altman's Z score ratio model using Mumias Sugar Company as the case study for the period (2009-2013) and established that the company likelihood of failure was high. Therefore the findings of the foregoing case studies of Mumias Sugar Company is subjective and not conclusive since it cannot be generalized to other sugar companies hence the need of this study which took a comprehensive view of all the public owned sugar companies and more than 50% of the private owned sugar companies. Additionally, conceptual gap exist since studies done for example,(Mak'obongo,2013;Kegonde and Ochola,2003; Akombo,2010) applied non-financial factors to predict financial failure while this current study modelled the financial ratios in the Altman's Z score using discriminant analysis to predict the bankruptcy likelihood of sugar companies in Kenya.

Therefore, from the above reviewed literature it is evident that limited studies have been done in Kenya to cover majority of the sugar companies, despite the fact that Ramisi Sugar Company has since been closed (SD, 2006). The government of Kenya is planning to privatize all government owned sugar companies since expansion of capacity cannot take off easily under the current financial situation (Privatization Commission of Kenya Report, 2015). Muhoroni and Miwani Sugar Companies are

under receivership and Chemilil Sugar Company is struggling with immature cane supplies, Mumias and Nzoia Sugar Companies are struggling to pay their debts (Sugar Directorate, 2016; Ministry of Agriculture, Livestock and Fisheries, 2014). These previous studies have not been conclusive enough, thus it's against this background that this study took a comprehensive view of public owned sugar companies in Kenya both quoted and unquoted and more than 50% of the private owned sugar companies. These previous studies applied regression analysis in the analysis of secondary data, while the current study applied the discriminant Z score analysis in the analysis of secondary this is because discriminant analysis is capable of grouping observations into groups (Orgler, 1975).The current study took advantage of this methodological gap in data analysis by using the discriminant Z score analysis as opposed to the regression analysis.

Additionally, the current study has linked the bankruptcy likelihood of sugar companies in Kenya with the GDP and total debt of the country this is because the performance of the Kenya sugar industry is likely to affect the performance and growth of the economy which is in line with Rijken (2011) who argued that the country's risk of default on its sovereign debt can be assessed by an analysis of the default chances of its industry sector. Similarly, (Simic *et al., 2012*) argues that the corporate failure prediction is essential for the prevention of negative economic fluctuations in a national economy. Therefore, it is against this background that the findings of this study may be used to salvage those sugar companies that can be salvaged and liquidate those that cannot be salvaged since it is expensive to maintain a company whose bankruptcy likelihood is high for a long period of time (Brig ham & Daves, 2010).

### 2.7 Summary of Literature Review

The chapter reviewed the various theories that explained the independent variables (working capital to total assets, retained earnings to total assets, earnings before interest and tax to total assets, market value of equity to total liabilities, book value of equity or market value of equity to total liabilities and sales to total assets) ratios and dependent variable which is bankruptcy likelihood of sugar companies in Kenya. The theories have

been identified in line with the independent variables. The chapter also explores the conceptualization of the independent and the dependent variables by analyzing the relationships between the two set of variables. In addition, an empirical review has been conducted where past studies both global and local have been reviewed and critiqued in line with this study.

# CHAPTER THREE

# RESEARCH METHODOLOGY

This chapter provides discussions on the research philosophy, research design, target population, sampling frame, sampling technique and sample size. In addition, the chapter provides data collection instruments, data collection procedures, pilot study, validity of instruments and reliability of instruments.

## 3.1 Research Philosophy

A research philosophy is a belief about the way in which data about a phenomenon should be collected and analyzed (Levin, 1988). In making a philosophical perspective, the researcher made several key assumptions regarding the nature of the society and the nature of science (Burrell & Morgan, 1979). Bryman and Bell (2007) defines positivism as an epistemological position which studies social reality and beyond by employing natural science method Saunders and Lewis (2000) argues that positivism is based on a believe that there exists a reality which is stable and can be described from an objective perspective. Positivism involves the establishment of the association which exists between elements, events and transactions in social world.

Positivistic epistemology was used in this study because it believes that reality exists and is stable and can be observed and described from an objective view point (Levin, 1988). Positivist's success is evaluated by how closely the findings of different researchers match (Cohen & Manion, 2007). This study was supported by positivism as it was aimed at working with what can be observed as reality (use of the Z score ratios model in predicting bankruptcy likelihood of sugar companies in Kenya). The status of any sugar company in Kenya for any year of study was either classified as bankruptcy likelihood high or low. The data was collected by the researcher personally, analyzed using statistical analytical tools (SPSS). The data collection methods and the statistical analytical tools did not influence the researcher neither did the researcher influence the

data and analytical tools used. This means that Z score is a scientific way of looking at a phenomenon.

### 3.2 Research Design

A research design serves as a plan structure that is executed by the research to maximize the validity of the finding (Cooper & Schindler, 2008). It gives directions from the underlying philosophical assumptions to research design and data collection. The purpose of this study was to model the Z score ratios to predict bankruptcy likelihood of sugar companies in Kenya for the period 2007 to 2016 for public owned and from 2010 to 2015 for private owned sugar companies depending on when the private owned sugar company was established. This period of 10 years was considered adequate by the study for establishing bankruptcy likelihood of public owned sugar companies in Kenya in terms of comparisons from one year to another and with those of other sugar companies. In addition this was in line with Kirkham (2012) who argue that trend analysis of financial ratios are likely to establish movements and changes in those movements in the overall performance of the company.

The study used descriptive research designs. Descriptive research design was deemed necessary because it ensured complete description and analysis of events and transactions by making sure that there was minimum bias in the collection and analysis of data (Creswell, 2011). In addition, a descriptive research design assists the researcher in answering questions such as what is the problem, where the problem is and how the problem is. Previous studies used a similar study design includes; Ntoiti (2013) who used the research design to investigate the bankruptcy likelihood facing local authorities in Kenya, Cheluget (2014) also applied the research design to establish the determinants of bankruptcy likelihood facing insurance companies in Kenya.

### 3.3 Target Population

Castillo (2009) defines a target population as a large collection of individuals, objects or firms that are the main focus of a scientific study and researches are done for the

benefits of the population. In addition, a target population refers to a set of firms, services, elements, events, transactions, things or households that are being investigated in order to determine the findings which is used for decision making (Cooper & Schindler, 2014; Kothari, 2004). The population of this study comprised of the 6 public owned sugar companies and 6 private owned sugar companies in Kenya as per sugar directorate year book, 2016 as presented in Appendix V.

In each of the public owned sugar companies (unit of analysis) selected for the study purposive sampling was adopted where employees (unit of observations) who were respondents from each public owned sugar company who included; Finance Manager, Chief Accountant, Accountants and Assistant Accountants were interviewed by filling Questionnaire which included both open and closed ended questions as presented in Appendix III for purposes of obtaining primary data which enabled the researcher to establish the variability, correlation and reliability of the study variables.

### 3.4 Sampling Frame, Sampling Techniques and Sample Size

#### 3.4.1 Sampling Frame

Cooper and Schinder (2008) defines sampling frame simply as a list of the population from which a sample will be drawn from and it must be a good representative of the population. It can also be reflected to as a set of directions for identifying a population (Gall & Borg, 2007). The sampling frame for this study was a list of the 12 sugar companies in Kenya as per sugar directorate year book, 2016 (See Appendix V).The purposive sampling method was used to select the public owned sugar companies (unit of analysis) from the sampling frame, where the unit of observation from each companies were identified and interviewed by filling questionnaires.

**Table 3.1: Target population**

| **Public owned sugar companies** |
|---|
| Mumias sugar Company |
| Nzoia sugar Company |
| South Nyanza Sugar Company |
| Miwani sugar company |
| Muhoroni Sugar Company |
| Chemelil Sugar Company |
| **Private owned sugar companies** |
| Trans Mara Sugar Company |
| Kibos Sugar Company |
| West Kenya Sugar Company |
| Butali Sugar Company |
| Kwale Sugar Company |
| Soin Sugar Company |

**Source: Sugar Directorate (2016)**

### 3.4.2 Sampling Techniques

Purposive sampling technique, which involves selecting certain units of items based on a specific purpose rather than randomly was adopted by the study to determine the sample size. It also involves selecting certain companies based on a certain purpose (Tashakkori & Teddlie, 2003). The purpose sampling techniques, which is a non-probability sampling technique was adopted by the researcher based on the researcher's knowledge on the geographical location of the sugar companies in Kenya (Freedman, 2007). In addition the population of the study was too small (Tran & Perry, 2003) since according to the Sugar Directorate, 2016 there are 6 public owned sugar companies and 6 private owned sugar companies in Kenya as shown in Appendix V. Additionally, this was in line with Tran and Perry (2003) who argue that when the population is small purposive sampling is appropriate.

Using purposive sampling technique, all public owned sugar companies operating in Western and South Nyanza were selected for the study and four private owned sugar companies whose financial data were obtained from government agencies hence the sample size of 10 companies was considered for this study. This was in line with Borg and Gall (2003) who states that at least 30% of the population representative is adequate for the sample size. In each of the 6 public owned sugar companies (unit of analysis) operating in Western Kenya and South Nyanza were selected using purposive sampling the unit of observations which included; Finance Managers, Chief Accountants, Accountants, and Assistant Accountants were requested to give their opinions by filling questionnaires for purposes of obtaining primary data as indicated in Appendix III.

### 3.4.3 Sample Size

**Table 3.2: Sample size**

| Unit of Analysis | Unit of Observation | Sample percentage |
|---|---|---|
| Mumias sugar Company | 21 | 20.4% |
| Nzoia sugar Company | 20 | 19.4% |
| South Nyanza Sugar Company | 20 | 19.4% |
| Miwani | 4 | 3.9% |
| Muhoroni Sugar Company | 19 | 18.45% |
| Chemelil Sugar Company | 19 | 18.45% |
| **Total** | **103 of 161** | **100%** |

**Source: Sugar Directorate (2016)**

The results in table 3.2 above gives the study sample size where the unit of observations selected were 103 who included; Financial Managers, Chief Accountants, Accountants and Assistant Accountants from each of the public owned sugar company in Kenya . The researcher personally distributed 103 questionnaires, where a total of 95 respondents filled the questionnaire as follows; Mumias sugar (20), Nzoia sugar (18), South Nyanza

sugar (19), Miwani sugar (3), Muhoroni sugar (18), Chemelil sugar (17) which represented 92.2% response rate, which was quite high compared to the commonly expected response rate of 50-75% for questionnaires personally delivered (Saunders *et al.,* 2007). In addition the sample percentage was 64% of the population which was in line with Mugenda and Mugenda (2003) who states that at least a sample size of more than 10% is considered adequate for a descriptive study. In addition, it also concurs with Borg and Gall (2003), who states that at least 30% of the population representative is adequate for the sample size.

### 3.5 Data Collection Instrument

This study used both primary and secondary data collection methods. Structured questionnaire was used to obtain primary data from public owned sugar companies. The respondents' opinions were captured on a 5 scale point (Strongly disagree, Disagree, Neutral, Agree and strongly agree) as shown in Appendix 111. Questionnaire is a set of statements that the researcher uses to evaluate suggestions, opinions, attitudes or other forms of information from the respondents (Cooper & Schindler, 2014; Burns & Burns, 2000). Questionnaire allows the researcher to use standardized questions which ensures uniformity of procedures, they provide time for the respondents to think about responses, they are economical and they are easy to administer and score (Mugenda & Mugenda 2003; Kothari, 2011). Secondary data was collected for public owned sugar companies for a period of 10 years (2007-2016) and for private owned sugar companies for a period of 5 to 6 years depending on when the sugar company was established.

Secondary data was collected from the sugar companies' financial statements (Statement of financial position and Income statement). Data collection sheet as shown in Appendix IV was used to collect secondary data. Secondary data was useful for this study because the objective of the study was to model the use of the Z score ratios model to predict bankruptcy likelihood of sugar companies in Kenya. According to Cooper and Schindler (2014) secondary data enables the researcher to interpret the events and transactions recorded in the financial statements hence enhancing comparability and forecasting of

the financial information for decision making. In addition, Polit and Beck (2010) also argue that secondary data analysis is reliable, efficient and economical for a research project.

### 3.6 Data Collection Procedures

Data collection refers to the process of gathering raw data or unprocessed information with the aim of processing it to meaningful information which will be used for decision making. Once the proposal was accepted the researcher sought for a letter from the University and NACOSTI as shown in Appendix VIII and IX and the third letter was obtained from the Ministry of Agriculture as shown in Appendix X.

The researcher used the introductory letter from the University and the Permit from NACOSTI to carry out the research by first writing to the Managing Directors of each of the sugar companies for an access of their annual financial statements for the years under study (2007-2016) as shown in Appendix I. The published financial statements were obtained from the sugar companies finance departments for those sugar companies whose consent was granted, from the sugar directorate, company websites and from the commodity fund. The researcher extracted the data with the aid of data collection sheet as indicated in Appendix IV. The required data was fed into excel using data collection instrument. The researcher involved no research assistants in the collection of data because it was convenient for him owing to the small number of the sugar companies under study.

The respondents were finance officers from the finance department of the various public owned sugar companies which made it convenient for the researcher in terms of movements and this ensured that the researcher collected valid and correct information. Primary data collection methods involved the questionnaires which were given to the respondents of the public owned sugar companies accompanied by an introductory letter from the university and the permit from NACOSTI authorizing the researcher to collect information from the sugar companies in Kenya.

### 3.7 Pilot Study

Cooper and Scheduler (2014) stated that pilot test is conducted to help the researcher detect weaknesses in the designed instrument and to provide proxy data for selection of a probability sample. Pilot test is an activity that assists the researcher to determine any flaws, limitations or other weaknesses within the interview design and allows the researcher to make necessary revisions prior to the implementation of the study (Kvale, 2007).The researcher gave 20 questionnaires to finance staff and administration staffs of one Sugar Company in Kenya this was in line with Mugenda and Mugenda (2003) who asserts that a sample size of 10% is appropriate for the study. The researcher carried out the pilot test on the questionnaires so that to evaluate how clear and understandable the questionnaires were to the respondents. In addition, the results of the pilot study gave an assurance to the researcher that the objectives of the study would be achieved by the questionnaire. The feedback of the pilot study established that the research instruments were reliable and the study results of the pilot study were used to enhance the research instruments. Additionally, table 4.25 gives reliability test of the questionnaire (constructs) where all the variables which were investigated shows an average factor loading of above 0.30 ( Hair, Black & Babin,2010 & Kothari, 2004) and reliability Cronbach's value of 0.70 and above where they were all accepted by the study Christensen, Johnson and Turner (2011).

#### 3.7.1 Validity of Instruments

Validity is defined as the degree by which the sample of test data represents the content the test intends to measure (Gill & Johnson, 2008). This study employed content validity which is a measure of the degree to which data collected using a particular research instrument represents a particular content of a particular concept. The study carried out a pilot study which enabled the researcher to be familiar with research and its administration where procedures and items were identified for modification which assisted the researcher in correcting any inconsistencies arising from the research instruments. This ensured that they measure what they intent to measure. In addition the

researcher requested for clarifications for any bias, inconsistency in information, and where necessary took more time in a particular company (Creswell, 2011).

### 3.7.2 Reliability of Instruments

Reliability reflects the extent to which the measurement procedures generate same results when repeated (Norman, 2008). It is the ability of the research instruments to measure in the same way each time it is subjected to the same state (Hair, Black & Babin, 2010; Tavakol, Mohsen & Dennick, 2011). The study carried out a pilot study to test the reliability and validity of the research instruments. Additionally, the Cronbach's alpha (α), which is a measure of internal consistency, was used to test the reliability of the data.

Azrilah (2010), the analysis applied Cronbach's alpha to test and determine reliability within the range of 0.00 to 1.00. Reliability value close to 1.00 is an indication that the factors being investigated can be measured reliably. In social science, the acceptable Cronbach's alpha value is 0.6 (Sekaran, 2010). The results of reliability of the instruments tests were based on the analysis of the questionnaires which were personally administered to the respondents. In addition, the statements on the questionnaires had a high Cronbach's alpha which was above 0.70 Christensen, Johnson and Turner (2011) and this was an indication of high internal consistency.

## 3.8 Data Analysis and Presentation

### 3.8.1 Data Analysis

Data analysis is the process of converting raw data into meaningful information so that it can assist in decision making process. The key highlight on financial ratio analysis in this study was how financial operations drive value by providing information which helps stakeholders to determine financial viability of companies for investment decision making (Fawad, Lqtidar, Shakir & Madad, 2014). Some finance analyst refers ratios analysis as the value driver's model that explains how a company makes money and

increases its value; others refer financial ratio analysis as the method for identifying the triggers of financial result (Callahan, Stetz & Brooks, 2007). Independent variables (working capital to total assets, retained earnings to total assets, profit before interest and tax to total assets, book value of equity to total liabilities, sales to total assets ratio) triggers the dependent variables predicting bankruptcy likelihood of sugar companies in Kenya, descriptive statistics such as standard deviation, median, mode, mean and test of significance of the overall model using analysis of variance (ANOVA) were used to analyze the data.

Correlation analysis was carried out to establish the relationship between the dependent and independent variables. Correlation measures the extent of interdependence where two variables are linearly related (Namusonge, 2010). Similarly, correlational analysis was necessary in underscoring the relationship between the independent and dependent variables (Bryman, 2012). The five key ratios of the Altman's Z score model were computed and analyzed for the period covered by the study and their relationship with the dependent variable (bankruptcy likelihood) was established for each of the study year

If variables are correlated, then a change in one variable will be accompanied by proportionate change in another variable. Correlation coefficient (R) is a measure of correlation between two variables. If variables are independent, R=0, if dependent R=1. If the value of r is close to 1, then it is an indication of a strong correlation between the variables. If the value is R is close to 0, then it is an indication of weaker correlation (Namusonge, 2010). The coefficient of determination, ($R^2$) provides information about the goodness of fit of the regression model. It is a statistical measure of how the regression line nears the real data and hence assesses the extent to which the changes in the dependent variables are caused by the changes in the independent variables. These measures were calculated using Statistical Package for Social Sciences (SPSS) software, this is because the software is user friendly and gives all the possible analysis required to make a decision.

Correlational analysis was used by the study to determine which of the five variables ($x_1$, $x_2$, $x_3$, $x_4$ and $x_5$) contributes significantly in predicting bankruptcy likelihood of sugar companies in Kenya. Secondary data for sugar companies in Kenya was analyzed using discriminating analysis, which is a technique developed by Fisher (1936) which sought to identify which linear combinations of independent variables best separates the groups, in this study between bankruptcy likelihood high or bankruptcy likelihood low (Thomas, 2000). The following five key ratios of the Altman's model which covers liquidity, profitability, efficiency, and gearing and investor's ratios were modelled using discriminant analysis and the resulting model was adopted by the study to predict bankruptcy likelihood of sugar companies in Kenya.

$$x_1 = \frac{Working\ capital}{Total\ assets}$$

$$x_2 = \frac{Retained\ eearnings}{Total\ assets}$$

$$x_3 = \frac{Profit\ before\ Interest\ and\ Tax}{Total\ assets}$$

$$x_4 = \frac{market\ value\ of\ Equity}{Total\ liabilities} \quad or \frac{Book\ value\ of\ Equity}{Total\ liabilities}$$

$$x_5 = \frac{Sales}{Total\ assets}$$

Z = Overall discriminant Z score index

The discriminant analysis linear equation was used to predict which group the observations belong to. The form of the function was as follows:

$D=a+m_1x_1+m_2x_2+m_3x_3+m_4x_4+m_5x_5+e$

Where D=discriminate function

$m_1$ = discriminate coefficients of independent variables ($m_1$, $m_2$, $m_3$, $m_4$, $m_5$)

$x_1$ = Working capital to total assets

$x_2$ = Retained profit to total assets

$x_3$ = Earnings before interest and tax to total assets

$x_4$ = Book value of equity or Market value of equity to total liabilities

$x_5$ = Sales to total assets ratio

The discriminant Z score value was a linear combination of five common business ratios where the liquidity ratio was used as the predictor value of each of the years where in a year which the ratio was negative it was taken that the company bankruptcy likelihood high (1) and in the year where the ratio was positive the study took that year as the company bankruptcy likelihood low (0).

The discriminant Z score values threshold was identified as follows:

Discriminant $0.382 < z < 1.449$ Bankruptcy Likelihood low

$-0.685 < z < 0.382$ Bankruptcy Likelihood High

### 3.8.2 Data Presentation

After the data was analyzed, it was presented by use of graphs, tables and charts, mean, median, variance and standard deviation. The regression output tables which included the estimated coefficient parameters of the model, their respective standard errors, T-statistics, P-values and analysis of the overall variance (ANOVA). Presentation of data was useful in identifying trends and forecasting (Marshall & Ross man, 2011).The statistical software SPSS was used to analyze the data. The p-value approach to hypotheses testing was used, correlation coefficient, coefficient of determination, mean,

mode, median and standard deviation test were used to give a deeper relationship of the independent variables and the dependent variable of the study and test the hypotheses for primary data.

Secondary data the following were computed and analyzed by the study; test of equality of the group means, covariance matrices, structure matrix, test results, eigenvalues, wilks' lamda, Standardized canonical discriminant function and canonical discriminant function coefficient (Z score) were used to test the hypotheses. The p-value was used for both primary and secondary data to test the hypotheses where the p value was compared with the significance level (alpha) which was set at 0.05. The statistical decision was; if p-value was less than significance level (alpha) we failed to reject the null hypothesis. But if p-value was greater than significance level (alpha) we rejected the null hypothesis.

**Table 3.3: Z-score Component and Weighting for Manufacturing Sugar Companies in Kenya**

| Variables | Formula | Weighting(coefficient) |
|---|---|---|
| $x_1$ | Working Capital to Total Assets | $M_1$ |
| $x_2$ | Retained Earnings to Total Assets | $M_2$ |
| $x_3$ | EBIT to Total Assets | $M_3$ |
| $x_4$ | Book Value of Equity to Total liabilities | $M_4$ |
| $x_5$ | Sales to Total Assets Ratio | $M_5$ |

$$\mathbf{Z=m_1x_1+ m_2x_2+ m_3x_3+ m_4x_4+ m_5x_5}$$

# CHAPTER FOUR

# RESULTS AND DISCUSSIONS

## 4.1 Introduction

The chapter describes the analysis of data followed by a discussion of the research findings as set out in chapter three. The findings relates to the research questions and the secondary data that guided the study were presented as descriptive and inferential statistics, figures and tables were also used. The chapter began with the analysis of the response rate, and then explained factor analysis and reliability techniques that the study adopted. Additionally, in order to reduce the number of indicators or factors in each of the research variables that did not meet certain minimum criteria and retain those indicators that explained the bankruptcy likelihood of sugar companies in Kenya, the study adopted factor analysis, where all the factors were retained. Reliability analysis was carried out by the researcher using Cronbach's alpha which is a coefficient of reliability tests that give an unbiased estimate of data generalizability.

The secondary data was analyzed using discriminating analysis by applying the five key ratios of the Altman's Z Score ratios model which includes; working capital to total assets, retained earnings to total assets, earnings before interest and tax to total assets, book value of equity or market value of equity to total liabilities and sales to total assets ratio were computed by the study with the aid of SPSS. These ratios covers liquidity position of the company, profitability position, efficiency or asset utilization, gearing or leverage position and investors or market ratio. The study modelled these ratios with the aid of SPSS to establish their weights in regard to discriminating abilities in terms of bankruptcy likelihood high or low.

### 4.2 Response Rate

According to the American Association for Public Opinion research, response rate is defined as the number of complete interviews with reporting units divided by the number of eligible reporting units in the sample. The study's response rate was tabulated as shown in figure 4.1 below.

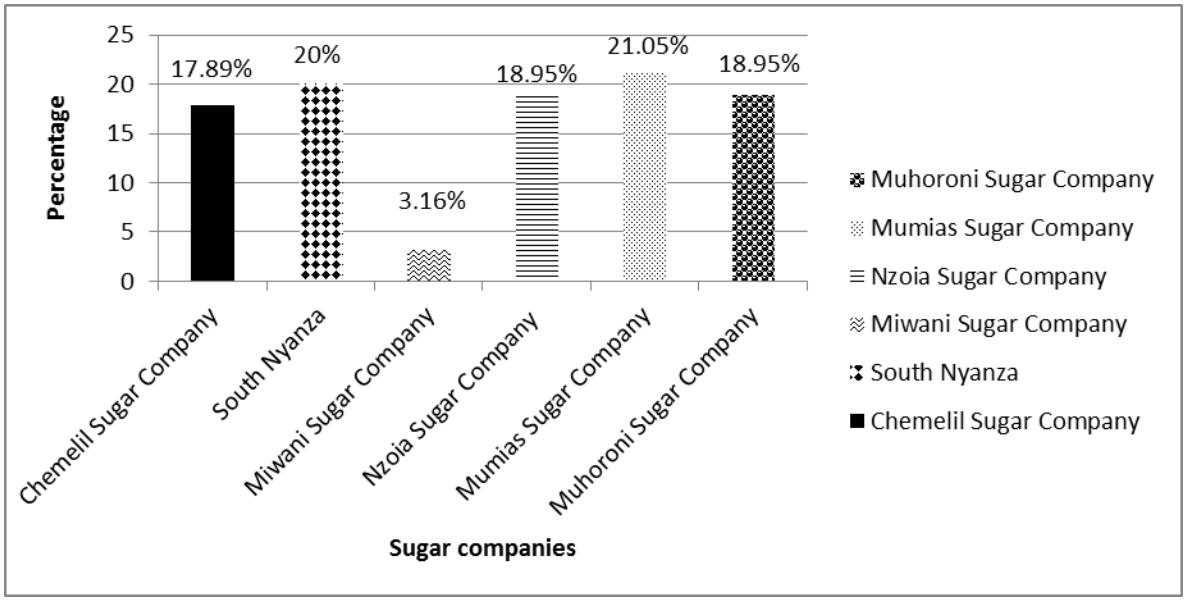



**Figure 4.1: Response Rate**

The number of questionnaires that were given to finance staff of one quoted (Mumias) and five unquoted (Muhoroni, Nzoia, Miwani, South Nyanza and Chemelil) public owned sugar companies in Kenya were 103 as per figure 4.1 above. The questionnaires were filled and 95 were handed in to the researcher representing 92.2% response rate as follows; Mumias sugar (20), Nzoia sugar (18), South Nyanza sugar (19), Miwani sugar (3), Muhoroni sugar (18), Chemelil sugar (17) which was within the threshold of Mugenda and Mugenda (2003), who asserts that a response rate of 50% or more is adequate for the analysis. The high response rate was due to the methodology used by the researcher which included personal visits, letter from the University, letter from

NACOSTI and letter from Ministry of Agriculture, Livestock and Fisheries which gave assurance to the respondents that the information given was confidential and was to be used only for academic purposes. This methodological approach conform with Bechhofer and Peterson (2008) who argues that personally administering of the questionnaire by meeting the respondents normally results into higher rate of response.

### 4.3 Status of the Company

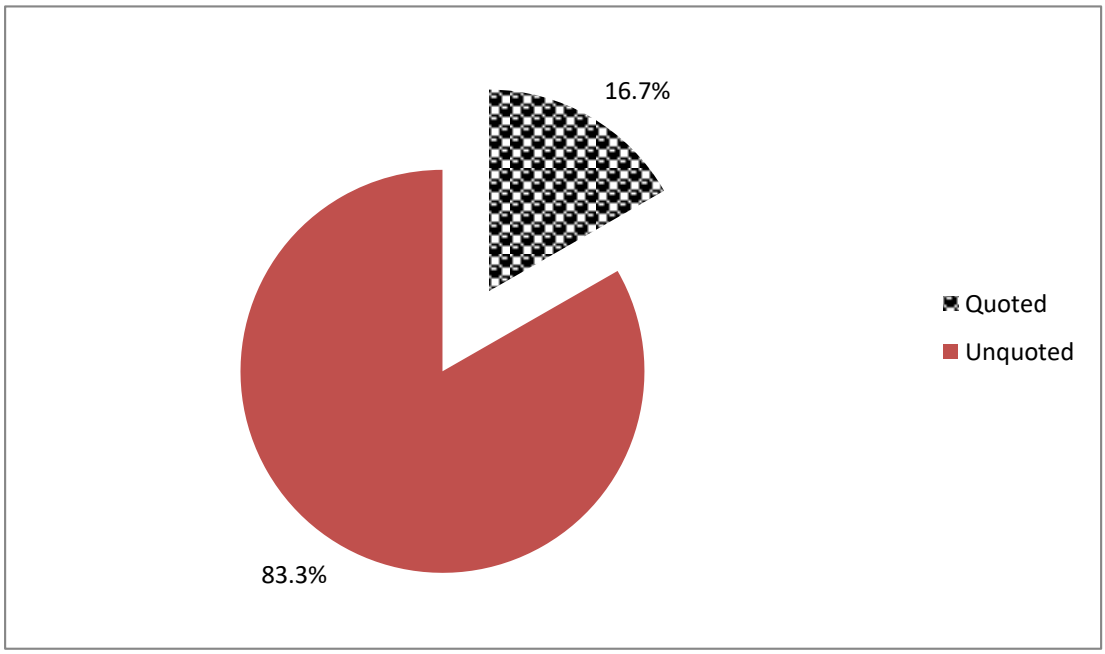



**Figure 4.2: Status of the Company**

The study classified, the status of the public owned sugar companies in Kenya using the primary method of data collection into two as per figure 4.2 above. The first classification status was quoted where there was only one (Mumias sugar company), which represented 16.7% of the public sugar companies in Kenya. The second Category consisted of unquoted public owned sugar companies, where there were five sugar companies: South Nyanza, Miwani, Chemelil, Muhoroni and Nzoia, which represented 83.3% of the public owned sugar companies in Kenya. The classification on status was

important because in determining the independent variable $x_4$ (book value of equity or market value of equity/ total liabilities) for quoted company the study used;

$$\frac{Market\ Value\ of\ Equity}{Total\ liabilities}$$

While on the other hand for unquoted companies the study used;

$$\frac{\text{Book value of equity}}{\text{Total liabilities}}$$

### 4.4 Demographic Information

This part of the study represented the demographics of the study. The demographic respondent's information covered in this part included: respondent's department and years worked.

#### 4.4.1: Respondent's Department

**Table 4.1: Respondent's Department**

| | Frequency | Percent |
|---|---|---|
| Finance | 95 | 100 |
| **Total** | **95** | **100.0** |

The respondent's department were as shown in (table 4.1) above. The results indicate that all the 95 were from the finance department. This was because the questions were on the company's financial statements and it was possible that the finance team had more knowledge and skills on the preparations, presentations and recognition of events and transactions in the financial statements. This was necessary because it is the finance staff of these public owned sugar companies in Kenya who were more likely educated in the areas of finance to prepare and interpret their respective financial statements information's and this results into efficiency which helps the company to grow faster (Woodruff, 2009). In addition this was important to the study since it was one way of

assurance that the respondents were knowledgeable on matters of preparations and presentations of their respective company's financial statements hence enhancing reliability of the respondents' opinions.

**Table 4.2: Respondent's Level of Education**

| Level of education | Numbers | Percentage (%) |
|---|---|---|
| University level | 18 | 19.0 |
| University and CPA | 49 | 51.6 |
| Tertiary & CPA | 12 | 12.6 |
| CPA | 16 | 16.8 |
| **Total** | **95** | **100** |

The respondent's level of education was tabulated and the results were as illustrated in table 4.2 above. The results revealed that 18 of the respondents which represented 19% had university level of education, 49 of the respondents which represented 51.6% had university education and CPA, 12 of the respondents which represented 12.6% had tertiary education and CPA and 16 of the respondents which represented 16.8% had CPA only. This was an assurance to the study that the finance staffs of the sugar companies were likely well trained to handle the preparation, presentation and interpretations of their respective companies' financial statements. This was in line with previous studies which have shown that companies with better educated employees and management are more efficient and effective in their performance (Burki & Terrell, 2008).

**Table 4.3: Respondent's Level of Management**

| Level of Management | Numbers | Percentage (%) |
|---|---|---|
| Top management | 16 | 16.8 |
| Middle level | 65 | 68.4 |
| Lower level | 14 | 14.8 |
| **Total** | **95** | **100** |

The respondent's level of Management was tabulated by the study as per their feedback the results were as indicated in the table 4.3 above. The respondents who were in the top Management were 16 which represented 16.8%, the number of respondents who were in middle level management were 65 representing 68.4% and those who were in lower level management were 14 representing 14.8%.Therefore majority of the respondents 85.2% were from top and middle level management. This was in line with Burki and Terrell (2008) who argues that companies with better educated management are more efficient in their operations and performance.

### 4.4.2 Years Worked

**Table 4.4: Years Worked**

| Years worked | Frequency | Percent |
|---|---|---|
| Less than 1 year | 1 | 1.1 |
| 1 – 5 years | 26 | 27.4 |
| 5 – 10 years | 26 | 27.4 |
| Over 10 years | 42 | 44.2 |
| **Total** | **95** | **100.0** |

The results of the study on years worked as shown in table 4.4 above indicate that only one respondent who represented 1.1% of the respondents had worked for less than one year, 26 which represented 27.4% of the respondents had worked for 1-5 years, 26 which represents 27.4% of the respondents had worked for 5 – 10 years and 42 which represents 44.2% of respondents had worked for over a period of 10 years, therefore, the majority of the respondents thus 42 which represented 44.2% of the respondents had worked over 10 years which meant that they had enough knowledge and experience on the preparations, presentations and recognition of events and transactions in the financial statements of their respective sugar companies in Kenya hence added value in the study. This was in line with Bhaduri and Hagen (2008) who argues that employees with past experience are more participatory which brings more chances of new

knowledge and better decision making. Additionally the results also concur with Bass (2005) who argues that age brings long experience, responsibilities and skills.

### 4.5 Factor and Reliability Analysis

The study carried out factor analysis among the observed variables so as to detect variability and check for any correlation between the variables with the objective of reducing redundancy. In addition the retention of the factors was as per (Hair, Black & Babin 2010; Kothari, 2004), who states that confectionary statements scoring more than 30%, should be retained as the minimum requirements for inclusion of a variable into the final analysis. The higher the absolute value of the loading, the more that factor contributes to the variable.

**Table 4.5: Total Assets Factor, Analysis Results**

| Component Matrix | |
|---|---|
| | **Component** |
| | **1** |
| The company revalues all its similar assets as per IAS 16 | .955 |
| The more total assets the company has, the low bankruptcy likelihood | .940 |
| The company has revalued its non-current assets for the last ten years | .940 |
| The company has complied with IAS 16 on valuation of non- current assets for the last ten years | .938 |
| The company has complied with IAS16 on cost ascertainment of non-current assets for the last ten years | .933 |
| The valuation of the company assets is done by independent valuer | .908 |

The results of total assets factor loading were as shown in table 4.5 above and the highest factor component on total assets was 0.955 where most of the respondents agreed that their companies revalue all its similar assets as per IAS 16, and the lowest was 0.908 where most of the respondents agreed that valuation of the company assets were done by an independent value. All the statements on total assets were included for further analysis because all had a factor loading of above 0.3 which is the minimum

requirement for inclusion of a variable into the final optimal model (Hair, Black & Babin, 2010; Kothari, 2004).

### 4.6 Reliability Statistics

The study carried out reliability test which reflects the extent to which the measurement procedures generate the same results when repeated (Norman, 2008).

**Table 4.6: Cronbach's Alpha Reliability Statistics for Total Assets**

| Cronbach's Alpha | N of Items |
|---|---|
| .971 | 6 |

The study applied reliability tests on total assets to determine reliability within the range of 0.00 to 1.00 (Azrilah, 2010), reliability close to 1.00 is an indication that the factors being investigated can be measured reliably (Sekaran, 2010), where in social sciences, the acceptable Cronbach's alpha value is 0.60 (Ghazali, 2008). The Cronbach's alpha value for all the 6 statements on total assets was 0.971 as per the table 4.6 above which was close to 1.00 (Sekaran, 2010) hence acceptable by the study. Additionally, the findings also concur with (Christensen, Johnson & Turner, 2011), who argue that coefficient of 0.70 and above, indicates a satisfactory reliability. Therefore, all the six statements of total assets which the study applied in prediction of bankruptcy likelihood of sugar companies in Kenya were sufficient in terms of internal consistency.

**Table 4.7: Sales Reliability Analysis Results**

| Component Matrix | |
|---|---|
| | **Component** |
| | **1** |
| The more the sales, the low bankruptcy likelihood | .871 |
| For the last ten years, the company has controls in place of ensuring that overdue credit sales are collected on a timely manner | .869 |
| The company has complied with IAS 18 when recognizing sales in the financial statements for the last ten years | .842 |
| The cost of sales has been increasing for the last ten years | .838 |
| For the last ten years, the sales of the company have been increasing | .437 |
| Extraction Method: Principal Component Analysis. | |

The findings of all the five sales factors loading were as in table 4.7 above, where they ranged from 0.437 to 0.871.The results of the study rule out exclusion of any sales factor since none of the factors had a factor loading of less than 0.3 (Hair, Black & Babin, 2010: Kothari, 2004), which is the minimum threshold recommended for inclusion of a variable into the final optimal model .The study therefore retained all the five factor loadings where the highest factor components was 0.871 where most of the respondents agreed that the more the sales, the low bankruptcy likelihood and the least was 0.437 where most respondents did not agree, that in the last ten years the sales of their companies has been increasing. The study therefore, retained all the five factors and observed that; company's cut-off procedures, efficiency in collection of over dues, compliance with relevant IAS, increasing or decreasing cost of sales and increasing or decreasing of sales are considered as some of the most reliable factors for determining the quality of sales which will in turn affect bankruptcy likelihood for public owned sugar companies in Kenya.

**Table 4.8: Reliability Statistics for Sales**

| Cronbach's Alpha | No of Items |
|---|---|
| .830 | 5 |

The findings in table 4.8 above gives the Cronbach's apha value of all the 5 statements on Sales as 0.830 which was above the acceptable Cronbach's apha value of 0.60 (Ghazali, 2008). This was an indication that all the 5 factors of sales which the study investigated were measured reliably. Additionally, the results were also in agreement with (Christensen, Johnson & Turner, 2011), who argue that coefficient of 0.70 and above, shows a satisfactory reliability. Therefore, all the 5 statements of sales which the study applied in prediction of bankruptcy likelihood of sugar companies in Kenya were adequate in terms of internal consistency.

**Table 4.9: Working Capital Factor, Analysis Results**

| Component Matrix | |
|---|---|
| | **Component 1** |
| The company has applied consistently the method of measurement of stock from one period to another for the last ten years | .946 |
| Increasing working capital is an indication of reduction in bankruptcy likelihood | .928 |
| The company has prepared debtors and creditors ledger control account at least monthly for the last ten years. | .919 |
| The company has complied with IAS 2 when recognizing stock in the financial statements for the last ten years. | .905 |
| For the last ten years the company? stock does not include obsolescence stock | .607 |

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

The study took factor analysis test on working capital and the findings were as indicated in table 4.9 above. This was done in order to establish among the five factor components which one should the study retain for further analysis or reject. The highest factor loading was 0.946 where most of the respondents agreed that their company applied consistently the method of measurement of stock from one period to another for the last ten years. The least was 0.607 where most of the respondents concurred that for the last ten years their company's stock does not include obsolescence stock. The output of this result shows that all the five statements on working capital were included in the study since all had a factor loading above 0.30, which is the minimum threshold for inclusion of the variables into the final optimal model (Hair, Black & Babin, 2010; Kothari 2004).

**Table 4.10: Reliability Statistics for Working Capital**

| Cronbach's Alpha | No of items |
|---|---|
| .908 | 5 |

The study carried out reliability tests on working capital as indicated in table 4.10 above. This was in order to establish the extent to which working capital measurement procedures can consistently produce the same results when repeated (Norman, 2008). The study results gave a value of 0.908 for all the 5 items of working capital being investigated, which was evidence that the working capital measurement procedures were measured reliably since their value was above 0.70. In addition this finding were also in line with those of (Christensen, Johnson & Turner, 2011), who found that a coefficient of 0.70 and above, implied a satisfactory reliability. Therefore, all the five statements of working capital on prediction of bankruptcy likelihood of sugar companies in Kenya had adequate internal consistency.

**Table 4.11: Retained Earnings Factor, Analysis Results**

| Component matrix | |
|---|---|
| | **Component 1** |
| For the last ten years the retained earnings of the company has been increasing | .872 |
| For the last ten years the company has a profit retention policy | .779 |
| The more the retained earnings, the higher bankruptcy likelihood | .743 |
| For the last ten years taxes the company pays to the government has been increasing | .717 |
| For the last ten years the expenses of the company has been Increasing | .652 |

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Retained earnings variability and correlations with other variables were done by the application of factor analysis. The main objective was to retain or reject certain factor components of retained earnings. The results of the study were as in table 4.11 above. The highest factor loading was 0.872, where most of the respondents were not in agreement that for the last ten years the retained earnings of their companies had been increasing and the lowest was 0.652, where most of the respondents agreed that for the last ten years the expenses of their companies had been increasing. The statements of retained earnings were all included in the final analysis because all of them had a factor loading of above 0.30, which is the minimum recommended threshold for inclusion of variables in the final optimal model (Hair, Black & Babin, 2010 & Kothari, 2004).

**Table 4.12: Reliability Statistics, for Retained Earnings**

| **Cronbach's Alpha** | **No of Items** |
|---|---|
| .802 | 5 |

The study established the extent to which the retained earnings measurement procedures can produce consistent results when repeated (Norman, 2008) by performing reliability statistic test on retained earnings. Additionally, the study applied Cronbach's alpha tests on retained earnings and the results of the findings were as in table 4.12 above. The value of Cronbach's alpha was 0.802 and the minimum acceptable value is 0.70 ((Christensen, Johnson & Turner, 2011).This was acceptable since it was above 0.7, an indication that retained earnings were measured reliably and hence the questionnaires used for the study as research instruments were reliable and capable of predicting bankruptcy likelihood of sugar companies in Kenya. In addition the findings were also in agreement with Christensen, Johnson and Turner (2011) who argues that coefficient of 0.70 and above indicates a satisfactory reliability. Therefore, all the five statements of retained earnings which the study applied in prediction of bankruptcy likelihood of sugar companies in Kenya were adequate in terms of internal consistency.

**Table 4.13: Earnings before Interest and Tax Factor, Analysis Results**

| **Component Matrix** | |
|---|---|
| | **Component 1** |
| For the last ten years the tax the company pays to the government has been increasing | .869 |
| For the last ten years the company has been paying tax promptly to the Government | .855 |
| For the last ten years the Earnings before interest and tax of the company has been increasing? | .810 |
| For the last ten years the expenses of the company has been increasing? | .705 |
| The higher the EBIT, the low bankruptcy likelihood | .589 |

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Factor analysis test was also carried out on earnings before interest and tax and the final output was as shown in table 4.13 above. The purpose of the test was to ascertain variability and relationship between the study variables with the aim of retaining those that meet the criteria of 0.30 which is the minimum threshold for inclusion of variable into the final optimal model (Hair, Black & Babin, 2010; Kothari, 2004). Those that do not meet the minimum thresholds were to be rejected. The results of the study shows that the highest factor component was 0.869, where most of the respondents disagreed that for the last ten years, the taxes their companies pay to the government had been increasing which was an indication that the profitability of the six public owned sugar companies had been decreasing which in turn has the effect of reducing the value of the discriminant Z score ratio and hence increasing bankruptcy likelihood for those sugar companies. The lowest factor component was 0.589 where most of the respondents agreed that the higher the EBIT, the low bankruptcy likelihood an indication to the study that the values of the figures in the financial statement are fairly stated. Therefore, all the five statements on EBIT had a factor loading of above 0.30, and were all included in the final analysis (Hair, Black & Babin, 2010; Kothari, 2004).

**Table 4.14: Reliability Statistics for Earnings before Interest and Tax**

| Cronbach's Alpha | No of Items |
|---|---|
| .825 | 5 |

The study applied Cronbach's alpha to test the reliability of all the five factor components of EBIT and the results were 0.825, as shown in table 4.14 above. The study results therefore, implied that all the five factor components of EBIT were measured reliably and the questionnaires used for the study were reliable for the prediction of bankruptcy likelihood of sugar companies in Kenya. The results of this study further concur with Christensen, Johnson and Turner (2011), who argue that coefficient of 0.70 and above, indicates a satisfactory reliability. Therefore, all the five statements of

earnings before interest and tax which the study used for the prediction of bankruptcy likelihood of sugar companies in Kenya had adequate internal consistency.

**Table 4.15: Total Liabilities and Factor Analysis Results**

| Component Matrix | |
|---|---|
| | **Component** |
| | **1** |
| The more the total liabilities, the higher bankruptcy likelihood | .769 |
| The company has been lowly geared for the last ten years | .710 |
| The company has complied with IAS 37 when recognizing provisions in the financial statement for the last ten years. | .612 |
| The company has been unable to pay its liabilities at any time for the last ten years | .597 |
| The company's total liabilities has been less than its total assets for the last ten years | .577 |

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

The study performed factor analysis on total liabilities so that variability and correlations between the variables could be detected for inclusion or exclusion from the final analysis where the results of the study were as in table 4.15 above. The highest factor loading was 0.769, where most of the respondents agreed that the more the total liabilities, the higher bankruptcy likelihood, this has an implication to the study because those sugar companies which had more total liabilities it had the effect of reducing the value of the discriminant Z score, hence increasing the bankruptcy likelihood for the public owned sugar companies in Kenya this is because the lower the Z Score the high bankruptcy likelihood.

The results of this study further agrees with Baxter (2007) who argues that excessive use of debts increase the chances of bankruptcy likelihood because the creditors of the company will demand extra premiums. The lowest was 0.577, where most of the respondents stated that for the last ten years the company's total liabilities were more

than its total assets, an indication that most of the assets of the public owned sugar companies were financed by external funding which has a likely effect of reducing profitability and cash flow hence, increasing bankruptcy likelihood due to low value of the discriminant Z score. The output of all the five statements on total liabilities were above 0.3 (Hair, Black & Babin, 2010; Kothari, 2004). Therefore, the study included all the five statements on liabilities because they were all above the minimum thresholds.

**Table 4.16: Reliability Statistics for Total Liabilities**

| Cronbach's Alpha | No of Items |
|---|---|
| .700 | 5 |

Reliability tests on total liabilities were undertaken by the study and the results were as in table 4.16 above. The study tabulated the value of Cronbach's alpha and the results shows that all the five statements had a value of 0.700, which was equal to the minimum value of 0.70 ((Christensen, Johnson & Turner, 2011).This was an indication that total liabilities figures were measured reliably by the research instruments used by the study.

**Table 4.17: Book Value of Equity Factor Analysis Results**

| Component Matrix | |
|---|---|
| | **Component** |
| | **1** |
| The book value of equity to total assets has been greater than 0.5 for the last ten years | .906 |
| The ratio of book value of equity to total liabilities has been greater than one for the last ten years. | .898 |
| The last ten years book value of equity of the company has been Increasing | .896 |
| The retained earnings of the company has been increasing over the last ten years | .825 |
| The more the BVE the higher bankruptcy likelihood | .785 |

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

The loading of the 5 variables of book value of equity that were carried out by the study in order to assess the variability amongst the variables and the results were as shown in table 4.17 above. They were checked for any correlation with the main objectives of reducing any redundant data since they were subjected to the minimum criteria of 0.30, which is the minimum threshold for inclusion of a variable into the final optimal model (Hair, Black & Babin, 2010 & Kothari, 2004). The results of the study show the highest loading factor of 0.906, where most of the respondents rejected the statement that for the last ten years the book value of equity to total assets ratio had been greater than 0.50, an indication that the total assets of these public owned sugar companies have been financed mostly by external funding, a situation which is likely to reduce the value of discriminant Z score and increase bankruptcy likelihood for all the public owned sugar companies in Kenya, due to reduced profitability and cash flow position.

The lowest value was 0.785, where most of the respondents of public owned sugar companies disagreed that the more the BVE the higher bankruptcy likelihood. This result further confirms the findings of Berk and De Marzo (2014), who assert that the company's current market value is reduced by the present value of potential bankruptcy costs. Therefore, from the study all the five factor loadings of the book value of equity had factor loadings of above 0.30 (Hair, Black & Babin, 2010, & Kothari, 2004). Therefore, the study included all the five variables of book value of equity into the final analysis.

**Table 4.18: Reliability Statistics for Book Value of Equity**

| Cronbach's Alpha | No. of Items |
|---|---|
| .914 | 5 |

Further the study undertook reliability test on the book value of equity as illustrated in table 4.18 above this was in order to establish the reliability of the measurement of book value of equity in predicting bankruptcy likelihood of sugar companies in Kenya. The value was 0.914 as per table 4.18 above, which meant that all the statements on book

value of equity were reliably measured since the value was closer to 1 (Sekaran, 2010). In addition the findings were also in line with Christensen, Johnson and Turner (2011), who argues that coefficient of 0.70 and above, indicates a satisfactory reliability. Therefore, all the five statements of book value of equity on prediction of bankruptcy likelihood of sugar companies in Kenya had adequate internal consistency.

**Table 4.19: Net Worth Reliability Analysis Results**

| Component Matrix | |
|---|---|
| | **Component** |
| | **1** |
| The more the net worth, the higher bankruptcy likelihood | .905 |
| The net worth of the company has been positive for the last ten years | .905 |
| The net worth of the company over the last ten years has been sufficient to sustain the operations and continuity of the company | .884 |
| The company has been purchasing fixed assets yearly for the last ten years | .614 |
| The company has been borrowing yearly for the last ten years. | .417 |

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

The study tabulated factor analysis test on net worth as a measure of the dependent variable. The purpose was to ascertain variability and relationship between the study variables with the main aim of retaining those that met certain minimum criteria and rejecting those that do not meet. The findings were as shown in table 4.19 above. The highest factor component of the five statements was 0.905, where most respondents of public owned sugar companies disqualified the statement that the more the net worth, the higher bankruptcy likelihood. The lowest was 0.417, where most of the respondents disqualified the statements that their companies had been borrowing for the last ten years and this is because on average all the public owned sugar companies were making losses and already they are highly geared situation which has made it impossible to borrow. The output of the results, for all the statements factor loading were above the minimum

criteria of 0.30 (Hair, Black & Babin 2010 ; Kothari, 2004).Therefore, all of them were included in the study because they reliably measured net worth as a measure of bankruptcy likelihood of sugar companies in Kenya.

**Table 4.20: Reliability Statistics for Net Worth**

| Cronbach's Alpha | No of Items |
|---|---|
| .815 | 5 |

The study further utilized the Cronbach's alpha to test the reliability of net worth and the results of the findings were as indicated in table 4.20 above. The value of all the five statements on net worth was 0.815, which was above the minimum value of 0.70 ((Christensen, Johnson & Turner, 2011). The results had an implication to the study that the net worth was measured reliably, and the questionnaires used for the study were reliable for the prediction of bankruptcy likelihood of sugar companies in Kenya.

**Table 4.21: Cash Flow Factor Analysis Results**

| Component Matrix | |
|---|---|
| | **Component** |
| | **1** |
| The company has been managing well its cash flows for the last ten years. | .847 |
| The company's internal cash flow generation ability has been strong for the last ten years strong. | .825 |
| The company is capable of meeting its short term financial obligations | .792 |
| The more the cash the company, the high bankruptcy likelihood | .751 |
| The company has been paying dividends out of internal cash flows for the last ten years. | .742 |
| The company has experienced cash flow problem for the last ten years. | .462 |

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

In order to obtain variability and any correlations between the variables the study performed factor analysis tests on cash flow as a measure of the dependent variable, so that those statements which do not meet certain minimum requirements were to be excluded from the analysis and the findings were as shown in table 4.21 above. The results of the test shows that the highest factor loading was 0.847 where most of the respondents disagreed that their companies had been managing their cash flows well for the last ten years, and this situation has caused cash flow problems in these public owned sugar companies which in turn had the impact of increasing bankruptcy likelihood of the sugar companies due to low working capital which reduced the value of the discriminant Z score value.

The lowest value was 0.462, where most of the respondents concurred that for the last ten years their companies had been experiencing cash flow problems which has an effect of increasing agency problems due to the in ability of the company to meet their short term obligations when they fall due. The results of all the six statements on cash flow were above 0.30, which is the minimum requirement for inclusion of the variable in the final optimal model (Hair, Black & Babin, 2010; Kothari, 2004), and therefore all the statements on cash flows were included in the final analysis of the study.

**Table 4.22: Reliability Statistics for Cash Flows**

| Cronbach's Alpha | No. of Items |
|---|---|
| .829 | 6 |

Reliability tests on cash flow were undertaken as shown in table 4.22 above, using Cronbach's alpha and the value of the test for all the statements on cash flows were 0.829. The findings shows that the value was more than the minimum criteria which was an indication that cash flow was measured reliably and the questionnaires used for the study were also reliable in addition the value was also closer to 1 (Sekeran, 2010). Additionally, the results were also in line with Christensen, Johnson and Turner (2011), who argues that coefficient of 0.70 and above, indicates a satisfactory reliability.

Therefore, all the six statements of cash flow on prediction of bankruptcy likelihood of sugar companies in Kenya had adequate internal consistency.

### 4.7 Reliability Analysis

According to Tavakol and Dennick (2011), reliability is an important concept in any research since it is used to enhance accuracy of the assessment and evaluation of the research. The Cronbach's Alpha value of both the independent and dependent variables and their average factor loading were computed by the study and the results were as illustrated in table 4.23 below.

**Table 4.23: Reliability Test of the Questionnaire (Constructs)**

| Variable | Average factor Loading | Reliability Cronbach's Alpha | Comments |
|---|---|---|---|
| Total assets | 0.936 | 0.971 | Accepted |
| Book value of equity | 0.862 | 0.914 | Accepted |
| Working capital | 0.861 | 0.908 | Accepted |
| Sales | 0.771 | 0.830 | Accepted |
| Earnings before interest and tax | 0.766 | 0.825 | Accepted |
| Retained earning | 0.753 | 0.802 | Accepted |
| Cash flow | 0.737 | 0.829 | Accepted |
| Net worth | 0.745 | 0.815 | Accepted |
| Total liabilities | 0.653 | 0.700 | Accepted |

The Cronbach's alpha test findings for independent variables as in table 4.23 show that total assets had the highest Cronbach's alpha of 0.971, book value of equity had 0.914, working capital had 0.908, sales had 0.830, earnings before interest and tax had 0.825 and retained earnings had 0.802 and the lowest was for total liabilities which has 0.700. The Cronbach's alpha test finding shows that the dependent variables measurements as

in table 4.23 above show that, cash flow had 0.829 and net worth had the lowest of 0.815 which were closer to 1 (Sekeran, 2010) an indication that they measured the dependent variable well. The result also reveal that the average factor loading for all the variables were above 0.30 which is the minimum criteria for inclusion of a variable into the final optimal model (Hair, Black & Babin, 2010 & Kothari, 2004). This is a confirmation to the study that the questionnaires used for the study were reliable and good predictors of bankruptcy likelihood of sugar companies in Kenya. The findings were also in line with Christensen, Johnson and Turner (2011) who argues that coefficient of 0.70 and above indicates a satisfactory reliability. Therefore, all the statements of the independent variables on prediction of bankruptcy likelihood of sugar companies in Kenya were reliable since they had adequate internal consistency.

### 4.7.1 Total Assets

The respondents of public owned sugar companies in Kenya were asked for their opinion on total asset figures recognized in their financial statements with the objective of ensuring that the figures were; free from any material misstatements, their recording complied with the relevant IAS and total the extent to which they influences bankruptcy likleihood their responses in a scale of 1-5 (strongly disagree, disagree, neutral, agree and strongly agree), were tabulated as shown in table 4.24 below.

**Table 4.24: Total Assets**

| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | Mean | Subtotal Mode | Subtotal Median | Subtotal Standard Deviation |
|---|---|---|---|---|---|---|---|---|---|
| The company has complied with IAS16 on cost ascertainment of non-current assets for the last ten years | 5.3% | 10.5% | 8.4% | 31.6% | 44.2% | 4 | 5 | 4 | 1 |
| The company has revalued its non-current assets for the last ten years | 8.4% | 13.7% | 15.8% | 25.3% | 36.8% | 4 | 5 | 4 | 1 |
| The company has complied with IAS 16 on valuation of non- current assets for the last ten years | 12.6% | 7.4% | 12.6% | 24.2% | 43.2% | 4 | 5 | 4 | 1 |
| The valuation of the company assets is done by independent valuer | 15.8% | 1.1% | 15.8% | 26.3% | 41.1% | 4 | 5 | 4 | 1 |
| The company revalues all its similar assets as per IAS 16 | 9.5% | 10.5% | 12.6% | 29.5% | 37.9% | 4 | 5 | 4 | 1 |
| The more the total assets the company has, the low bankruptcy likelihood | 7.4% | 9.5% | 15.8% | 32.6% | 34.7% | 4 | 5 | 4 | 1 |

The respondent opinions on statements on total assets, regarding the statement that the company had complied with IAS 16 on cost ascertainment of non-current assets, the responses were as shown in table 4.24 above, where; 5.3% strongly disagreed, 10.5% disagreed, 8.4% were neutral, 31.6% agreed and 44.2% strongly agreed with mean of 4, mode of 5, median of 4 and standard deviation of 1, an indication that the statement was

a good predictor of total assets since there was low spread of the data from the mean and majority 75.8%, were in agreement with the statement, which meant that the value of total assets recognized in the financial statements were comparable from one period to another and with those of similar companies hence, the Z score value that the study computed relying on total assets, as one of the independent variable which classified all the public owned sugar companies as bankruptcy likelihood high were not materially misstated, and were comparable from one period to another and with those of similar companies. The results of these findings were in line with those of Fraczkiewicz-Wronka (2013) who concludes that those companies that fail to continuously evaluate the quality, quantity and usefulness of their resources cannot effectively execute their mission, create value or respond to changes emerging in their environment this is because although the public owned sugar companies had complies with IAS 16 their efficiency asset utilization capacity had been low as evidenced by low earnings before interest and tax to total assets ratio.

On the statement on whether the Company has revalued its non-current assets for the last ten years the respondents stated as follows; 8.4% strongly disagreed, 13.7% disagreed, 15.8% were neutral, 25.3% agreed and 36.8% strongly disagreed. The statement had a mean of 4, mode of 5, median of 4 and standard deviation of 1 which was a low variability; an indication of no great variation from the mean. Respondent's feedback revealed that for the last ten years, the public owned sugar companies had revalued their non-current assets because 62.1% of the respondents attested to that. The descriptive statistics shows that the statements were good predictor of total assets since S.D of 1 was an indication of low variation from the mean. This implied that mostly the values of non-current assets which the study relied on to compute the value of discriminant Z score were not historical but fairly represents their market values; hence the results of this study were not materially misleading to the study in classification of the sugar companies in Kenya as either bankruptcy likelihood low or high.

The statement on whether the company has complied with IAS 16 on valuation of non-current assets for the last ten year 12.6% strongly disagreed, 7.4% disagreed, 12.6%

were neutral,24.2% agreed and 43.2% strongly agreed therefore from the results it was a clear indication that the sugar companies had complied with IAS 16, since 67.4% of the respondents were in agreement with the statement with mean of 4 which is agreed, mode of 5, median of 4 and standard deviation of 1, an indication of no great variation from the mean. This meant that the valued figures of non-current assets recognized in the statement of financial position were not contradicting the market values because the valuation were carried out by an independent valuer hence reliability of the discriminant Z score value computed by the study while relying on the values of these non-current assets as recognized in the financial statements of various public owned sugar companies in Kenya.

The respondents were asked if the valuation of the company assets were done by an independent valuer and their feedback were as follows; 15.8% strongly disagreed, 1.1% disagreed, 15.8% were neutral, 26.3% agreed and 41.1% strongly agreed. The results show that majority of the respondents 67.4%, were in agreement that the valuation of the company's assets are done by independent valuer which had, an implication to the study that the values of non-current assets recognized in the statement of financial positions were not materially misstated hence reliable for the study meaning that the computed discriminant Z score values were not misleading.

The results of these study concurred with those of Fraczkiewicz-Wronka (2013) who argues that those companies that fail to continuously evaluate the quality, quantity and usefulness of their resources cannot effectively execute their mission, create value or respond to changes emerging in their environment this is because although the public owned sugar companies asset valuation are done by an independent value, their efficiency utilization capacity had been low as evidenced by low earnings before interest and tax to total assets ratio. The statement on if the valuation is done by independent valuer had a mean of 4 which meant agreed, mode of 5, median of 4 and standard deviation of 1, an indication of no great variability from the mean.

The respondents were also asked on whether the company revalue all similar assets and their feedback were as follows; 9.5% strongly disagreed, 10.5% disagreed, 12.6% were neutral, 29.5% agreed and 37.9% strongly agreed. Therefore, a majority of the respondents 67.4% agreed that the company revalue all it is similar assets, which was an assurance to the study that no class of asset may be over or understated in comparison with the other. The statement pertaining whether the company value all similar assets had a mean of 4 which meant agreed, mode of 5, median of 4 and standard deviation of 1, which was an indication that there was no great variation from the mean making the results reliable.

Finally the respondents were asked if the more the total assets the company has low bankruptcy likelihood, the respondents answers were as follows; 7.4% strongly disagreed, 9.5% disagreed, 15.8% were neutral, 32.6% agreed and finally 34.7% strongly agreed hence, majority of the respondents 67.3% agreed that the more the total assets the company has low bankruptcy likelihood. This has an implication to the study that those sugar companies with more total assets and using them well to generate sales and are able to minimize cost of sales and other operating expenses it is likely to results into higher profitability, cash flow and net worth which reduces bankruptcy likelihood.

The statements on the more the total assets the low bankruptcy likelihood had mean of 4 which meant agreed, mode of 5, median of 4 and standard deviation of 1, which was an indication of no great variation from the mean, meaning that all the statements on total assets were good predictors of the value of total assets with a low variation from the mean because all had a standard deviation of one. The above findings on statements from total assets concur with IAS 16 on property, plant and equipment on cost ascertainment and valuation, IAS 8 on accounting policies and changes in accounting policies also agree with the findings of Poghosyan and Cihak (2009), who argue that inadequate capitalization, poor asset quality and insufficient earnings are key factors contributing to bankruptcy likelihood.

### 4.7.2 Sales

The respondents of public owned sugar companies in Kenya were asked for their opinion on the sales figure recognized in their financial statements, with the main aim of ensuring that the figures of sales and cost of sales were correctly stated and were free from any material misstatements, and their recording complied with the relevant IAS and their feedback in a scale of 1-5 (strongly disagree, disagree, neutral, agree and strongly agree), were as shown in table 4.25 below.

**Table 4.25: Sales**

| | | | | | | Sub-total | | | |
|---|---|---|---|---|---|---|---|---|---|
| | **Strongly disagree** | **Disagree** | **Neutral** | **Agree** | **Strongly agree** | **Mean** | **Mode** | **Median** | **Standard Deviation** |
| The company has complied with IAS 18when recognizing sales in the financial statements for the last ten years | 7.4% | 12.6% | 9.5% | 25.3% | 45.3% | 4 | 5 | 4 | 1 |
| For the last ten years the sales of the company has been increasing? | 10.5% | 41.1% | 7.4% | 20.0% | 21.1% | 3 | 2 | 2 | 1 |
| The cost of sales has been increasing for the last ten years | 6.3% | 18.9% | 9.5% | 28.4% | 36.8% | 4 | 5 | 4 | 1 |
| The more the sales, the low bankruptcy likelihood. | 4.2% | 14.7% | 15.8% | 25.3% | 40.0% | 4 | 5 | 4 | 1 |

| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | Sub-total Mean | Mode | Median | Standard Deviation |
|---|---|---|---|---|---|---|---|---|---|
| The company has complied with IAS 18when recognizing sales in the financial statements for the last ten years | 7.4% | 12.6% | 9.5% | 25.3% | 45.3% | 4 | 5 | 4 | 1 |
| For the last ten years the sales of the company has been increasing? | 10.5% | 41.1% | 7.4% | 20.0% | 21.1% | 3 | 2 | 2 | 1 |
| The cost of sales has been increasing for the last ten years | 6.3% | 18.9% | 9.5% | 28.4% | 36.8% | 4 | 5 | 4 | 1 |
| The more the sales, the low bankruptcy likelihood. | 4.2% | 14.7% | 15.8% | 25.3% | 40.0% | 4 | 5 | 4 | 1 |
| For the last ten years, the company has controls in place of ensuring that overdue credit sales are collected on a timely manner. | 8.4% | 15.8% | 13.7% | 38.9% | 23.2% | 4 | 4 | 4 | 1 |

When respondents were asked on whether the company had been complying with IAS 18 when recognizing sales in the financial statements for the last ten years, 7.4% of the respondents strongly disagreed,12.6% of the respondents disagreed, 9.5% of the respondents were neutral, 25.3% agreed and 45.3% strongly agreed therefore, majority of the respondents 70.6% felt that their companies comply with IAS 18, which meant that the value of sales on which the secondary data had been based on to compute the value of discriminant Z score ratio model was accurate and the classification of bankruptcy likelihood low or high was not misleading the findings were in line with

Hwang, Chung and Chu (2011) who argued that there is a linkage between bankruptcy likelihood and technical efficiency because even if sales has been correctly reported in the sugar company's financial statements they were not able to control cost of sales and other operating expenses which reduced profitability, cash flows and increased agency problems hence increasing bankruptcy likelihood . The mean was 4 which implied agreed, the mode was 5, the median was 4 and standard deviation was 1, an indication that the statement was a good predictor of sales and that no great variation from the mean.

The respondents were asked on whether for the last ten years the sales of the company had been increasing and their opinion were as follows; 10.5% strongly disagreed, 41.1% disagreed, 7.4% were neutral, 20% agreed and 21.1% strongly agreed therefore, many of the respondents 59% disagreed that the sales of their companies for the last ten years had been increasing and this has an effect of reducing the value of the discriminant Z score ratio model and increasing the level of bankruptcy likelihood. The mean was 3 which meant neutral, mode was 2, median was 2 and standard deviation was 1 meaning that the statement was a good predictor of the sales value since the measure of variability from the mean was low; standard deviation of 1. The findings of these results agree with Hwang, Chung and Chu (2011) who asserts that there is a linkage between bankruptcy likelihood prediction and technical efficiency since reduction of sales reduce profitability, cash flows, book value of equity, retained earnings and increases bankruptcy likelihood.

The respondents were asked for their views on if for the last ten years, the cost of sales of their companies had been increasing and their views were as follows; 6.3% strongly disagreed, 18.9% disagreed, 9.5% were neutral, 28.4% agreed and 36.8% strongly agreed. Therefore, 65.2% of the respondents agreed that for the last ten years the cost of sales had been increasing and this has impacted negatively on the profitability of the public owned sugar companies, since all of them were making losses hence, increasing bankruptcy likelihood since increase in cost of sales has an effect of reducing profitability and cash flows which in turn reduce the computed value of discriminant Z

score. The mean was 4 which meant agreed, mode 5, median 4, and standard deviation was 1, an indication that the statement was a good predictor of sales since it did not have a great variation from the mean. These results concur with Stewart (2011) who stated that if the company pays interest and other costs that exceed what it is receiving its bankruptcy likelihood is likely to be high.

The respondents were asked for their opinion on whether the more the sales, the low bankruptcy likelihood the results of their opinion were as follows; 4.2% strongly disagreed, 14.7% disagreed, 15.8% were neutral, 25.3% agreed and 40.0% strongly agreed. Therefore, a majority of the respondents 65.3% agreed that the more the sales, the low bankruptcy likelihood. This has an implication to the study that those companies with more sales and were able to minimize cost of sales and other operating expenses it resulted into more profitability, cash flow and net worth which reduced bankruptcy likelihood. The mean of this statement regarding the more the sales the low bankruptcy likelihood was 4 which meant agreed, mode was 5, median was 4 and standard deviation was 1, which was an indication that the statement was a good predictor of sales since it had no great variation from the mean.

Finally on sales the respondents were asked if their companies had control in place of ensuring that overdue credit sales are collected on a timely manner and their views were as follows; 8.4% strongly disagreed, 15.8% disagreed, 13.7% were neutral, 38.9% agreed and 23.2% strongly agreed. Therefore, majority of the respondents 62.1% agreed that their companies have control in place to ensure that sales on credit is collected on a timely manner and hence the liquidity problems that all the public owned sugar companies are experiencing were not due to uncollectable debts but due to high cost of production and other operating expenses; the findings concur with various previous studies for example, the report of the Kenya national assembly eleventh parliament (third session-2015) report of the departmental committee on agriculture, livestock and co-operative on the crisis facing sugar companies in Kenya and Stewart (2011) who stated that if the company pays interests and other costs that exceed what it is receiving it is likely to experience bankruptcy likelihood high. The statement regarding if the

company has controls in place of ensuring that overdue credit sales are collected had the mean of 4 which implied agreed, mode of 4, median of 4 and standard deviation of 1 which was also an indication of a good predictor of sales because no great variation was detected from the mean.

### 4.7.3 Working Capital

The respondents of public owned sugar companies in Kenya were asked for their opinions on the working capital figures recognized in their financial statements, with the main aim of ensuring that the figures of stock, debtors, cash, creditors and short term obligations were correctly stated in the financial statements and were free from any material misstatements, their recording complied with the relevant IAS, the extent to which the ratio WC to TA influences bankruptcy likelihood and their feedback in a scale of 1-5 (strongly disagree, disagree, neutral, agree and strongly agree). The findings were as shown in table 4.26 below.

**Table 4.26: Working Capital**

| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | Sub total Mean | Median | Mode | Standard Deviation |
|---|---|---|---|---|---|---|---|---|---|
| The company has applied consistently the method of measurement of stock from one period to another for the last ten years. | 7.4% | 10.5% | 9.5% | 25.3% | 47.4% | 4 | 4 | 5 | 1 |
| The company has complied with IAS 2 when recognizing stock in the financial statements for the last ten years. | 6.3% | 8.4% | 6.3% | 40.0% | 38.9% | 4 | 4 | 4 | 1 |
| For the last ten years the company's stock did not include obsolescence stock | 15.8% | 18.9% | 23.2% | 11.6% | 30.5% | 3 | 3 | 5 | 1 |
| The company has prepared debtors and creditors ledger control account at least monthly for the last ten years. | 9.5% | 9.5% | 7.4% | 35.8% | 37.9% | 4 | 4 | 5 | 1 |
| Increasing working capital is an indicating of reduction in bankruptcy likelihood | 10.5% | 9.5% | 5.3% | 28.4% | 46.3% | 4 | 4 | 5 | 1 |

The respondents were asked whether in their own view their company has applied consistently the method of measurement of stock from one period to another for the last ten years and their views were as in table 4.28 above; 7.4% of the respondents strongly

disagreed, 10.5% disagreed, 9.5% were neutral, 25.3% agreed and 47.4% strongly agreed. Therefore, a greater percentage of the respondents 72.7% agreed that their company apply the method of stock measurement consistently from one period to another which was an assurance to the study that the value of stock was not material misstated and was comparable from one period to another and with those of similar companies hence the computation of the ratio working capital to total assets of the discriminant Z score which was one of the variable the study used to classify sugar companies into either bankruptcy likelihood high or not was not materially misstated, and the classification by the study into bankruptcy likelihood low or high was not material misleading the statement agrees with Sahut and Mili (2011) who argued that poor management of working capital leads to increases bankruptcy likelihood this is because although the sugar companies complied with IAS 2 they had negative working capital an indication of poor management of debtors, stock, cash and creditors.

The statement on if the company applies method of measurement of stock consistently from one period to another had a mean 4, which implied agreed, median of 4, mode of 5 and standard deviation of 1, which implied that the statement was not a bad predictor of working capital as an independent variable in the Z score ratios model. The respondents were asked to comment if their companies complied with IAS 2 when recognizing stock in the financial statements for the last ten years, and their feedback were as in table 4.26 above where; 6.3% strongly disagreed, 8.4% disagreed, 6.3% were neutral, 40% agreed and 38.9% strongly agreed. The study results revealed that majority of the respondents 78.9% agreed that their companies for the last ten years had complied with IAS 2 when recognizing stocks in the financial statements which was an indication that the value of stock was comparable from one period to another within the study period, comparable with other similar public owned sugar companies and implication to the study that the computed values of discriminant Z score values for the study period which relied on working capital was not misleading.

The findings of this agrees with Sahut and Mili (2011) who argued that poor management of working capital is likely to increase bankruptcy likelihood this is

because although the public owned sugar companies complied with IAS 2 they had negative working capital ratio being an indication of poor management of debtors, stock cash and creditors. The statement as to whether method of measurement of stock is consistent from one period to another had a mean of 4 which meant agreed, median, mode of 4 and standard deviation of 1 which was an indication that the statement was a good predictor of working capital since the study never detected any great variation from the mean since the standard deviation of the statement was 1.

The respondents were asked if for the last ten years the company's stock did not include obsolescence stock. Their opinions were as follows; 15.8% strongly disagreed, 18.9% disagreed, 23.2% were neutral, 11.6% agreed and 30.5% strongly agreed. The results show a greater percentage 65.3% agreed that their company's stock did not include obsolescence stock which was an assurance to the study that the figures of stock in the statement of financial position are not materially misstated and was reliable for the computation of the discriminant Z score, which the study computed while relying on the working capital figures. The statement to the effect that the stock of the company does not include obsolescence stock had a mean of 3 which implied neutral, median of 3, mode of 5 and standard deviation of 1 which was an indication of no great variation from the mean.

The respondents were asked on whether their companies had prepared debtors and creditors ledger control accounts at least monthly for the last ten years. Their opinions were as in table 4.26 above where; 9.5% strongly disagreed, 9.5% disagreed, 7.4% were neutral, 35.8% agreed and 37.9% strongly agreed. The results show that a greater percentage 73.7% concurred that their companies prepare the debtors and creditors control accounts at least monthly and this was an indication that the amount of debtors and creditors are free from material misstatements since the reconciliations assist in detecting and correction of errors on timely manner hence reliability of the debtors figures which were components of the working capital which the study applied to compute the discriminant Z score values the findings agrees with Waston and Head (2010) who argue that maintaining appropriate working capital is important both in the

short and long term basis this is because public owned sugar companies had more current liabilities than current assets a situation which made them to be illiquid. The statement regarding on if the company prepares debtors and creditors ledger had a mean of 4, which implied agreed, media of 4, mode of 5 and standard deviation of 1, which also had an implication that the statement was a good predictor of working capital since it had no great variation from the mean.

Finally on working capital the respondents were asked if increasing working capital is an indication of reduction in bankruptcy likelihood, their comments were as in table 4.26 above, where 10.5% strongly disagreed, 9.5 disagreed, 5.3% were neutral, 28.4% agreed and 46.3% strongly agreed. The results indicate that most of the respondents 74.7% agreed that increasing working capital is a sign of decrease in bankruptcy likelihood. This has an implication to this study that those companies which had positive increasing working capital had more Z score value an indication of free any possibility of bankruptcy likelihood. The results of this study concurs with Waston and Head (2010) since the public owned sugar companies have not kept appropriate working capital ratio which has necessitated current liabilities being more than current assets and hence increased their bankruptcy likelihood. The statement pertaining whether increasing working capital is an indication of free from bankruptcy likelihood had mean of 4 which meant agreed, median of 4, mode of 5 and standard deviation of 1, which meant that the statement was a good predictor of working capital and the variations is not significant.

### 4.7.4 Retained Earnings

The respondents of public owned sugar companies in Kenya were asked for their feelings on the retained earnings figures recorded in their financial statements, with the main aim of ensuring that the figures were correctly stated in the financial statements, were free from any material misstatements, their recording complied with the relevant IAS the extent to which retained earnings influences bankruptcy likelihood and their feedback in a scale of 1-5 (strongly disagree, disagree, neutral, agree and strongly agree), were as shown in table 4.27 below.

**Table 4.27: Retained Earnings**

| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | Subtotal Mean | Mode | Median | Standard Deviation |
|---|---|---|---|---|---|---|---|---|---|
| For the last ten years the retained earnings of the company has been increasing | 32.6% | 30.5% | 15.8% | 9.5% | 11.6% | 2 | 1 | 2 | 1 |
| For the last ten years taxes the company pays to the government has been increasing | 30.5% | 28.4% | 6.3% | 13.7% | 21.1% | 3 | 1 | 2 | 2 |
| For the last ten years the expenses of the company has been Increasing | 15.3% | 10.0% | 9.5% | 34.2% | 31.1% | 2 | 1 | 2 | 2 |
| for the last ten years the company has a profit retention policy | 28.4% | 13.7% | 40.0% | 2.1% | 15.8% | 3 | 3 | 3 | 1 |
| The more the retained earnings the higher bankruptcy likelihood | 40.0% | 21.1% | 30.5% | 3.2% | 5.3% | 2 | 1 | 2 | 1 |

The respondent's opinion on retained earnings of their respective sugar companies that had been recognized in the financial statements of the respective public owned sugar companies in Kenya were as tabulated in table 4.27 above; when the respondents were asked on whether for the last ten years, the retained earnings of their companies had been increasing and their responses were as follows; 32.6% strongly disagreed, 30.5% disagreed, 15.8% were neutral, 9.5% agreed and 11.6% strongly agreed, from the analysis it was evidenced that a majority of the respondents 63.1% disagreed that the retained earnings of their companies had been increasing and this was supported by negative average retained earnings of the public owned sugar companies of -8.0163 as

evidenced from figure 4.11, which had an impact to the study of reducing the book value of equity and increases liabilities since the company is likely not be able to be financed internally but from external borrowings which had an effect of increasing total liabilities and in turn is likely to reduce the value of the discriminant Z score and hence increasing bankruptcy likelihood.

The mean of the statement on whether the retained earnings has been increasing for the last ten years was 2, which meant disagreed mode was 1,median 2 and standard deviation of 1 which was an indication of no great variation from the mean. The findings of this statement concur with Campbell, Hischer and Ssikggi, (2012) who argue that the more, the retained earnings the firm has, the more the investments which is likely to lead into free from bankruptcy likelihood. The respondents were asked if for the last ten years, taxes the company pays to the Government has been increasing and their views were as follows; 30.5% strongly disagreed, 28.4% disagreed, 6.3% were neutral, 13.7% agreed and 21.1% disagreed from the results of the feedback of this statement majority of the respondents 58.9% dis agreed that the taxes the company pays to the government has been increasing and this is evidenced by deteriorating and negative profitability which had an effect of reducing the book value of equity and earnings before interest and tax as evidenced by the findings of secondary data as per figure 4.15 and figure 4.13 respectively, a situation which may have likely increased their level of bankruptcy likelihood.

The statement on whether the taxes the company pays to the government has been increasing had a mean of 3 which implied neutral, mode of 1, median of 2 and standard deviation of 2. The study results agree with Zeitun and Tian (2007) who stated that capital structure of the firm has a significant effect on the firms performance since nonpayment of taxes was likely an indication of firm's whose performance was deteriorating. In addition the results also concur with Frank and Goyal (2008) Stewart (2011) who state that increase in the cost of debt will lead the company to be financially overstretched due to high payment of interests and other charges which are likely to reduce profitability and cash flows hence leading to high bankruptcy likelihood. When

the respondents were asked if for the last ten years the expenses of their companies had been increasing their feedback as in table 4.27 above were as follows; 15.3% strongly disagreed, 10.0% disagreed, 9.5% were neutral, 34.1% agreed and 31.1% strongly agreed hence from the analysis, 65.3% agreed that the expenses of the company had been increasing for the last ten years, while 9.5% respondents were neutral therefore we can state that the expenses of the companies had been increasing and that may be the reason which led to all public owned sugar companies to make losses as evidenced by the findings of secondary data as shown in figure 4.11,which shows that averagely retained earnings for public owned sugar companies ranged from 0 to -8.016 while private owned sugar companies ranged between 0 to 0.0438. This contributed to the classification of the public owned sugar companies in Kenya as bankruptcy likelihood high. These statement regarding if the expenses of the company has been increasing had a mean of 2 which meant disagreed, mode of 1, median of 2 and standard deviation of 2.The findings of this statement concur with Stewart (2011) who stated that if the company pays interest and other costs that exceed what it is receiving it is likely to experience bankruptcy likelihood high.

The respondents were asked if for the last ten years which was the period of study covered for by public owned sugar companies in Kenya whether they had profit retention policy. Their feedback were as shown in table 4.27 above where; 28.4% strongly disagreed, 13.7% disagreed, 40% were neutral 2.1% agreed and 15.8% strongly agreed. Therefore since all the public owned sugar companies were making losses 82.1% of the respondents including the neutral ones disagreed that their companies do not have profit retention policy this was also evidenced by secondary data (as shown in figure 4.11) which showed that on average all the public owned sugar companies had an average of retained earnings to total assets ratio ranging from 0 to -8.0163, this had a likely implication to the study of increasing external borrowings, and increasing bankruptcy likelihood of all public owned sugar companies in Kenya. This statement pertaining if the company has retention policy had a mean of 3 which meant neutral, mode and median of 3 and standard deviation of 1, which was an indication that there

was no great variation from the mean. The findings of this statement concur with Campbell, Hischer & Ssikggi (2012) who argue that the more the retained earnings the firm has the more the investments it do have, which automatically lead to low bankruptcy likelihood.

Finally on retained earnings the respondents were asked if the more the retained earnings the high bankruptcy likelihood and their views were as in table 4.27 above.40.0% strongly disagreed, 21.1% disagreed, 30.5% were neutral, 3.2% agreed and 5.3% strongly agreed and therefore majority of the respondents including those who were neutral 91.6% disagreed that the more the retained earnings the higher bankruptcy likelihood this means that those companies with negative and low retained earnings were able to finance their assets through external funding which was likely to increase interest payment and reduce profitability and cash flow hence increasing bankruptcy likelihood. The findings further agrees with the results of secondary data whereby public owned sugar companies had negative retained earnings to total assets ratio which ranged from 0 to -8.01633 for the study period (as shown in figure 4.11) and rapid decline in the market price per share of Mumias sugar company which was the only quoted public owned sugar company from Kshs 29 in 2007 to Kshs 1.30 in 2016 (See Appendix VII).

This statement on the more the retained earnings the higher bankruptcy likelihood had a mean of 2 meaning disagree, median of 2 and mode of 1 and standard deviation of 1 an indication of no great variation from the mean. The findings of this statements on retained earnings concurs with Campbell, Hischer and Ssikggi (2012)who assert that the more the retained earnings the more the investments hence retained earnings of all this public owned sugar companies had been decreasing and the less the investment and the more likely the companies are experiencing bankruptcy likelihood high. In addition, Horkan (2014) argues that retained earnings are retained capital, that the company does not pay as dividends but set it aside for future expansion and payment of debt and hence public owned sugar companies did not set aside any retained earnings since they were making losses they have not been able to expand and this has reduced the value of BVE to TL ratio and increased their bankruptcy likelihood status. The results further agree

with De Angelo and De Angelo (2007) who stated that when the firm is deciding on retention policy it's important to consider that stakeholders supplied capital to the company only because they had an expectations of receiving pay outs from the company either in form of dividends or capital appreciation and this explains why the MPS of Mumias sugar company dropped from Kshs 29 in 2007 to Kshs 1.30 in 2016 (as indicated in Appendix VII).

### 4.7.5 Earnings before Interest and Tax

Respondents of public owned sugar companies in Kenya were asked for their feedback on the earnings before interest and tax figures recorded in their financial statements for the period of study of ten years (2007-2016) with the objective of ensuring that the figures were correctly stated in the financial statements and were free from any errors, material misstatements and their recognition complied with the relevant IAS and their feedback in a scale of 1-5 (strongly disagree, disagree, neutral, agree and strongly agree), where their opinions were as shown in table 4.28 below.

**Table 4.28: Earnings before Interest and Tax**

| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | Subtotal | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Mean | Mode | Median |
| For the last ten years the Earnings before interest and tax of the company has been increasing? | 24.2% | 24.2% | 15.8% | 18.9% | 16.8% | 3 | 1 | 3 |
| For the last ten years the tax the company pays to the government has been increasing | 22.1% | 27.4% | 22.1% | 14.7% | 13.7% | 3 | 2 | 3 |
| For the last ten years the expenses of the company has been increasing? | 15.8% | 23.2% | 13.7% | 25.3% | 22.1% | 3 | 4 | 3 |
| For the last ten years the company has been paying tax promptly to the Government | 21.1% | 31.6% | 17.9% | 11.6% | 17.9% | 3 | 2 | 2 |
| The higher the EBIT, the low bankruptcy likelihood | 11.6% | 14.7% | 15.8% | 24.2% | 33.7% | 4 | 5 | 4 |

The respondents comments on earnings before interest and tax if it has been increasing for the last ten years and their feedback were as in table 4.28 above; where their comments were as follows; 24.2% of the respondents strongly disagreed, 24.2% disagreed, 15.8% were neutral, 18.9% agreed and 16.8% strongly agreed from the results about 64.2% of the respondents including those who were neutral disagreed, that the EBIT has not been increasing and this agrees with the secondary data that show that averagely all the public owned sugar companies had been reporting losses which increased their level of bankruptcy likelihood, due to low EBIT, which averagely ranged from 0 to -0.093 (as per figure 4.13) which may further have impacted on the reduction of book value of equity due to negative retained earnings experienced by all public owned sugar companies. The statement findings conforms with Franzkiewicz-Wroka (2013) who argues that those companies that fails to continuously evaluate the quality,

quantity and usefulness of their resources cannot effectively execute their mission, create value or respond to changes in their changing environment. This statement regarding if the EBIT of the company has been increasing had a mean of 3 which was an indication of neutral, median of 3 and mode of 1, which was an indication of no great variation from the mean.

The respondents were asked for their views if for the last ten years (2007-2016) covered by the study if the company's tax payments to the government had been increasing and their responses were as follows; 22.1% strongly disagreed, 27.4% disagreed, 22.1% were neutral, 14.7% agreed and 13.7% strongly agreed from the results majority of the respondents 71.6% including those that were neutral disagreed that company's tax payments to the government has been increasing and this was because all the public owned sugar companies were making losses payments of taxes was not possible as evidenced by an average of negative EBIT as evidenced in figure 4.13. This was further confirmed by public owned sugar companies having averagely negative retained earnings to total assets ratio as shown in figure 4.11, which implied no funds for reinvestments which increased borrowings and increased bankruptcy likelihood of the public owned sugar companies in Kenya. The statement on if payment of taxes to the government has been increasing had mean of 3 which meant neutral, mode of 2 and median of 3. The study results agrees with (Zeitun and Tian,2007; Frank and Goyal,2008) who states that capital structure of the firm has a significant effect on the firms performance since nonpayment of taxes was an indication of firm's whose performance were deteriorating and bankruptcy likelihood high.

The respondents were also asked if for the last ten years the expenses of the company had been increasing and their comments were as follows; 15.8% strongly disagreed, 23.2% disagreed, 13.7% were neutral, 25.3% agreed and 22.1% strongly agreed therefore 61.1% including those that were neutral agreed that the expenses of their companies had been increasing hence an implication to the study of reducing profitability, cash flows and increasing the level of bankruptcy likelihood being high due to increased borrowings. The findings of this statement agree with the secondary data

(See figure 4.13) where public owned sugar companies had an average of negative EBIT to Total assets ratio. In addition the findings concur with Stewart (2011) who stated that if the company pays interests and other costs that exceed what it is receiving it is likely to experience bankruptcy likelihood which is high.

The statement whether the expenses of the company have been increasing had a mean of 3 which meant neutral, median was 3 and the mode was 4. When the respondents were asked whether for the last ten years their company had been paying taxes promptly to the government their opinions were as follows; 21.1% strongly disagreed, 31.6% disagreed, 17.9% were neutral, 11.6% agreed and 17.9% strongly agreed from the tabulation it was clear 70.6% of the respondents disagreed that their companies do not pay taxes promptly to the government and this had an impact of increasing noncurrent liabilities (deferred tax) and increasing current liabilities (current tax due) in the financial statements which in turn is likely to increase the level of bankruptcy likelihood because increase in total liabilities reduce the value of the ratio book value of equity to total liabilities, hence increased the bankruptcy likelihood level of all the public owned sugar companies in Kenya. The statement had a mean of 3 which meant neutral, mode and median of 2. The results agree with secondary data findings where on average all the public owned sugar companies had a negative BVE to TL ratio ranging from 0 to -0.295 as shown in figure 4.15.

The findings of this statement also collaborates with Loncan and Caldeira (2014) who argued that the higher the gearing the less liquidity the firm is therefore highly geared companies should reduce, the risk of bankruptcy likelihood which eventually leads to bankruptcy. The findings of this study also agree with Pervan, Pervan and Vukoja (2011) who argue that profitability ratios are normally used as a measure of management efficiency since, it measures how effective management uses its assets to generate earnings. All the public owned sugar companies EBIT to TA ratio has been decreasing over the period of the study meaning that it was likely that the assets were not used effectively which led to low profitability hence not able to pay taxes.

Finally the respondents were asked if in their opinion the higher the EBIT, the low bankruptcy likelihood, their suggestions were as follows; 11.6% strongly disagreed, 14.7% disagreed, 15.8% were neutral, 24.2% agreed and 33.7% strongly agreed so it was evidenced from the results that many of the respondent 73.7% agreed that the higher the EBIT, the low bankruptcy likelihood. This has implication to this study that those sugar companies which had high sales and were able to control cost of sales and other operating expenses resulted into higher EBIT which increased the discriminant Z score and hence reducing bankruptcy likelihood.

### 4.7.6 Market Value of Equity

Respondents of Mumias public owned sugar company in Kenya which was the only public owned quoted sugar company were asked for their opinions on the market value of equity of the company figures recognized in their financial statements with the objective of ensuring that the figures were correctly stated in the financial statements and were free from any errors, and the level of shareholders confidence in the company and their feedback in a scale of 1-5 (strongly disagree, disagree, neutral, agree and strongly agree), where the results were as shown in table 4.29 below.

**Table 4.29: Market Value of Equity**

| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | Subtotal Mean | Mode | Median | Standard Deviation |
|---|---|---|---|---|---|---|---|---|---|
| The last ten years the company market price per share has been Increasing. | 38.8% | 31.2% | 16.4% | 9.1% | 4.5% | 2 | 3 | 2 | 1 |
| The relationship between the company management and shareholders has been good. | 29.7% | 33.6% | 11.8% | 14.2% | 10.6% | 3 | 3 | 3 | 1 |
| For the last ten years, the market value of the company has been greater than its total liabilities. | 25.8% | 36.7% | 17.9% | 10.6% | 9.1% | 3 | 3 | 3 | 1 |
| Increasing in the MPS is an indication of low bankruptcy likelihood. | 9.1% | 8.8% | 15.8% | 35.8% | 30.6% | 4 | 4 | 4 | 1 |
| Issues raised by shareholders in the annual general meetings are addressed by the company management on a timely basis | 20.6% | 35.2% | 16.4% | 15.8% | 12.1% | 3 | 3 | 3 | 1 |

Regarding the market value of equity the respondents of Mumias Sugar Company were asked whether for the last ten years, the market price per share of the company had been increasing and their responses were as follows; 38.8% strongly disagreed, 31.2% disagreed, 16.4% were neutral, 9.1% agreed and 4.5% strongly agreed. Therefore, 86.4% of the respondents felt that the market price per share had not been increasing which had a likely effect of making the shareholders lose confidence with the continuity of the

company and reducing the value of the company discriminant Z score and increased bankruptcy likelihood. The statement pertaining to if the market price of the company has been increasing had a mean of 2 which meant disagreed, median of 2, mode of 3 and standard deviation of 1, which was an indication of a low spread of data from the mean meaning there was a low variability of data from the mean hence reliability of the statement as a measure of bankruptcy likelihood of sugar companies in Kenya. The results of this statement concurs with Berk and De Marzo (2014) who argued that even if the firm is not proposed as bankruptcy likelihood high investors include the potential for future likelihood into the assessment of the market value. Thus, if there is an indication of bankruptcy likelihood the firms proposed market value is likely to be reduced by the present value of these potential bankruptcy costs.

The respondents were asked for their opinion on whether the relationship between the company management and shareholders had been good and their opinions were tabulated as follows; 29.7% strongly disagreed, 33.6% disagreed, 11.8% were neutral, 14.2% greed and 10.6% strongly agreed. The output of the results, indicated that majority of the respondents 75.1% disagreed that the relationship between the company management and shareholders has been good and this had an effect of increasing the agency problem due to increased agency costs and hence increase bankruptcy likelihood since, it had an effect of reducing shareholders confidence in the company which was evidenced by the drop in the MPS of Mumias sugar company from Kshs 29 in 2007 to Kshs 1.30 in 2016 as per Appendix VII.

The statement on the relationship between management and shareholders had a mean of 3 which was an indication of neutral, mode and median of 3 and standard deviation of 1, an indication that the there was no great variation from the mean. The findings of this statement concurs with Friend man and Mile (2006) who argued that it's important for the firm to consider the interests of stakeholders because they affect the performance of the organization in various ways. Mitchell and Cohen (2006) claims that stakeholders bear some risks as a result of their direct or indirect investments in a particular organization. Therefore, when their interests and risks are not minimized it results into

agency problems which reduce the financial performance of the firm hence, increasing bankruptcy likelihood.

The respondents were required to give their views on whether for the last ten, the market value of their company had been greater than its total liabilities and 25.8% strongly disagreed, 36.7% disagreed, 17.9% were neutral,10.6% agreed and 9.1% strongly agreed therefore, from the tabulation 80.4% of the respondents disagreed that the market value of the company had been greater than its total liabilities an indication that the companies liabilities are more than its market value, meaning that the shareholders had lost confidence in the company which was evidenced by rapid drop in MPS from kshs 29 in 2007 to kshs 1.30 in 2016 as shown in Appendix VII which had an effect of reducing the net worth, profitability and cash flows of the company and hence increasing bankruptcy likelihood. The statement was in line with Franzkiewicz-Wroka (2013) who stated that those companies which fail to continuously evaluate the quantity, quality and usefulness of their resources (total assets) cannot effectively execute their mission, create value or respond to the changes in their changing environment and for the purposes of this study reduced profitability, cash flows and increased bankruptcy likelihood. The statement about if the market value has been greater than total liabilities had mean of 3 which meant neutral, mode and median of 3 and standard deviation of 1, which implied that there was no significant variation from the mean.

The respondents were asked in their opinion if increasing in the MPS is an indication of free from bankruptcy likelihood and their opinions were as follows; 9.1% strongly disagreed, 8.8% disagreed, 15.8% were neutral, 35.8% agreed and 30.6% strongly agreed hence majority of the respondents 82.2% felt that increasing in the MPS is an indication of free from bankruptcy likelihood. This has an implication to this study of increasing market value which resulted into higher value of discriminant Z score and hence reducing bankruptcy likelihood. The statement on if increasing in the MPS is an indication of low bankruptcy likelihood had mean of 4 which meant agree, mode and median of 4 and standard deviation of 1, which was an indication that there were no major variations of data from the mean. The results of the statement agree with Saunders

and Cornett (2011) who assert that a higher gearing ratio will increase borrower security charges and claim on firm's cash flows and hence increasing bankruptcy likelihood.

Finally the respondents of Mumias sugar were asked for their comments on whether the issues raised by shareholders in the AGM had been addressed by the company management on timely basis ; 20.6% Strongly disagreed, 35.2% disagreed,16.4% were neutral, 15.8% agreed and 12.1% strongly agreed it was evidenced that majority of the respondents 72.2% disagreed because the company has not paid dividend from 2015 and the market price per share has dropped from kshs.29 in 2007 to kshs.1.30 in 2016,which was a significant drop of the market price per share for the 10 years period of the study as evidenced in Appendix VII . This had a likely effect of increasing the agency problem due to increased agency costs hence, increasing the level of bankruptcy likelihood. The statement about if issues raised in the AGM are addressed by management had a mean of 3 which was an indication of neutral, mode and median of 3 and standard deviation of 1, an indication that the variation of the data from the mean was not great hence reliability of the statement as a measure of bankruptcy likelihood. The result of this statements are in line with various previous studies (Friedman and Mile; Mitchell and Cohen 2006) who argued that it's important for the firm to consider the interests of stakeholders because they affect the performance of the organization in various ways.

### 4.7.7 Total Liabilities

Respondents of public owned sugar company in Kenya were asked for their feelings on the total liabilities figures recognized in their financial statements for the period of the study (2007-2016). The objective was to ensure that the figures were correctly stated in the financial statements, were free from any material errors, the company had the ability to meet their obligations and the company complies with the relevant IAS and their feelings in a scale of 1-5 (strongly disagree, disagree, neutral, agree and strongly agree), were as shown in table 4.30 below.

**Table 4.30: Total Liabilities**

| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | Subtotal Mean | Mode | Median | Standard Deviation |
|---|---|---|---|---|---|---|---|---|---|
| The more the total liabilities, the higher bankruptcy likelihood. | 8.4% | 9.5% | 13.7% | 31.1% | 37.4% | 3 | 2 | 3 | 1 |
| The company has been lowly geared for the last ten years | 31.9% | 41.8% | 12.6% | 6.3% | 7.4% | 3 | 2 | 2 | 1 |
| The company has been unable to pay its liabilities at any time for the last ten years | 7.4% | 6.3% | 12.6% | 41.8% | 31.9% | 3 | 2 | 2 | 1 |
| The company's total liabilities has been less than its total assets for the last ten years | 24.2% | 37.4% | 18.9% | 8.9% | 10.5% | 3 | 2 | 2 | 1 |
| The company has complied with IAS 37 when recognizing provisions in the financial statement for the last ten years. | 12.6% | 13.7% | 15.8% | 30.5% | 27.4% | 3 | 4 | 4 | 1 |

Regarding the statement that the more the total liabilities, the higher bankruptcy likelihood, the respondents opinions were as follows; 8.4% strongly disagreed, 9.5% disagreed, 13.7% were neutral, 31.1% agreed and 37.4% strongly agreed which meant that a greater percentage 82.2% agreed that the more the total liabilities, the higher bankruptcy likelihood. This has an implication to this study because those companies

which were highly geared, it was likely to lead to more payment of interest and other obligations which increased bankruptcy likelihood Stewart (2011). In addition, this statement agrees with results of secondary data as shown in figure 4.15 where on average all the public owned sugar companies had negative BVE to TL ratio ranging from 0 to -0.295. additionally, these findings concur with the following previous studies (Zeitun & Tian, 2007; Frank & Goyal, 2008) who states that capital structure of the firm has a significant effect on the firms performance since nonpayment of taxes was an indication of firm's whose performance were deteriorating. The statement on whether the more the total liabilities, the higher bankruptcy likelihood had mean of 3, which was an indication of neutral, median of 3 and mode of 2 with standard deviation of 1, indicating that the variation of the data from the mean was not great.

The respondents were asked whether in their views their company had been lowly geared for the last ten years and 31.9% strongly disagreed, 41.8% disagreed, 12.6% were neutral, 6.3% agreed and 7.4% strongly agreed therefore it was evidenced that most of the respondents 86.3% disagreed that the company has been lowly geared, an indication that their companies were highly geared which had an effect of increasing bankruptcy likelihood due to high interest payments Stewart (2011).This leads to low cash flow due to high obligations of interest payments which was also supported by secondary data where on average BVE to TL ratio ranged from 0 to -0.295 as evidenced in figure 4.15. This was an indication that the liabilities of these public sugar companies had been increasing and BVE to TL ratio declining over this period of study of ten years (2007 – 2016) which contributed to reduction of the value of the discriminant Z score and hence increased bankruptcy likelihood of all the public owned sugar companies in Kenya.

The findings of this statement agrees with Saunders and Cornett (2011) who assert that a higher gearing ratio will increase borrower security charges and claim on firms cash flows, hence increasing bankruptcy likelihood. The statement regarding whether the company has been lowly geared had mode and median of 2, mean of 3 which meant neutral and standard deviation of 1, which implied that the data does not vary greatly from the mean hence reliability of statement as a measure of total liabilities. The

respondents were asked if the company had been unable to pay its liabilities at any time for the last ten years; 7.4% strongly disagreed, 6.3% disagreed, 12.6% were neutral, 41.8% agreed and 31.9% Strongly agreed hence, majority of the respondents 86.3% agreed that the company had been unable to pay its liabilities which was also supported by secondary data where the average WC to TA ratio for public sugar company ranged from 0 to -4.9785 as shown in figure 4.9. This implied insufficient cash flow position and for private sugar companies ranged from 0 to 0.0748 as indicated in figure 4.9 an indication that public sugar companies were illiquid and bankruptcy likelihood high. The findings agree with Saunders and Cornett (2011) who assert that a higher gearing ratio will increase borrower security charges and claim on, firm's cash flow hence, increasing bankruptcy likelihood. The statement pertaining whether the company has been unable to pay its debts had mode, median of 2, and mean of 3 which implied neutral and standard deviation of 1 which signified that the data had no significant variation from the mean. The respondents were asked for their opinions on whether their company's total liabilities had been less than its total assets for the last ten years, their responses were as follows; 24.2% strongly disagreed, 37.4% disagreed, 18.9% were neutral, 8.9% agreed and 10.5% strongly agreed. Therefore, most of the responses representing 61.6% disagreed that the company's total liabilities had been less than its total assets which was an indication that the company's total assets are mostly financed by liabilities hence, increasing gearing position of all the public owned sugar companies in Kenya as evidenced by the secondary data figure 4.15 where all the public owned sugar companies had an average book value of equity to total liabilities ratio ranging from 0 to -0.295. This had a likely implication to the study of reducing the discriminant Z score value and increasing bankruptcy likelihood of public owned sugar companies in Kenya.

The statement results were in agreement with Narayanan (2008) who argues that optimal capital structure of the firm is where the cost of capital is minimized and the value of the firm maximized and at this optimal capital structure the level of bankruptcy likelihood is likely to be low. The results were also consistent with Youn and Gu (2007) who tested the prediction of business failure in the Korean lodging industry and concluded that

Korean lodging firms should lower their reliance on debt financing and increase the efficiency in using existing assets to generate sales revenue. The statement about if the company total liabilities has been less than total assets had a mean of 3 which meant neutral, mode and median of 2 and standard deviation of 1 which was an indication of no great variation from the mean. When respondents were asked if the company comply with IAS37, when recognizing provision, contingent assets and contingent liabilities in the financial statements for the last ten years (2007 – 2016) their feedback were as follows; 12.6% strongly disagreed, 13.7% dis agreed, 15.8% were neutral, 30.5% agreed and 27.4% strongly agreed hence majority of the respondents 73.7% agreed that the company had complied with IAS 37, an indication that the financial statements are comparable from one period to another and with those of similar companies which enhanced the reliability of the discriminant Z score values and the classification of bankruptcy likelihood of the sugar companies in Kenya.

The statement conforms to Frank and Goyal (2008) who argued that increased cost of debt will lead the company to be financially overstretched due to high interest payment which for the purposes of this study had a likelihood of reducing profitability, cash flows and increased agency problems hence increasing bankruptcy likelihood. The statement had a mode and median of 4, mean of 3 which meant neutral and standard deviation of 1, which implied that the data did not vary greatly from the mean.

### 4.7.8 Book Value of Equity

The respondents of public owned sugar company in Kenya were asked for their opinion on the book value of equity figures recorded in their financial statements for the study period (2007 – 2016) with the objective of ensuring that the figures were correctly stated in the financial statements and were free from any material errors and their feedback in a scale of 1-5 (strongly disagree, disagree, neutral, agree and strongly agree), were as shown in table 4.31 below.

**Table 4.31: Book Value of Equity**

| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | Subtotal Mean | Mode | Median | Standard Deviation |
|---|---|---|---|---|---|---|---|---|---|
| The last ten years book value of equity of the company has been Increasing | 32.6% | 30.5% | 18.9% | 13.7% | 4.2% | 2 | 1 | 2 | 1 |
| The ratio of book value of equity to total liabilities has been greater than one for the last ten years. | 15.8% | 45.3% | 21.1% | 9.5% | 8.4% | 2 | 2 | 2 | 1 |
| The book value of equity to total assets has been greater than 0.5 for the last ten years | 22.1% | 32.6% | 26.3% | 14.7% | 4.2% | 2 | 2 | 2 | 1 |
| The retained earnings of the company has been increasing over the last ten years | 31.6% | 36.8% | 18.9% | 7.4% | 5.3% | 2 | 2 | 2 | 1 |
| The more the BVE the higher bankruptcy likelihood | 31.2% | 32.0% | 22.1% | 7.4% | 7.4% | 3 | 3 | 3 | 1 |

Regarding the book value of equity the respondents were asked whether for the last ten years the book value of equity of their company had been increasing and their feelings were as follows; 32.6% strongly disagreed, 30.5% disagreed, 18.9% were neutral, 13.7% agreed and 4.2% strongly agreed. The feedback findings revealed that the book value of equity has been reducing since 82% of the respondents felt so which had an effect of reducing the net worth of the company and increasing bankruptcy likelihood. This was also supported by secondary data as shown in figure 4.15 where the average BVE to TL ratio for public sugar companies ranged from 0 to -0.295 while on the other hand for

private sugar companies the average ratio ranged from 0 to 0.612 an indication that the book value of equity of public owned sugar companies which was negative meant that their assets were financed by external borrowing which increased their level of bankruptcy likelihood high while private owned sugar companies had an average of BVE to TL ratio ranging from 0 to 0.612 which was an indication that 61.2% of their assets were financed internally while 38.8% was externally, which meant that they were lowly geared.

The statement results agree with the following various previous studies (Zeitun & Tian, 2007; Frank & Goyal, 2008) who stated that capital structure of the firm has a significant effect on the firms performance since increase in the cost of debt led to the public owned sugar companies to be financially overstretched due to high payment of interest which reduced profitability and cash flow hence, leading to high bankruptcy likelihood (Stewart, 2011). The statement as to if the BVE has been increasing had a mean 2 which meant disagreed, median of 2, mode of 1 and standard deviation of 1 which was an indication of no great variation from the mean. On the statement that the ratio of book value of equity to total liabilities had been greater than one for the last ten years; 15.8% of the respondents strongly disagreed, 45.3% disagreed, 21.1% were neutral, 9.5% agreed and 8.4% strongly agreed, therefore 82.2% of the respondents disagreed which was also a clear indication that total liabilities are more than the book value of equity which had an effect of reducing the discriminant Z score value and increasing bankruptcy likelihood of public owned sugar companies in Kenya.

The statement results concurs with Saunders and Cornett (2011) who assert that a higher gearing ratio will increase borrower security charges and claim on firms cash flows and hence increasing bankruptcy likelihood. The statement as to whether the ratio BVE to TL has been greater than one had a mean of 2 which was an indication of disagreed, mode and median of 2 and standard deviation of 1 which was a sign of no great variation from the mean. When the respondents were asked for their comments on whether the book value of equity to total assets ratio has been greater than 0.5 for the last ten years; 22.1% strongly disagreed, 32.6% disagreed, 26.3% were neutral, 14.7%

agreed and 4.2% strongly agreed hence, from the results 81% of the respondents disagreed , that the book value of equity to total assets ratio had been greater than 0.5 for the last ten years an indication that the assets of the companies are financed mostly by external borrowings which had a likely effect to the study of increasing bankruptcy likelihood.

These findings were also supported by secondary data where the average BVE to TL ratio for public owned sugar companies ranged from 0 to -0.295 as per figure 4.15. The results were in agreement with Narayanan (2008) who argues that optimal capital structure of the firm is where the cost of capital is minimized and the value of the firm maximized and at this optimal capital structure the company will not be bankruptcy likelihood high. The statement had a mean of 2 which meant disagreed, mode and median of 2 and standard deviation of 1 which was an indication of no great variation from the mean. On the statement regarding the retained earnings of the company had been increasing over the last ten years (2007 – 2016) the following were the feelings of the respondent; 31.6% strongly disagreed, 36.8% disagreed, 18.9% were neutral, 7.4% agreed and 5.3% strongly agreed.

The results shows that 87.3% of the respondents disagreed that the retained earnings of their company's had been increasing over the last ten years which was also supported by secondary data as per figure 4.11 which indicated that averagely RE to TA ratio for public sugar companies ranged from 0 to -8.0163 and for private sugar companies ranged from 0 to 0.0438, which meant that for public sugar companies their average RE to TA ratio was negative which increased their bankruptcy likelihood. The results of this statement agrees with De Angelo and De Angelo (2007) who stated that when the firm is deciding on retention policy it's important to consider that stakeholders supplied capital to the company only because they had an expectations of receiving pay outs from the company either in form of dividends or capital appreciation and this explains why the MPS of Mumias sugar company dropped from Kshs 29 in 2007 to Kshs 1.30 in 2016 as shown in Appendix VII. The statement on if the retained has been increasing had a mean

of 2 which meant disagreed, mode and median of 2 and standard deviation of 1 which was a sign of no great variation from the mean.

The respondents were asked for their views on whether the more the BVE the higher bankruptcy likelihood and their opinions were as follows; 31.2% strongly disagreed, 32% disagreed, 22.1% were neutral, 7.4% agreed and 7.4% strongly agreed hence the results indicated that 85.3% of the respondents disagreed that the more the BVE the higher bankruptcy likelihood. This had a likely effect that those companies with low BVE resulted into low value of discriminant Z score which increased bankruptcy likelihood.

The findings collaborates with the following various previous studies (Friend Man and Mile; Mitchell and Cohen, 2006) who argued that it's important for the firm to consider the interests of stakeholders because they affect the performance of the organization in various ways and that stakeholders bear some risks as a result of their direct or indirect investments in a particular organization. Therefore, when their interests and risks are not considered it results into agency problems which reduce the financial performance of the firm and for the purposes of this study increases bankruptcy likelihood. The results were also in line with Youn and Gu (2007) who tested the prediction of business failure in the Korean lodging industry and concluded that Korean lodging firms should lower their reliance on debt financing and increase the efficiency in using existing assets to generate sales revenue. The statement on whether the more the BVE the higher bankruptcy likelihood had a mean, mode and median of 3 and standard deviation of 1, which was an indication that there was no great variation from the mean.

### 4.7.9 Net Worth

The respondents of public owned sugar company in Kenya were asked for their feelings on the net worth figures recorded in their financial statements with the main aim of ensuring that the figures were correctly stated in the financial statements and were free

from any material errors and their opinions in a scale of 1-5 (strongly disagree, disagree, neutral, agree and strongly agree) were as shown in table 4.32 below.

**Table 4.32: Net Worth**

| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | Subtotal Mean | Mode | Median | Standard Deviation |
|---|---|---|---|---|---|---|---|---|---|
| The net worth of the company had been positive for the last ten years | 21.1% | 30.5% | 24.2% | 10.5% | 13.7% | 3 | 2 | 2 | 1 |
| The more the net worth the high bankruptcy likelihood | 23.2% | 35.8% | 21.1% | 10.5% | 9.5% | 2 | 2 | 2 | 1 |
| The net worth of the company over the last ten years has been sufficient to sustain the operations and continuity of the company | 20.0% | 31.6% | 17.9% | 22.1% | 8.4% | 3 | 2 | 2 | 1 |
| The company has been borrowing yearly for the last ten years. | 8.4% | 29.5% | 34.8% | 14.7% | 12.6% | 3 | 3 | 3 | 1 |
| The company has been purchasing fixed assets yearly for the last ten years | 16.8% | 20.0% | 36.8% | 14.7% | 11.6% | 3 | 3 | 3 | 1 |

The respondents were asked for their opinion on whether the net worth of their companies had been positive for the last ten years under study and their feelings were as in table 4.24 above where; 21.1% strongly disagreed, 30.5% disagreed, 24.2% were

neutral, 10.5% agreed and 13.7% strongly agreed. Most of the respondents 75.8% felt that the net worth of their companies had been positive for the last ten years (2007 – 2016) the statement was supported by negative average working capital to total assets ratio ranging from 0 to -4.978 as shown in figure 4.9 and negative average book value of equity to total liabilities ratio ranging from 0 to -0.295 as indicated in figure 4.15 of all the public owned sugar companies in Kenya and this had a likely effect of increasing their bankruptcy likelihood due to high interest payment (Stewart, 2011). The statement results agree with Waston and Head (2010) who assert that adequate liquidity is needed to ensure survival of the business in the long term. The statement regarding if the net worth of the company has been positive had mean of 3, mode and median of 2 and standard deviation of 1, which show that the statement was a good predictor of the net worth of the public owned sugar companies with low variation from the mean.

The respondents were asked if the more the net worth the high bankruptcy likelihood and their comments were as follows; 23.2% strongly disagreed, 35.8% disagreed, 21.1% were neutral, 10.5% agreed and 9.5% strongly agreed hence majority 80.2% including those that were neutral disagreed that the more the net worth the high bankruptcy likelihood. The effect of this to the study is that those companies which had higher net worth increased their discriminant Z score value which bankruptcy likelihood. Further, this was evidenced by high liabilities in their statement of financial position and negative average BVE to TL ratio ranging from 0 to -0.295 as presented in figure 4.15. This had a likely effect of increasing the bankruptcy likelihood due to it is impact of reducing the value of discriminant Z score. The findings of this statement collaborates with (Waston and Head, 2010) who assert that adequate liquidity is needed to ensure survival of the business in the long term. The statement about the more the net worth the high bankruptcy likelihood the company, had been increasing had mean, mode and median of 2 with standard deviation of 1, which was an indication that the statement was a good predictor of the net worth of the respective public owned sugar companies.

The respondents were asked on if the net worth of their companies had been sufficient to sustain the operational and continuity of the company the feelings of the respondents

were as below; 20.0% strongly disagreed, 31.6% disagreed, 17.9% were neutral, 22.1% agreed and 8.4% strongly agreed therefore majority 69.5% felt that the net worth of their companies were not sufficient to cover operations and continuity of their company which was also supported by the secondary data upon which the Z score was computed and the findings indicated that all the public owned sugar companies bankruptcy likelihood was high as presented in figure 4.29. The results of this statement concur with Saunders and Cornett (2011) who assert that a higher gearing ratio will increase borrower security charges and claim on firm's cash flow and hence increase bankruptcy likelihood. The statement whether the net worth of the company is enough to sustain the operational and continuity of the company had mean of 3, mode and median of 2 and standard deviation of 1.Which was an indication that the statement was a good predictor of the net worth of the company.

The respondent were asked for their views on whether their companies had been borrowing yearly for the last ten years and their responses were as follows; 8.4% strongly disagreed, 29.5% disagreed, 34.8% were neutral,14.7% agreed and 12.6% strongly agreed. The results of the findings indicated that a majority 72.6% felt that their companies had not been borrowing yearly, because from the financial statement position these public owned sugar companies had more debts and they are already highly geared, hence access to more credit may not be possible. The statement of this findings agree with Saunders and Cornett (2011) who assert that a higher gearing ratio will increase borrower security charges and claim on firms cash flow and hence increasing bankruptcy likelihood. The statement about if the company has been borrowing yearly had mean, mode and median of 3 and standard deviation of 1 which was an indication of no great variability from the mean.

Finally the respondents were asked whether their companies had been purchasing fixed assets yearly for the last ten years (2007 – 2016) responses were as follows;16.8% strongly disagreed, 20% disagreed, 36.8% were neutral,14.7% agreed and 11.6% strongly disagreed therefore a greater majority of the respondents 73.6% including those who were neutral felt that their companies had not been purchasing fixed assets yearly

for the last ten years this was because all the public owned sugar have got cash flow problems and also their operational efficiency were low as indicated by the negative average EBIT to TA ratio ranging from 0 to -0.093 as presented in figure 4.13 and negative average RE to TA ratio ranging from 0 to -8.01633 as per figure 4.11 for the last ten years which was the period of the study (2007-2016). The findings of this statement collaborates with Loncan and Caldeira (2014) who argued that the higher the gearing the less liquidity the firm is hence the reasons as to why the public owned sugar companies have not been able to purchase fixed assets therefore highly geared companies should reduce, the risk of bankruptcy likelihood which eventually leads to bankruptcy. The statement regarding if the company has been purchasing fixed assets yearly had a mean, mode and median of 3 and standard deviation of 1, an indication that the statement was a good predictor of the net worth of the respective public owned sugar companies in Kenya.

### 4.7.10 Cash Flow

The respondents of public owned sugar company in Kenya were asked for their views on the cash generating ability of their companies in order to assess their ability to settle short term obligations when they fall due, and their feelings in a scale of 1-5 (strongly disagree, disagree, neutral, agree and strongly agree), the findings were as shown in table 4.33 below.

**Table 4.33: Cash Flow**

| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | Subtotal Mean | Mode | Median | Standard Deviation |
|---|---|---|---|---|---|---|---|---|---|
| The more the cash the company has the high bankruptcy likelihood. | 38.9% | 32.6% | 15.8% | 8.4% | 4.2% | 2 | 1 | 2 | 1 |
| The company managing well its working capital for the last ten years. | 24.2% | 31.6% | 18.9% | 18.9% | 6.3% | 3 | 2 | 2 | 1 |
| The company is capable of meeting its short term financial obligations | 21.1% | 28.4% | 20.0% | 25.3% | 5.3% | 3 | 2 | 3 | 1 |
| The company has been paying dividends out of internal cash flows for the last ten years. | 27.4% | 20.0% | 46.3% | 2.1% | 4.2% | 2 | 3 | 3 | 1 |
| The company's internal cash flow generation ability has been strong for the last ten years strong. | 20.0% | 36.8% | 20.0% | 18.9% | 4.2% | 3 | 2 | 2 | 1 |
| The company has experienced cash flow problem for the last ten years. | 5.3% | 2.1% | 20.0% | 40.2% | 32.4% | 3 | 4 | 3 | 1 |

The respondents were asked for their comment on whether the more the cash the company has, the high bankruptcy likelihood and their comments were as follows; 38.9% strongly disagreed, 32.6% disagreed, 15.8% were neutral, 8.4% agreed and 4.2% strongly agreed it was evidenced that 87.3% including those that were neutral disagreed that the more the cash the company has, the high bankruptcy likelihood. In addition, this

was supported by negative or low WC to TA ratio and low BVE to TL ratio for public owned company which reduced the value of the discriminant Z score, having an overall effect of increasing bankruptcy likelihood. The findings concurs with Bhurnia and Sarkar (2011) who stated that bankruptcy likelihood is high when the firm is experiencing financial problems such that it is cash inflow are in sufficient to meet its debt obligations. The statement on the more the cash the company has, the high bankruptcy likelihood had a mean and median of 2, mode of 1 and standard deviation of 1.

The respondents were again asked if in their opinion their companies had been managing well their working capital for the last ten years (2007 – 2016) and their feelings were as follows; 24.2% strongly disagreed, 31.6% disagreed, 18.9% were neutral, 18.9% agreed and 6.3% strongly agreed therefore 74.7% including those that were neutral felt that their respective companies have not been managing their working capital well which was also evidenced by the secondary data where the WC to TA ratio was negative or too low in some years and this had an effect of reducing the value of the discriminant Z score ratio model and hence, increasing the likelihood of going into bankruptcy. The findings of this study collaborates with Loncan and Caldeira (2014) who argued that the higher the gearing the less liquidity the firm is therefore highly geared companies should reduce, the risk of bankruptcy likelihood which eventually leads to bankruptcy. The statement had a mean of 3, mode and median of 2 and standard deviation of 1 which was a sign that the statement was a good predictor of cash flow.

The respondents were asked to give opinions on whether their companies were capable of meeting their short term obligations and the results of their opinions were as follows; 21.1% strongly disagreed, 28.4% disagreed, 20% were neutral, 25.3% agreed and 5.3% strongly agreed. A majority of the respondents 69.5% including those that were neutral disagreed that their companies were capable of meeting their short term financial obligations this was in line with the secondary data where the WC to TA ratio was negative or too low and had an overall impact of increasing bankruptcy likelihood for these public owned sugar companies. The findings of this statement were in agreement

with Petersen and Plenborg (2012) who argued that a firm will not be able to meet its short term obligations as they fall due when it is not liquid and that liquidity is affected by the firm's ability to generate positive net cash inflow both in the short and long term. The statement on if the company is capable meeting it's short term obligations had a mean and median of 3, mode of 2 and standard deviation of 1.

The respondents of Mumias sugar company were asked if the company has been paying dividends out of internal cash flow and their feelings were as follows; 27.4% strongly disagreed, 20.0% disagreed, 46.3% were neutral, 2.1% agreed and 4.2% strongly agreed from the results 93.7% of the respondents including those that were neutral felt that their company has not been paying dividends out of internal funds and this was because for the last three years the company has not been paying dividends. The study statement results agree with Bhurnia and Sarkar (2011) who stated that bankruptcy likelihood is high when the firm is experiencing financial problems such that its cash inflow are in sufficient to meet its debt obligations. The statement pertaining whether the company has been paying dividends out of retained earnings had mode and median of 3, mean of 2 and standard deviation of 1.

The respondents were asked to give their views on whether their companies internal cash flow generation ability has been strong for the last ten years (2007 – 2016) and their responses were as follows; 20% strongly disagreed, 36.8% disagreed, 20% were neutral, 18.9% agreed and 4.2% strongly agreed. The results of their views shows that; 76.8% disagreed that their companies' internal generation ability had been strong and this was supported by low efficiency ratio (EBIT to TA ratio) from the secondary data an indication that the public owned sugar companies in Kenya ability to settle their obligations is too low which had an effect to the study of increasing bankruptcy likelihood. The statement on the capability of the company internal generating ability had a mean of 3, mode and median of 2 and standard deviation of 1, an implication of no great variability from the mean.

Finally the respondents were requested to give their comments on if the company has experienced cash flow problem for the last ten years (2007 – 2016) and the results of their comments revealed that 5.3% strongly disagreed, 2.1% disagreed, 20.0% were neutral, 40.2% agreed and 32.4% strongly agreed therefore, from the results of the respondents it was evidenced that their companies had experienced cash flow problems since 92.6%, of the respondents agreed including those that were neutral. The statement had a mean and median of 3,mode of 4 and standard deviation of 1 the results of this statement concurs with Saunders and Cornett (2011) who asserts that a higher gearing ratio is likely to increase borrower security charges and claim on firms cash flows and hence increasing bankruptcy likelihood. In addition, it agrees with Frank and Goyal (2008), who argue that increase in debts will make the company to be financially overstretched due to high payment of interests which will reduce profitability and cash flow hence, leading to bankruptcy likelihood high. All the statements on cash flow were good predictor of cash flow since all had a standard deviation of 1 meaning that there were no great variations.

### 4.8 Correlation Analysis

Correlation analysis was carried out to establish the relationship between the independent and dependent variables. Correlation analysis shows both the direction and the degree to which the dependent variable varies with the independent variables. The results of correlation analysis give correlation coefficients of each of the independent variables which measure the dependent variable Wang (2012). In addition, values of correlation coefficients ranging from -1 to +1. A correlation coefficient of +1 is an indication that there is a strong perfect positive relationship between the independent variable and dependent variable. In addition, a correlation coefficient of -1 is an indication of a strong perfect negative relationship between the independent variable and dependent variable. Further, a correlation coefficient of 0 is an indication of no linear relationship between the independent variable and dependent variable (Wang, 2012).

The study used a scatter diagram and line of best fit to clearly show the correlation analysis results. A scatter diagram is a graph that indicates the relationship between two quantitative variables with a scatter plots which are used to indicate the possible relationship between the variables while a line of best fit is an important indicator of the predictive accuracy of the model (Anderson *et al., 2002*).

Regression analysis is a technique, used in statistics for investigating and modelling the relationship between variables under study (Douglas, Montgomery, Peck, &Vinning, 2012). Pearson correlation coefficients was used for the correlation analysis where the correlation coefficient (R) was computed so as to indicate the extent and direction of the independent variables on the dependent variable, the coefficient of determination which is a measure in statistics of how close the data are to the fitted regression line. It is also the percentage of the response variable variation that is explained by the linear model R squared ($R^2$) was also computed in order to establish the variations in the dependent variable that are caused by the independent variable.

### 4.8.1 Scatter Graph Working Capital to Total Assets Ratio, Line of Best Fit and Bankruptcy Likelihood

In order to determine the direction of the relationship between working capital to total assets ratio and bankruptcy likelihood, the study deemed it necessary to draw a line of best fit which is a key indicator of the predictive accuracy of the model (Anderson eta l., 2002) and the results were as shown in in figure 4.3 below.

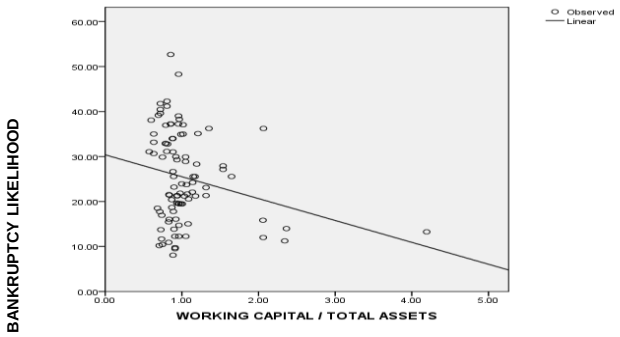



**Figure 4.3: Scatter Graph of Working Capital to Total Assets Ratio**

The results of the findings as per figure 4.3 above established a negative linear relationship between the independent variable (working capital to total assets ratio) and dependent variable Z score (bankruptcy likelihood). Increase in one unit of working capital to total assets ratio results in reduction in bankruptcy likelihood by 4.863 units as shown in table 4.37 below. The results of p value was 0.026 which was less than 0.05, at 5% significance level an indication that WC to TA ratio statistically, was a good predictor of bankruptcy likelihood of public owned sugar companies in Kenya. The results of the findings agree with Sahut and Mili (2011) who argue that poor management of liquidity leads to increases bankruptcy likelihood. The findings also collaborate with Loncan and Caldeira (2014) who argued that the higher the gearing the less liquidity the firm is therefore highly geared companies should reduce, the risk of bankruptcy likelihood which eventually leads to bankruptcy.

**Table 4.34: Correlation**

| | | Bankruptcy likelihood | Working capital total assets |
|---|---|---|---|
| Bankruptcy likelihood | Pearson Correlation | 1 | -.230 |
| | Sig. (2-tailed) | | .026 |
| | N | 95 | 95 |
| Working capital total assets | Pearson Correlation | -.230 | 1 |
| | Sig. (2-tailed) | .026 | |
| | N | 95 | 95 |

*. Correlation is significant at the 0.05 level (2-tailed).

Regression analysis which is a technique used in statistics for investigating and modelling the relationship between variables (Douglas, Montgomery, Peck,& Vinning, 2012) was carried out and Pearson correlation coefficients was used for the correlation analysis where the correlation coefficient (R) was established to be -0.230 as per table 4.35 below which implies that there is a weak negative correction between working capital to total assets ratio and bankruptcy likelihood, an indication that an increase by one unit of the working capital to total assets ratio results into decrease of bankruptcy likelihood by 0.230 unit. The value of P value was also 0.026 which was less than 0.05, an indication that WC to TA ratio significantly influences prediction of bankruptcy likelihood of sugar companies in Kenya.

**Table 4.35: Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | -.230 | .053 | .042 | 9.86534 |

a. Predictors: (Constant), working capital total assets

Coefficient (R) was established to be -0.230 as indicated in table 4.35, above which implied that there was a weak negative correlation between working capital to total assets ratio and bankruptcy likelihood. The coefficient of determination which is a measure in statistics of how close the data are to the fitted regression line, it is also the

percentage of the response variable variation that is explained by the linear model R squared ($R^2$) was 0.053, which implied that 5.3% of the variations in bankruptcy likelihood were determined by working capital to total assets ratio and 94.7% was determined by other factors at 0.05 significance level.

**Table 4.36: ANOVA**

| Model | | Sum of Squares | Df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 498.772 | 1 | 498.772 | 5.125 | .026 |
| | Residual | 8953.890 | 94 | 97.325 | | |
| | **Total** | **9452.661** | **95** | | | |

a. Predictors: (Constant),

Working capital total assets

b. Dependent Variable: Bankruptcy Likelihood

The results of analysis of variance (ANOVA) of working capital to total assets ratio and bankruptcy likelihood of sugar companies in Kenya gives the results of regression coefficient which indicates that the P Value was 0.026 as shown in table 4.36 above which was less than 0.05, at 95% confidence level, implying that there was a significant relationship between working capital to total assets ratio and bankruptcy likelihood. The higher value of F (5.125) was also large to conclude that the ratio WC to TA significantly influences bankruptcy likelihood of sugar companies in Kenya. Therefore, from the results of the study as in table 4.36 above the null hypothesis ($H_{01}$) is rejected at 95% confidence interval, meaning that statistically, there was a significant association between working capital to total assets ratio and prediction of bankruptcy likelihood of public owned sugar companies in Kenya.

**Table 4.37: Coefficients**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | | |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | T | Sig. |
| 1 | (Constant) | 30.374 | 2.443 | | 12.435 | .000 |
| | Working capital total assets | -4.863 | 2.148 | -.230 | -2.264 | .026 |

a. Dependent Variable: Bankruptcy Likelihood

The findings as in table 4.37, above shows that there was a strong negative association between the independent variable (working capital to total assets ratio), and the dependent variable Z score (bankruptcy likelihood). This was evidenced by the coefficient of working capital to total assets ratio of -4.863 which was an indication that for every increase by one unit in WC to A ratio, bankruptcy likelihood reduces by 4.863. In addition, the P value which was 0.026 was also less than 0.05 at 5%, significance level also the P value of the constant was 0.00 was less than 0.05. The T value which was -2.264 also depicts the negative relationship between the independent variable and dependent variable. This implies that WC to TA ratio has significant negative influence on bankruptcy likelihood of sugar companies in Kenya. The results of this study agree with Waston and Head (2010) who argue that maintaining adequate working capital is not just important in the short term. Adequate liquidity is needed to ensure the survival of the company in the long term. The regression equation modelled therefore, took the following form;

Z=30.374-4.863WC to TA ratio;

Where = Z score which is a Measure of Bankruptcy Likelihood

WC to TA ratio=Working Capital to Total Assets ratio

### 4.8.2 Retained Earnings to Total Assets ratio, Line of Best Fit and Bankruptcy Likelihood

The study established the relationship between retained earnings to total assets ratio and bankruptcy likelihood by drawing a line of best fit which was a key indicator of the predictive accuracy of the model (Anderson eta l., 2002) and the results were as shown in figure 4.4 below.

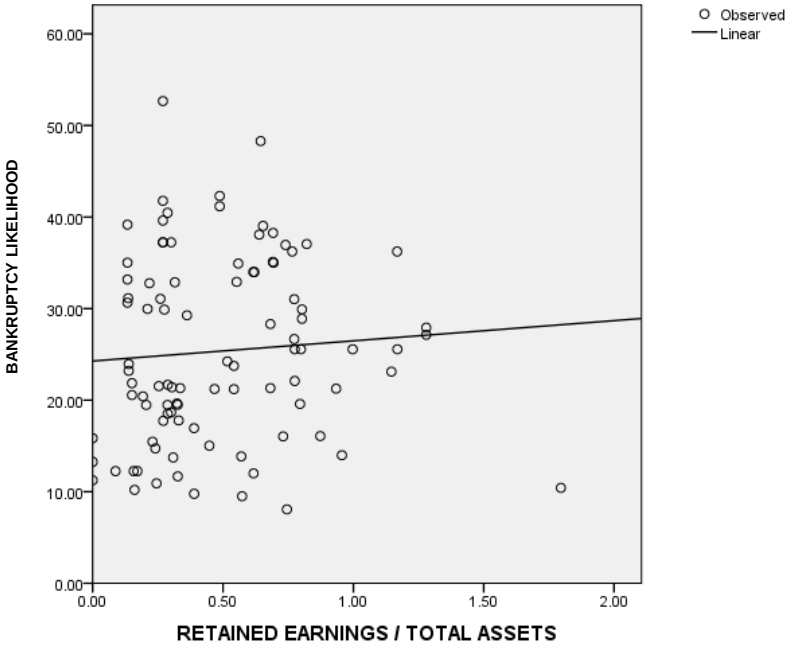



**Figure 4.4: Scatter Graphs of Retained Earnings to Total Assets ratio**

The scatter diagram and line of best fit in figure 4.4 above indicate a positive linear relationship between the independent variable (retained earnings to total assets ratio) and dependent variable (bankruptcy likelihood). An increase in one unit of retained earnings to total assets ratio results in an increase of 2.206 unit of the firm's bankruptcy likelihood. In addition, the P value as in table 4.40 below was 0.485 which was more than 0.05 which was an indication that from the primary data of public owned sugar companies RE to TA ratio does not significantly determine bankruptcy likelihood of sugar companies in Kenya. The findings concur with Stewart (2011) who stated that if

the company pays interest and other costs that exceed what it is receiving its bankruptcy likelihood is likely to be high no matter its size, but the results of this study disagree with Ooghe and Prijcker (2008) who assert that bigger firms can survive during periods of high bankruptcy likelihood than smaller firms due to larger accumulation of retained profits.

**Table 4.38: Correlations**

| | | Bankruptcy likelihood | Retained earnings total assets |
|---|---|---|---|
| Bankruptcy likelihood | Pearson Correlation | 1 | .073 |
| | Sig. (2-tailed) | | .485 |
| | N | 95 | 94 |
| Retained earnings total assets | Pearson Correlation | .073 | 1 |
| | Sig. (2-tailed) | .485 | |
| | N | 94 | 94 |

The study carried out regression analysis which a technique used in statistics for assessing and modelling the relationships between variables (Douglas, Montgomery, Peck, & Vinning, 2012). In addition Pearson correlation coefficients was used for the correlation analysis where the correlation coefficient (R) was established to be 0.073 as presented in table 4.38 above, which implied that there was a weak positive correlation between retained earnings to total assets ratio and bankruptcy likelihood. The p value was 0.485 which was more than 0.05 at 5% level of significance signifying that RE to TA ratio does not significantly determine the bankruptcy likelihood of public owned sugar companies in Kenya.

**Table 4.39: Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .073 | .005 | -.006 | 10.10943 |

a. Predictors: (Constant), Retained earnings total assets

The study applied Pearson correlation coefficients which were used for the correlation analysis where the correlation coefficient (R) was established to be 0.073 as shown in table 4.39 above which implied that there was a weak positive correction between retained earnings to total assets ratio and bankruptcy likelihood. The coefficient of determination which is the percentage of the response variable variation that is explained by the linear model R Squared ($R^2$) was 0.05 which implied that 5% of the changes in bankruptcy likelihood were determined by RE to TA ratio and 95% was determined by other factors at 0.05, significance level. The findings of this study agree with Abor (2007), who argues that a firm should apply a mixture of debt and equity capital in different ratios in order to maximize the value of the firm. In addition, it concurs with Campbell, Hischer and Ssikggi (2012) who argue that the more the retained earnings the firm has, the more the investment which automatically lead to low bankruptcy likelihood.

**Table 4.40: ANOVA**

| Model | Sum of Squares | Df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Regression | 50.207 | 1 | 50.207 | .491 | .485 |
| Residual | 9402.454 | 92 | 102.201 | | |
| Total | 9452.661 | 93 | | | |

a. Predictors: (Constant), Retained earnings total assets

b. Dependent Variable: Bankruptcy Likelihood

The results of analysis of variance (ANOVA) on retained earnings to total assets ratio and bankruptcy likelihood was established as indicated in table 4.40 above. The result indicates that the P value was 0.485 which was more than 0.05 at 95% confidence level hence implying that there was no significant relationship between RE to TA ratio and prediction of bankruptcy likelihood of sugar companies in Kenya which was supported by value of F of 0.491. The study, therefore failed to reject the null hypothesis ($H_{02}$) at 95% confidence interval, meaning that statistically, there was no significant relationship between retained earnings to total assets ratio and prediction bankruptcy likelihood of public owned sugar companies in Kenya.

**Table 4.41: Coefficients**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | | |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | T | Sig. |
| 1 | (Constant) | 24.270 | 1.857 | | 13.071 | .000 |
| | Retained earnings total assets | 2.206 | 3.147 | .073 | .701 | .485 |

a. Dependent Variable: Bankruptcy Likelihood

The results of correlation coefficients as indicated in table 4.41 above indicated that there was a positive relationship between retained earnings to total assets ratio and bankruptcy likelihood. This was indicated by a coefficient of RE to TA ratio of 2.206 as evidenced from table 4.41 above. This meant that for every one-unit increase in RE to TA ratio bankruptcy likelihood increases by 2.206 units. The P value was 0.485 which was more than 0.05 at 5% significance level meaning that RE to TA ratio does not significantly influence prediction of bankruptcy likelihood, however the P value of the constant was 0.000 which was significant. The T value which was 0.071 also depicts the insignificant relationship of the primary data between RE to TA ratio and bankruptcy likelihood of public owned sugar companies in Kenya. Therefore, the modelled regression equation took the following form;

Z=24.27 + 2.206 RE to TA ratio.

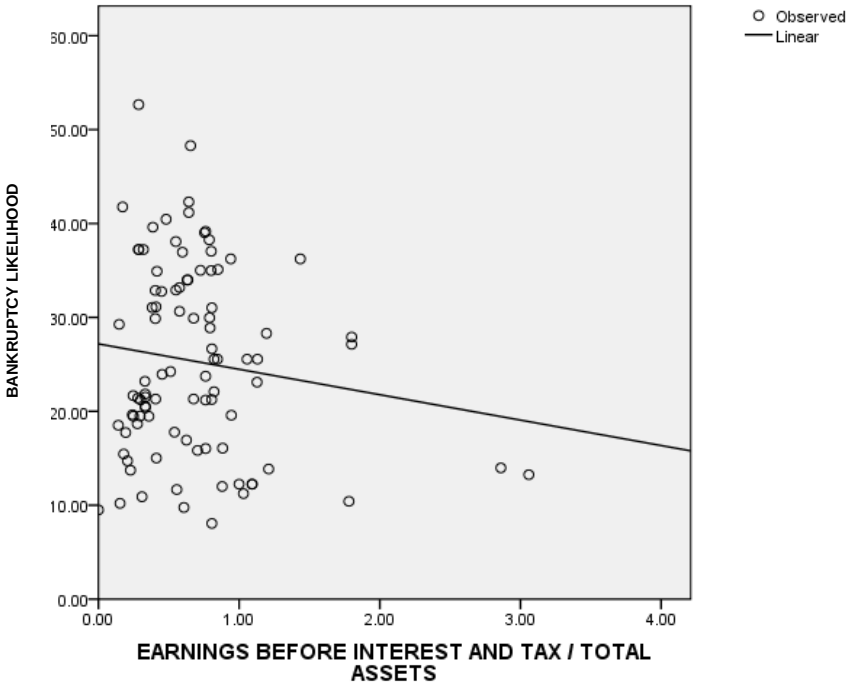
Where=Z score which Measure Bankruptcy Likelihood

RE to TA ratio =Retained Earnings to Total Assets ratio

### 4.8.3 Earnings before Interest and Tax to Total Assets ratio, Line of Best fit and Bankruptcy Likelihood

The study determined the direction of the association between earnings before interest and tax to total assets and bankruptcy likelihood, by drawing a line of best fit since the

line is crucial in providing the predicting ability of the model (Anderson *et al.,* 2002), and the results of the findings were shown in the figure 4.5 below.




**F x to Total Assets ratio**

The results of the study in figure 4.5 above indicate that there was a negative linear relationship between independent variable, (earnings before interest and tax to total assets) ratio, and the dependent variable (bankruptcy likelihood). An increase in one unit of earnings before interest and tax to total assets ratio results in a reduction of 2.705 units of the firm's bankruptcy likelihood. The P value as presented in table 4.45 below was 0.201 which was more than 0.05 at 5% level of significance which meant that from the primary data of public owned sugar companies EBIT to TA ratio does not significantly determine the bankruptcy likelihood of sugar companies in Kenya. The findings concur with Stewart (2011), who stated that if the company pays interest and other costs that exceed what it is receiving its likely to be bankruptcy likelihood high. This is because the ratio EBIT to TA ratio measure the efficiency of management to

utilize the assets at their disposal to generate earnings but before interest and tax, more interest (due to high borrowings), EBIT may be negative after they are subjected to interest hence increasing bankruptcy likelihood of the company..

**Table 4.42: Correlations**

| | | Bankruptcy likelihood | Earnings before interest and tax total assets |
|---|---|---|---|
| Bankruptcy likelihood | Pearson Correlation | 1 | -.133 |
| | Sig. (2-tailed) | | .201 |
| | N | 95 | 95 |
| Earnings before interest and tax total assets | Pearson Correlation | -.133 | 1 |
| | Sig. (2-tailed) | .201 | |
| | N | 95 | 95 |

Pearson correlation coefficients was used for the correlation analysis where the correlation coefficient (R) was established to be -0.133, the P value was 0.201 (See table 4.42) above which was more than 0.05 at 95% confidence level. This implied that there was a weak negative correction between EBIT to TA ratio and bankruptcy likelihood and the ratio EBIT to TA does not significantly influence the bankruptcy likelihood of sugar companies in Kenya.

**Table 4.43: Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | -.133 | .018 | .007 | 10.04631 |

a. Predictors: (Constant), Earnings before interest and tax total assets

Pearson correlation coefficients were used for the correlation analysis where the correlation coefficient (R) was established to be -0.133 as indicated in table 4.43 above. The implication is that there is a weak negative correction between earnings before interest and tax to total assets ratio and bankruptcy likelihood Namusonge (2010). The

coefficient of determination which is the percentage of the response variable variation that is explained by the linear model and is commonly called R squared ($R^2$) was 0.018 (See table 4.46) above. This was an indication that 1.8% of the variations on sugar companies in Kenya bankruptcy likelihood were determined by EBIT to TA ratio and 98.2% was determined by other factors at 0.05significance level.

**Table 4.44: ANOVA**

| Model | | Sum of Squares | Df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 167.246 | 1 | 167.246 | 1.657 | .201 |
| | Residual | 9285.415 | 95 | 100.928 | | |
| | Total | 9452.661 | 95 | | | |

a. Predictors: (Constant), Earnings before interest and tax total assets

b. Dependent Variable: Bankruptcy Likelihood

The results of analysis of variance (ANOVA) on earnings before interest and tax to total assets ratio and bankruptcy likelihood were tabulated and the results were as in table 4.44 above. The results of regression coefficient indicated that the P value was 0.201 which was more than 0.05 at 95% confidence level hence an implication that there was no significant relationship between EBIT to TA ratio and bankruptcy likelihood. The value of F (1.657) also depicted the insignificant association between EBIT to TA ratio and the bankruptcy likelihood of sugar companies in Kenya. The study, therefore failed to reject the null hypothesis ($H_{03}$), at 95% confidence interval, meaning that statistically, there was no significant relationship between earnings before interest and tax to total assets ratio and prediction of bankruptcy likelihood of public owned sugar companies in Kenya.

**Table 4.45: Coefficients**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | | |
|---|---|---|---|---|---|---|
| | | **B** | **Std. Error** | **Beta** | **T** | **Sig.** |
| 1 | (Constant) | 27.181 | 1.761 | | 15.431 | .000 |
| | Earnings before interest and tax total assets | -2.705 | 2.101 | -.133 | -1.287 | .201 |

Dependent Variable: Bankruptcy Likelihood

The findings of the study as indicated in table 4.45 above, gives a negative association between the earnings before interest and tax to total assets ratio and bankruptcy likelihood. This was evidenced by the coefficient of EBIT to TA ratio of -2.705 from table 4.48 above. This implied that for every one-unit increase in EBIT to TA ratio bankruptcy likelihood reduces by 2.705 units. The P value is 0.201 which was more than 0.05 at 5% level of significance an indication that EBIT to TA was not significant in predicting the bankruptcy likelihood as per collected primary data from public owned sugar companies in Kenya, but the P value of the constant was 0.000 which was significant. The value of T which was -1.287 depicts that EBIT to TA ratio was not significant in determining the bankruptcy likelihood of public owned sugar companies in Kenya.

The fitted regression model was as follows:

Z=27.181 – 2.705 EBIT to TA ratio

Where, Z= Z score which measured the bankruptcy likelihood

EBIT to TA ratio= Earnings before Interest and tax to total assets ratio

### 4.8.4 Book Value of Equity, Line of Best Fit and Bankruptcy Likelihood

The study determined the relationship between book value of equity/total liabilities and bankruptcy likelihood by drawing a line of best fit. This was because the line of best fit was important in indicating the predictive accuracy of the model (Anderson *et al.*, 2002). The findings of the study were as indicated in the (figure 4.6) below.

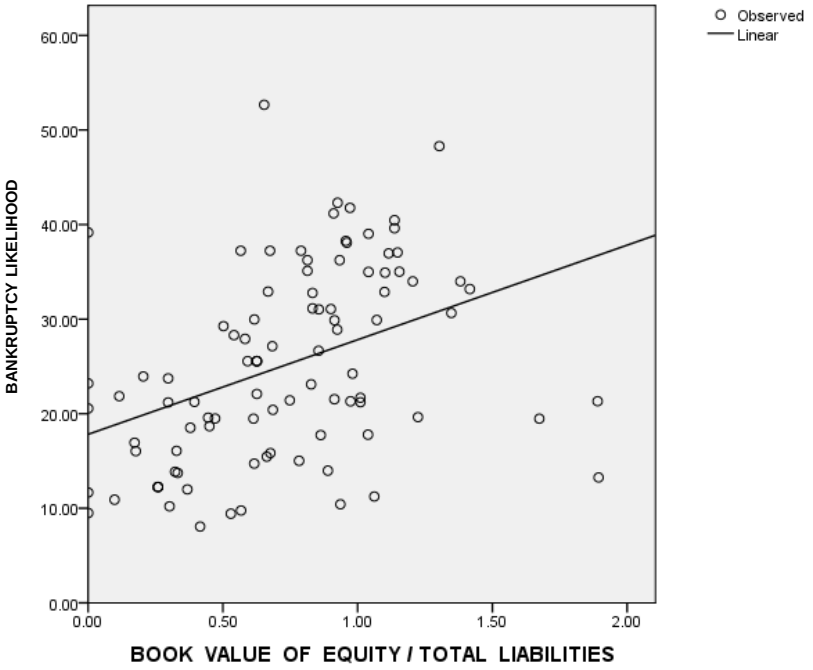



**Figure 4.6: Scatter Graphs of Book Value of Equity to Total Liabilities Ratio**

The scatter diagram and line of best fit which gives the output of a positive relationship between BVE to TL ratio and bankruptcy likelihood is shown in Figure 4.6 above. The figures show a positive relationship where an increase in one unit of BVE to TL ratio results into increase of bankruptcy likelihood by 9.999 units. The findings in table 4.49 below gives the P value of 0.000 which was less than 0.05 at 5% level of significance an indication that from the primary data of public owned sugar companies in Kenya BVE to TL ratio significantly influences bankruptcy likelihood of public owned sugar companies in Kenya. The results of this study concurs with (Abor, 2007) who argues

that companies should apply a mixture of equity and debt capital in different ratios in order to maximize the value of the firm. The findings also concur with Frank and Goyal (2008), who argue that increase in the cost of debt is likely to lead the company to be financially over stretched due to high payment of interest which will reduce profitability and cash flow hence leading to high bankruptcy likelihood of a company.

**Table 4.46: Correlations**

| | | **Bankruptcy likelihood** | **Book value of equity total liabilities** |
|---|---|---|---|
| Bankruptcy likelihood | Pearson Correlation | 1 | .396 |
| | Sig. (2-tailed) | | .000 |
| | N | 95 | 95 |
| Book value of equity total liabilities | Pearson Correlation | .396 | 1 |
| | Sig. (2-tailed) | .000 | |
| | N | 95 | 95 |

**. Correlation is significant at the 0.01 level (2-tailed).

Table 4.46 above shows the results of regression analysis which is a technique used in statistics for investigating and modelling the relationships between variables being studied (Douglas Montgomery, Peck & Vinning, 2012),was carried out by the study and Pearson correlation coefficients were used for the correlation analysis where the correlation coefficient (R) was established to be 0.396 as shown in table 4.49 above, which implied that there was a weak positive correction between book value of equity to total liabilities ratio and bankruptcy likelihood. The P value was 0.000 which was less than 0.05 at 95% confidence level, an indication that the ratio BVE to TL significantly influences bankruptcy likelihood of sugar companies in Kenya. The findings conform to those of Loncan and Caldeira (2014), who argued that the higher the gearing the less liquidity the firm is therefore highly geared companies should reduce, the risk of bankruptcy likelihood which eventually leads to actual bankruptcy.

**Table 4.47: Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .396 | .157 | .148 | 9.37982 |

a. Predictors: (Constant), Book value of equity total liabilities

Pearson correlation coefficients was used for the correlation analysis as shown in table 4.47 above where the correlation coefficient (R) was established to be 0.396 which implied that there was a weak positive relationship between BVE to TL ratio and bankruptcy likelihood (Namusonge, 2010), the P was 0.000 which was less than 0.05 an indication that BVE to TL ratio was significant in determining the bankruptcy likelihood of sugar companies in Kenya. The coefficient of determination ($R^2$) was 0.157 which was an indication that 15.7%, of the variations on bankruptcy likelihood was influenced by working BVE to TL ratio and 85.3% was determined by other factors at 0.05, significance level.

**Table 4.48: ANOVA**

| ANOVA | | | | | | |
|---|---|---|---|---|---|---|
| Model | | Sum of Squares | Df | Mean Square | F | Sig. |
| 1 | Regression | 1521.089 | 1 | 1521.089 | 17.289 | .000 |
| | Residual | 8182.240 | 95 | 87.981 | | |
| | Total | 9703.329 | 95 | | | |

a. Predictors: (Constant), Book value of equity total liabilities
b. Dependent Variable: Bankruptcy Likelihood

The results, of the study on analysis of variance (ANOVA) on BVE to TL ratio and bankruptcy likelihood were as shown in table 4.48 above. The P value was 0.000 which was less than 0.05 at 95% confidence level, hence implying that there was a significant relationship between book value of equity to total liabilities ratio and bankruptcy likelihood. The value of F (17.289) was also significant an implication that the BVE to TA ratio has a significant impact in predicting the bankruptcy likelihood of public

owned sugar companies in Kenya. The results of the findings agree with (Addae *et al.,* 2013) who argues that firms should be able to make decisions on gearings levels which will maximize the value of the firm. The study therefore, rejected the null hypothesis ($H_{04}$), at 95% confidence interval, meaning that statistically, there was a significant relationship between book value of equity to total liabilities ratio and prediction of bankruptcy likelihood of public owned sugar companies in Kenya.

**Table 4.49: Coefficients**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | | |
|---|---|---|---|---|---|---|
| | | **B** | **Std. Error** | **Beta** | **T** | **Sig.** |
| 1 | (Constant) | 17.824 | 2.014 | | 8.850 | .000 |
| | Book value of equity total liabilities | 9.999 | 2.405 | .396 | 4.158 | .000 |

a. Dependent Variable: Bankruptcy Likelihood

The findings from the above table 4.49 indicated that there was a positive correlation between book value of equity to total liabilities ratio and bankruptcy likelihood. The results gave the coefficient of BVE to TL ratio as 9.999 which meant that for every one-unit increase in BVE to TL ratio the bankruptcy likelihood increases by 9.999 units. The t value of 4.158 was statistically significant and supported by the p value of 0.000 and the p value of the constant was 0.000 which were less than 0.05 at 5% significance level an implication that both the BVE to TL ratio and the constant has a significant influence in predicting bankruptcy likelihood of sugar companies in Kenya. The fitted regression model appeared as below;

Z=17.824 + 9.999 BVE to TL ratio, where

Z =Z score which is a Measure of Bankruptcy Likelihood

BVE to TL ratio=Book value of equity to total liabilities ratio

### 4.8.5 Sales to Total Assets ratio, Line of Best and Bankruptcy Likelihood

The direction of the relationship between sales to total assets ratio and prediction of bankruptcy likelihood was determined by drawing a line of best fit since the line is important in providing the predicting ability of the model (Anderson *et al.*, 2002). The finding results were as in figure 4.7 below.

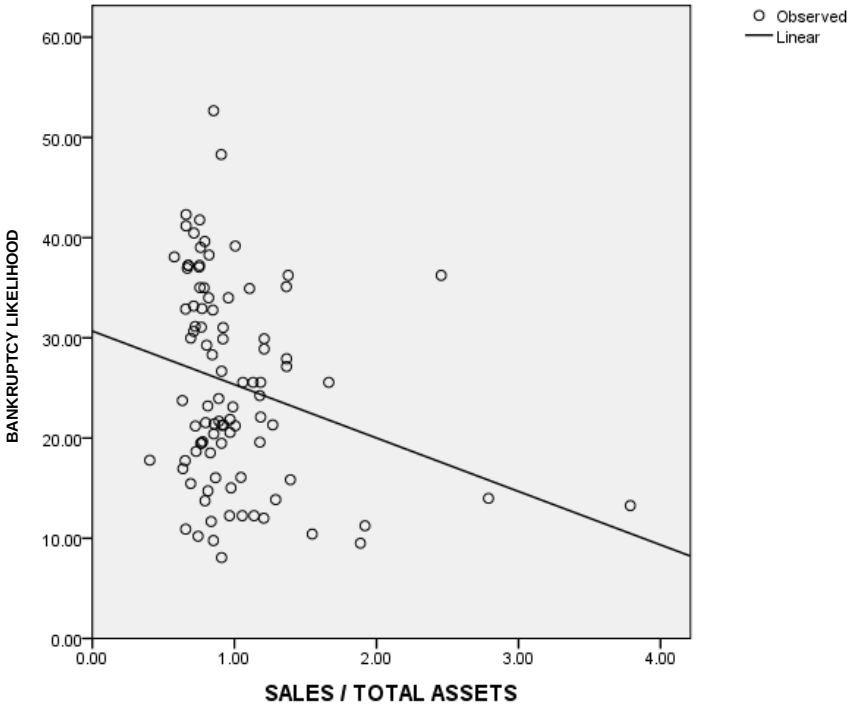



**Figure 4.7: Scatter graphs of Sales to Total Assets ratio**

The scatter diagram and line of best fit in (figure 4.7) above indicate negative association between sales to total assets ratio and bankruptcy likelihood. An increase by one unit of sales to total assets ratio results in the decrease of bankruptcy likelihood by 5.333 units. The p value as indicated in table 4.53 below was 0.016 which was less than 0.05 at 5% significant level, meaning that from the primary data of public owned sugar companies' sales to total assets ratio significantly influences bankruptcy likelihood of sugar companies in Kenya. The study results are in line with Pandey (2010) who argued

that the firm's total assets turnover ratio measure the firm's ability in generating sales out of its total financial resources committed to total assets and the more the ability the less bankruptcy likelihood the company may be.

**Table 4.50: Correlations**

| | | Bankruptcy Likelihood | Sales total assets |
|---|---|---|---|
| Bankruptcy likelihood | Pearson Correlation | 1 | -.247 |
| | Sig. (2-tailed) | | .016 |
| | N | 95 | 95 |
| Sales total assets | Pearson Correlation | -.247 | 1 |
| | Sig. (2-tailed) | .016 | |
| | N | 95 | 95 |

*. Correlation is significant at the 0.05 level (2-tailed).

Regression analysis is a technique used in statistics for investigating and modelling the relationships between variables being investigated by the study (Douglas, Montgomery, Peck, & Vinning, 2012), was carried out. In addition Pearson correlation coefficients was used for the correlation analysis where the correlation coefficient (R) was established to be -0.247 as per table 4.50 above which implied that there was a weak negative correction between sales to total assets ratio and bankruptcy likelihood. The results of the findings also gave the P value of 0.016 which was less than 0.05 at 5% level of significance meaning that the ratio significantly influences bankruptcy likelihood of sugar companies in Kenya.

**Table 4.51: Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | -.247 | .061 | .051 | 9.82237 |

a. Predictors: (Constant), Sales total assets

Pearson correlation coefficients was used for the correlation analysis where the correlation coefficient (R) was established to be -0.247 as indicated in table 4.51 above which was an indication that there was a weak negative relationship between sales to total assets ratio and bankruptcy likelihood (Namusonge, 2010), the coefficient of determination R squared ($R^2$) was 0.061 as given in table 4.51 above which implied that 6.1% of the changes in bankruptcy likelihood was determined by sales to total assets ratio and 93.9% was determined by other factors at 0.05 significance level.

**Table 4.52: ANOVA**

| Model | | Sum of Squares | Df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 576.600 | 1 | 576.600 | 5.976 | .016 |
| | Residual | 8876.061 | 92 | 96.479 | | |
| | **Total** | **9452.661** | **93** | | | |

a. Predictors: (Constant), Sales total assets

b. Dependent Variable: Bankruptcy Likelihood

Table 4.52 above gave the results of analysis of variance (ANOVA) on sales to total assets ratio and bankruptcy likelihood. The results of regression coefficient indicated that the P value was 0.016 which was less than 0.05 at 95% confidence level which was an indication that statistically, there was a significant relationship between sales to total assets ratio and bankruptcy likelihood of sugar companies in Kenya. The value of F 5.976 was also significant to conclude that the ratio was critical in prediction of bankruptcy likelihood of sugar companies in Kenya. Therefore, from the results of the study as shown in table 4.52 above the null hypothesis ($H_{05}$) is rejected at 95% confidence interval, meaning that statistically, there was a significant relationship

between sales to total assets ratio and prediction of bankruptcy likelihood of public owned sugar companies sin Kenya.

**Table 4.53: Coefficients**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | | |
|---|---|---|---|---|---|---|
| | | **B** | **Std. Error** | **Beta** | **T** | **Sig.** |
| 1 | (Constant) | 30.669 | 2.401 | | 12.772 | .000 |
| | Sales total assets | -5.333 | 2.181 | -.247 | -2.445 | .016 |

a. Dependent Variable: Bankruptcy Likelihood

The results in table 4.53 above shows, that there was a negative relationship between sales to total assets ratio and bankruptcy likelihood of sugar companies in Kenya. The result indicate that the coefficient of sales to total assets ratio was -5.33, which implied that for every one-unit increase in ratio the value of the Z score ratio model reduces by 5.333 which in turn reduces bankruptcy likelihood of sugar companies in Kenya. The P value was 0.016 which was less than 0.05 at 5% significance level. The T value of -2.445 was also significant to conclude that the ratio sales to total ratio asset statistically was significant in influencing the bankruptcy likelihood of sugar companies in Kenya. The resulting regression model was as follows:

Z=30.669 – 5.333 Sales to total assets ratio

### 4.9 The Joint Effect Model of Primary Data

The study tabulated the joint effect of the independent variables on the dependent variables in order to establish the extent to which all the independent variables influence the dependent variables.

**Table 4.54: Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Durbin-Watson |
|---|---|---|---|---|---|
| 1 | .913 | .833 | .824 | 11.44435 | 1.733 |

As evidenced from table 4.54 above, the joint regression model of using the Z score ratios model in predicting bankruptcy likelihood of sugar companies in Kenya. The correlation coefficient was 0.913 which was an indication that all the five independent variables jointly had strong positive associations with the dependent variable (Z) bankruptcy likelihood (Namusonge, 2010). In addition, R squared was 0.833, which implies that 83.3% of the variations in the Z score (bankruptcy likelihood) are caused jointly by the independent variables (working capital to total assets, retained earnings to total assets, earnings before interest and tax to total assets, book value of equity or market value of equity to total liabilities and sales to total assets ratios) and others 16.7% was caused by other factors outside the model. The value of Durbin-Watson was 1.733 which is below 2 was an indication that there was a positive autocorrelation. A rule of the thumb is that test statistics values in the range of 1.5 to 2.5 are relatively normal. The findings were in line with Field (2009), who suggested that values under 1 or more than 3 are a definite for concern.

**Table 4.55: ANOVA**

| Model | | Sum of Squares | Df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 58188.245 | 5 | 11637.649 | 88.855 | .000 |
| | Residual | 11656.614 | 89 | 130.973 | | |
| | Total | 69844.859[b] | 94 | | | |

ANOVA results for the overall model were as indicated in table 4.55 above. The results shows that the overall model was significant, meaning that the independent variables jointly influences the prediction of dependent variable since the joint P value was 0.000 as shown in table 4.55 above which was less than 0.05 at 5% significance level, the joint

F value of 88.855 was also significantly large to conclude that the model was significant in influencing the prediction of bankruptcy likelihood of sugar companies in Kenya.

### 4.10 Multi Collinearity Test

The study tested multi collinearity by computing the Variance Inflation factor (VIF) and it's reciprocal, the tolerance. The finding results were as shown in table 4.56 below.

**Table 4.56: Coefficients**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | | | Collinearity Statistics | |
|---|---|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | T | Sig. | Tolerance | VIF |
| 1 | Working capital total assets | -0.6470 | 1.208 | -2.270 | -5.355 | .000 | .264 | 3.788 |
| | Retained earnings total assets | 1.6198 | 3.929 | .351 | 4.122 | .000 | .259 | 3.858 |
| | Earnings before interest and tax total assets | -0.9768 | 4.038 | -.300 | -2.419 | .018 | .122 | 8.222 |
| | Book value of equity total liabilities | 1.9003 | 2.766 | .586 | 6.871 | .000 | .258 | 3.875 |
| | Sales total assets | -1.8164 | 5.499 | -.047 | -3.303 | .001 | .438 | 2.283 |

a. Dependent Variable: Bankruptcy Likelihood

b. Linear Regression through the Origin

The results of the study as shown in table 4.56 above indicate that variation inflation factors (VIF) which indicate whether a predictor has a strong linear relationship with other predictors in the model. The largest VIF should not be greater than 10 and from the findings as shown in table 4.56 above all the variables had a VIF of less than 10, working capital to total assets (3.788), retained earnings to total assets (3.858), earnings before interest and tax to total assets (8.222), book value of equity to total liabilities (3.8575) and sales to total assets ratio (2.283), which was an indication that the related regression coefficients were not poorly estimated because of multicollinearity (Douglas

Montgomery, Peck & Vinning, 2012). Tolerance which is used as an indicator of multicollinearity and estimated as (1-R squared) was computed as shown in table 4.56 above and the study established that all the independent variables had a tolerance of above 0.10; working capital to total assets (0.264), retained earnings to total assets (0.259), earnings before interest and tax to total assets (0.122), book value of equity to total liabilities (0.258) and sales to total assets ratio (0.438). Therefore, all the independent variables had a tolerance value of above 0.10 which is the minimum recommended level of tolerance (Tabachnick & Fidell, 2001) in addition it implied that the independent variables were not duplicated and they do not measure the same thing. As indicated in the table 4.56 above all the independent variables had a P value of less than 0.05; working capital to total assets (0.00), retained earnings to total assets (0.00), earnings before interest and tax to total assets (0.018), book value of equity to total liabilities (0.00) and sales to total assets ratio (0.001). This was an indication that statistically, the independent variables were significant in predicting the bankruptcy likelihood of sugar companies in Kenya.

Multiple regression analysis was used in order to establish how the independent variables (Z score ratios) namely; $X_1$=working capital to total assets ratio, $X_2$=retained earnings to total assets ratio, $X_3$=earnings before interest and tax to total assets, $X_4$=book value of equity or market value of equity to total liabilities and $X_5$=sales to total assets ratio jointly influences the dependent variable Z Score (bankruptcy likelihood). The results of the study established that there was a linear relationship between the independent variables and dependent variable. The multiple regression model of the study took the following form.

The overall regression equation derived was therefore, as follows:

$$Z = -0.647x_1 + 1.6198x_2 - 0.9768x_3 + 1.9003x_4 - 1.8164\,x_5$$

### 4.11 Test of Normality of the Primary Data

Statistical procedures carried on the primary data included correlation; T-tests, F-tests, mean mode, median standard deviation and Analysis of Variance (ANOVA). They were based on the assumption that the collected data follows a normal distribution (Razali & Wah, 2011).

$H_0$: The data is drawn from normally distributed population

$H_1$: The data is not drawn from a normally distributed population

Table 4.57 below gives the output of one-sample Kolmogorov test, where the value of Asymp. Sig. of the study variable was 0.531, which is more than 0.05, hence; we fail to reject the null hypothesis ($H_o$) and conclude that; the data competency and performance follows normally distributed (Field, 2009).

**Table 4.57: One – Sample Kolmogorov Test**

| | | **Bankruptcy Likelihood transformed** |
|---|---|---|
| N | | 95 |
| Normal Parameters | Mean | .0480 |
| | Std. Deviation | .02311 |
| Most Extreme Differences | Absolute | .148 |
| | Positive | .148 |
| | Negative | -.154 |
| Kolmogorov-Smirnov Z | | 0.446 |
| Asymp. Sig. (2-tailed) | | .531 |

Based on the output of one sample Kolmogorov-Smirnov test as shown in table 4.57 above indicates that the value of the variable a symp.sig (2-tailed) of 0.531 which was more than 0.05, and the study concludes that t statistically the data is normally distributed (Razali & Wah, 2011).

### 4.12 Testing of Primary Data Hypothesis for Public Owned Sugar Companies

The study sought to model the use of Z score ratios in predicting bankruptcy likelihood of sugar companies in Kenya. Therefore, to achieve this study conducted an overall regression model of each of the independent variables on the dependent variable to establish the effect of each independent variable on the dependent variable (bankruptcy likelihood) of sugar companies in Kenya. In addition the study carried out a joint effect of the independent variables on the dependent variable in order to establish how the independent variables jointly predict the dependent variable.

**Table 4.58: Hypothesis for Altman Z score Ratios Model in Predicting Bankruptcy Likelihood of Sugar Companies in Kenya**

| Altman's Z score ratio | Hypothesis | P-Value | Decision |
|---|---|---|---|
| Working capital to total assets | $H_{01}$: The ratio Working Capital to Total Assets has no significant influence in predicting Bankruptcy Likelihood of sugar companies in Kenya. | 0.000 | Rejected |
| Retained earnings to total assets | $H_{02:}$ The ratio Retained Earnings to Total Assets has no significant contribution in predicting Bankruptcy Likelihood of sugar companies in Kenya. | 0.000 | Rejected |
| Earnings before interest and tax to total assets | $H_{03:}$ The ratio Earnings before Interest and Tax to Total Assets has no significant influence in predicting Bankruptcy Likelihood of sugar companies in Kenya. | 0.018 | Rejected |
| Book value of equity or market value of equity to total liabilities | $H_{04:}$ The ratio Book Value of Equity or Market Value of Equity to Total Liabilities has no significant contribution in predicting Bankruptcy Likelihood of sugar companies in Kenya. | 0.000 | Rejected |
| Sales to total assets | $H_{05:}$ The ratio Sales to Total Assets has no significant influence in predicting Bankruptcy Likelihood of sugar companies in Kenya? | 0.001 | Rejected |

The study modelled and tested bankruptcy likelihood of sugar companies in Kenya by using the Altman's Z score ratios model and the output was as shown in table 4.58 above, the findings of the primary data of public owned sugar companies revealed that the Altman's Z score ratios model (working capital to total assets, retained earnings to total assets, earnings before interest and tax to total assets, book value of equity or market value of equity to total liabilities and sales to total assets ratio) ratios statistically they significantly influenced bankruptcy likelihood of sugar companies in Kenya, as their P value (P=0.000, 0.000, 0.018, 0.000 and 0.001) respectively were all less than 0.05. Therefore, the results of the study indicate that statistically, the Altman's Z score ratios model has a significant influence in predicting bankruptcy likelihood of sugar companies in Kenya for the period of the study at 95% confidence level.

### 4.13 Analysis of Secondary Data

The objective of the study was to model the use of Z score ratios in predicting bankruptcy likelihood of sugar companies in Kenya. The secondary data for public owned sugar companies was collected for a period of ten years (2007-2016) and secondary data for private owned sugar companies was collected for a period of five to six years (2010-2015) depending on when the private sugar company was established. Secondary data for both public and private owned sugar companies was collected with the aid of a data collection sheet as shown in Appendix IV. The collection and analysis of secondary data is reliable, efficient and economical for the research thesis (Polit & Beck, 2010).

Data was analyzed using SPSS where discriminant analysis was used. The analysis that has been presented in this chapter include; independent variables ratio for each company, independent variables per company status, group statistics, test of equality of group means, covariance matrices, log determinants, test results, Eigen values, Wilk's lambda, standardized canonical discriminant function coefficients, structure matrix, canonical discriminant function coefficient (Z score) and functions at group centroids.

### 4.13.1 Working Capital to Total Assets ratio and Bankruptcy Likelihood

Working capital is defined as the difference between current assets and current liabilities (Bhurnia & Sarkar; Burksaitiene & Mazintiene, 2011). When a firm had a positive working capital it is likely an indication of short term solvency, which meant that the company was able to pay its short term obligations when they fall due (Bhurnia & Sarkar (2011), Burksaitiene & Mazintiene, 2011). The study computed average working capital to total assets (average) ratio for each company status where the results were as illustrated in figure 4.8 below.

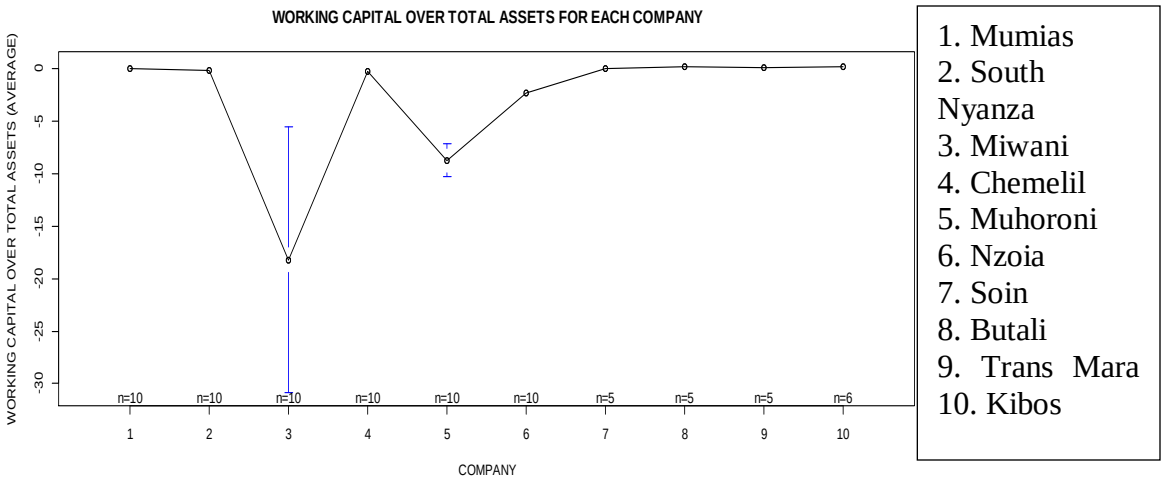



**Figure 4.8: Working Capital to Total Assets for Each Company**

The average working capital to total assets ratio for both public owned and privately owned sugar companies was computed and the results were as indicated in figure 4.8 above. The findings of the study show that in the public owned sugar companies Mumias Sugar Company had the greatest WC to TA ratio of -0.0466 which was averagely negative for the 10 years' period of study. This was because the company had a positive WC to TA ratio for the first 6 years of the study (2007-2012) however, for the last 4 years from (2013-2016) the WC to TA ratio was negative an indication that among the public owned sugar companies Mumias sugar was fairly managing well its

working capital management than the other five public owned sugar companies, South Nyanza sugar was second with an average WC to TA ratio of -0.182, Chemelil sugar company was third with an average WC to TA ratio of -0.3075, the fourth was Nzoia sugar company with an average WC to TA ratio of -2.374, fifth was Muhoroni sugar company with an average WC to TA ratio of -8.752 and the last one was Miwani sugar company with WC to TA ratio of -18.208 therefore all the public owned sugar companies had a negative average WC to TA ratio which ranged between 0 to -4.9785 as per figure 4.9 below for the period of ten years of study (2007-2016) which contributed to them being classified by the study as bankruptcy likelihood high.

The ratio of WC to TA ratio had a negative effect on bankruptcy likelihood prediction since the ratio had a discriminant Z score of 0.040 as shown in table 4.69, which meant that for every increase by one unit of WC to TA ratio the discriminant Z score value increased by 0.040 which reduced bankruptcy likelihood by 0.040 units, since all the public owned sugar companies were classified by the study as bankruptcy likelihood high, it meant that this ratio influenced their classification.

Additionally, the study computed the average WC to TA ratio for private owned sugar companies and the results were as illustrated in figure 4.8 above. Kibos Sugar Company had the greatest average WC to TA ratio of 0.1688, Butali Sugar Company was second with 0.1314, Transmara was third with 0.029 and Soin Sugar Company was last with -0. 277. Therefore averagely the private owned sugar companies had an average ratio ranging from 0 to 0.07476 as shown in figure 4.9 below. This partly explains the reason as to why all the private owned sugar companies were classified by the study as bankruptcy likelihood low, accept Soin Sugar Companies which was liquidated in 2014. The results of this study concurred with Sahut and Mili (2011) who state that poor management of short term liquidity may lead to increased bankruptcy likelihood in the firm and therefore, the bankruptcy likelihood of public owned sugar companies was likely due to poor management of liquidity, the results also was consistent with Bhurnia and Sarkar (2011) who state that bankruptcy likelihood is high when the firm is

experiencing financial problems such that its cash inflows are insufficient to meet its debt obligations both in the short and long term.

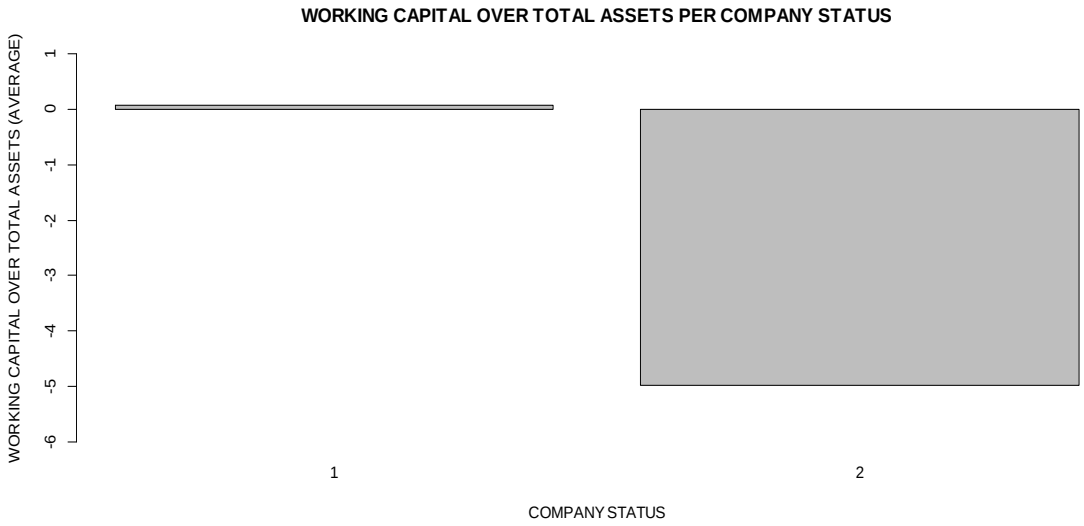



**Figure 4.9: Working Capital to Total Assets per Company Status**

**Group.1**

1. Private 0 to 0.0747619

2. Public 0 to -4.9785000

The study computed the average results of the working capital to total assets ratio per company status where the average ratio for public sugar companies ranged from 0 to -4.9785 and for private sugar companies the ratio ranged between 0 and 0.0748. Therefore, on average the ratio of public sugar companies was negative which meant that on average they were not able to settle their short term obligations when they fall. In addition it is an indication that their bankruptcy likelihood was high. The results of this finding were consistent with the findings of the primary data of public owned sugar companies, which revealed that the higher the ratio, the low bankruptcy likelihood the

sugar company was as indicated in figure 4.3. Additionally, table 4.26 shows that 74.7 % of the respondents agreed that increasing in working capital is an indication of low bankruptcy likelihood. This study finding conforms to those of Pranowo *et al.,* (2010) who established that the more the financial ratios decline in value the higher the bankruptcy likelihood the company is likely to be.

The average ratio for private sugar companies was positive although relatively low which meant that on average they were able to settle their short term obligations when they fall due which was an indication that their bankruptcy likelihood was low within the study period, the results also were in line with Waston and Head (2007) who asserts that adequate liquidity is needed to ensure survival of the business in the short and long term.

### 4.13.2 Retained Earnings to Total Assets ratio and Bankruptcy Likelihood

Retained earnings are the portion of a firm's income that is reinvested into the company for future expansion and growth (Bhurnia & Sarkar, 2011; Burksaitiene & Mazintiene, 2011). In addition, retained earnings are important components of the Altman's Z score ratio model because it measures the overall profitability of the firm over time (Gibson, 2011). The study computed retained earnings to total assets average ratio for each company status and the results were as shown in figure 4.10 below

The more the retained earnings the more the investments the company has which is likely to reduce bankruptcy likelihood by increasing the book value of equity and provision of internal funding which is not costly Campbell, Hischer and Ssikggi (2012). In addition Stewart (2011) argues that use of retained earnings reduces an interest payment which increases profitability, cash flows and net worth and hence reduces bankruptcy likelihood.

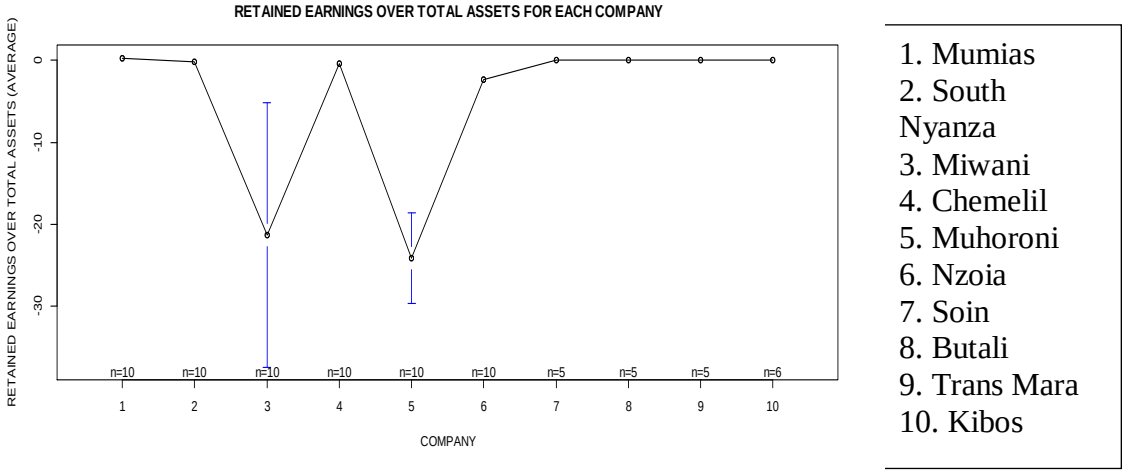



**Figure 4.10: Retained Earnings to Total Assets for each Company**

The average RE to TA ratio for both public owned and privately owned sugar companies were computed and the results were as indicated in figure 4.10 above. The Public owned sugar companies results indicates that Mumias Sugar Company had the greatest average RE to TA ratio of 0.2475 for the 10 years period of study this was because Mumias Sugar Company had a positive RE to TA ratio for the first 9 years of the study (2007-2015), except for the last year of study 2016 when the RE to TA ratio was negative an indication that among the public owned sugar companies Mumias Sugar Company was better in terms of using internal sources of funds in financing its total asset than the other 5 public owned sugar companies. South Nyanza Sugar company was second with an average RE to TA ratio of -0.1718, Chemelil sugar company was third with an average RE to TA ratio of -0.3509, Nzoia was fourth with -2.285, Miwani was fifth with -21.338 and Muhoroni was last with -24.196 this was because for the whole 10 years period of the study (2007-2016) Muhoroni sugar company had a negative RE to TA ratio which averaged to – 24.196.This was an indication that all the projects of Muhoroni sugar company were financed by external borrowings a situation which

increases interest and other cost payments and increased bankruptcy likelihood (Stewart, 2011).

The output of the discriminant function as indicated in table 4.69 shows the discriminant coefficient of RE to TA ratio of -0.049 which meant that for every increase by one unit of RE to TA ratio the value of discriminate Z score reduced by 0.049 unit which lowered the discriminant Z score value and increased bankruptcy likelihood because the lower the discriminate Z score value the more bankruptcy likelihood the company was, however since this ratio is also a component of the book value of equity which had the highest discriminating power. This means that the lower the ratio the lower the book value of equity which in turn reduced the value of the discriminant Z score and increases bankruptcy likelihood of public owned sugar companies in Kenya. The findings of this study agree with Pranowo *et al.* (2010) whose study of Indonesia stock exchange companies established that the more the financial ratios decline the higher the bankruptcy likelihood the company is likely to be a scenario which call for the need of companies to improve their financial performance position.

The average RE to TA ratio for private owned sugar companies was computed and the results were as shown in figure 4.10 above. The results indicates that Kibos Sugar Company had the greatest average RE to TA ratio of 0.0865, Butali sugar was second with 0.0614, Transmara was third with 0.0175 and Soin sugar was last with 0. 0014. Therefore from the study results it is evidenced that private owned sugar companies were more effective in using their assets to generate profits and retained more of their profits which they use partly to finance their assets a situation which reduced their leverage levels, increased profitability, cash flows and net worth and reduces bankruptcy likelihood . The results of this study agree with Frank and Goyal (2008), who argues that increase in the cost of debt is likely to lead the company to be financially overstretched due to high payments of interests which may reduce profitability, cash flow and net worth hence, leading to bankruptcy likelihood high . The findings of this study were also consistent with Saunders and Cornett (2011), who

asserts that a higher gearing ratio will increase borrower security charges and claim on firm's cash flow hence increase bankruptcy likelihood.


**Figure 4.11: Retained Earnings to Total Assets Per Company Status**

Group1

1. Private 0 to 0.04380952

2. Public 0 to -8.01633333

The study tabulated the average retained earnings to total assets ratio per company status and the findings were as shown in figure 4.11 above where on average the ratio for public sugar companies ranged between 0 to -8.01633 and for private sugar companies ranged between 0 to 0.0438. This ratio on average for public sugar companies was negative which signified that the entire assets of these sugar companies were financed by external borrowings which reduce profitability due to increased interest payments

Stewart (2011) hence increasing bankruptcy likelihood due to reduced cash flows, profitability and net worth.

The results of this secondary data was in line with the findings of primary data (as shown in table 4.27) where most of the respondents of public owned sugar companies in Kenya (63.1%) disagreed that the retained earnings of their sugar companies has been increasing for the last ten years of the study. The results are consistent with Kasilingam and Jayabal (2012) who argues that the more the retained earnings the company has the more it's assets will be financed internally a situation which reduces interest payment and increase profitability, cash flows and net worth and hence leading to reduce bankruptcy likelihood.

In the case of private sugar companies, the average ratio was positive, but relatively low which indicated that on average 4.38% of the private sugar company's total assets were financed by retained earnings and a greater percentage 95.62% were financed by other sources. The results of this study was consistent with the findings of Campbell, Hischer and Ssikggi (2012), who argue that the more the retained earnings the firm has the more the investments which automatically lead to low bankruptcy likelihood.

### 4.13.3 Earnings before Interest, Tax and Bankruptcy Likelihood

The study computed earnings before interest and tax to total assets ratio for each company status and the results were as shown in figure 4.12 below. The ratio is in the category of profitability ratios which is normally used as a measure of management efficiency since it measures how effective management uses its assets (resources) to generate revenue (Pervan, Pervan & Vukoja, 2011).The results of this study revealed that the lower the ratio the higher bankruptcy likelihood the sugar company was.

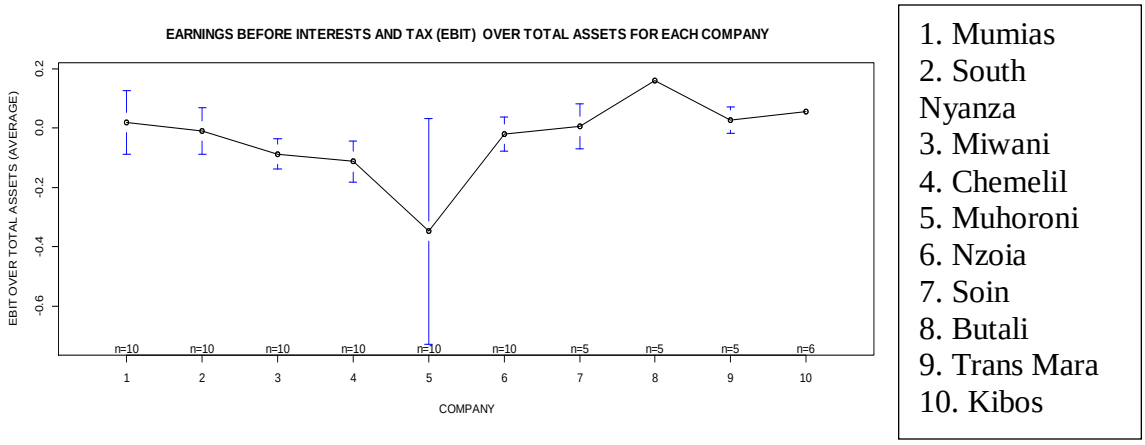



**Figure 4.12: Earnings Before Interest and Tax to Total Assets ratio for Each Company**

The study computed the average retained EBIT to total assets ratio for both public owned and privately owned sugar companies and the results were as shown in figure 4.12 above. Public owned sugar companies results shows that Mumias sugar had the greatest average EBIT to TA ratio of 0.159 for the 10 years' period of study (2007-2016). This was due to the fact that Mumias sugar company had a positive EBIT to TA ratio for all the ten years' period of the study (2007-2016), which was an indication that among the public owned sugar companies Mumias sugar was better in terms of using the assets they had employed in the business to generate earnings than the other five public owned sugar companies for the periods of the study. South Nyanza was second with -0.00746, Nzoia was third with -0.0203, Miwani was fourth with -0.0853, Chemelil was fifth with -0.1127 and the worst was Muhoroni which had EBIT to TA ratio of -0.348. The findings of this study concurs with Pranowo *et al.* ,(2010), whose study of Indonesia stock exchange companies concluded that the more the financial ratios of a company decline the higher the bankruptcy likelihood the company is likely to be.

The average EBIT to TA ratio for private owned sugar companies was computed and the results were as shown in figure 4.12 above where Butali Sugar Company had the greatest average EBIT to TA ratio of 0.159, Kibos sugar was second with 0.0558, Transmara was third with 0.0237 and Soin sugar was last with 0.0064. Therefore, all the

public owned sugar companies had a negative EBIT to TA ratio accept Mumias which had a positive of 0.159, although it has been deteriorating over time. This was an indication that the private owned sugar companies had been controlling their cost of sales and other operating expenses in order to maximize EBIT than the public owned sugar companies. The results of table 4.69 shows that the discriminant Z score coefficient for the EBIT to TA ratio was 1.554 which meant that for every increase by one unit of EBIT to TA ratio the discriminate Z score value increases by 1.554, units which in turn reduced the bankruptcy likelihood because the higher the discriminant Z score the lower the bankruptcy likelihood. The results of this findings were consistent with (Bhurnia & Sarkar, 2011), who stated that bankruptcy likelihood is high when the firm is experiencing financial problems such that it is cash inflow are in sufficient to meet its debt obligations. It also agrees with Stewart (2011), who stated that if the company pays interest and other costs that exceed what it is receiving its likely to experience bankruptcy likelihood high.

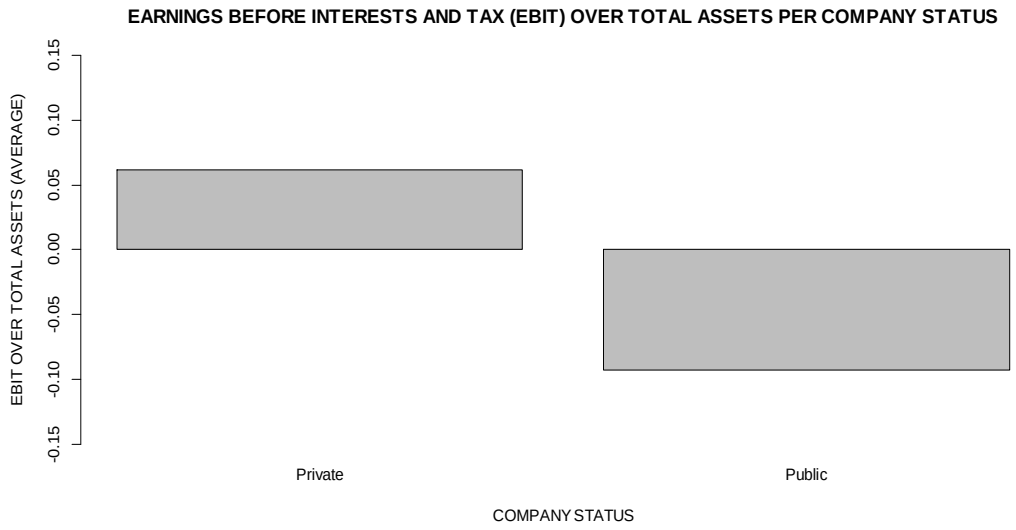



**Figure 4.13: Earnings before Interest and Tax to Total Assets Per Company Status**

Group 1 x

1. Private 0 to 0.06190476

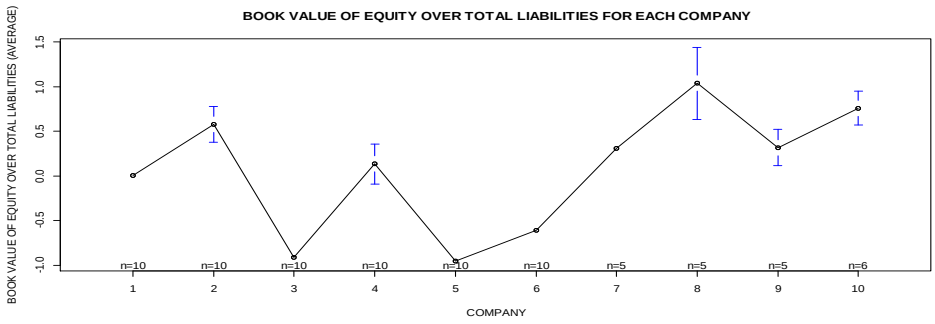
2. Public 0 to -0.093000

The average results of earnings before interest and tax to total assets ratio per company status were illustrated as shown in figure 4.13 above. On average the ratio for public sugar companies ranged between 0 to -0.093 which was negative, meaning that the management of public owned sugar companies in Kenya were not effective in using the resources (total assets) they have employed in the business to generate earnings which has an effect of increasing the bankruptcy likelihood due to reduced profitability, cash flows and net worth. These findings of secondary data agree with the results of primary data for public owned sugar companies in Kenya (as per table 4.28) where a majority of the respondents (64.2%) disagreed that the earnings before interest and tax of their sugar companies had been increasing for the last ten years. In addition figure 4.5 shows a negative relationship between the primary data of public owned sugar companies and prediction of bankruptcy likelihood where an increase by one unit in the ratio EBIT to TA bankruptcy likelihood by 2.705 units. The results of this study further concur with Palenu and Healy (2008) who argues that high earnings before interest and tax to total asset is an indication of a company that is effective in controlling operating costs to maximize profitability.

The ratio for private sugar companies averaged between 0 to 0.0619 which was positive although relatively low but an indication that private owned sugar companies were more effective in using the resources they had employed in the business to generate earnings than the public owned sugar companies and this contributed to them being classified by the study as bankruptcy likelihood low. The results of this study concur with the findings of Loncan and Caldeira (2014) who argues that the higher the gearing the less liquidity the firm. Therefore, highly geared companies should reduce the risk of bankruptcy likelihood which eventually is likely to results actual bankruptcy.

### 4.13.4 Book Value of Equity to Total Liabilities ratio and Bankruptcy Likelihood

Book value of equity is the ownership or stockholder's investment in a firm (Cornett et al, 2012). The study computed the average BVE to TL ratio and the findings were as tabulated in figure 4.14 below. The book value of equity is normally represented in the statement of financial position and can be measured as the difference between total assets and total liabilities also it indicates the extent to which the total assets of the company are financed and for purposes of this study if a company was financed mostly by liabilities than equity it had the effect of increasing the bankruptcy likelihood and vice versa due to high interest payments which reduces profits, cash flows and net worth.




1. Mumias
2. South Nyanza
3. Miwani
4. Chemelil
5. Muhoroni
6. Nzoia
7. Soin
8. Butali
9. Trans Mara
10. Kibos

**Figure 4.14: Book Value of Equity to Total Liabilities for Each Company**

The average BVE to TL ratio, for each of the sugar companies was tabulated and the results were as illustrated in figure 4.14 above. The findings shows that South Nyanza Sugar Company had the highest ratio of 0.577, Chemelil was second with 0.1324, Mumias was third with 0.023, Nzoia was fourth with -0.6088, Miwani was fifth with -0.915 and the worst was Muhoroni with -0.957. The results indicate that Nzoia, Miwani and Muhoroni are highly geared companies and their assets were financed more than 100% by external borrowing. The results in table 4.69, indicate that the discriminant Z score coefficient for BVE to TL ratio was 1.669 which meant that for every increase by one unit of BVE to TA ratio the Z score value increased by 1.669 units which reduces bankruptcy likelihood this is because the higher the discriminant Z score the lower the

bankruptcy likleihood. The study findings are in line with Klammer (2011) who states that the use of gearing is one way of improving performance of the firm if used properly in productive units. In addition it concurs with Rayan (2010) whose study of listed companies in Johannesburg Stock Exchange, South Africa revealed a negative relationship between use of debt in relation to equity and bankruptcy likelihood.

The average BVE to TL ratio for the private owned sugar companies was also as illustrated in figure 4.14 above. The results shows that Butali had the highest ratio of 1.037, Kibos was second with the ratio of 0.7575, Trans Mara sugar was third with 0.318 and the last was Soin with the average BVE to TL ratio of 0.306. The results of this study reveals that all the private owned sugar companies total assets were financed by both equity and external borrowing and this contributed to their classification by the study as bankruptcy likelihood low in comparison to the public owned sugar companies which were classified by the study as bankruptcy likelihood high. The findings of this study agrees with various previous studies for example, (Loncan & Caldeira ; Loncan & Caldeira, 2014; Wang & Campbell, 2010) who argued that the higher the gearing the less the liquidity the company is, therefore highly geared companies should reduce the risk of bankruptcy likelihood.

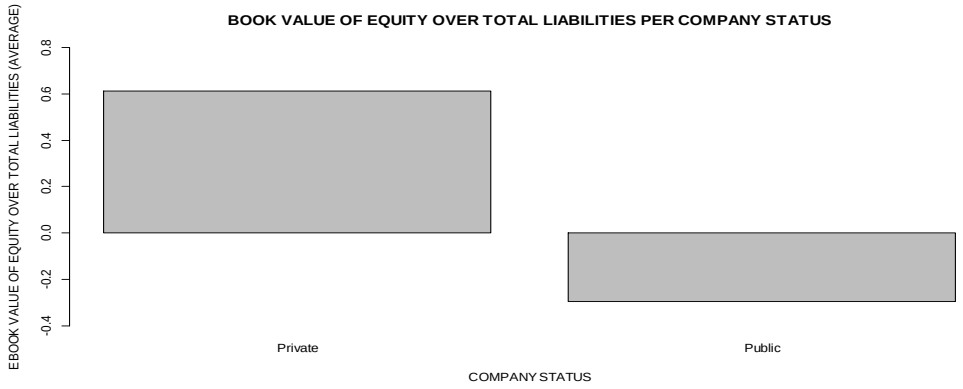



**Figure 4.15: Book Value of Equity to Total Liabilities ratio per Company Status**

Groups

1. Private 0 to 0.6124286

2. Public 0 to -0.2950078

The average ratio book value of equity to total liabilities was computed by the study and the findings were as shown in figure 4.15 above as per company status. As indicated the average ratio for public owned sugar companies ranged between 0 to -0.295 which was negative, an indication that the total assets of these public sugar companies had been financed by liabilities and not equity a situation which increased their level of bankruptcy likelihood. The output of this secondary data concurs with the findings of primary data (As shown in table 4.31) where most of the respondents of public owned sugar companies in Kenya (82.2%), agreed that the more the total liabilities, the more bankruptcy likelihood. The findings in table 4.31 clearly show that 82% of the respondents of public owned sugar companies disagreed that the book value of equity of their respective companies has been increasing. The results of this study also concur with Abor (2007) who argues that a company should apply a mix of debt and equity in different proportions which will maximize the value of the company and minimize the level of bankruptcy likelihood.

While for private sugar companies averagely the ratio ranged between 0 to 0.612, an indication that total assets of these companies had been financed by 61.2% equity and 38.8% liabilities a situation which reduced their level of bankruptcy likelihood due to low interest payments which in turn increases profitability, cash flows and net worth. The findings of this study were consistent with various previous studies which established that high gearing will reduce profitability, cash flows and net worth due to high interest payments and increase the bankruptcy likelihood (Stewart, Saunders & Cornett, 2011).

### 4.13.5 Sales to Total Assets ratio and Bankruptcy Likelihood

Total assets turnover is a quantitative measure of total sales divided by total book value of assets (Cornett *et al.,* 2012). The ratio total assets turnover which is the ratio that measures how effective a company utilizes its total assets to generate sales was computed by the study and the results were as shown in figure 4.16 below. If sales are high compared to the asset base of a company or sales increasing at a high rate in comparison to total assets it will be an indication of efficient utilization of the assets in the overall operation of the company. Low total assets turnover rate is an indication that the company may have many idle assets that are not productive or the management of the company is not effective in utilizing total assets to generate sales hence for the purpose of this study contributing to bankruptcy likelihood high (Palenu & Healy, 2008).This is due to low profitability, low cash flow and low net worth.

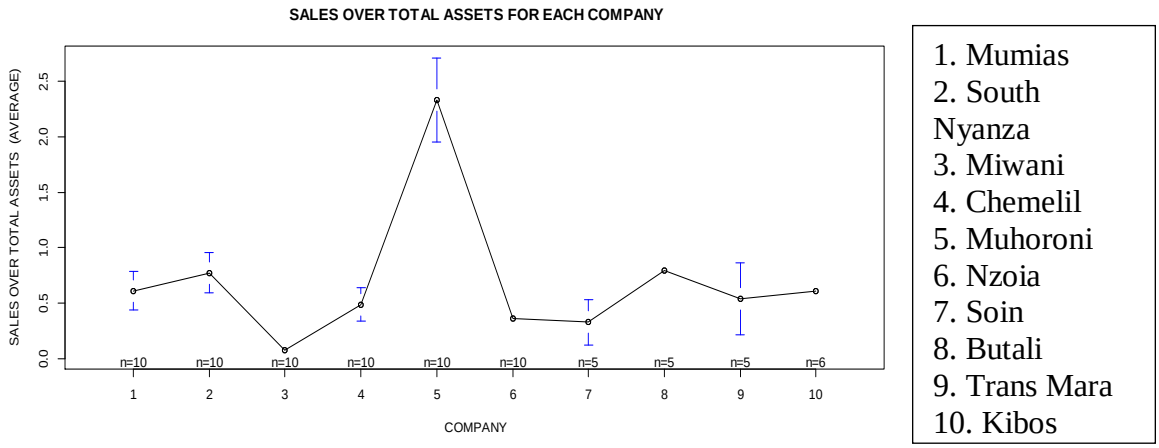



**Figure 4.16: Sales to Total Assets Ratio for Each Company**

The average sales to total assets ratio for both public owned sugar companies and privately owned sugar companies were computed and the results were as in figure 4.16 above. The results of this study indicates that in the public owned sugar companies Muhoroni Sugar Company had the highest average sales to TA ratio of 2.328 for the 10 years which was the period of study (2007-2016). This was because Muhoroni sugar

company had a higher sales to TA ratio for the period of study (2007-2016), an indication that among the public owned sugar companies Muhoroni sugar was better within the study period in using the total assets they have employed in the business to generate sales, South Nyanza was second with 0.7708, Mumias was third with 0.611, Chemelil was fourth with 0.4867, Nzoia was fifth with 0.359 and Miwani was the last with 0.0757.

The findings of this study, concurs with Pranowo *et al.,* (2010) who argued that the company's efficiency is measured by how well the company utilizes its assets to generate revenues, where for the purposes of this study those sugar companies which were able to properly utilizes their total assets to generate revenues had an effect of increasing profitability, cash flows and net worth hence assuming that cost of sales and other operating expenses remaining the same or increasing at a low margin it increased the value of discriminant Z score and reduced the level of bankruptcy likelihood.

The average sales to TA ratio for private owned sugar companies were computed and the results were as indicated in figure 4.16 above. Butali Sugar Company had the highest average sales to TA ratio of 0.795, Kibos sugar was second with 0.6065, Transmara was third with 0.537 and Soin Sugar was last with 0.327. The results in table 4.69 gives the discriminate Z score coefficient of -0.016, which meant that there was a weak negative relationship between the sales to TA ratio and the discriminate Z score ( bankruptcy likelihood) value because for every increase by one unit of sales to TA ratio the value of the discriminate Z score reduced by 0.016 unit and this explains why although public owned sugar companies having a higher average sales to TA ratio of 0.7723 as in figure 4.17 below, their bankruptcy likelihood was high compared to private owned sugar companies who had an average ratio of 0.569 as in figure 4.17 below. This was because the ratio was insignificant in influencing bankruptcy likelihood of sugar companies in Kenya the reason was that a company with high sales but very high cost of sales and other operating costs it is profits, cash flows, net worth will be low a situation which is likely to increase bankruptcy likelihood . The findings of this study were consistent with Bhurnia and Sarkar (2011) who state that bankruptcy likelihood is high when the firm is

experiencing financial problems such that its cash inflows are insufficient to meet its debt obligations. The results also concur with Stewart (2011) who stated that if the company pays interests and other costs that exceed what it is receiving its bankruptcy likelihood will be high.

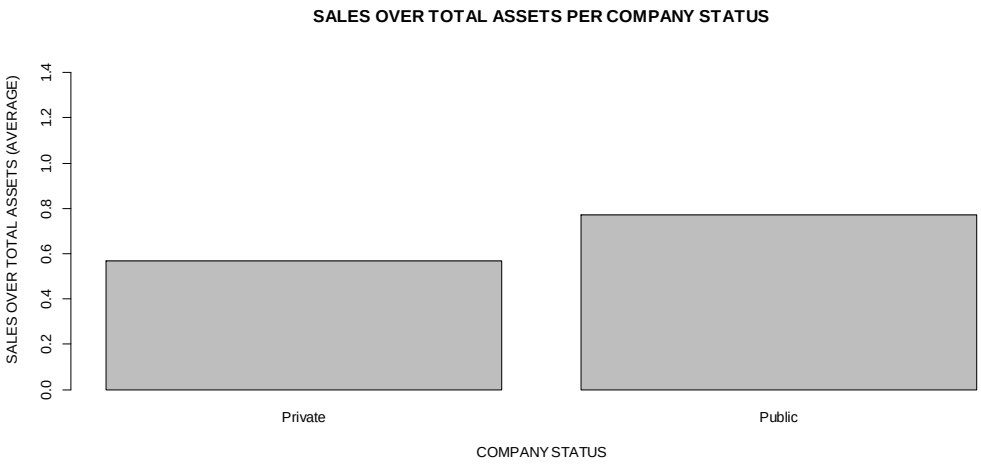



**Figure 4.17: Sales to Total Assets ratio Per Company Status**

**Groups**

1. Private 0 to 0.5690476

2. Public 0 to 0.7723333

The results of average sales to total assets ratio per company status was tabulated by the study as illustrated in figure 4.17 above. The ratio measures how management utilizes total assets to generate sales, the more the ratio the better. On average the ratio for public owned sugar companies ranged between 0 to 0.7723 which was positive and meaning that for every one-unit investment in total assets generated 0.7723 units of sales on average as shown in figure 4.17 above. The private owned sugar companies the ratio ranged between 0 to 0.569 on average which was an indication that public sugar companies were more effective in utilizing their total assets to generate sales than the private sugar companies, however the public sugar companies were not effective in

controlling cost of sales and other operational costs in order to maximize profitability, cash flows and net worth since their profitability and cash flows were low compared to private owned sugar companies a situation which led to their classification by the study as bankruptcy likelihood high.

This findings of secondary data concurs with the findings of primary data for public owned sugar companies (As per table 4.25), where 59% of the respondents disagreed that for the last ten years the sales of their companies has been increasing, also 65.2% of the respondents agreed that for the last ten years the cost of sales has been increasing. The results of this study agree with Bhurnia and Sarkar (2011) who stated that the firm is said to be in a state of bankruptcy likelihood high when the firm is experiencing financial problems such that its cash inflow are insufficient to meet its debt obligations.

Averagely for private owned sugar companies the ratio ranged from 0 to 0.569 as shown in figure 4.17 above. These findings meant that for every sh1 unit invested in total assets it generated 0.569 units of sales which was less than the average for public owned sugar companies where averagely it generated 0.7723 units of sales. However, averagely the management of private owned sugar companies is more effective in controlling their cost of sales and other operating expenses to maximize profitability as it is evidenced from the results in figure 4.13. This had a likely effect of reducing bankruptcy likelihood by increasing the value of discriminant Z score.

**Table 4.59: Group Statistics**

| Bankruptcy Likelihood | | Mean | Std. Deviation | Valid N (listwise) Unweighted | Weighted |
|---|---|---|---|---|---|
| Bankruptcy Likelihood low | Working capital to Total assets | .1035 | .09256 | 26 | 26.000 |
| | Retained earnings to Total assets | .1288 | .13222 | 26 | 26.000 |
| | Earnings before interest and tax to Total assets | .0908 | .05491 | 26 | 26.000 |
| | Book values of equity to Total liability | .9142 | .54672 | 26 | 26.000 |
| | Sales to Total assets | .6692 | .18967 | 26 | 26.000 |
| Bankruptcy Likelihood high | Working capital to Total assets | -5.4515 | 9.95386 | 55 | 55.000 |
| | Retained earnings to Total assets | -8.7893 | 14.50230 | 55 | 55.000 |
| | Earnings before interest and tax to Total assets | -.1207 | .25611 | 55 | 55.000 |
| | book values of equity to Total liability | -.2971 | .63620 | 55 | 55.000 |
| | Sales to Total assets | .7435 | .82325 | 55 | 55.000 |
| Total | Working capital to Total assets | -3.6684 | 8.58433 | 81 | 81.000 |
| | Retained earnings to Total assets | -5.9267 | 12.63014 | 81 | 81.000 |
| | Earnings before interest and tax to Total assets | -.0528 | .23471 | 81 | 81.000 |
| | Book values of equity to Total liability | .0917 | .83091 | 81 | 81.000 |
| | Sales to Total assets | .7196 | .68551 | 81 | 81.000 |

The study tabulated the distribution of the observations to the two study groups (bankruptcy likelihood low or high) in order to establish whether the model was capable of discriminating between bankruptcy likelihood low or high by computing group statistics as indicated in table 4.59 above. The group bankruptcy likelihood low were 26 observations and the independent variable book value of equity to total assets ratio had the highest mean of 0.9142, with the highest variations from the mean of 0.5491.The second was sales to total assets ratio with the mean of 0.6692, being the second highest

variations from the mean of 0.1867, the third was retained earnings to total assets ratio which had the mean of 0.1288 with a variation of 0.1288 which was third, the fourth was working capital to total assets ratio with a mean of 0.1035 and with the fourth highest variations from the mean of 0.09256 and the last one was earnings before interest and tax to total assets ratio which had a mean of 0.0908 and with the least variations from the mean of 0.05491. Therefore the more the mean the more the variation from the mean and there was a high difference between the mean of book value of equity to total liabilities ratio and the mean of earnings before interest and tax to total assets ratio which means that the ratio book value of equity to total liabilities had the most discriminating power on whether an observation was classified in this group of bankruptcy likelihood low and the ratio earnings before interest and tax to total assets had the most discriminating power on whether an observation was to be classified in this group or the other group.

In addition table 4.59 above gives the results for the group bankruptcy likelihood high where there were 55 observations and the independent variable retained earnings to total assets ratio had the highest mean of -8.789, with the highest variations from the mean of 14.502, the second was working capital to total assets ratio with the mean of -5.4515, also with the second highest variations from the mean of 9.954, the third was sales to total assets ratio which had the mean of 0.7435 with a variation of 0.823 which was third, the fourth was book value of equity to total liabilities ratio with a mean of -0.297 and with the fourth highest variations from the mean of 0.63620 and the last one was earnings before interest and tax to total assets ratio which had a mean of -0.1207 and with the least variations from the mean of 0.25611. Therefore the more the mean the more the variation from the mean and there was a high difference between the mean of retained earnings to total assets ratio and the mean of earnings before interest and tax to total assets ratio which means that the ratio retained earnings to total assets had the most discriminating power on whether an observation was classified in this group of bankruptcy likelihood high and the ratio earnings before interest and tax to total assets had the most discriminating power on whether an observation was classified in this

group or the other group. Therefore, the ratio earnings before interest and tax to total asset ratio had the greatest discriminating power in which in which group an observation was to be grouped.

Additionally, table 4.59 gives the results of the total number of observations which were 81 and retained earnings to total assets ratio had the highest discriminating power with a mean of -5.927 with the largest variations from the mean of 12.630, working capital to total assets ratio was second with the mean of -3.668 and with the second variations from the mean of 8.584, the third ratio was sales to total assets ratio with a mean of 0.7196 and a disparity from the mean of 0.686, the fourth ratio was book value of equity to total liabilities which had a mean of 0.0917 with a disparity from the mean of 0.831 and the last ratio was earnings before interest and tax to total assets which had a mean of -0.0528, with a variation from the mean of 0.23471. Therefore there were many 55 out of 81 observations which were grouped as bankruptcy likelihood high.

On the other hand there were 26 out of 81 observations that were grouped as bankruptcy likelihood low. On average, the mean for bankruptcy likelihood low were more than the mean for bankruptcy likelihood high, which was a confirmation that the more the score the low bankruptcy likelihood the sugar company was. The standard deviation of bankruptcy likelihood low were also lower ranging from 0.05491 to 0.54672, than the standard deviation for bankruptcy likelihood high which ranged from 0.25611 to 14.5023, this was an indication that there was great variation of means for bankruptcy likelihooded than not bankruptcy likelihood.

**Table 4.60: Tests of Equality of Group Means**

| | Wilks' Lambda | F | df1 | df2 | Sig. |
|---|---|---|---|---|---|
| Working capital to Total assets | .908 | 8.043 | 1 | 79 | .006 |
| Retained earnings to Total assets | .890 | 9.767 | 1 | 79 | .002 |
| Earnings before interest and tax to Total assets | .821 | 17.246 | 1 | 79 | .000 |
| Book values of equity to Total liability | .531 | 69.774 | 1 | 79 | .000 |
| Sales to Total assets | .997 | .205 | 1 | 79 | .652 |

Table 4.60 above indicates the results of tests of the equality of the group mean by measuring each independent variable potential in discriminating power for either bankruptcy likelihood low or bankruptcy likelihood high. This is by comparing the differences that exists between the variable means of bankruptcy likelihood low and bankruptcy likelihood high which was carried out by the study to identify independent variables ability to discriminate well where all the independent variables had a P value of less than 0.05.The results of the study revealed that book value of equity to total liabilities ratio (0.000), earnings before interest and tax to total assets (0.000), retained earnings to total assets (0.002), working capital to total assets (0.006).

In addition the sales to total assets ratio which had a P value of more than 0.05 which was 0.652, meaning that statistically, the ratio was not significant in discriminating between the means for either bankruptcy likelihood low or bankruptcy likelihood high thus, the findings of the study revealed that the following four independent variables were important predictors of the classification between bankruptcy likelihood sugar companies in Kenya this is because in addition, their F test which measures the significant of the Wilk's Lambda was were as follows; BVE to TL ratio was the best predictor with F value of 69.774 , followed by EBIT to TA ratio with F value of 17.246, RE to TA ratio was third with F value of 9.767, WC to TA ratio was fourth with the F value of 8.043 and the last was sales to total assets ratio with the F value of 0.205 and P-value of 0.652 which was more than 0.05, meaning that statistically, the ratio does

not significant predictor of bankruptcy likelihood of sugar companies in Kenya. The Wilk's Lambda which measures the independent variables potential power of discriminating or predicting was also carried out by the study, the smaller the value of the Wilk's Lambda the better that variable contributes to discriminating between the groups. The SPSS result outputs indicates that the ratio BVE to TL had the lowest (0.531), EBIT to TA (0.821), RE to TA (0.890), WC to TA (0.908) and the last was sales to TA (0.997), meaning that statistically, the ratio sales to TA did not discriminate well between the prediction bankruptcy likelihood of sugar companies in Kenya. Therefore, table 4.60 above test of equality of group means provides sufficient statistical evidence of significant differences between means of bankruptcy likelihood low and bankruptcy likelihood high where BVE to TL ratio and EBIT to TA ratio produced higher value of F which was an indication that they had the highest discriminating powers in the model.

Therefore from the results as in table 4.60 above the study rejected the following hypothesis;

$H_{01}$: The ratio Working Capital to Total Assets has no significant influence in predicting bankruptcy likelihood of sugar companies in Kenya.

$H_{02}$: The ratio Retained Earnings to Total Assets has no significant contribution in predicting bankruptcy likelihood of sugar companies in Kenya.

$H_{03}$: The ratio Earnings before Interest and Tax to Total Assets has no significant influence in predicting bankruptcy likelihood of sugar companies in Kenya.

$H_{04}$: The ratio Book Value of Equity or Market Value of Equity to Total Liabilities has no significant contribution in predicting bankruptcy likelihood of sugar companies in Kenya.

Therefore from the results as in table 4.60 above the study failed to reject the following hypotheses;

$H_{05}$: The ratio Sales to Total Assets has no significant influence in predicting bankruptcy likelihood of sugar companies in Kenya.

**Table 4.61: Hypotheses for Altman Z score ratios Model influence on Bankruptcy Likelihood of sugar Companies in Kenya**

| Altman's Z score ratio | Hypothesis | P-Value | Decision |
|---|---|---|---|
| Working capital to total assets | $H_{01}$: The ratio working capital to total assets has no significant influence in predicting bankruptcy likelihood of sugar companies in Kenya. | .006 | Rejected |
| Retained earnings to total assets | $H_{02:}$ The ratio retained earnings to total assets has no significant contribution in predicting bankruptcy likelihood of sugar companies in Kenya. | .002 | Rejected |
| Earnings before interest and tax to total assets | $H_{03:}$ The ratio Earnings before interest and tax to total assets has no significant influence in predicting bankruptcy likelihood of sugar companies in Kenya. | .000 | Rejected |
| Book value of equity or market value of equity to total liabilities | $H_{04:}$ The ratio book value of equity or market value of equity to total liabilities has no significant contribution in predicting bankruptcy likelihood of sugar companies in Kenya. | .000 | Rejected |
| Sales to total assets | $H_{05:}$ The ratio, sales to total assets has no significant influence in predicting bankruptcy likelihood of sugar companies in Kenya? | .652 | Fail to reject |

The study modelled and tested the bankruptcy likelihood of sugar companies in Kenya by using the Altman's Z score ratios, the results of the secondary data study revealed that the Altman's Z score ratios statistically significantly influences bankruptcy likelihood of sugar companies in Kenya, as their P value (P=0.006, 0.002, 0.000, 0.000 and 0.652) respectively were less than 0.05. However the study failed to reject the

hypothesis for sales to total asset ratio, as the P-value of test of equality of group means (P=0.652) revealed that statistically the ratio does not predict well, between the means of bankruptcy likelihood low and bankruptcy likelihood high of sugar companies in Kenya. This was because sugar companies which had more sales to total assets ratio but were not able to control cost of sales and other operating expenses their profits, cash flows and net worth were low a situation which likely increased their bankruptcy likelihood (Stewart, 2011).

**Table 4.62: Covariance Matrices**

| Bankruptcy Likelihood | | Working Capital to Total Assets | Retained Earnings to Total Assets | Earnings Before Interest And Tax to Total Assets | Book Values of Equity to Total Liability | Sales to Total Assets |
|---|---|---|---|---|---|---|
| Bankruptcy Likelihood low | Working Capital to Total Assets | .009 | .003 | .001 | .021 | .003 |
| | Retained Earnings to Total Assets | .003 | .017 | .003 | .057 | .008 |
| | Earnings Before Interest And Tax to Total Assets | .001 | .003 | .003 | .018 | .005 |
| | Book Values Of Equity to Total Liability | .021 | .057 | .018 | .299 | .066 |
| | Sales to Total Assets | .003 | .008 | .005 | .066 | .036 |
| Bankruptcy Likelihood high | Working Capital to Total Assets | 99.079 | 131.721 | .477 | 3.336 | -.465 |
| | Retained Earnings to Total Assets | 131.721 | 210.317 | 1.063 | 5.651 | -5.106 |
| | Earnings Before Interest And Tax to Total Assets | .477 | 1.063 | .066 | .036 | -.057 |
| | Book Values Of Equity to Total Liability | 3.336 | 5.651 | .036 | .405 | -.143 |
| | Sales to Total Assets | -.465 | -5.106 | -.057 | -.143 | .678 |

The study tabulated the direction of the relationship between the independent variables by computing the covariance matrices as shown in table 4.62 above. The results of the study established that the covariance's for bankruptcy likelihood low were positive, the highest being the correlation between BVE/TL ratio and BVE to TL ratio which was 0.299 which was an indication that the ratio significantly influences the prediction of bankruptcy likelihood of sugar companies in Kenya and the lowest was between EBIT to TA ratio and WC to TA ratio which was 0.001 which gives a range of 0. 298. This was an indication to the study that positive values of the study variables mostly contributed to predicting towards bankruptcy likelihood low of sugar companies in Kenya. The covariance's of bankruptcy likelihood high were both positive and negative the highest was between RE to TA ratio and RE to TA ratio which was 210.317 and the lowest was between sales to TA ratio and RE to TA ratio which was -5.106 giving a range of 215.423. The results revealed, that there was great variability for bankruptcy likelihood high than bankruptcy likelihood low, this was because the sugar companies which were classified by the study as bankruptcy likelihood high were public owned and their financial performance had greater variations in comparison to private owned sugar companies.

The results in table 4.62 reveal that BVE to TL ratio was the strongest discriminator skewed towards bankruptcy likelihood low, EBIT to TA ratio and RE to TA ratio was the least predictor and discriminator skewed towards bankruptcy likelihood low. In addition table 4.62 gives the finding that RE to TA ratio is the strongest discriminator skewed towards bankruptcy likelihood high and the least discriminator skewed towards bankruptcy likelihood high was sales to TA ratio. The findings of this study, concur with (Cornett 2011; Addae *et al.*, 2013), who stated that a higher gearing ratio increase borrowers' charges and claim on firms' cash flows and firms need to make gearing decisions that maximize the firm's value.

**Table 4.63: Log Determinants**

| Bankruptcy likelihood | Rank | Log Determinant |
|---|---|---|
| Bankruptcy Likelihood low | 5 | -21.593 |
| Bankruptcy Likelihood high | 5 | 1.626 |
| Pooled within-groups | 5 | .284 |

The ranks and natural logarithms of determinants printed are those of the group covariance matrices.

Table 4.63 gives the output of the log determinants. The results in the table shows that the log determinants for bankruptcy likelihood low was -21.593, and bankruptcy likelihood high was 1.626, which was an indication that the group covariance matrix for bankruptcy likelihood low differs with the group covariance matrix for bankruptcy likelihood high meaning that the model statistically, predicted well between bankruptcy likelihood low and bankruptcy likelihood high of sugar companies in Kenya. The Rank which was 5 indicated the number of independent variables in the model.

### 4.14 Joint Effects of the Independent Variables against Dependent Variable

The study computed the joint effect of the independent variables (working capital to total assets, retained earnings to total assets, earnings before interest and tax to total assets, book value of equity or market value of equity to total liabilities and sales to total assets ratio) against the dependent variable (bankruptcy likelihood). This was in order to determine if jointly the independent variables significantly, predict the dependent variable.

**Table 4.64: Test results**

| | | |
|---|---|---|
| Box's M | | 474.433 |
| F | Approx. | 29.004 |
| | df1 | 15 |
| | df2 | 1.017E4 |
| | Sig. | .000 |

Tests null hypothesis of equal population covariance matrices.

Table 4.64 above gives the test of the results where the Box's M which tests the assumption of equality of covariance across the groups was 474.433 and F value was 29.004 which was significant since the value of P was 0.00 which was less than 0.05 at 5% significance level. This meant that statistically, the bankruptcy likelihood of sugar companies in Kenya were reliably modelled and predicted by the Z score ratios.

**Table 4.65: Eigenvalues**

| Function | Eigenvalue | % of Variance | Cumulative % | Canonical Correlation |
|---|---|---|---|---|
| 1 | 1.018 | 100.0 | 100.0 | .810 |

a. First 1 canonical discriminant functions were used in the analysis.

The results in table 4.65 gives the eigenvalue also referred to as the characteristic roots, which is a ratio between the explained and the unexplained variations in the model which was 1.018 an indication of a good model that fitted the data well, since the eigenvalue was above 1. The larger the eigenvalue, the more of the variance in the dependent variable is explained by the independent variable(s). The table also has given the results output of canonical correlation which is a measure of the association between the groups in the dependent variable and the discriminant function which was 0.810, an indication of a high level of association between the groups of dependent variables and the discriminant function since it was above 0.5, meaning that 81% of the variations in bankruptcy likelihood of sugar companies in Kenya were explained by the model at 95% confidence level and 19% by other factors outside the model since the canonical correlation is the equivalent of R Squared in the regression analysis. The percentage of variance was 100% as indicated in table 4.65 above which implied that the function accounted for 100% of the discriminating ability of the discriminating variables.

**Table 4.66: Wilks' Lambda**

| Test of Function(s) | Wilks' Lambda | Chi-square | df | Sig. |
|---|---|---|---|---|
| 1 | .496 | 53.693 | 5 | .000 |

The table 4.66 above gives the results of Wilks' Lambda which is used to test the significance of the discriminant functions by providing a measure of how well the function separates cases into groups by identifying significant independent variables of the discriminant functions (Siotani *et al.*, 1985; Rencher, 1993).The study results gives a wilk's lambda value of 0.496, Chi-square statistic was used to test the significance of Wilk's lambda which was 53.693 as indicated in table 4.66 above. This was an indication of greater discriminatory ability of the function between bankruptcy likelihood low and bankruptcy likelihood high. The results, in the table also give a P-value of 0.000, which was also less than 0.05 at 5% significance level. Similarly this means that nearly all of the variations in the dependent variable are significantly influenced by the 5 independent variables in the model which jointly contributes to prediction of bankruptcy likelihood of sugar companies in Kenya. Therefore, an indication that the Z score ratios model statistically, is a robust model of predicting bankruptcy likelihood.

**Table 4.67: Standardized Canonical Discriminant Function Coefficients**

| | Function |
|---|---|
| | 1 |
| Working capital to total assets | .330 |
| Retained earnings to total assets | -.332 |
| Earnings before interest and tax to total assets | .592 |
| Book values of equity to total liability | 1.017 |
| Sales to total assets | -.011 |

The standardized Canonical discriminant function coefficients were computed and the results were as shown in table 4.67 above. The canonical coefficient which is a

correlation between the discriminant scores and the level of the dependent variable, which indicates the relative importance of each independent variables in predicting the dependent variable to the canonical discriminant function (Rencher, 1993). High correlation is an indication of a function that discriminates well. The SPSS result output clearly indicate that BVE to TL ratio had the highest discriminating power with a correlation index value of 1.017, EBIT to TA ratio was the second strongest predictor with a correlation coefficient of 0.592, RE to TA was third with correlation index of -0.332,WC to TA was fourth with correlation index of 0.330 and the last was sales to total assets ratio which had a correlation index of -0.11, meaning that the ratio was not a good discriminator and predictor of bankruptcy likelihood of sugar companies in Kenya. This is because a company with high sales, but not able to control cost of sales and other operating expenses may reduce it is profitability, cash flows and net worth which is likely to reduce the value of the discriminant Z score thus, resulting into bankruptcy likelihood high.

**Table 4.68: Structure Matrix**

| | **Function** |
|---|---|
| | **1** |
| Book Values Of Equity to Total Liability | .932 |
| Earnings Before Interest And Tax to Total Assets | .463 |
| Retained Earnings to Total Assets | .349 |
| Working Capital to Total Assets | .316 |
| Sales to Total Assets | -.050 |

Pooled within-groups correlations between discriminating variables and standardized canonical discriminant functions Variables ordered by absolute size of correlation within function.

Table 4.68 as indicated above shows the structure matrix that shows the correlations of each variable with each discriminant function were computed by the study and the

results shows that the book value of equity to total liabilities had the highest factor loading of 0.932, earnings before interest and tax to total assets had 0.463, retained earnings to total assets had 0.349,working capital to total assets had 0.316 all these variables had a factor loading of more than 0.30 (Hair, Black & Babin 2010; Kothari, 2004), showing that they were strong predictors of bankruptcy likelihood of sugar companies in Kenya. However, the sales to total assets ratio was a weaker predictor since it has a factor loading of -.050 which was less than 0.30.This was an indication that bankruptcy likelihood of sugar companies in Kenya significantly, was not predicted by the sales to total assets ratio at 95% confidence level, but a function of other factors like cost of sales and operating expenses which are netted from sales to determine profitability, cash flow and net worth of the company. This result concurs with Stewart (2011) who states that if a company is paying more interest and other related costs than what it is receiving the likelihood of bankruptcy may be high.

**Table 4.69: Canonical Discriminant Function Coefficients (Z- score)**

| | **Function 1** |
|---|---|
| Working Capital to Total Assets | .040 |
| Retained Earnings to Total Assets | -.049 |
| Earnings Before Interest And Tax to Total Assets | 1.554 |
| Book Values Of Equity or Market Value of Equity to Total Liability | 1.669 |
| Sales to Total Assets | -.016 |
| (Constant) | -.205 |

Unstandardized coefficients

The study computed discriminant function coefficient as shown in table 4.69. This was in order to determine how the independent variables $x_1$=working capital to total assets, $x_2$=retained earnings to total assets, $x_3$=earnings before interest and tax to total assets, $x_4$=book value of equity to total liabilities and $x_5$=sales to total assets ratio predicts the dependent variable Z Score (bankruptcy likelihood) of sugar companies in Kenya. The

study established the discriminant coefficients to be as follows; WC to TA ratio was 0.040, RE to TA ratio was -0.049, EBIT to TA ratio was 1.554, BVE to TL ratio was 1.669 and finally sales to TA ratio was -0.016. The variables with the largest weights are those which contributed mostly to predicting the groups (Orgler, 1975). Therefore, from the findings as per table 4.69 above indicates that the BVE to TL ratio had a discriminant coefficient of 1.669 which was the highest an indication that for every one unit increase in BVE to TL ratio the discriminate Z score value increases by 1.669 hence, reducing the bankruptcy likelihood because the magnitudes of these coefficients indicate how strongly the discriminating variable impacts to the discriminant Z score, the second highest ratio was EBIT to TA ratio which had a discriminant coefficient of 1.554, the third was RE to TA ratio which had a discriminant coefficient of -0.049, the fourth was WC to TA ratio which had a discriminant coefficient of 0.040 and the last and least was sales to TA ratio which had -0.016. The resulting discriminant equation was modelled as follows;

$$Z = -0.205 + 0.040\,x_1 - 0.049\,x_2 + 1.5564x_3 + 1.669\,x_4 - 0.016x_5$$

Where; Z = Z score (Bankruptcy Likelihood)

$x_1$, $x_2$, $x_3$, $x_4$ and $x_5$ are independent variables. The constant was -0.205 which meant that if all the independent variables were removed from the model the value of Z will be -0.205 which was negative and below the cut off score of 0.382, indicating the significance of the independent variables because if all the independent variables (working capital to total assets, retained earnings to total assets, earnings before interest and tax to total assets, book value of equity or market value of equity to total liabilities and sales to total assets ratio ratio) ratios were to be removed from the model the value of the discriminant Z score will be -0.205, which will be an indication of bankruptcy likelihood high meaning that the independent variables are significant in predicting bankruptcy likelihood of sugar companies in Kenya.

Additionally, the study results reveals that the independent variables BVE to TL ratio and EBIT to TA ratio individually have a significant effect in predicting bankruptcy likelihood this is because by removing all the independent variables and remaining with only EBIT to TA ratio the discriminant Z score value will be 1.351 (1.556-.0205) which will mean it has moved from bankruptcy likelihood high to low. In addition when all the other independent variables were to be removed from the model and we are left with BVE to TL ratio the value of discriminant Z score will be 1.464, also meaning bankruptcy likelihood low.

**Table 4.70: Functions at Group centroids**

| | **Function 1** |
|---|---|
| Bankruptcy Likelihood | 1 |
| Bankruptcy Low | 1.449 |
| Bankruptcy High | -.685 |

Unstandardized canonical discriminant functions evaluated at group means

Table 4.70 above shows the results of interpreted discriminant analysis using the group means (centroids) of the predictor variables. These are the means of the discriminant function scores by each group function calculated where for this study bankruptcy likelihood low or bankruptcy likelihood high. Therefore, bankruptcy likelihood low had a mean of 1.449 and bankruptcy likelihood high had a mean of -.685 meaning that if in a year a sugar company had a discriminant score of closer to 1.449 it was classified as bankruptcy likelihood low and closer to -.685 was classified as bankruptcy likelihood high. The study tabulated the cutoff score which was the average of bankruptcy likelihood low and bankruptcy likelihood high was computed as follows.

$$= \frac{(\text{Lower Centroids}) + (\text{Higher Centroids})}{2}$$

$$= \frac{1.449 + -0.685}{2}$$

$$= 0.382$$

Where the decision rule was derived as follows;

Predict as bankruptcy likelihood low if

0.382 <z< 1.449

Predict as bankruptcy likelihood high if

-0.685<z< 0.382

**Table 4.71: Classification of results**

| | **Predicted** | |
|---|---|---|
| **Actual** | **Bankruptcy Low** | **Bankruptcy High -** |
| Bankruptcy Low | 22(27.2%) | 4(4.9%) |
| Bankruptcy High | 10(12.3%) | 45(55.5%) |

The classification results, for the study were as shown in table 4.71 above where bankruptcy low which were correctly classified as bankruptcy low were 22 observations, which represented 27.2%. Those observations which were bankruptcy high and correctly classified as bankruptcy high were 45 observations out of 55, which represented 55.5% correct classification by the model. The observations that were bankruptcy low and classified incorrectly as bankruptcy high were 4 observations which represented 4.9%. Those observations which were bankruptcy high and were incorrectly classified as bankruptcy low were 10, which represented 12.3% of total observations. The findings of this classification were in line with Thomas (2000) who established in a study of banking cardholders good or bad that it is possible to have few good applicants being classified as bad especially where the model (independent variables) does not determine 100% of the changes in the dependent variable.

The overall, classification rate for those number of observations that were correctly classified were 82.7% (27.2%+55.5%), and those observations that were incorrectly classified were 17.2% (4.9%+12.3%). Therefore the results of this study concur with several previous studies for example, (Bhurnia & Sarkar; Burksaitiene & Mazintiene,

2011). Additionally in Kenya various previous studies for example, (Mamo, 2011; Kungu, 2015; Taliani, 2010; Kariuki, 2013), whose studies have established that the Z score ratio model produces consistent results based on financial statement data and the model is reliable for predicting corporate failures in Kenya. In addition the findings of the study agrees with Alareeni and Branson (2013) who argues that most statistical failure prediction models have been developed and tested in developed countries such as USA and European, but the Altman Z score ratios model is the most statistical used models in predicting corporate failure.

### 4.15 Optimal Conceptual Framework

The findings of the secondary data show that there were four independent variables which were found to significantly contribute to predicting bankruptcy likelihood of sugar companies in Kenya. The hypotheses of this study were tested by conducting a discriminant Z score analysis. The results of standardized canonical discriminant function coefficients as in table 4.69, indicated that book value of equity to total liabilities ratio had the highest discriminant coefficient of 1.017, the retained earnings to total assets had -0.332, earnings before interest and tax to total assets had 0.592, working capital to total assets had 0.330 and sales to total assets ratio which was not significant had -0.011. The results were further supported by the structure matrix in table 4.68, where book value of equity to total liabilities had a factor loading of 0.932, EBIT to total assets had a factor loading of 0.463, retained earnings to total assets had a factor loading of 0.349, working capital to total assets had a factor loading of 0.316 and sales to total assets ratio had insignificant factor loading of 0.050. In addition the results of Canonical discriminant function coefficient as tabulated in table 4.69 revealed that the ratio BVE to TL had the highest discriminating coefficient of 1.669, EBIT to TA had 1.554, RE to TA had -0.049, WC to TA had 0.040, and finally sales to TA had -0.016 which was insignificant.

The study excluded sales to total assets ratio which was less than 0.30, which is the minimum cut off factor loading (Hair, Black & Babin, 2010; Kothari, 2004). Therefore, the optimal hypothetical model was as illustrated in figure 4.18 below.

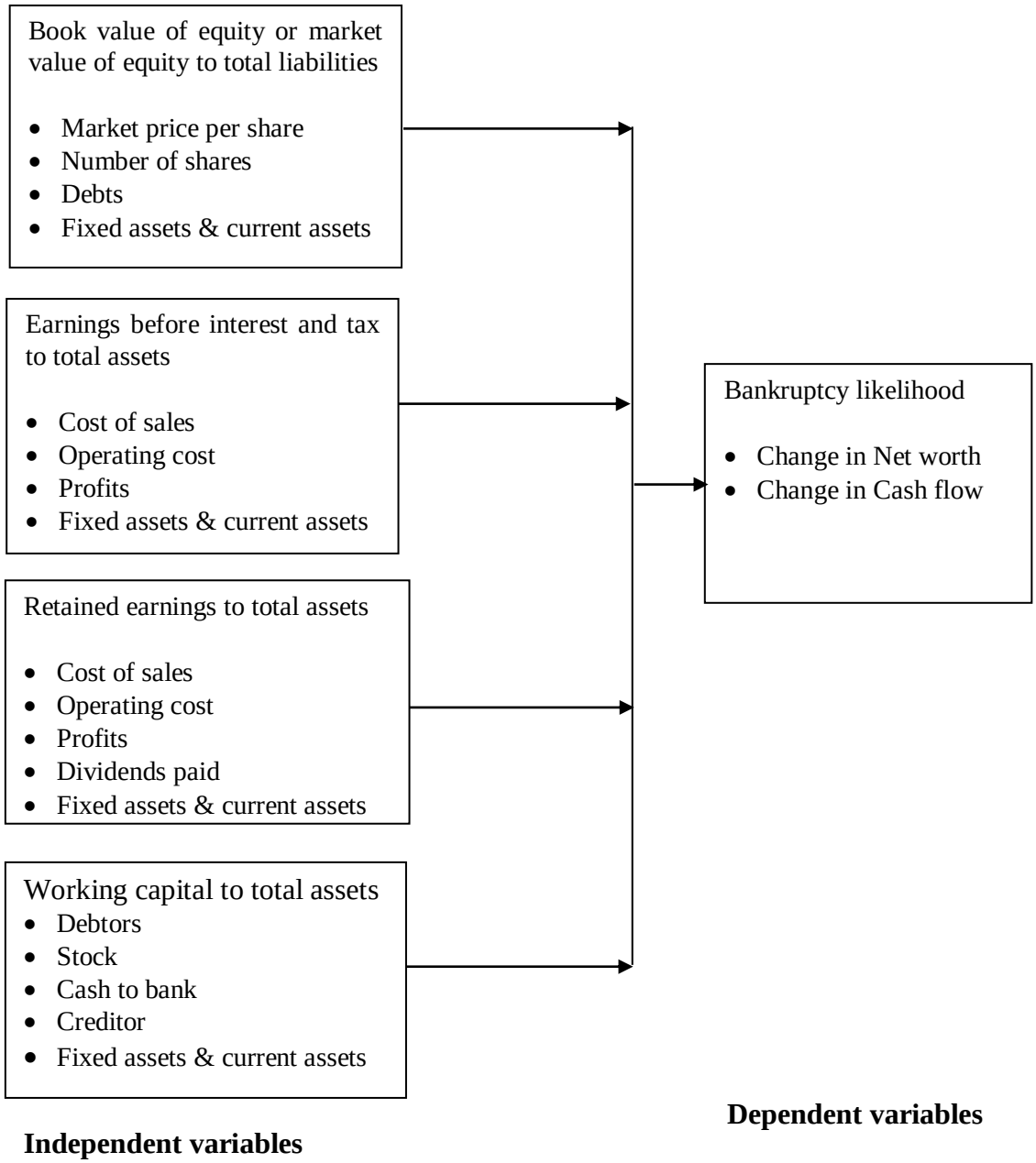



**Figure 4.18: Revised optimal model**

### 4.16 Sugar Companies Discriminant Z Score and Bankruptcy Likelihood

### 4.16.1 Mumias Sugar Company Discriminant Z Score and Bankruptcy Likelihood Status Per Year

The study computed the discriminant Z score as shown in figure 4.19 below for purposes of determining for each of the ten years of study (2007-2016), whether the discriminant Z score of Mumias Sugar Company illustrated bankruptcy likelihood high or low. The study performed this by comparing the discriminant Z score for each of the years with the discriminant Z score of bankruptcy likelihood low (1.449), bankruptcy likelihood high high (-0.685) and cutoff discriminant Z score (0.382) as shown in table 4.70. In any year where the discriminant Z score was below 0.382 it was termed as bankruptcy likelihood high. This was necessary for the study for purposes of allocating the classification status of the company in each of the study years as bankruptcy likelihood low or bankruptcy likelihood high.

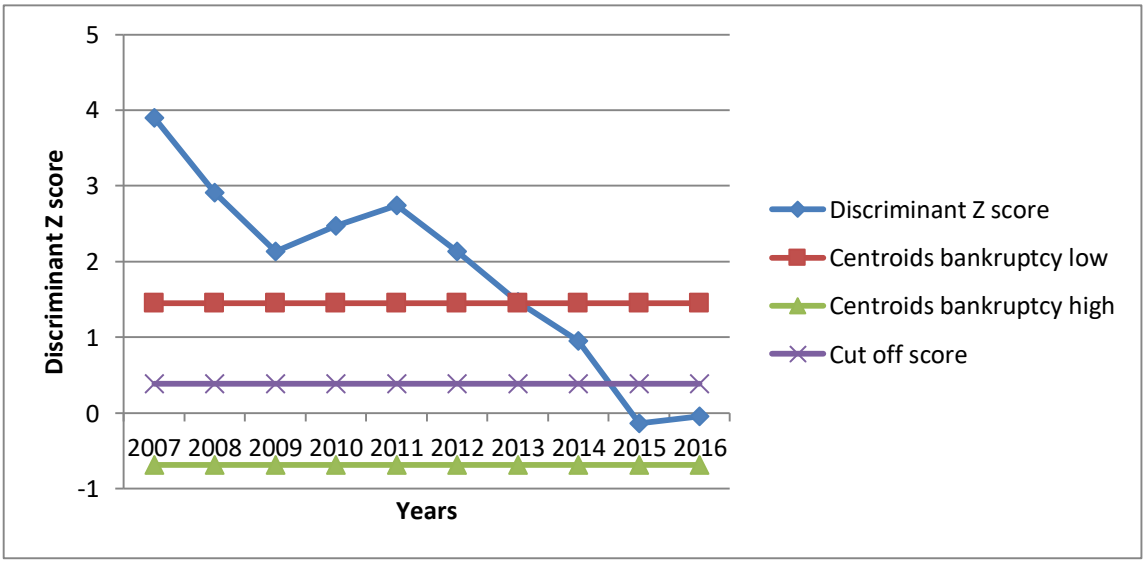



**Figure 4.19: Mumias Sugar Company Bankruptcy Likelihood Status per Year**

The periods of the study for Mumias Sugar Company which was a public owned sugar company in Kenya covered from 2007 to 2016 a period of ten years as shown in Appendix VI. Figure 4.19 above gives the discriminant Z scores where for the year 2007 the score was 3.903, in 2008 it was 2.910, in 2009 it was 2.132, in 2010 the score was 2.475, in 2011 it was 2.746, in 2012 it was 2.133, in 2013 it was 1.469, in 2014 the score was 0.948,in 2015 it was -0.138 and in 2016 the score was -0.045, the results in Figure 4.19 above also shows that up to 2012, the discriminant Z score was above the centroids bankruptcy low score of 1.449 and in 2013 the score was 1.469 which was in the mark of centroids bankruptcy low, in 2014 it dropped to 0.948 and in 2015 and 2016 it had a score of -0.138 and -0.045 respectively which were below the cutoff score of 0.382, as indicated in figure 4.19 above.

The highest discriminant Z score was in 2007, which was 3.903 and the lowest was in 2016 which was -0.045 which was due to changes in both the gearing and profitability of the company which were key in predicting or discriminating between bankruptcy likelihood low or high. Total liabilities increased from Kshs 3,579,209 in 2007 to Kshs 27,018,727 in 2016 which was 654.9 % increase, market value of equity reduced from Kshs 14,790 in 2007 to Kshs 2,371.50 in 2016 which was 84 % reduction, earnings before interest and tax reduced from Kshs 1,880,480 in 2007 to Kshs -5,192,999 in 2016,which was 376.15% reduction and total assets of the company increased from Kshs 11,916,869 in 2007 to Kshs 27,018,727 in 2016 which was 126.7 % increase, an indication that the increased assets did not increase efficiency and profitability. In addition the ratio BVE to MV of the company had increased from 0.564 in 2007 to 3.870 in 2016 as shown in Appendix VII. This means that the BVE of the company has been more than the MV of the company since the MV has been decreasing a circumstance that is likely to reduce the net worth resulting into bankruptcy likelihood high of the sugar company.

Therefore, the study classified the Mumias Sugar Company as one of the sugar company whose bankruptcy likelihood was high for the period of the study because over the years the discriminant Z score had been decreasing and for the last two years it was below the

cutoff score of 0.382. However since the discriminant score was below the cut off score of 0.382 for only the last two years of the study (2015-2016) it can be salvaged if proper intervention mechanisms are initiated early (Brigham & Daves, 2010). The results of this findings agrees with (Natalia, 2007), who stated that early detection of bankruptcy likelihood is necessary for the company to put appropriate strategies to salvage the situation and (Altman & Hotchkiss, 2006), adds that bankruptcy costs are enormous and negatively affect all stakeholders of the company.

### 4.16.2 South Nyanza Sugar Company Discriminant Z score and Bankruptcy Likelihood Status per Year

The study tabulated the discriminant Z score as shown in figure 4.20 below with the main aim of establishing for each of the ten years of study (2007-2016), whether the discriminant Z score of South Nyanza Sugar Company indicated bankruptcy likelihood high or not. The study found this necessary in terms of establishing the classification status of the company in each of the study year.

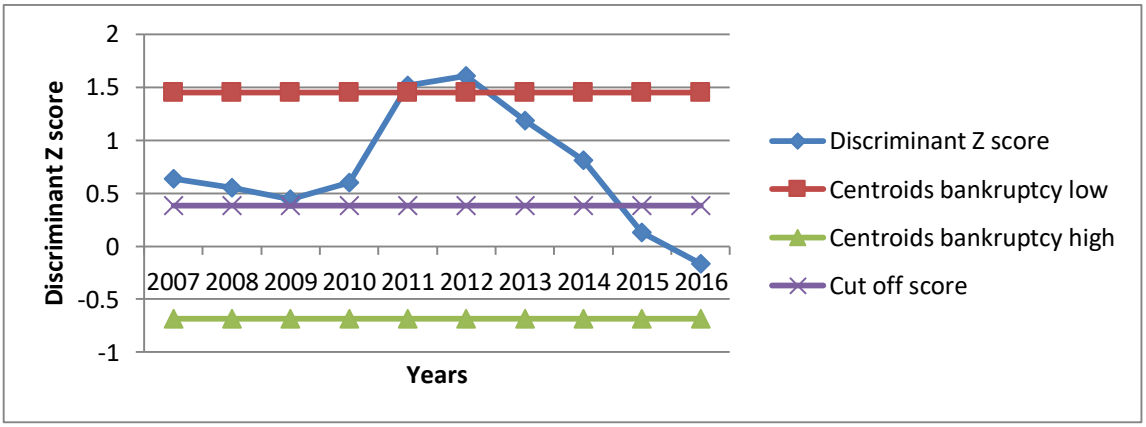



**Figure 4.20: South Nyanza Sugar Company Bankruptcy Likelihood Status per Year**

The study period for South Nyanza Sugar Company covered a period of ten years (2007-2016), as shown in Appendix VI and figure 4.20 above. The year 2007 the discriminant Z score of South Nyanza sugar company was 0.638 which was above the cutoff score of 0.382, in 2008 it was 0.553, in 2009 the score was 0.445, in 2010 the score was 0.602, in 2011 it was 1.519, in 2012 it was 1.609, in 2013 it was 1.183, in 2014 it was 0.812, in 2015 the score was 0.130 and finally in 2016 the score was (-0.163). Therefore the discriminant Z score of the company was above the cut off score of 0.382 from 2007 to 2014, but in 2015 and 2016 the score was below the minimum cutoff score of 0.382.

The company's highest discriminant Z score was in 2012 of 1.609 and the lowest was in 2016 of -0.163, which was due to changes in both the gearing and profitability of the company which were key in predicting or discriminating between bankruptcy likelihood low or high. The total liabilities increased from Kshs 3,399,130 in 2012 to kshs 4,224,443 in 2016 which was 24.3% increase, book value of equity reduced from Kshs 3,252,514 in 2012 to Kshs 743,198 in 2016 which was 77.15% reduction, earnings before interest and tax reduced from Kshs 998,056 in 2012 to Kshs -768,671 in 2016,which was 177.02% reduction and total assets of the company reduced from Kshs 6,651,644 in 2012 to Kshs 4,967,641 in 2016 which was 25.3% reduction, which lead to reduced efficiency, profitability and increased bankruptcy likelihood due to its effect on reducing the value of the discriminant Z score value. The study, classified the company as bankruptcy likelihood high, however since the scores of the company has been above the cut off score of centroids bankruptcy high of 0.382 for the first eight years of the study (2007-2014), it means with proper strategies the company can be salvaged (Natalia, 2007). The finding of this study agrees with Saunders and Cornett (2011), who assert that a higher gearing ratio will increase borrower security charges and claim on firm's cash flows and hence increasing bankruptcy likelihood.

### 4.16.3 Miwani Sugar Discriminant Z Scores and Bankruptcy Likelihood Status Per Year

The discriminant Z score as shown in figure 4.21 below was analyzed by the researcher, with an objective of establishing for each of the ten years of study (2007-2016), whether the discriminant Z score of Miwani Sugar Company bankruptcy likelihood low or high.

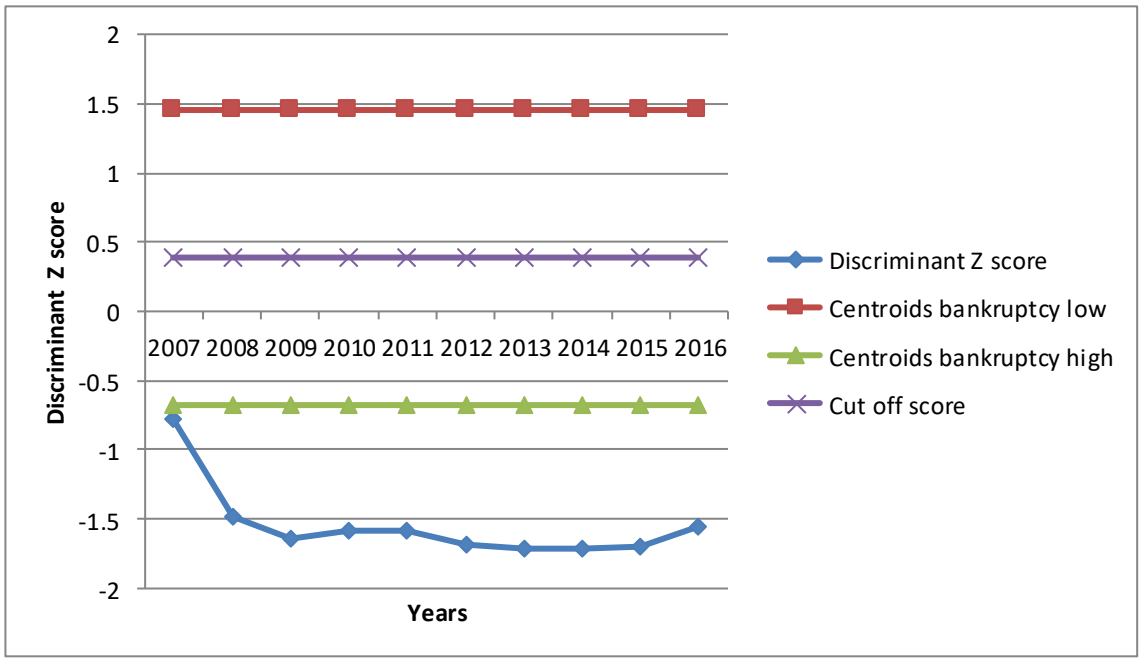



**Figure 4.21: Miwani Sugar Company Bankruptcy Likelihood Status per Year**

The period of the study for Miwani Sugar Company covered (2007 - 2016), a period of ten years as shown in Appendix VI and figure 4.21 above. The discriminant Z score for the year 2007 of Miwani sugar was -0.777, in 2008 it was -1.493, in 2009 it was -1.640, in 2010 it was -1.593, in 2011 the score was -1.588, in 2012 it was 0.696, in 2013 it was -1.714, in 2014 it was -1.723, in 2015 it was -1.699 and in 2016 the score was -1.566. Therefore for all the years of the study from 2007 to 2016 the scores for Miwani sugar company had been negative and below the line of cutoff score of 0.382 (figure 4.21 above) the line of centroids bankruptcy high of -0.685 and had a down ward trends as in

the figure 4.21 above. The highest discriminant Z score was -0.777 in 2007 and the lowest was in 2015 of -1.699, these changes were due to changes in both the gearing and profitability of the company which were important in predicting or discriminating between bankruptcy likelihood low and high. Total liabilities increased from kshs 8,891,907 in 2007 to Kshs 25,674,325 in 2015 which was 188.7% increase, book value of equity reduced from Kshs -8,786,312 in 2007 to Kshs -21,654,136 in 2015 which was 146.45% reduction, earnings before interest and tax reduced from Kshs -28,246 in 2007 to Kshs -125,643 in 2015, which was 344.8% reduction and total assets of the company increased from Kshs 105,595 in 2007 to Kshs 1,096,750 in 2015 which was 938.64% increase, meaning that the increase in assets did not increase profitability and efficiency, a situation which reduced the value of the discriminant Z score and increased bankruptcy likelihood of the sugar company.

The study classified the company as bankruptcy likelihood high since, the results of the study revealed that for the entire period of the study the discriminant Z score for the company had been below, the cutoff score of 0.382 and the discriminant Z score of bankruptcy likelihood low of 1.449 (as per figure 4.21). The results of these findings concur with Brigham and Daves (2010), who argue that maintaining companies on life support for a long period of time does not serve the interests of bankruptcy laws which they were meant to protect. They argued that a viable resolution of bankruptcy law should have the following two goals. The first goal is to liquidate the company and the second goal is to assist the company to recover as quickly as possible.

### 4.16.4 Chemelil Sugar Company Discriminant Z score and Bankruptcy Likelihood Status per Year

The discriminant Z score as shown in figure 4.22 below was tabulated by the study in order to establish for each of the ten years of study (2007-2016) as shown in Appendix VI and figure 4.22 below whether the discriminant Z score of Chemelil Sugar Company indicated bankruptcy likelihood low or high.

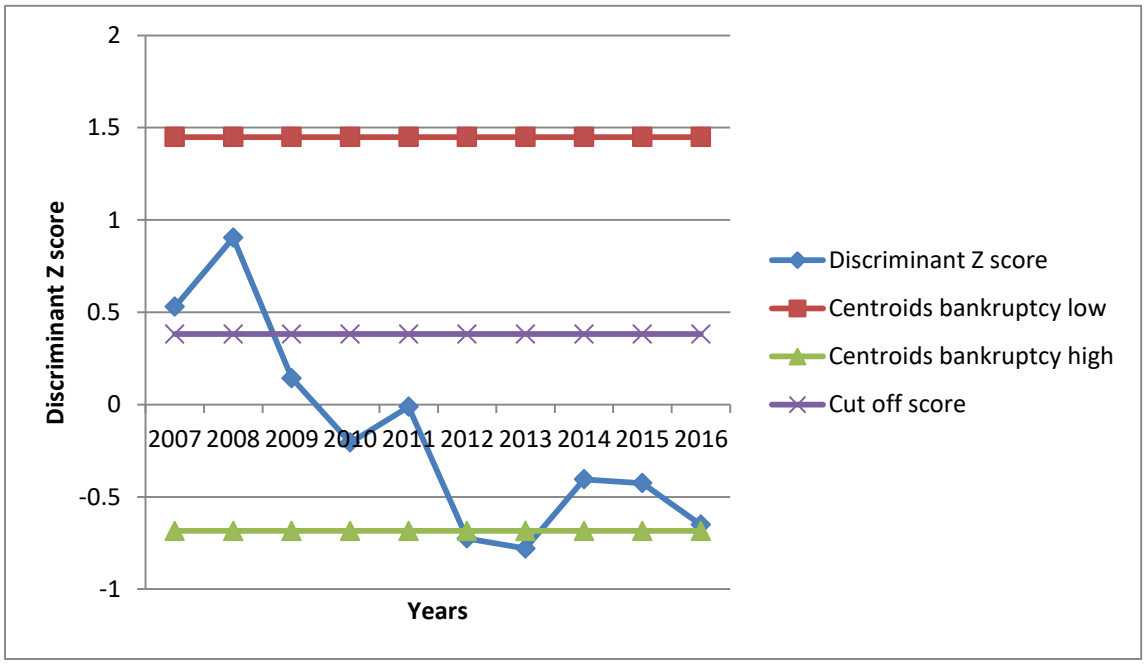



**Figure 4.22: Chemelil Sugar Company Bankruptcy Likelihood Status Per Year**

The period of the study for Chemelil Sugar Company was from 2007 to 2016 where the results were as indicated in Appendix VI and figure 4.22 above. The discriminant Z score as indicated in figure 4.22 above indicates that for the year 2007 Chemelil sugar discriminant Z score was 0.530, in 2008 it arose to 0.904 where the score for the first two years of study was above the cutoff score of 0.382 as in the figure 4.22 above, in 2009 the score dropped to 0.143 and was below the cutoff score of 0.382, in 2010 the score was -0.206, in 2011 it was -0.012, in 2012 it was -0.725, in 2013 it was -0.780, in 2014 it was -0.405, in 2015 it was -0.426 and in 2016 it was -0.651 as shown in Appendix VI, which was slightly above the line centroids bankruptcy high as in the figure 4.22 above. The highest discriminant Z score was in 2008 of 0.904 and the lowest was in 2013 of -0.780, this was due to changes in both the gearing and profitability of the company which were key in predicting and discriminating between bankruptcy likelihood low or high for instance, total liabilities went up from Kshs 2,718,491 in 2007 to Kshs 6,173,501 in 2013,which was 127.1% increase, book value of equity reduced

from Kshs 1,207,442 in 2007 to Kshs -1,025,606 in 2013 which was 184.94% reduction, earnings before interest and tax reduced from Kshs 69,183 in 2007 to Kshs -620,596 in 2013,which was 997% reduction and total assets of the company increased from Kshs 2,718,491 in 2007 to Kshs 5,147,895 in 2013 which was 89.37 % increase however, the increase did not result into efficiency and profitability since the EBIT for the same period reduced by 997% a situation which contributed to reduction of the discriminant Z score and increased bankruptcy likelihood of the sugar company .

Therefore, the study classified the company as bankruptcy likelihood high because for the last eight years of the study (2009 – 2016), the score had been below the cutoff score of 0.382 as per the figure 4.22 above. The findings of this study were consistent with Youn and Gu (2007) who tested the prediction of business failure in the Korean lodging industry and concluded that Korean lodging firms should lower their reliance on debt financing and increase the efficiency in using existing assets to generate sales revenue.

### 4.16.5 Muhoroni Sugar Company Discriminant Z score and Bankruptcy Likelihood Status Per Year

The discriminant Z score as shown in figure 4.23 below was tabulated by the study in order to establish for each of the ten years of study (2007-2016), whether the discriminant Z score of Muhoroni Sugar Company shows bankruptcy likelihood high or low (as shown in Appendix VI). This was necessary for purposes of classifying the company either bankruptcy likelihood low or high.

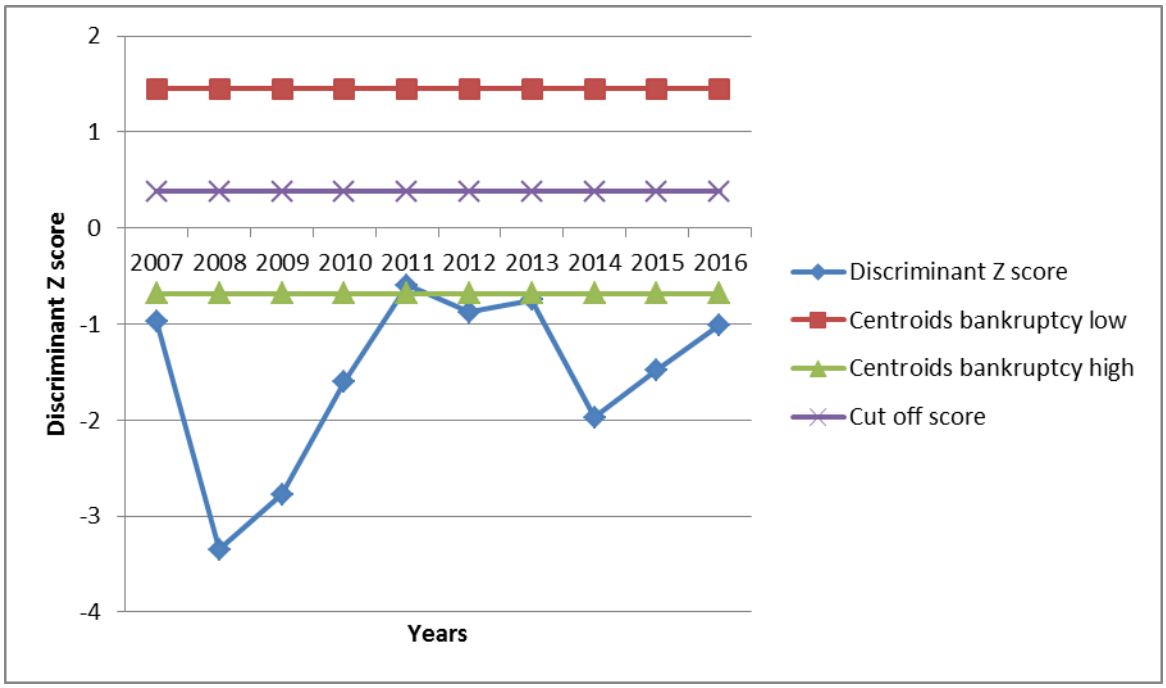



**Figure 4.23: Muhoroni Sugar Company Bankruptcy Likelihood Status Per Year**

The results in figure 4.23 above give the discriminant Z score for Muhoroni Sugar Company for the period of the study (2007 - 2016), which was a period of ten years. The discriminant Z score for the year 2007 of Muhoroni sugar was -0.968 then, in 2008 the score was -3.352, in 2009 the score was -2.775, in 2010 the score was -1.598, in 2011 it was -0.595, in 2012 it was -0.874, in 2013 the score was -0747, in 2014 the score was -1.973, in 2015 the score was -1.474 and finally in 2016 the discriminant score was -1.010 as indicated in Appendix VI. The results of the study shows that the score was negative below the cut off score of 0.382 and also below the line of centroids bankruptcy high score of -0.685 with exception of 2011 where the score was -0.595 which was slightly high than the centroids bankruptcy high line of -0.685 but below the line of cutoff score of 0.382.

The highest discriminant Z score was in 2011 of -0.595 and the lowest discriminant Z score was in 2008 of -3.352, which was due to changes in both the gearing and profitability position of the company which were key in predicting and discriminating

between bankruptcy likelihood low or high. The total liabilities increased from Kshs 15,520,639 in 2008 to Kshs 22,307,561 in 2011 which was 43.7 % increase, book value of equity reduced from Kshs -14,644,353 in 2008 to Kshs -21,259,284 in 2011 which was 45.2% reduction, earnings before interest and tax increased from Kshs -1,156,472 in 2008 to Kshs 373,493 in 2011,which was 132.3% increase however this increase did not have significant effect in the discriminant Z score because of the significant changes in the other variables like total liabilities, book value of equity and total asset, total assets of the company increased from Kshs 876,276 in 2008 to Kshs 1,048,277 in 2011 which was 19.6 % increase. The study therefore, classified the company as bankruptcy likelihood high. In addition the company is under receivership then the company should be liquidated, completely overhauled or privatized which is in line with (Brigham and Daves,2010), who argues that maintaining a company on life support does not serve the interests that bankruptcy laws were meant to protect.

### 4.16.6 Nzoia Sugar Company Discriminant Z score and Bankruptcy Likelihood Status per Year

The discriminant Z score as shown in figure 4.24 below was tabulated by the study in order to establish for each of the ten years (2007-2016) as shown in Appendix VI in order to establish if the discriminant Z score of Nzoia Sugar Company reflected bankruptcy likelihood high or low. This was necessary for purposes of classifying the company in either one of the group.

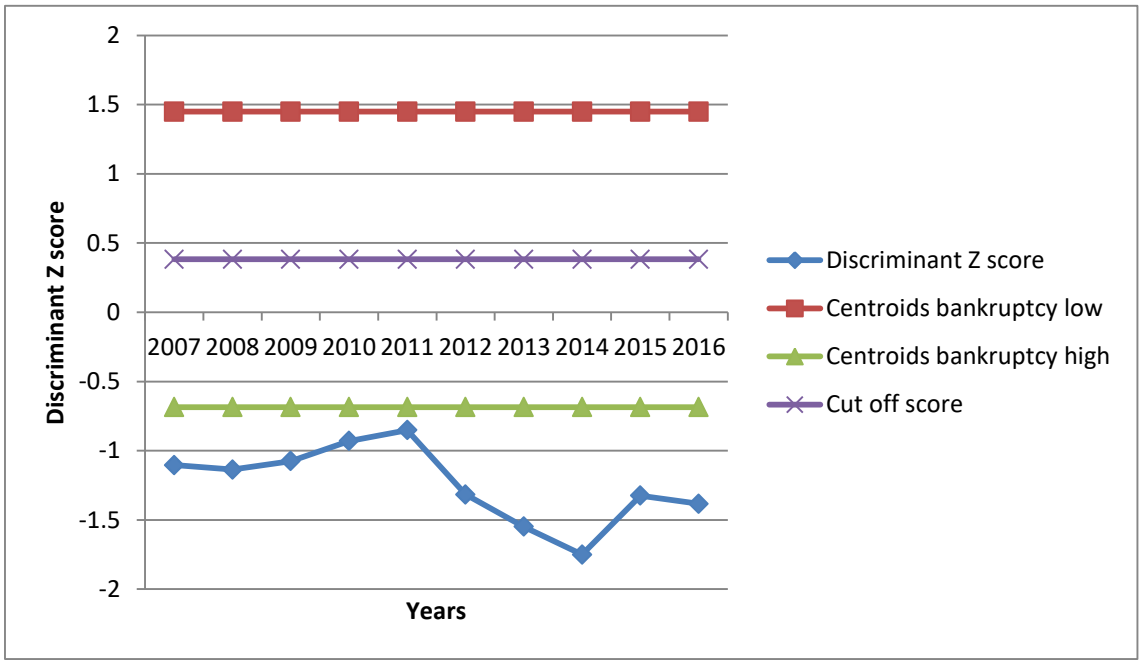



**Figure 4.24: Nzoia Sugar Company Bankruptcy Likelihood Status Per Year**

The period of the study for Nzoia Sugar Company was for a period of ten years from 2007 to 2016 as shown in Appendix VI and figure 4.24 above. The discriminant Z scores for the company was as shown in figure 4.24 above where in the year 2007 the score for Nzoia sugar was -1.104, in 2008 the score was -1.136, in 2009 it was -1.075, in 2010 the score was -0.930, in 2011 it was -0.851, in 2012 it was -1.316, in 2013 it was -1.549, in 2014 it was -1.750, in 2015 it was -1.324 and finally in 2016 the score was -1.383. Therefore as evidenced from the figure 4.24 above, in all the years of the study (2007-2016) the score was negative and below the cutoff score of 0.382 and the centroids bankruptcy high of -0.685.

The lowest discriminant Z score was in 2014 of -1.750 and the highest was in 2011 of -0.851, which was due to changes in both the gearing and profitability position of the company which was key in predicting and discriminating between bankruptcy likelihood low and high. The total liabilities increased from Kshs 20,706,933 in 2011 to Kshs 39,783,251 in 2014 which was 92.13% increase, book value of equity reduced from

Kshs -9,944,519 in 2011 to Kshs -30,119,346 in 2014 which was 202.9% reduction, earnings before interest and tax reduced from Kshs 517,753 in 2011 to Kshs -1,820,045 in 2014, which was 451.5% reduction and total assets of the company reduced from Kshs 10,761,415 in 2011 to Kshs 9,663,905 in 2014 which was 10.2% reduction .Therefore, the study classified the company as bankruptcy likelihood high. The results of this study agrees with various previous studies which established that the higher the gearing the less liquidity the firm is therefore highly geared companies should reduce, the risk of bankruptcy likelihood by lowering their reliance on debts and increasing their efficiency which eventually lead to lowers bankruptcy likelihood (Loncan & Caldeira, 2014; Youn & Gu, 2007).

### 4.16.7 Soin Sugar Company Discriminant Z score and Bankruptcy Likelihood Status per Year

The discriminant Z score as shown in figure 4.25 below was analyzed. In order to establish for each of the five years of study (2010-2014) as tabulated in Appendix VI which was necessary in determining if the discriminant Z score of Soin Sugar Company reflected bankruptcy likelihood high or low.

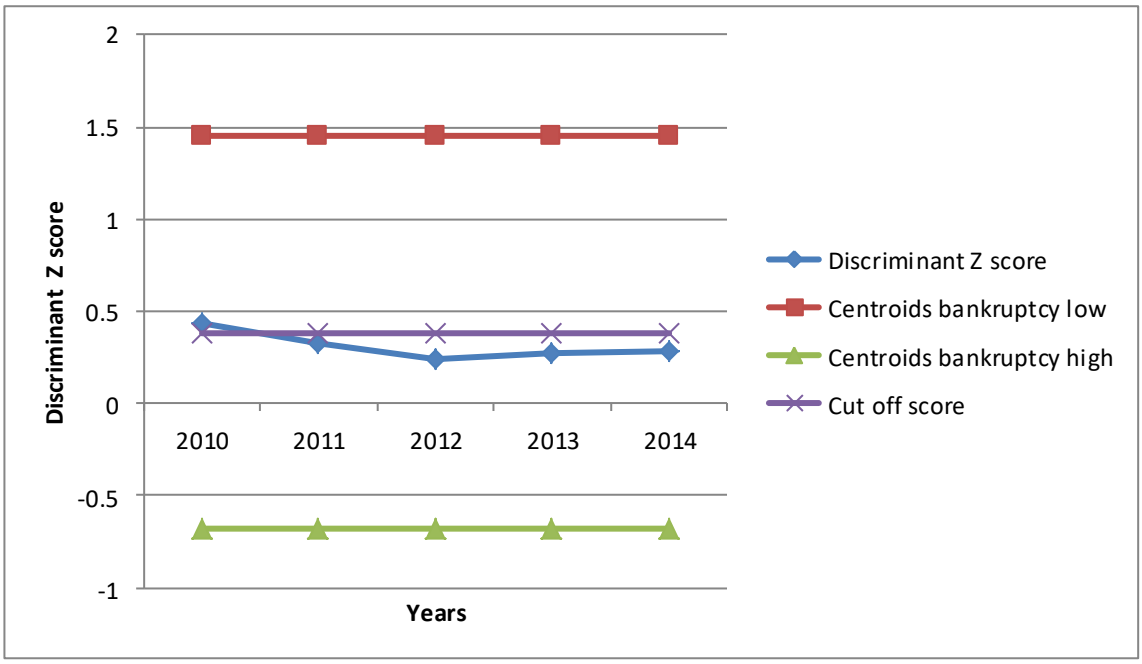



**Figure 4.25: Soin Sugar Company Bankruptcy Likelihood Status per Year**

The period of study for Zoin Sugar Company was from 2010 to 2014 because the company was liquidated in 2015.The results of the study revealed that the discriminant Z score in 2010 was 0.430 where the company was classified as free any possibility of bankruptcy likelihood, in 2011 the score was 0.330 which was below the minimum cut off point of 0.382, in 2012 the score was 0.239, in 2013 it was 0.275 and in 2014 it was 0.282,when the company was liquidated the score was 0.282 as shown in figure 4.25 above and Appendix VI. Therefore if proper intervention mechanism were put in place as early as 2011 when the study revealed that the discriminant Z score was below the minimum cutoff score of 0.382 this situation of the company being liquidated in 2014 could have been prevented for the interests of all stakeholders of the company. The results of this study is consistent with (Gibson 2011; Sormunen and Laitinen 2012), who argued that the reality is that companies usually experience financial difficulties from time to time and some of these financial difficulties do in fact lead to total liquidation if corrective action is not taken early (Brigham & Daves, 2010).

### 4.16.8 Butali Sugar Company Discriminant Z score and Bankruptcy Likelihood Status per Year

The discriminant Z score as shown in figure 4.26 below was tabulated by the study, in order to establish for each of the five years (2011-2015), if the discriminant Z score of Butali Sugar Company was illustrated as bankruptcy likelihood low or high.

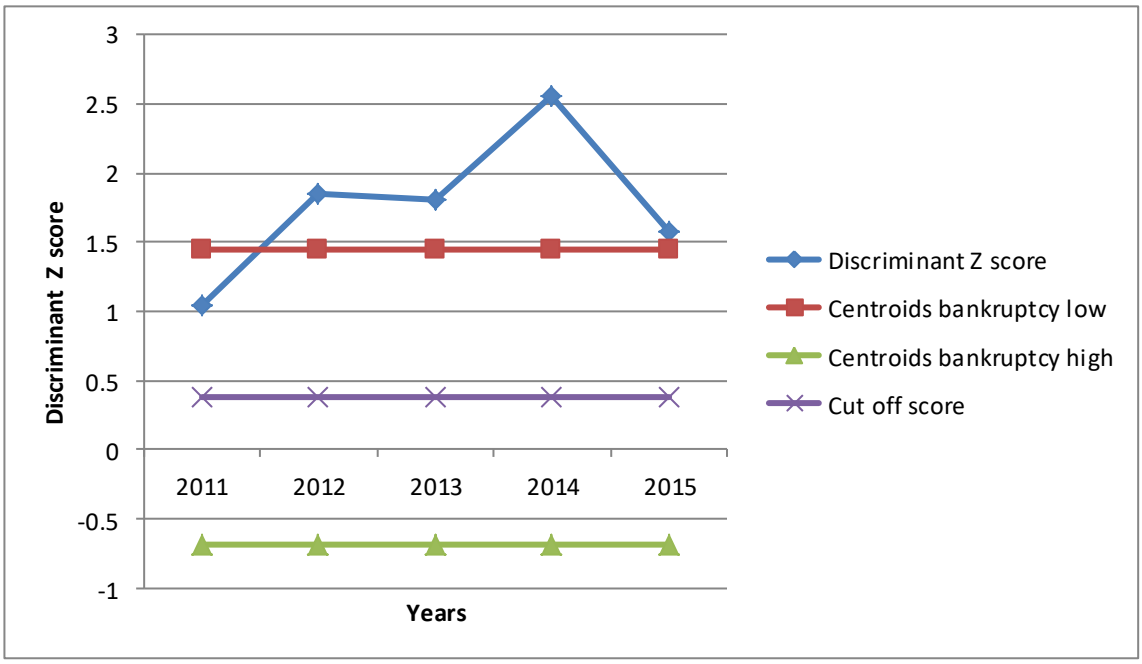



**Figure 4.26: Butali Sugar Company Bankruptcy Likelihood Status Per Year**

The period of the study for Butali sugar was from 2011to 2015 as shown in figure 4.26 above and Appendix VI, where the discriminant Z score was 1.037 in 2011as shown in figure 4.26 above, in 2012 it was 1.854, 2013 it was 1.803, 2014 it was 2.551 and 2015 it was 1.582.Therefore, for the entire period of the study of this sugar company which was five years the discriminant Z score values were above the minimum cut off score of 0.382 as shown in figure 4.26 above and in 2012,2013,2014,and 2015 the score was above the centroids bankruptcy low. Therefore for the entire period of the study Butali Sugar Company was classified bankruptcy likelihood low because for each of the years

from 2012 to 2015 the score was above the centroid bankruptcy likelihood low score of 1.449.The findings of this study concur with Loncan and Caldeira(2014) who argue that the higher the gearing the less the liquidity the firm is therefore highly geared companies should reduce the risk of bankruptcy possibilities which eventually leads to bankruptcy (Loncan & Caldeira, 2014).

### 4.16.9 Trans-Mara Sugar Company Discriminant Z score and Bankruptcy Likelihood Status per Year

The discriminant Z score as shown in figure 4.27 below was tabulated by the study in order to establish for each of the five (2011-2015), if the discriminant Z score of Trans Mara Sugar Company shows bankruptcy likelihood low or high.

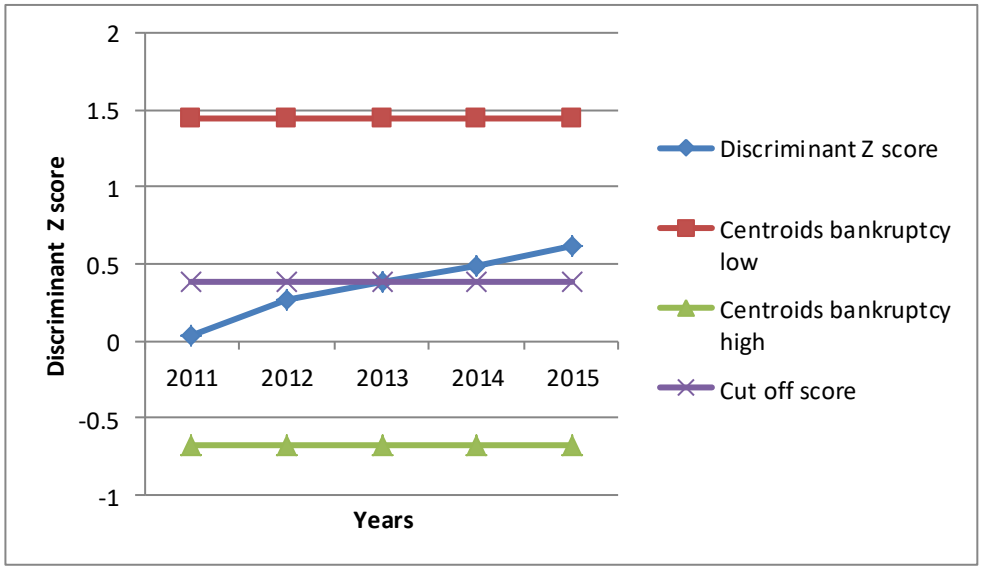



**Figure 4.27: Trans Mara Sugar Company Bankruptcy Likelihood Status Per Year**

The period of the study for Trans Mara sugar company was (2011-2015) as indicated in Appendix VI, where the discriminant Z score was 0.034 in 2011 as shown in figure 4.27 above, and in 2012 the score increased to 0.269 but still the score was below the minimum cut off point of 0.382, but from 2013 the score increased to 0.386 which was above the minimum cut off point and in 2015 it was 0.618.The results of the study

revealed that the discriminant Z score had been increasing and from 2013 to 2015 the score was above the cutoff score of 0.382 hence , the study classified the company as bankruptcy likelihood low. The findings of this study were in agreement with Narayanan (2008) who argues that optimal capital structure of the firm is where the cost of capital is minimized and the value of the firm maximized and at this optimal capital structure the company is likely to be bankruptcy likelihood free.

### 4.16.10 Kibos Sugar Company Discriminant Z score and Bankruptcy Likelihood Status Per Year

The discriminant Z score as indicated in figure 4.28 below was computed by the study with the objective of establishing for each of the six years of study (2010-2015), if the discriminant Z score of Kibos Sugar Company reflected bankruptcy likelihood low or high.

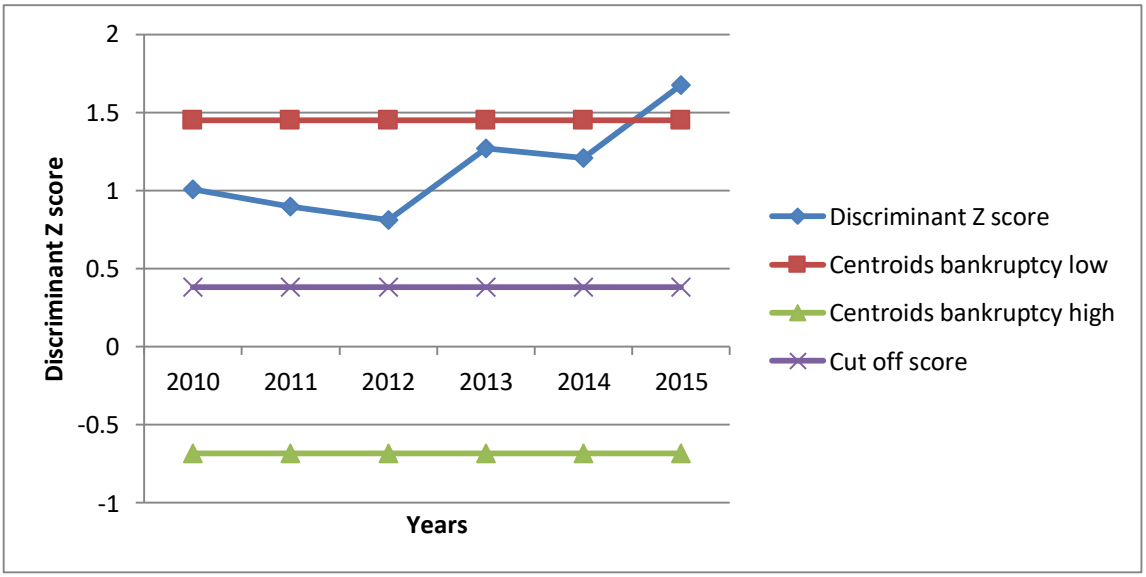



**Figure 4.28: Kibos Sugar Company Bankruptcy Likelihood Status Per Year**

The period of the study for Kibos sugar company was for six years (2010 -2015) as shown in Appendix VI and figure 4.28 above, where the discriminant Z score was 1.009 in 2010 which was above the cutoff score of 0.382, 2011 the score was 0.895, 2012 it was 0.809, 2013 it was 1.270, 2014 it was 1.208 and 2015 it was 1.675.Therefore for all the years of study the score was above the minimum cut off score of 0.382 and in the last year of study 2015 the discriminant Z score was above the centroids free from bankruptcy likelihood high score of 1.449 as evidenced from figure 4.28 above. The study therefore classified the company as bankruptcy likelihood low. The results of this study is consistent with Zein and Tian (2007) who argue that capital structure of the firm has a major effect on the firm's performance and overlooking of bankruptcy costs may lead firms to borrow heavily and lead to high debt in the firm's capital structure which will increase the likelihood of going into bankruptcy. This was because averagely private owned sugar companies were lowly geared as evidenced by the tabulated statistics in figure 4.15.

## 4.17 Public and Private owned Sugar Company's Discriminant Z score and Cut off score for the 10 Years of Study

### 4.17.1 Public owned Sugar Companies' Discriminant Z score and Cut off score for the 10 Years of Study

The computed discriminant Z scores of the sugar companies per status for purposes of comparability where all the public owned sugar companies' results were presented as shown in figure 4.29 below.

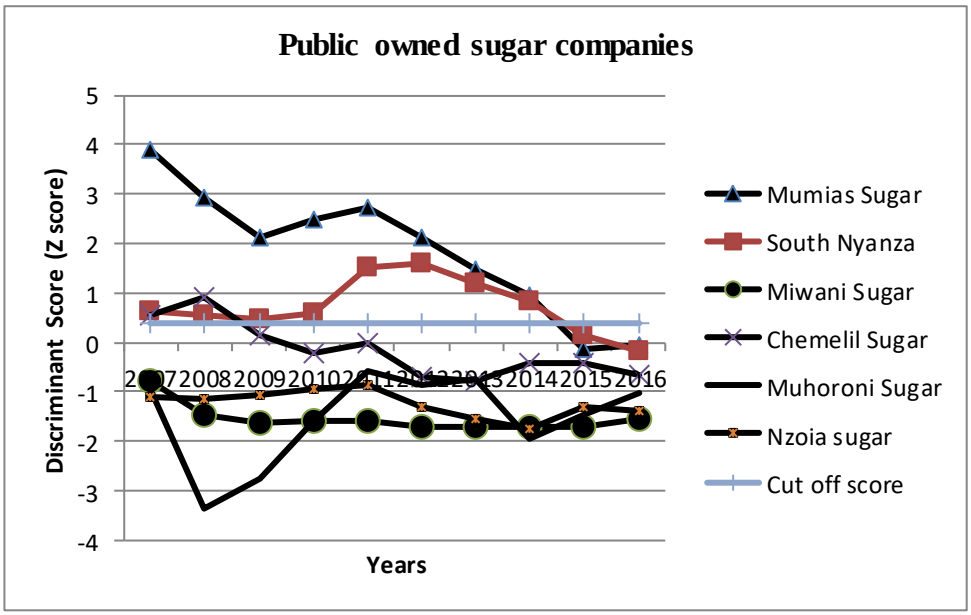



**Figure 4.29: Public owned Sugar Companies Discriminant Z score**

The findings in figure 4.29 above indicate the graph of each of the public owned sugar companies and their respective discriminate score for the ten years of the study and Appendix VI gives the discriminant Z score per company per year. In 2007 Mumias Sugar Company had a score of 3.903 which kept on dropping, in 2015 and 2016 the discriminant score was below the minimum cut off score of 0.382, hence the company was classified as bankruptcy likelihood high. South Nyanza Sugar Company had a discriminant Z score of 0.638 in 2007 and the score increased up to 2013 it started a declining trend where in 2015 and 2016 the score was below the minimum cut off score of 0.382 as shown in figure 4.29 above. The study classified the company as bankruptcy likelihood high. Miwani sugar company had a score of -0.777 in 2007 which had dropped to -1.566 in 2016, all the years of the study the company's discriminant Z score was below the minimum cut off score of 0.382, hence was classified as bankruptcy likelihood high for the entire period of the study which means that the company is likely to require a complete overhaul to salvage the company from bankruptcy. Chemelil Sugar Company had a discriminant Z score of 0.530 in 2007, but from 2009 to 2016 the score had been below the minimum cut off score of 0.382 as shown in the figure 4.29 above,

hence for the last 8 years the study classified the company as bankruptcy likelihood high. Muhoroni Sugar Company had a discriminant Z score of -0.968 in 2007 which had dropped to -1.010 in 2016, for the entire period of the study the score was below the minimum cut off of 0.382, hence for the entire period the company had status of bankruptcy likelihood high, hence complete overhaul is required to salvage the company.

Nzoia Sugar Company had a discriminant Z score of -1.104 in 2007 which had dropped to -1.383 in 2016 where the entire 10 years which was the period of the study the score of the company was below the minimum thresholds of 0.382, hence the study classified the company as bankruptcy likelihood high. This means that for the survival of the company complete overhaul may be required. The findings of this study was consistent with (Saunders & Cornett, 2011), who assert that a higher gearing ratio will increase borrower security charges and claim on firms' cash flows and hence increasing bankruptcy likelihood. In addition, it also concurs with Loncan and Caldeira (2014) who argue that the higher the gearing the less liquidity the firm is therefore highly geared companies should reduce the risk of bankruptcy likelihood which eventually leads to bankruptcy. This was because on average public owned sugar companies were highly geared, while on the other hand private owned sugar companies were lowly geared as per figure 4.15 on BVE to TL average ratio per companies' status, which measured the gearing position where the ratio for public owned sugar companies averagely ranged from 0 to -0.295, on the other side private owned sugar companies ranged from 0 to 0.612.

### 4.16.2 Private owned Sugar Companies' Discriminant Z score and Cut off score for the 5-6 Years of Study

In order to compare the discriminant Z score of private sugar companies which were studied, the researcher computed the discriminant Z score combining all the private owned sugar companies and the results were as shown in figure 4.30 below.

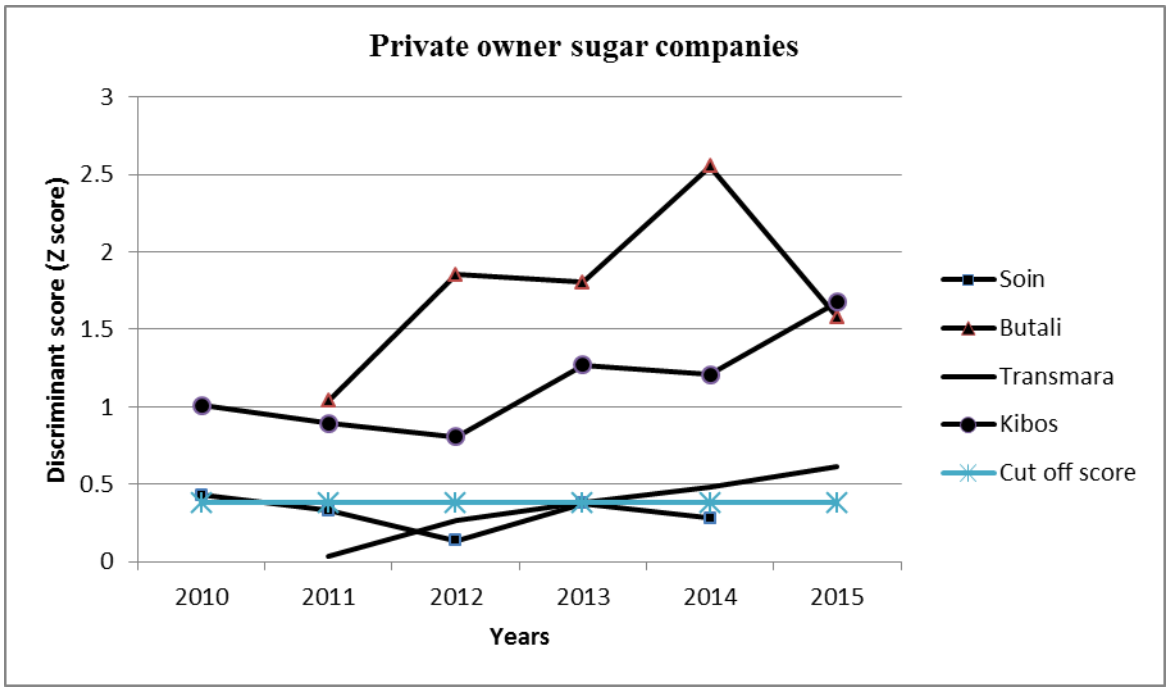



**Figure 4.30: Private owned sugar companies discriminate Z score**

The figure 4.30 above gave the private owned sugar companies in Kenya and their discriminate Z scores over the period of the study. Soin Sugar Company had a score of 0.430 in 2010 which had dropped to 0.282 in 2014 when the company was liquidated in 2015 as evidenced from the figure 4.30 above and Appendix VI. The discriminant Z score was above the minimum thresholds of 0.382 in 2010 only from there the score was below the minimum threshold score of 0.382 up to 2014 when the company was liquidated in 2015. The score was below the threshold which meant that if the Z score model was applied to the company yearly then the company would have been salvaged before the actual liquidation in 2015.

Butali Sugar Company had a score of 1.037 which had increased to 1.582 in 2015; meaning for the entire period of the study the score of the company was above the minimum threshold of 0.382. The study classified the company as bankruptcy likelihood low.

Transmara Sugar Company had a score of 0.034 in 2010, which had increased to 0.638 in 2015 therefore for the last three years the discriminant Z score of the company was above the minimum threshold of 0.382, hence the company was classified as bankruptcy likelihood low. Kibos Sugar Company had a score of 1.009 in 2010 which had increased to 1.675 in 2015 where the discriminant Z score of the company had been above the minimum thresholds of 0.382 for the entire period of the study and the study classified the company as bankruptcy likelihood low. Therefore, all the private owned sugar companies in Kenya except Soin which was liquidated in 2015 had a discriminant score of above the cut off line of 0.382, either for the entire period of the study or for the last two years of the study hence they were classified as bankruptcy likelihood low. The findings of this study were consistent with Zeitun and Tian (2007) who stated that capital structure of the firm has a significant effect on the firms' performance of the firm. In addition it also concurs with Frank and Goyal (2008) who stated that increase in the cost of debt is likely to lead the company to be financially overstretched due to high payment of interest which will reduce profitability and cash flow leading to high bankruptcy likelihood. This was the likely reason as to why all highly geared companies were classified by the study as bankruptcy likelihood high. Additionally, the book value of equity or market value of equity to total liabilities being a ratio that measures the gearing position showed the highest discriminating power of 1.669 as shown in table 4.69.

### 4.18 Hypothesis Testing for the Secondary Data Study Variables

The study modelled bankruptcy likelihood of sugar companies in Kenya using the Altman's Z score ratios; discriminant analysis was conducted to test the hypotheses where a company was either classified as bankruptcy likelihood low or high based on the minimum cut off discriminant score as per table 4.70. The tests were done at 95% confidence level where (alpha=0.05).

### 4.19 Observations from Primary and Secondary Data

Using the primary data all the null hypotheses were rejected at 95% confidence level, meaning that statistically, all the independent variables were good predictor of bankruptcy likelihood of Kenya sugar companies. However using the secondary data the independent variable sales to total assets was found not to be a good predictor of bankruptcy likelihood of sugar companies in Kenya this was due to the fact that bankruptcy likelihood was significantly, determined by gearing and profitability hence a company with more sales but not able to control cost of sales, other operating expenses and with high debts all this combined to reduce profitability, cash flows and hence increase the level of bankruptcy likelihood of the company.

# CHAPTER FIVE

# SUMMARY, CONCLUSION AND RECOMMENDATIONS

## 5.1 Introduction

The study sought to model the use of the Z score ratios model to predict bankruptcy likelihood of sugar companies in Kenya. The study specifically, determined how the following independent variables (working capital to total assets ratio, retained earnings to total assets ratio, earnings before interest and tax to total assets, book value of equity to total liabilities, market value of equity to total liabilities and sales to total assets ratio) influence bankruptcy likelihood of sugar companies in Kenya. The chapter summarized the results findings, drew conclusions, made recommendations, overall recommendations, implications of the study and areas of further research. Additionally, conclusions, which were drawn by the study, were on the basis of the specific objectives and research hypotheses of the study.

## 5.2 Summary of the Findings

The general objective of this study was to model the use of the Z score ratios to predict bankruptcy likelihood of sugar companies in Kenya. Specifically, the study assessed the effects of working capital to total assets ratio, determined the influence of retained earnings to total assets ratio, established the effect of earnings before interest and tax to total assets ratio, examined the influence of book value of equity or market value of equity to total liabilities ratio and established the effect of sales to total assets ratio in predicting bankruptcy likelihood of sugar companies in Kenya. This summary is presented in line with the study objectives.

### 5.2.1 Working Capital to Total Assets ratio and Bankruptcy Likelihood

The first objective of this study was to assess the effect of working capital to total assets ratio in predicting bankruptcy likelihood of sugar companies in Kenya. The results established that working capital to total assets ratio had a positive and statistically

significant in predicting bankruptcy likelihood of sugar companies in Kenya. The results further revealed that all public owned sugar companies had a negative average working capital to total assets while private had a positive average working capital to total assets ratio. The negative average working capital to total assets ratio of public owned sugar companies reduces the value of the discriminant Z score value implying bankruptcy likelihood high. On the other hand, the positive average working capital to total assets ratio of private owned sugar companies increase the value of the discriminant Z score value implying bankruptcy likelihood low.

### 5.2.2 Retained Earnings to Total Assets ratio and Bankruptcy likelihood

The second objective of this study was to determine the influence of retained earnings to total assets ratio in predicting bankruptcy likelihood of sugar companies in Kenya. The results of the study revealed that retained earnings to total assets ratio had a negative and statistically significant in predicting bankruptcy likelihood of sugar companies in Kenya. This meant that an increase in the retained earnings to total assets ratio reduced the value of the discriminant Z score ratio model and increased the bankruptcy likelihood.

Additionally, the results further shows that all public owned sugar companies had a negative average retained earnings to total assets and on the other hand private owned sugar companies had relatively low positive average retained earnings to total assets ratio. The negative average retained earnings to total assets ratio of public owned sugar companies reduced the value of their discriminant Z score since retained earnings are added to the book value of equity hence the lower the retained earnings the lower the book value of equity, meaning a higher bankruptcy likelihood of these companies in Kenya. On the other hand, the positive retained earnings to total assets ratio of private owned sugar companies increase the value of the discriminant Z score due to its impact of increasing the book value of equity value implying bankruptcy likelihood low.

### 5.2.3 Earnings before Interest and Tax to Total Assets ratio and Bankruptcy Likelihood

The third objective of this study was to establish the effect of earnings before interest and tax to total assets ratio in predicting bankruptcy likelihood of sugar companies in Kenya. The findings found out that earnings before interest and tax to total assets ratio had a positive and statistically significant in predicting bankruptcy likelihood of sugar companies in Kenya. In addition the results further shows that all public owned sugar companies had negative average earnings before interest and tax to total assets whereas private owned sugar companies had positive average earnings before interest and tax to total assets ratio. The negative earnings before interest and tax to total assets ratio of public owned sugar companies reduces the value of the discriminant Z score value suggesting bankruptcy likelihood high. Additionally, the positive average earnings before interest and tax to total assets ratio of private owned sugar companies increases the value of the discriminant Z score value indicating bankruptcy likelihood low.

### 5.2.4 Book Value of Equity or Market Value of Equity to Total Liabilities ratio

The fourth objective of this study was to examine the influence of book value of equity or market value of equity to total liabilities ratio in predicting bankruptcy likelihood of sugar companies in Kenya. Further the findings revealed that book value of equity or market value of equity to total liabilities ratio had a positive and statistically significant in predicting bankruptcy likelihood of sugar companies in Kenya. Additionally, the results shows, that all public owned sugar companies had a negative average book value of equity to total liabilities and Mumias Sugar Company had a relative low market value of equity to total liabilities ratio similarly private sugar companies had a positive average book value of equity to total liabilities ratio. The negative average book value of equity to total liabilities ratio of public owned sugar companies meant reduction of the value of the discriminant Z score value denoting a situation of bankruptcy likelihood high. In addition, the positive average book value of equity to total liabilities ratio of private

owned sugar companies increased their value of the discriminant Z score entailing bankruptcy likelihood low.

### 5.2.5 Sales to Total Assets ratio and Bankruptcy Likelihood

The fifth objective of this study was to establish the effect of sales to total assets ratio in predicting the bankruptcy likelihood of sugar companies in Kenya. The results of the study found out that sales to total assets ratio had a negative and statistically not significant in predicting bankruptcy likelihood of sugar companies in Kenya. In addition, the findings of the study indicated that all public owned sugar companies had higher positive average sales to total assets and on the other hand private sugar companies had lower positive sales to total assets ratio. Consequently the higher positive average sales to total assets ratio of public owned sugar companies did not increase the value of the discriminant Z score value and reduce their bankruptcy likelihood meaning they were classified by the study as bankruptcy likelihood high. This was because they were not able to minimize cost of sales and other operating expenses in order to maximize profitability, cash flows and net worth. Therefore despite the low positive average sales to total assets ratio of private owned sugar companies the value of their discriminant Z score was relatively high implying bankruptcy likelihood low. This was because they were able to control cost of sales and other operating expenses a situation which increased their profitability, cash flows and net worth hence leading to bankruptcy likelihood low.

### 5.2.6 Bankruptcy Likelihood using Z score ratios model

The general objective of the study was to model the Z score ratio to predict bankruptcy likelihood of sugar companies in Kenya. The results revealed that the gearing ratio which is measured by book value of equity or market value of equity to total liabilities ratio was the highest predictor of bankruptcy likelihood of sugar companies in Kenya. This was followed by profitability ratio which was measured by earnings before interest and tax to total assets ratio. The third predictor of bankruptcy likelihood of sugar

companies in Kenya was retained earnings to total assets ratio while working capital to total assets was the least predictor of bankruptcy likelihood of sugar companies in Kenya. However, the study established that the sales to total assets ratio was found not be a good predictor of bankruptcy likelihood of sugar companies in Kenya. In addition, the study established that the four ratios (BVE to TL, EBIT to TA, RE to TA and WC to TA) for public owned sugar companies were negative on average and they were classified as bankruptcy likelihood high. On the other hand the foresaid ratios for private owned sugar companies on average were positive and they were classified as bankruptcy likelihood low.

## 5.3 Conclusions

Based on the findings of the study, the following conclusions were established;

### 5.3.1 Working Capital to Total Assets Ratio and Bankruptcy likelihood

The first objective of the study to assess the effect of working capital to total assets ratio in predicting bankruptcy likelihood of sugar companies in Kenya. The results established that working capital to total assets ratio was positive and statistically significant in predicting bankruptcy likelihood of sugar companies in Kenya. The discriminant coefficient of this ratio was positive meaning that an increase in the ratio increased the value of the discriminant Z score and reduced bankruptcy likelihood of sugar companies in Kenya. This was an indication that low current assets value, high current liabilities and high total assets value increased bankruptcy likelihood. The results further revealed that those sugar companies with more current assets than current liabilities and lower total assets had a higher working capital to total asset ratio which increased the value of the discriminant Z score and reduced their bankruptcy likelihood. In addition the descriptive statistics as shown in table 4.26 indicates that 80% of the respondent agreed that increasing WC is an indication of reduction in bankruptcy likelihood. Therefore, the study concludes that working capital to total assets ratio is a good predictor of bankruptcy likelihood of sugar companies in Kenya. The results of this

study gives further credence to liquidity preference theory hence confirming it is versatility. In addition it also confirms the entropy theory.

### 5.3.2 Retained Earnings to Total Assets ratio and Bankruptcy Likelihood

The second objective of the study sought to determine the influence of retained earnings to total assets ratio to predict bankruptcy likelihood of sugar companies in Kenya. The findings revealed that retained earnings to total assets ratio was negative but statistically significant in predicting bankruptcy likelihood of sugar companies in Kenya. The discriminant coefficient of this ratio was negative, which meant that an increase in the ratio reduced the value of the discriminant Z score and increased bankruptcy likelihood. This was because the lower the discriminant Z score values the higher bankruptcy likelihood the company was. Additionally the average retained earnings of the six public owned sugar companies that were investigated during the period of study were negative. Therefore, it was an indication that those sugar companies which had more sales but high cost of sales, high operating expenses, making losses and negative retained earnings had their discriminant Z score value low and their level of bankruptcy likelihood was high than those sugar companies which had positive retained earnings, even if they had more total assets they were classified by the study as bankruptcy likelihood low. The ratio retained earnings to total assets was significant in discriminating between bankruptcy likelihood low and bankruptcy likelihood high of sugar companies in Kenya. Therefore, the study concludes that retained earnings to total assets ratio is a good predictor of bankruptcy likelihood of sugar companies in Kenya. Additionally the descriptive statistics as presented in table 4.27 shows that 91.5% of the respondent disagreed that the more the retained earnings the higher the bankruptcy likelihood. The findings of this study give further support to the facts of the pecking order theory confirming it is practicability in predicting bankruptcy likelihood of sugar companies. It also confirms the propositions of static trade off theory, resource dependence theory and entropy theory.

### 5.3.3 Earnings before Interest and Tax to Total Assets ratio and Bankruptcy Likelihood

The study also investigated the effect of earnings before interest and tax to total assets ratio in predicting bankruptcy likelihood of sugar companies in Kenya. The results show that earnings before interest and tax to total assets ratio was positive and statistically significant in predicting bankruptcy likelihood of sugar companies in Kenya. The discriminant coefficient of the ratio earnings before interest and tax to total assets was positive meaning that an increase in the ratio increased the value of the discriminant Z score and reduced bankruptcy likelihood of sugar companies in Kenya, because the higher the discriminant Z score the lower bankruptcy likelihood. Those sugar companies which had high sales, low cost of sales, low operating expenses and low total assets resulted into more earnings before interest and tax to total assets ratio which reduced bankruptcy likelihood of sugar companies in Kenya. In addition this ratio had the second highest discriminating power. Similarly, those sugar companies which had more sales, less cost of sales, less operating expenses and less total assets were classified by the study as bankruptcy likelihood low since they were more effective in controlling their cost of sales and other operating expenses to maximize profitability and cash flows .Further descriptive statistics in table 4.28 indicates that 73.3% of the respondents agreed that the higher EBIT, the lower the bankruptcy likelihood. Therefore, the study concludes that the ratio earnings before interest and tax to total assets are a robust predictor of bankruptcy likelihood of sugar companies in Kenya. The results of this study support the assertion in entropy theory. It also further confirms the resource dependence theory.

### 5.3.4 Book Value of Equity or Market Value of Equity to Total Liabilities ratio

The study determined the effect of book value of equity to total liabilities ratio to predict bankruptcy likelihood of sugar companies in Kenya. The discriminant coefficient of the ratio book value of equity to total liabilities ratio was positive meaning that an increase in the ratio increased the value of the discriminant Z score and reduced the level of

bankruptcy likelihood of sugar companies in Kenya, because the higher the discriminant Z score the lower bankruptcy likelihood. This was an indication that those sugar companies which had more share capital, more retained earnings, more reserves and low noncurrent liabilities and low current liabilities, resulted into more book value of equity or market value of equity to total liabilities ratio which reduced their bankruptcy likelihood. Additionally, the ratio had the highest discriminating power skewed towards bankruptcy likelihood low. The descriptive statistics as per table 4.31 also gives the findings that 85.6% of the respondents dis agreed that the higher the BVE, the higher bankruptcy likelihood. Therefore, the study concludes that those sugar companies with more share capital, more reserves, more retained earnings, less noncurrent liabilities and less current liabilities were classified by the study as bankruptcy likelihood low. The ratio book value of equity to total liabilities statistically was significant in predicting bankruptcy likelihood of sugar companies in Kenya. The results of this study give credence to resource dependence theory hence confirming it is versatility. It further also confirms the following theories; static trade off, pecking order and entropy theories.

### 5.3.5 Sales to Total Assets ratio and Bankruptcy Likelihood

The study sought to determine the influence of sales to total assets ratio to predict bankruptcy likelihood of sugar companies in Kenya. The discriminant coefficient of this ratio was negative, which was an indication that an increase in the ratio reduced the value of the discriminant Z score and increased bankruptcy likelihood. The lower the discriminant Z score value the higher bankruptcy likelihood the sugar company was, this was due to the fact that even if sugar companies had more sales if they were not able to minimize cost of sales and other operating expenses it resulted into low profitability and insufficient cash flows and increased bankruptcy likelihood of the sugar companies especially the public owned sugar companies in Kenya. Therefore, it was an indication that those sugar companies which had high cost of sales, high operating expenses, making losses and negative retained earnings were classified by the study as bankruptcy likelihood high. In addition the descriptive statistics as shown in table 4.25 indicates that 74.7% of the respondent agreed that the cost of sales of their companies has been

increasing which meant reduction in profitability, cash flows and net worth hence is an indication of increase in bankruptcy likelihood. Therefore, it is possible to conclude that those sugar companies which had high sales, but more cost of sales and other operating expenses even if they had more total assets they were classified by the study as bankruptcy likelihood high. The results of the study revealed that the ratio sales to total assets ratio was not significant in discriminating between bankruptcy likelihood low or bankruptcy likelihood high of sugar companies in Kenya.

Therefore the study concludes that Z score ratios model has a significant negative relationship with bankruptcy likelihood of sugar companies in Kenya which means that the more the ratio the low bankruptcy likelihood . However the weights of the predicting powers of the Z score ratios model varied from one ratio to another Additionally, the study found that the ratio book value of equity and market value of equity to total liabilities had the highest predicting power, followed with earnings before interest and tax to total assets, the third ratio was retained earnings to total assets which was followed with working capital to total assets ratio. While the ratio sales to total assets ratio was statistically not a robust predictor of bankruptcy likelihood of sugar companies in Kenya. The study findings support the facts of the liquidity preference theory, resource dependence theory, statistic trade off theory, pecking order theory and entropy theory.

## 5.4 Recommendations

### 5.4.1 Working Capital to Total Assets ratio and Bankruptcy Likelihood

The ratio working capital to total assets positively influences prediction of bankruptcy likelihood of sugar companies in Kenya. This implies that working capital to total assets ratio increases the discriminant Z score value hence leading to low bankruptcy likelihood. In addition the descriptive statistics in table 4.26 shows that 80% of the respondents consented that increasing WC leads to reduction of bankruptcy likelihood. The management should also look into strategies of reducing their debt burden by prudent borrowing and debt renegotiations this are likely to reduce short term

borrowings with higher interest rates like bank overdraft and short term loans hence reducing short term and long term obligations, the government should inject in more funds for this public owned sugar companies for their survivals especially those sugar companies like South Nyanza and Mumias sugar whose the study has revealed that they can be salvaged.

Similarly, the study recommend to management of sugar companies in Kenya to develop a working capital management policy which is likely to ensure that current liabilities are always maintained at a lower level than current assets this policy should be bench marked with other sugar industry in Kenya through the sugar directorate which is the regulatory authority where the liquidity ratios can be computed and compared with the target from the policy for timely corrective action. Additionally, the study recommends the Sugar Directorate-the regulatory authority charged with monitoring and ensuring stability in the sugar industry in Kenya, to develop a working capital to total assets ratio model and the application of the Z score model for early detection of financial difficulties in sugar companies in Kenya for timely corrective action.

### 5.4.2 Retained earnings to total assets ratio and bankruptcy likelihood

The retained earnings to total assets ratio has a negative but statistically significant in predicting bankruptcy likelihood of sugar companies in Kenya. This result implies that it impacted negatively on the discriminant Z score value and increased bankruptcy likelihood. Additionally, the descriptive statistics in table 4.27 gives that 91.6% of the respondents disagreed that the more the retained earnings the higher the bankruptcy likelihood increasing. This is because retained earnings are added to book value of equity to increase the extent to which the assets of the company are internally financed.

The study therefore, recommends enhanced utilization of retention policy strategies which are geared towards highlights strategies of improving retained earnings in sugar companies in Kenya. The improvements of the retained earnings can be maximized by effectively using their total assets (resources) to generate increased sales, reduce the cost

of sales and other operating expenses. This will likely increase retained earnings which is normally added to book value of equity, hence increasing the value of the discriminant Z score and reduce bankruptcy likelihood, it will also ensure that internal funds for financing the projects are from internal sources hence reducing interest payment obligations resulting into high profits, cash flows and reducing bankruptcy likelihood. In addition, the study recommends management of sugar companies in Kenya to apply the Pecking order theory, static trade off theory and the resource dependence theory, which emphasizes on prudent borrowings and resource management.

### 5.4.3 Earnings before Interest and Tax to Total Assets ratio and Bankruptcy Likelihood

The study established that earnings before interest and tax to total assets ratio was positive and statistically significant in predicting bankruptcy likelihood of sugar companies in Kenya. In addition the descriptive statistics in table 4.28 indicates that 73.70% of the respondents agreed that the higher EBIT, the lower bankruptcy likelihood. This study recommends proper utilization of earnings before interest and tax to total assets ratio test to enhance operation efficiency of sugar companies in Kenya. The study further recommends improved control of financial performance by reducing cost of sales and other operating expenses in order to check any bankruptcy likelihood of their respective sugar companies. Finally, the study recommends that the management of sugar companies in Kenya to benchmark with other sugar companies in the world in order to improve operational efficiency.

### 5.4.4 Book Value of Equity (Market Value of Equity) to Total Liabilities ratio and Bankruptcy Likelihood

On the influence of book value of equity or market value of equity to total liabilities ratio, the study revealed that the ratio was positive and significant in predicting bankruptcy likelihood of sugar companies in Kenya. This ratio had the highest discriminating power. The descriptive statistics as shown in table 4.31 shows, that

85.6% of the respondents concurs that the more the BVE, the lower the bankruptcy likelihood.

The study recommends prudent borrowings and management of liabilities in sugar companies in Kenya which consequently is likely to reduce bankruptcy likelihood. The study also recommends application of the pecking order theory which states that companies should use internal financing before resorting to any form of external funding thus reducing total liabilities and increasing book value of equity due to increased retained earnings hence increasing the discriminant Z score value and reduce bankruptcy likelihood. In addition, the study recommends the management of sugar companies in Kenya to apply the static trade off theory (STT) by maximizing the tax saving benefits and minimizing the interest cost payment. Further, the study recommends the government- through the commodity fund, to come up with policies for giving sugar companies in Kenya loans at subsidized rate of interests which is likely to reduce their bankruptcy likelihood due to reduction of liabilities.

Finally, the study recommends proper management of resources and better investments of borrowed funds to generate enough returns which are likely to increase the reserves (book value of equity) of those companies and increase the discriminant Z score hence, reducing bankruptcy likelihood.

### 5.5.5 Sales to Total Assets ratio and Bankruptcy Likelihood

This ratio of sales to total assets ratio had no significant effect in predicting bankruptcy likelihood of sugar companies in Kenya. The descriptive statistics as indicated in table 4.25 shows that 81.10% of the respondents concurs that increasing sales leads to reduction of bankruptcy likelihood. The study therefore, recommends that management of sugar companies in Kenya should focus on strategies of effectively utilizing their total assets (resource based theory) to generate more sales, but more important is to reduce the cost of sales and other operating expenses (static trade off theory), this is likely to results into increased profits which may result in increased cash flows hence reduction

of bankruptcy likelihood. This is because, the company can be making more sales, but if it's not able to control its cost of sales and other operating expenses; it's earnings before interest and tax to total assets ratio, retained earnings to total assets ratio and book value of equity to total liabilities ratio will be low, a situation which is likely to reduce the value of the discriminant Z score and lead to increased bankruptcy likelihood. Since the study results has revealed that all the public owned sugar companies that were investigated had bankruptcy likelihood high. The study recommends to the government to salvage those sugar companies which can be salvaged so that this can increase gross domestic products which may ensure repayment of the national debt which has been on increasing trends as per table 1.3, also vision 2030 and the government big 4 agenda may not be fully realized if the government does not boost the manufacturing sector which is pertinent to sustainability of economic development where the sugar industry is included.

### 5.5.6 Z score ratios Model and Bankruptcy Likelihood

The study recommends the adoption of the Z score ratios model as a predictor in bankruptcy likelihood as a warning for insolvency. The study also recommends that various stakeholders of the sugar companies and other sectors to use Altman Z score ratios model when analyzing and interpreting the company's financial statements. Finally the study recommends the utilization of the Z score ratios Model to assure sustainability of an otherwise flagging performance sugar industries in Kenya in order to achieve vision 2030, big 4 agenda and other developmental agenda and increase in the GDP.

## 5.6 Implications of the Study

The study contributes to the existing body of knowledge by establishing that the Z score ratios model developed by Altman is a robust model of predicting bankruptcy likelihood of companies both in developed and developing countries. Hence this study extended the discourse of the application of this model. The model's key ratios working capital to total assets, retained earnings to total assets, earnings before interest and tax to total

assets, book value of equity or market value of equity to total liabilities and sales to total assets ratio covers all aspects of the company's financial performance including profitability, liquidity, leverage, efficiency and shareholders value. Therefore this study contributes to the existing studies in the areas of bankruptcy and bankruptcy likelihood facing companies by elaborating further the existing theories, models and empirical studies on bankruptcy and bankruptcy likelihood facing sugar companies in Kenya including recommendations to policy makers and other stakeholders. The study is likely to contribute to the existing knowledge in bankruptcy and bankruptcy likelihood since it reviewed the model that can be used to predict bankruptcy likelihood and bankruptcy likelihood of sugar companies in Kenya by applying the discriminant analysis.

The findings of this study has implications to policy by establishing that for the country to achieve vision 2030 and the big 4 agenda there is need to salvage the sugar sector and not to wait for it to be liquidated. In practice the findings of this study has implications to employees and potential employees since they may be able in conjunction with management to develop strategies that are likely to improve the financial performance of their respective companies and potential employees to seek employment in those financial stable companies. In addition financial institutions are likely to be able to determine the continuity and the ability of the company to pay back the debt (credit worth ness) of the sugar companies in Kenya. Additionally, the findings of the study has implications to customers and suppliers since it provides information which may enable them to assess the likelihood of bankruptcy and bankruptcy likelihood of the sugar companies in Kenya for continuous supply of goods, services and raw materials.

The results of this study has implications to methodology because it employed descriptive research design unlike the previous studies which used case study design which is subjective and not conclusive hence the need of this study which took a comprehensive view of all public owned sugar companies and four private owned sugar companies. Finally this study finding has implications to various stakeholders of sugar companies in Kenya on the need to salvage those sugar companies which can be

salvaged and liquidate those that cannot be salvaged because it may be expensive to maintain a company whose likelihood of bankruptcy is high for a long period of time.

### 5.7 Areas of Further Research

This study was anchored on the Z score ratios model. Future research may explore the application of other models such as the Springate and Zmijewski's models to predict the likelihood of bankruptcy of sugar companies in Kenya to check if they can derive the same results. This study focused only on sugar companies in Kenya. Scholars may extend this analysis to include other sectors such as construction industry, airlines, supermarkets and hotel industry which are pertinent to the achievement of vision 2030 and government big 4 agenda. Alternatively, further research may be carried out in sugar companies in Kenya using nonfinancial factors for example, Staff Motivation, Boardroom Wrangles and company relationship with its stakeholders to establish if the same results may be arrived at this is because nonfinancial factors affect financial factors.

Similarly, future research may be carried out to establish the weaknesses in the regulatory framework of the sugar industry that need to be addressed in order to encourage efficiency and effectiveness in the financial performance of the sugar industries in Kenya. This is because failure of one Sugar Company can automatically lead to failure of another. Further researcher may carry out a study which may link the financial statement ratios with information obtained from the footnotes of the financial statements which includes; contingent liabilities, past and pending law suits, pension obligations, chairman's and directors report this is likely to assist in establishing if there is a correlation between the financial statement ratios and the additional information's in the footnotes. Those sugar companies like Miwani, Muhoroni and Nzoia sugar companies, which the study has classified as bankruptcy likelihood high for the whole period of the study (2007-2016), future researchers, may consider conducting a study to find out from 2006 backward when these sugar companies may have started experiencing bankruptcy likelihood high. In addition future researchers may consider

carrying out a study to establish if there is any correlation between the bankruptcy prediction model and the Auditors report on the company's financial statement.

Further research may carry out a comprehensive study that is likely to cover all the private owned sugar companies in Kenya seeking to predict their bankruptcy likelihood. Comprehensive research may definitely have wider implications to the sugar industry. Finally, repetition of this study in the near future may be expected to include other years not covered by this study.

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# APPENDICES

## Appendix I: Letter of Authorization

Maurice Mwita Range

P.O. Box 6989-00400

Nairobi

Cell: 0724-942764

To, The Chief Executive Officer

……. Sugar Company

Dear Sir / Madam,

**RE: MODELLING THE USE OF Z SCORE RATIOS IN PREDICTING BANKRUPTCY LIKELIHOODOF SUGAR COMPANIES IN KENYA**

I am a student pursuing a doctorate degree in Business Administration (Finance Option) at Jomo Kenyatta University of Agriculture and Technology. And one of the requirements is to undertake a research proposal as partial fulfillment for the award of this degree. My research topic is as stated above and I am humbly requesting for your cooperation in making my research a success.

The purpose of this letter is therefore to kindly request you to participate in this research work and also allow for collection of relevant data from your staff who will be selected as respondents. Finally, I assure you that all the data collected will be treated with utmost confidentiality and will be used only for the purposes of achieving this research objective.

I remain looking forward for your positive consideration.

Yours faithfully,

**Maurice Mwita Range**

**Student Reg. HD433-C003-2720/2014**

**Appendix II: Interview Schedule for Finance Staff in Sugar Companies in Kenya**

Name of the Sugar Company ----------

1. Name ----------(optional)
2. What is your age bracket?

   Less than 30 years ☐

   30-40 years ☐

   40-50 years ☐

   Over 50 years ☐

3. How long have you been with this Sugar Company?

   Less than 5 years ☐

   5-10 years ☐

   10-20 years ☐

   Above 20 years

**Appendix III: Questionnaire**

This questionnaire is concerned with providing the information which will enable the researcher assess the bankruptcy likelihood of sugar companies in Kenya.

**Section A: Demographic information**

1. Name of the sugar company……

2. Category type (please tick as appropriate)

   a) Quoted ☐

   b) Unquoted ☐

3. Respondents' particulars

   Level of education

   University level ☐

   University and CPA ☐

   Tertiary and CPA ☐

   CPA ☐

   Others (specify)……...

4. **Department**

   a) Finance ☐

   b) Procurement ☐

c) Sales and marketing ☐

d) Other ☐

5. How long have you worked with this sugar company?

a) Less than 1 year ☐

b) 1 – 5 years ☐

c) 5 – 10 years ☐

d) Over 10 years ☐

**Level of Management**

Top management ☐

Middle level ☐

Lower level ☐

**Section B**

The questionnaire in this section B is concerned with assessing the fair recognition, measurement, compliance with relevant standards and presentation of the element of the financial statement to enhance comparability from one person to another and with those of similar companies.

**Total assets**

The objective is to assess whether the company complies with the provisions of IAS 16, IAS 8 and other relevant standards when recognizing total assets in the financial

statements because this will enhance comparability from one period to another and with those of similar companies.

**Tick appropriately using a scale of 1-5 where; 1-Strongly agree, 2-Agree, 3-Neutral, 4-Disagree, 5-Strongly Disagree**

| Statements | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 1) The company has complied with IAS16 on cost ascertainment of non-current assets for the last ten years | | | | | |
| 2) The company has revalued its non-current assets for the last ten years | | | | | |
| 3) The company has complied with IAS 16 on valuation of non-current assets for the last ten years | | | | | |
| 4) The valuation of the company assets is done by independent valuer | | | | | |
| 5) The company revalues all its similar assets as per IAS 16 | | | | | |
| 6) The more the total assets the company has, the low bankruptcy likelihood | | | | | |

7) The company recognizes assets in the financial statements when one or all of the following conditions are met.

a) The cost of the assets is measured reliably.
b) It's probable that there will be future inflows of economic benefits to the assets.
c) Definition of an asset has been met.

d) Others

(specify)……

8) Has the company ever changed its methods of depreciation for the last ten years?

a) Yes ☐ b) No ☐

9) If yes, when was the last time that the company changed its methods of depreciation? ☐

a) 1 year ago ☐ b) 2 years ago c) 3 years ago ☐

d) 5 years ago ☐ e) above 5 years ago ☐

10) The change of the method of depreciation was from

a) Straight linemethod to reducing balance ☐

b) Reducing balance method to straight line method ☐

c) Others (Specify)……..

11) What was the reason for the change?

a) Required by the standard ☐

b) Management's opinion ☐

c) Others (specify)……

12) After how long does the company revalue its assets?

☐

Less than 1 year ☐ 1 - 2 years ☐ 3-5 years ☐ above 5 years

13) The company follows the rules of revaluation when revaluing assets (tick appropriately where applicable)

a) All similar assets are revalued ☐

b) Revaluation is done by independent value ☐

c) Revalued amount does not contradict the market value ☐

d) Others (specify)…….

**Sales**

The questionnaire in this section is aimed at assessing if the company measures sales at the fair value of the consideration received or receivable by complying with the provisions of IAS 18 on recognition measurement and disclosure of sales in the financial statements.

**Tick appropriately using a scale of 1-5 where; 1-Strongly agree, 2-Agree, 3-Neutral, 4-Disagree, 5-Strongly Disagree**

| Statements | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 1) The company has complied with IAS 18when recognizing sales in the financial statements for the last ten years | | | | | |
| 2) For the last ten years the sales of the company has been increasing? | | | | | |
| 3) The cost of sales has been increasing for the last ten years | | | | | |
| 4) The more the sales, the low bankruptcy likelihood. | | | | | |
| 5) For the last ten years, the company has controls in place of ensuring that overdue credit sales are collected on a timely manner. | | | | | |

6) For the last ten years the company has been recognizing sales in the financial statement when one or all of the following conditions has been met (tick those that are applicable).

a) Risk and rewards associated with the sale has been transferred to the buyer

b) The seller has lost control over the goods ☐

c) The amount of sales is measured reliably ☐

d) Costs of sales is measured reliably ☐

e) It's probable that there will be future transfer of economic benefit to the company ☐

f) Others (specify)……

**Working capital**

The questionnaire intends to assess whether the company complies with IAS 2 on the recognition and measurement of stock in the financial statements also if the company has adequate controls of ensuring that the proposed assets of the company are safeguarded.

**Tick appropriately using a scale of 1-5 where; 1-Strongly agree, 2-Agree, 3-Neutral, 4-Disagree, 5-Strongly Disagree**

| Statements | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 1) The company has applied consistently the method of measurement of stock from one period to another for the last ten years. | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| 2) The company has complied with IAS 2 when recognizing stock in the financial statements for the last ten years. | | | | | |
| 3) For the last ten years the company's stock does not include obsolescence stock. | | | | | |
| 4) The company has prepared debtors and creditors ledger control account at least monthly for the last ten years. | | | | | |
| 5) Increasing working capital is an indicating of reduction in the bankruptcy likelihood | | | | | |

6) Which method does the company use in valuing stock?

☐ LIFO

☐ FIFO

☐ Weighted average cost

☐ Actual unit cost

Others (specify)……

7) How does the company measure its stock?

☐ Cost

☐ Net releasable value

Others (specify)……

8) The company recognize stock in the financial statements when one or all of the following conditions have been met (tick where applicable).

a) The amount of stock is measured reliably ☐

b) It's probable that there will be future transfer of economic benefit to the company ☐

c) Others (specify)…….

9) When was the last time when the debtors and creditors ledger control accounts were reconciled and updated?

a) 1 month ago ☐ b) 2 months ago ☐ c) 3 months ago ☐

d) More than 3 months ago ☐

**Retained earnings**

The questionnaire in this section intends to assess whether the company has a retention policy and whether the Retained Earnings are invested wisely for the future continuity of the company.

**Tick appropriately using a scale of 1-5 where; 1-Strongly agree, 2-Agree, 3-Neutral, 4-Disagree, 5-Strongly Disagree**

| Statements | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 1) For the last ten years the retained earnings of the company have been increasing | | | | | |
| 2) For the last ten years taxes the company pays to the government has been increasing | | | | | |
| 3) For the last ten years the expenses of the company have been increasing | | | | | |
| 4) For the last ten years the company has a profit retention policy | | | | | |
| 5) The more the retained earnings the higher bankruptcy likelihood | | | | | |

6) The company for the last ten years had a dividend policy?

a) Yes ☐ b) No ☐

7) If no, specify briefly how it pays dividend……..

8) If the company has a dividend policy, which policy?

a) Residual dividend policy ☐

b) Constant amount per share policy ☐

c) Constant amount per share plus extra ☐

d) Constant payout ratio ☐

e) Others (specify)……..

9) List some of the projects the company has been using it's retained earnings for the last ten years.

……

……

10) The retained earnings of the company meet all projects the company has with Positive Net Present Value.

a) Yes ☐ b) No ☐

11) If no, list some of the projects the company has been unable to implement because of insufficient retained earnings.

……

……

12) In your opinion do you think non-implementation of the above project has affected or will affect the going concern of the company?

a) Yes ☐ b) No ☐

**Earnings before interest and tax**

The questionnaire in this section tends to assess the company's ability to generate Earnings and its ability to control expenses because if the earnings before interest and tax are decreasing it will be an indication that the likelihood of the company going into bankruptcy is high.

**Tick appropriately using a scale of 1-5 where; 1-Strongly agree, 2-Agree, 3-Neutral, 4-Disagree, 5-Strongly Disagree**

| Statements | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 1) For the last ten years the Earnings before interest and tax of the company has been increasing? | | | | | |
| 2) For the last ten years the tax the company pays to the government has been increasing | | | | | |
| 3) For the last ten years the expenses of the company has been increasing | | | | | |
| 4) For the last ten years the company has been paying tax promptly to the Government. | | | | | |
| 5) The higher the EBIT, the low bankruptcy likelihood. | | | | | |

6) For the last ten years the company has differed tax

☐ ☐

a) Yes b) No

7) If yes, how much was the amount of differed tax…….

8) How does the company treats interest payments in the financial statement?

a) Capitalise ☐

b) Expense ☐

c) Others (specify)……..

9) Does the company apply the treatment in (8) above consistently from one period to another?

a) Yes ☐ b) No ☐

**Market value of Equity**

The questionnaire in this section tends to assess whether there is growth in capital gain of the company's shares and whether the shareholders for quoted companies have confidence with the company. Since if the share prices have been increasing it will mean

that the shareholders have confidence with the company and the likelihood of the company going bankruptcy will be low.

**Tick appropriately using a scale of 1-5 where; 1-Strongly agree, 2-Agree, 3-Neutral, 4-Disagree, 5-Strongly Disagree**

| Statements | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 1) The last ten years the company market price per share has been increasing. | | | | | |
| 2) The relationship between the company management and shareholder has been good. | | | | | |
| 3) For the last ten years, the market value of the company has been greater than its total liabilities. | | | | | |
| 4) Increasing in the MPS is an indication of low bankruptcy likelihood | | | | | |
| 5) Issues raised by shareholders in the annual general meetings are addressed by the company management on a timely basis | | | | | |

6) (i) Is the company listed in the stock exchange

Yes ☐ No ☐

(ii) If yes who are the shareholders of the company?

a) Individuals ☐

b) Management ☐

c) Institutions ☐

d) Individual, management and institutions ☐

e) Others (specify)……..

7) How many shares does the company have……

**Total Liabilities**

The questionnaire in this section tends to assess the company's ability to settle its liabilities when they fall due and the gearing level of the company since if the company is unable to settle its liabilities and the gearing level is high then the likelihood of the company going bankruptcy will be high.

**Tick appropriately using a scale of 1-5 where; 1-Strongly agree, 2-Agree, 3-Neutral, 4-Disagree, 5-Strongly Disagree**

| **Statements** | **1** | **2** | **3** | **4** | **5** |
|---|---|---|---|---|---|
| 1) The more the total liabilities, the higher bankruptcy likelihood. | | | | | |
| 2) The company has been lowly geared for the last ten years | | | | | |
| 3) The company has been unable to pay its liabilities at any time for the last ten years. | | | | | |
| 4) The company's total liabilities have been less than its total assets for the last ten years. | | | | | |
| 5) The company has complied with IAS 37 when recognizing provisions in the financial statement for the last ten years. | | | | | |

6) The company for the last ten years been recognizing provisions in the financial statements when one or all of the following conditions are met. (tick whichever is applicable)

a) There is a present obligation as a result of a past event. ☐

b) Amount of provisions is measured reliably. ☐

c) It is probable that there will be future outflows of economic benefit from the entity. ☐

d) Others (specify)…….

**Book value of equity**

The objective of the questionnaire in this section is to assess whether the total assets of the company is financed mostly by equity or by liabilities because if financed more by liabilities, then it will increase the bankruptcy likelihood.

**Tick appropriately using a scale of 1-5 where; 1-Strongly agree, 2-Agree, 3-Neutral, 4-Disagree ,5-Strongly Disagree**

| Statements | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 1) The last ten years book value of equity of the company has been increasing. | | | | | |
| 2) The ratio of book value of equity to total liabilities has been greater than one for the last ten years. | | | | | |
| 3) The book value of equity to total assets has been greater than 0.5 for the last ten years. | | | | | |
| 4) The retained earnings of the company have been increasing over the last ten years. | | | | | |
| 5) The more the BVE the higher bankruptcy likelihood | | | | | |

**Net worth**

The questionnaire intends to assess whether the company's net worth (Total assets less total liabilities) are sufficient to sustain the operations and continuity of the company.

**Tick appropriately using a scale of 1-5 where; 1-Strongly agree, 2-Agree, 3-Neutral, 4-Disagree , 5-Strongly Disagree**

| Statements | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 1) The net worth of the company has been positive for the last ten years | | | | | |
| 2) The more the net worth the high bankruptcy likelihood | | | | | |
| 3) The net worth of the company over the last ten years has been sufficient to sustain the operations and continuity of the company | | | | | |
| 4) The company has been borrowing yearly for the last ten years. | | | | | |
| 5) The company has been purchasing fixed assets yearly for the last ten years | | | | | |

**Cash flow**

The questionnaire in this section will enable the researcher to establish the cash generating ability of the company.

**Tick appropriately using a scale of 1-5 where; 1-Strongly agree, 2-Agree, 3-Neutral, 4-Disagree, 5-Strongly Disagree**

| Statements | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 1) The more the cash the company has, the high bankruptcy | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| likelihood. | | | | | |
| 2) The company managing well it's working capital for the last ten years. | | | | | |
| 3) The company is capable of meeting its short term financial obligations. | | | | | |
| 4) The company has been paying dividends out of internal cash flows for the last ten years. | | | | | |
| 5) The company's internal cash flow generation ability has been strong for the last ten years strong. | | | | | |
| 6) The company has experienced cash flow problem for the last ten years. | | | | | |

7) The cash flow position of the company for the last ten years has been positive.

Yes ☐ No ☐

7) State briefly the reasons of your answer in 6 above.

……

……

8) If no, briefly explain in your own opinion what has made the net worth to be negative.

……

……

**Agency problem**

The questionnaire intends to assess whether there has been agency problem with any class of stakeholders for the last ten years which would increase the likelihood of the company going into bankruptcy.

**Tick appropriately using a scale of 1-5 where; 1-Strongly agree, 2-Agree, 3-Neutral, 4-Disagree, 5-Strongly Disagree**

| Statements | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 1) The management of the company and employees has been working towards increasing the value of the company for the benefit of shareholders and other stakeholders for the last ten years. | | | | | |
| 2) For the last ten years there has been no conflict of interest between the management of the company and its stakeholders. | | | | | |
| 3) Management remuneration has been based on performance for the last ten years. | | | | | |
| 4) The company has been having audit and risk committee for the last ten years. | | | | | |
| 5) The company management has been restricting unnecessary borrowings since it increases gearings and reduce the profits attributable to shareholders because of increased interest | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| payment for the last ten years. | | | | | |
| 6) The more the agency problems, the low bankruptcy likelihood. | | | | | |

7) The shareholders of the company include

a) Individuals ☐

b) Management ☐

c) Institutions ☐

d) Individual, management and institutions ☐

e) Others (specify)……..

8) Has the company ever experienced agency problems for the last ten years?

Yes ☐ No ☐

9) If yes, the agency problem was between

a) Management and shareholders ☐

b) Shareholders and lenders ☐

c) Management and creditors ☐

d) Management and lenders ☐

e) Others (specify)……

10) If No, why do you think for the last ten years there has been no agency problem?

a) Management financial decisions are always towards maximizing shareholders value. ☐

b) Stakeholders of the company do not have financial management skills. ☐

c) Agency problems arises and are solved before immediately. ☐

**Appendix IV: Data Collection Sheet**

Company Name: ……

| | **2007** | **2008** | **2009** | **2010** | **2011** | **2012** | **2013** | **2014** | **2015** | **2016** |
|---|---|---|---|---|---|---|---|---|---|---|
| Working capital | | | | | | | | | | |
| Total assets | | | | | | | | | | |
| Retained earnings | | | | | | | | | | |
| Earnings before interest and tax | | | | | | | | | | |
| Market value of equity | | | | | | | | | | |
| Book value of equity | | | | | | | | | | |
| Sales | | | | | | | | | | |
| Total liabilities | | | | | | | | | | |
| **Overall index=z** | | | | | | | | | | |

**Appendix V: List of Sugar Companies in Kenya**

| | **Name of the sugar company** | **Address** | **Location** |
|---|---|---|---|
| 1 | Mumias Sugar Company | 3115-40100 | Private Bag Mumias,Kenya |
| 2 | South Nyanza Sugar Company | 107-40405 | Sare-Awendo |
| 3 | Muhoroni Sugar Company | 2-40107 | Muhoroni,Ahero |
| 4 | Chemelil Sugar Company | 177 | Muhoroni |
| 5 | Nzoia Sugar Company | 285-50200 | Bungoma,Kenya |
| 6 | Miwani Sugar Company | Private Bag | Kisumu |
| 7 | Trans Mara Sugar Company | 113 | Kilgoris,Kenya |
| 8 | Kibos Sugar Company | 3115-40100 | Kisumu,Kenya |
| 9 | West Kenya Sugar Company | 2101-50100 | Kakamega,Kenya |
| 10 | Butali Sugar Company | 1400-50205 | Webuye,Kenya |
| 11 | Kwale Sugar Company | 46279-00100 | Nairobi |
| 12 | Soin Sugar Company | 2175-20200 | Kericho,Kenya |

Source: KSB Strategic Plan (2007 – 2012)

**Appendix VI: Discriminant Z score Per Company Per Year**

| | | Casewise Statistics | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Highest Group | | | | | Second Highest Group | | | Discriminant Scores |
| | | | Case Number | Actual Group | Predicted Group | P(D>d \| G=g) p | P(D>d \| G=g) df | P(G=g \| D=d) | Squared Mahalanobis Distance to Centroid | Group | P(G=g \| D=d) | Squared Mahalanobis Distance to Centroid | Function 1 |
| | Year | Company | | | | | | | | | | | |
| Original | 2007 | Mumias Sugar | 1 | 0 | 0 | .011 | 1 | .999 | 6.538 | 1 | .001 | 20.316 | 3.903 |
| | 2008 | Mumias Sugar | 2 | 0 | 0 | .128 | 1 | .994 | 2.316 | 1 | .006 | 12.471 | 2.910 |
| | 2009 | Mumias Sugar | 3 | 0 | 0 | .477 | 1 | .974 | .506 | 1 | .026 | 7.658 | 2.132 |
| | 2010 | Mumias Sugar | 4 | 0 | 0 | .285 | 1 | .987 | 1.143 | 1 | .013 | 9.638 | 2.475 |
| | 2011 | Mumias Sugar | 5 | 0 | 0 | .177 | 1 | .992 | 1.824 | 1 | .008 | 11.356 | 2.746 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2012 | Mumias Sugar | 6 | 0 | 0 | .476 | 1 | .974 | .508 | 1 | .026 | 7.664 | 2.133 |
| | 2013 | Mumias Sugar | 7 | 1 | 0** | .984 | 1 | .909 | .000 | 1 | .091 | 4.475 | 1.469 |
| | 2014 | Mumias Sugar | 8 | 1 | 0** | .602 | 1 | .770 | .272 | 1 | .230 | 2.573 | .948 |
| | 2015 | Mumias Sugar | 9 | 1 | 1 | .591 | 1 | .762 | .289 | 0 | .238 | 2.731 | -.138 |
| | 2016 | Mumias Sugar | 10 | 1 | 1 | .530 | 1 | .722 | .395 | 0 | .278 | 2.422 | -.045 |
| | 2007 | South Nyanza | 11 | 1 | 0** | .398 | 1 | .633 | .714 | 1 | .367 | 1.689 | .638 |
| | 2008 | South Nyanza | 12 | 1 | 0** | .351 | 1 | .590 | .871 | 1 | .410 | 1.479 | .553 |
| | 2009 | South Nyanza | 13 | 1 | 0** | .296 | 1 | .532 | 1.093 | 1 | .468 | 1.233 | .445 |
| | 2010 | South Nyanza | 14 | 1 | 0** | .378 | 1 | .615 | .778 | 1 | .385 | 1.598 | .602 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2011 | South Nyanza | 15 | 0 | 0 | .942 | 1 | .917 | .005 | 1 | .083 | 4.686 | 1.519 |
| | 2012 | South Nyanza | 16 | 0 | 0 | .867 | 1 | .930 | .028 | 1 | .070 | 5.080 | 1.609 |
| | 2013 | South Nyanza | 17 | 1 | 0** | .782 | 1 | .846 | .077 | 1 | .154 | 3.366 | 1.183 |
| | 2014 | South Nyanza | 18 | 1 | 0** | .507 | 1 | .715 | .440 | 1 | .285 | 2.162 | .812 |
| | 2015 | South Nyanza | 19 | 1 | 1 | .424 | 1 | .638 | .640 | 0 | .362 | 1.888 | .130 |
| | 2016 | South Nyanza | 20 | 1 | 1 | .608 | 1 | .772 | .263 | 0 | .228 | 2.819 | -.163 |
| | 2007 | Miwani Sugar | 21 | 1 | 1 | .928 | 1 | .932 | .008 | 0 | .068 | 5.377 | -.777 |
| | 2008 | Miwani Sugar | 22 | 1 | 1 | .427 | 1 | .987 | .631 | 0 | .013 | 9.393 | -1.493 |
| | 2009 | Miwani Sugar | 23 | 1 | 1 | .348 | 1 | .991 | .880 | 0 | .009 | 10.352 | -1.640 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2010 | Miwani Sugar | 24 | 1 | 1 | .373 | 1 | .990 | .795 | 0 | .010 | 10.038 | -1.593 |
| | 2011 | Miwani Sugar | 25 | 1 | 1 | .375 | 1 | .990 | .788 | 0 | .010 | 10.010 | -1.588 |
| | 2012 | Miwani Sugar | 26 | 1 | 1 | .321 | 1 | .992 | .986 | 0 | .008 | 10.730 | -1.696 |
| | 2013 | Miwani Sugar | 27 | 1 | 1 | .312 | 1 | .992 | 1.021 | 0 | .008 | 10.852 | -1.714 |
| | 2014 | Miwani Sugar | 28 | 1 | 1 | .308 | 1 | .992 | 1.039 | 0 | .008 | 10.913 | -1.723 |
| | 2015 | Miwani Sugar | 29 | 1 | 1 | .319 | 1 | .992 | .992 | 0 | .008 | 10.751 | -1.699 |
| | 2016 | Miwani Sugar | 30 | 1 | 1 | .387 | 1 | .989 | .749 | 0 | .011 | 9.861 | -1.566 |
| | 2007 | Chemelil Sugar | 31 | 1 | 0** | .338 | 1 | .577 | .916 | 1 | .423 | 1.424 | .530 |
| | 2008 | Chemelil Sugar | 32 | 1 | 0** | .570 | 1 | .753 | .322 | 1 | .247 | 2.437 | .904 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2009 | Chemelil Sugar | 33 | 1 | 1 | .416 | 1 | .631 | .662 | 0 | .369 | 1.849 | .143 |
| | 2010 | Chemelil Sugar | 34 | 1 | 1 | .638 | 1 | .789 | .222 | 0 | .211 | 2.971 | -.206 |
| | 2011 | Chemelil Sugar | 35 | 1 | 1 | .509 | 1 | .707 | .437 | 0 | .293 | 2.317 | -.012 |
| | 2012 | Chemelil Sugar | 36 | 1 | 1 | .969 | 1 | .924 | .002 | 0 | .076 | 5.128 | -.725 |
| | 2013 | Chemelil Sugar | 37 | 1 | 1 | .925 | 1 | .933 | .009 | 0 | .067 | 5.393 | -.780 |
| | 2014 | Chemelil Sugar | 38 | 1 | 1 | .783 | 1 | .854 | .076 | 0 | .146 | 3.730 | -.405 |
| | 2015 | Chemelil Sugar | 39 | 1 | 1 | .799 | 1 | .860 | .065 | 0 | .140 | 3.814 | -.426 |
| | 2016 | Chemelil Sugar | 40 | 1 | 1 | .974 | 1 | .912 | .001 | 0 | .088 | 4.785 | -.651 |
| | 2007 | Muhoroni Sugar | 41 | 1 | 1 | .781 | 1 | .956 | .077 | 0 | .044 | 6.336 | -.968 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2008 | Muhoroni Sugar | 42 | 1 | 1 | .009 | 1 | 1.000 | 6.865 | 0 | .000 | 25.010 | -3.352 |
| | 2009 | Muhoroni Sugar | 43 | 1 | 1 | .040 | 1 | .999 | 4.217 | 0 | .001 | 19.362 | -2.775 |
| | 2010 | Muhoroni Sugar | 44 | 1 | 1 | .370 | 1 | .990 | .805 | 0 | .010 | 10.075 | -1.598 |
| | 2011 | Muhoroni Sugar | 45 | 1 | 1 | .929 | 1 | .901 | .008 | 0 | .099 | 4.531 | -.595 |
| | 2012 | Muhoroni Sugar | 46 | 1 | 1 | .853 | 1 | .945 | .034 | 0 | .055 | 5.853 | -.874 |
| | 2013 | Muhoroni Sugar | 47 | 1 | 1 | .952 | 1 | .928 | .004 | 0 | .072 | 5.230 | -.747 |
| | 2014 | Muhoroni Sugar | 48 | 1 | 1 | .206 | 1 | .996 | 1.602 | 0 | .004 | 12.709 | -1.973 |
| | 2015 | Muhoroni Sugar | 49 | 1 | 1 | .438 | 1 | .986 | .601 | 0 | .014 | 9.269 | -1.474 |
| | 2016 | Muhoroni Sugar | 50 | 1 | 1 | .749 | 1 | .960 | .102 | 0 | .040 | 6.563 | -1.010 |
| | 2007 | Nzoia Sugar | 51 | 1 | 1 | .680 | 1 | .967 | .170 | 0 | .033 | 7.073 | -1.104 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2008 | Nzoia Sugar | 52 | 1 | 1 | .658 | 1 | .970 | .196 | 0 | .030 | 7.250 | -1.136 |
| | 2009 | Nzoia Sugar | 53 | 1 | 1 | .701 | 1 | .965 | .147 | 0 | .035 | 6.913 | -1.075 |
| | 2010 | Nzoia Sugar | 54 | 1 | 1 | .810 | 1 | .952 | .058 | 0 | .048 | 6.141 | -.930 |
| | 2011 | Nzoia Sugar | 55 | 1 | 1 | .870 | 1 | .943 | .027 | 0 | .057 | 5.739 | -.851 |
| | 2012 | Nzoia Sugar | 56 | 1 | 1 | .535 | 1 | .980 | .384 | 0 | .020 | 8.295 | -1.316 |
| | 2013 | Nzoia Sugar | 57 | 1 | 1 | .396 | 1 | .989 | .720 | 0 | .011 | 9.750 | -1.549 |
| | 2014 | Nzoia Sugar | 58 | 1 | 1 | .295 | 1 | .993 | 1.095 | 0 | .007 | 11.104 | -1.750 |
| | 2015 | Nzoia Sugar | 59 | 1 | 1 | .530 | 1 | .980 | .394 | 0 | .020 | 8.340 | -1.324 |
| | 2016 | Nzoia Sugar | 60 | 1 | 1 | .493 | 1 | .983 | .470 | 0 | .017 | 8.702 | -1.383 |
| | 2010 | Soin Sugar | 61 | 0 | 0 | .289 | 1 | .524 | 1.125 | 1 | .476 | 1.200 | .430 |
| | 2011 | Soin Sugar | 62 | 0 | 1** | .319 | 1 | .531 | .993 | 0 | .469 | 1.359 | .330 |
| | 2012 | Soin Sugar | 63 | 1 | 1 | .418 | 1 | .633 | .655 | 0 | .367 | 1.862 | .239 |
| | 2013 | Soin Sugar | 64 | 1 | 1 | .298 | 1 | .506 | 1.084 | 0 | .494 | 1.251 | .275 |
| | 2014 | Soin Sugar | 65 | 1 | 1 | .342 | 1 | .557 | .902 | 0 | .443 | 1.478 | .282 |
| | 2011 | Butali Sugar | 66 | 0 | 0 | .668 | 1 | .802 | .184 | 1 | .198 | 2.860 | 1.037 |
| | 2012 | Butali Sugar | 67 | 0 | 0 | .673 | 1 | .956 | .178 | 1 | .044 | 6.220 | 1.854 |
| | 2013 | Butali Sugar | 68 | 0 | 0 | .712 | 1 | .952 | .136 | 1 | .048 | 5.974 | 1.803 |
| | 2014 | Butali Sugar | 69 | 0 | 0 | .251 | 1 | .988 | 1.318 | 1 | .012 | 10.105 | 2.551 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2015 | Butali Sugar | 70 | 0 | 0 | .890 | 1 | .926 | .019 | 1 | .074 | 4.959 | 1.582 |
| | 2010 | Transmara Sugar | 71 | 0 | 1** | .480 | 1 | .685 | .499 | 0 | .315 | 2.172 | .034 |
| | 2012 | Transmara Sugar | 72 | 0 | 1** | .348 | 1 | .564 | .879 | 0 | .436 | 1.509 | .269 |
| | 2013 | Transmara Sugar | 73 | 0 | 1** | .293 | 1 | .500 | 1.106 | 0 | .500 | 1.227 | .386 |
| | 2014 | Transmara Sugar | 74 | 0 | 0 | .314 | 1 | .553 | 1.012 | 1 | .447 | 1.317 | .483 |
| | 2015 | Transmara Sugar | 75 | 0 | 0 | .387 | 1 | .623 | .749 | 1 | .377 | 1.638 | .618 |
| | 2010 | Kibos Sugar | 76 | 0 | 0 | .647 | 1 | .792 | .210 | 1 | .208 | 2.768 | 1.009 |
| | 2011 | Kibos Sugar | 77 | 0 | 0 | .564 | 1 | .750 | .333 | 1 | .250 | 2.408 | .895 |
| | 2012 | Kibos Sugar | 78 | 0 | 0 | .505 | 1 | .714 | .444 | 1 | .286 | 2.154 | .809 |
| | 2013 | Kibos Sugar | 79 | 0 | 0 | .852 | 1 | .868 | .035 | 1 | .132 | 3.689 | 1.270 |
| | 2014 | Kibos Sugar | 80 | 0 | 0 | .802 | 1 | .853 | .063 | 1 | .147 | 3.459 | 1.208 |
| | 2015 | Kibos Sugar | 81 | 0 | 0 | .814 | 1 | .938 | .055 | 1 | .062 | 5.373 | 1.675 |
| | | **. Misclassified case | | | | | | | | | | | |

**Appendix VII: Mumias Sugar Company Book Value and Market Value of Shares**

| Year | BVE | MPS | No. of shares | MV | BVE/MV |
|---|---|---|---|---|---|
| 2007 | 8,337,660 | 29 | 510,000 | 14,790,000 | 0.564 |
| 2008 | 9,041,499 | 12.7 | 510,000 | 6,477,000 | 1.396 |
| 2009 | 10,039,469 | 5.95 | 1,530,000 | 9,103,500 | 1.103 |
| 2010 | 10,999,852 | 12.8 | 1,530,000 | 19,584,000 | 0.564 |
| 2011 | 14,476,007 | 7.15 | 1,530,000 | 10,939,500 | 1.323 |
| 2012 | 15,723,686 | 6.15 | 1,530,000 | 9,409,000 | 1.671 |
| 2013 | 13,382,490 | 4.20 | 1,530,000 | 6,426,000 | 2.083 |
| 2014 | 10,641,805 | 2.85 | 1,530,000 | 4,360,500 | 2.441 |
| 2015 | 5,932,044 | 2.35 | 1,530,000 | 3,595,500 | 1.650 |
| 2016 | 7,693,783 | 1.30 | 1,530,000 | 1,989,000 | 3.870 |

## Appendix VIII: Letter from the University

**JOMO KENYATTA UNIVERSITY**
**OF**
**AGRICULTURE AND TECHNOLOGY**
**W E S T L A N D S  C A M P U S**

***OFFICE OF THE DIRECTOR***

**P. O. BOX 62000 NAIROBI 00200, KENYA•Tel. 020-4447769• Fax. 020-4448679•E-Mail:nbicentre@jkuat.ac.ke**

**JKU**/04/ HD433-C003-2720/2014 **10th October, 2016**

**TO WHOM IT MAY CONCERN**

**RE: MAURICE RANGE MWITA**

This is to confirm that the above named is a student at Jomo Kenyatta University of Agriculture &Technology – Westlands Campus, undertaking a degree in Doctor of Philosophy in Business Administration..

It is a requirement that the student undertakes a Research Thesis in a relevant field in order to improve on his skills. Mr. Mwita's Research is on **"Use of the Z-Score ratios model in predicting likelihood of bankruptcy of sugar companies in Kenya."** This Research Is Purely Academic.

Any assistance given to him will be highly appreciated and if you need clarification please contact the undersigned.

Thank you.

JKUAT WESTLANDS CAMPUS 12 OCT 2016 P.O. BOX 62000-00200 NAIROBI www.jkuat.ac.ke OFFICE OF THE DIRECTOR

**DR. ANTONY WAITITU**
**Ag. Director**

## Appendix IX: Research Authorization Letter from NACOSTI

NACOSTI

NATIONAL COMMISSION FOR SCIENCE,
TECHNOLOGY AND INNOVATION

Telephone: +254-20-2213471,
2241349, 3310571, 2219420
Fax: +254-20-318245, 318249
Email: dg@nacosti.go.ke
Website: www.nacosti.go.ke
When replying Please quote

9th Floor, Utalii House
Uhuru Highway
P. O. Box 30623-00100
NAIROBI-KENYA

Ref: No. **NACOSTI/P/16/8745/14299**

Date: **24th October, 2016**

Maurice Mwita Range
Jomo Kenyatta University of Agriculture
And Technology
P.O. Box 62000-00200
**NAIROBI.**

**RE: RESEARCH AUTHORIZATION**

Following your application for authority to carry out research on ***"Use of the Z Score Ratios Model in predicting likelihood of bankruptcy of sugar companies in Kenya,"*** I am pleased to inform you that you have been authorized to undertake research in **all Counties** for the period ending **18th October, 2017.**

You are advised to report to **the Chief Executive Officers of selected sugar companies, the County Commissioners and the County Directors of Education, all Counties** before embarking on the research project.

On completion of the research, you are expected to submit **two hard copies and one soft copy in pdf** of the research report/thesis to our office.

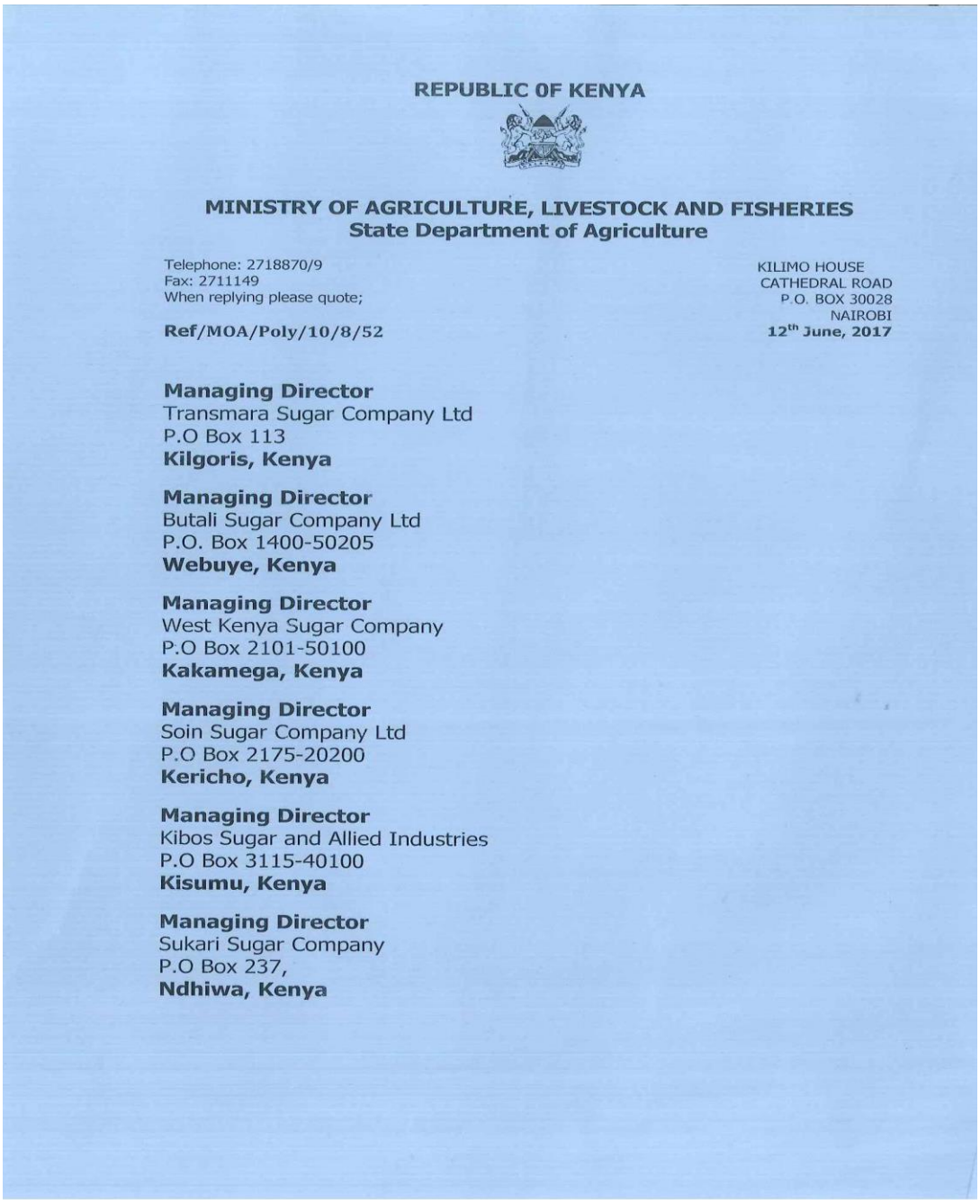
**BONIFACE WANYAMA**
**FOR: DIRECTOR-GENERAL/CEO**

Copy to:

The Chief Executive Officers
Selected Sugar Companies.

The County Commissioners
All Counties.

## Appendix X: Authorization Letter from Ministry of Agriculture



REPUBLIC OF KENYA

**MINISTRY OF AGRICULTURE, LIVESTOCK AND FISHERIES**
**State Department of Agriculture**

Telephone: 2718870/9
Fax: 2711149
When replying please quote;

KILIMO HOUSE
CATHEDRAL ROAD
P.O. BOX 30028
NAIROBI

**Ref/MOA/Poly/10/8/52**

**12th June, 2017**

**Managing Director**
Transmara Sugar Company Ltd
P.O Box 113
**Kilgoris, Kenya**

**Managing Director**
Butali Sugar Company Ltd
P.O. Box 1400-50205
**Webuye, Kenya**

**Managing Director**
West Kenya Sugar Company
P.O Box 2101-50100
**Kakamega, Kenya**

**Managing Director**
Soin Sugar Company Ltd
P.O Box 2175-20200
**Kericho, Kenya**

**Managing Director**
Kibos Sugar and Allied Industries
P.O Box 3115-40100
**Kisumu, Kenya**

**Managing Director**
Sukari Sugar Company
P.O Box 237,
**Ndhiwa, Kenya**

**RE: AUTHORIZATION LETTER FOR COLLECTION OF DATA FOR ACADEMIC PURPOSE**

This is to inform you that Mr. Maurice Mwita Range is a PhD student at JKUAT. He is currently doing research on the use of the Z Score Ratios Model in predicting the likelihood of bankruptcy of sugar companies in Kenya. This study will help the Government to develop good policy for sustainability of the sugar industry in the country.

The study will require information on income statements, balance sheet from 2009 to 2016 and filling of the questionnaire. The information provided will be confidential and used for academic purpose.

The purpose of this letter is to request you to give him the necessary assistance.

Johnson Irungu, PhD
**FOR: PRINCIPAL SECRETARY**

CC.
Agriculture Food Authority- Sugar Directorate

Mr. Maurice Mwita Range

**Appendix XI: Sugar Companies Z score ratios**

| Company Name | Company Code | Company Status Name | Company Status Code | Year | WC | RE | EBIT | BV.TL | Sales |
|---|---|---|---|---|---|---|---|---|---|
| Mumias sugar | 1 | Public | 1 | 2007 | 0.18 | 0.44 | 0.16 | 2.33 | 0.86 |
| Mumias sugar | 1 | Public | 1 | 2008 | 0.08 | 0.3 | 0.12 | 1.77 | 0.85 |
| Mumias sugar | 1 | Public | 1 | 2009 | 0.08 | 0.3 | 0.07 | 1.35 | 0.81 |
| Mumias sugar | 1 | Public | 1 | 2010 | 0.18 | 0.35 | 0.14 | 1.49 | 0.85 |
| Mumias sugar | 1 | Public | 1 | 2011 | 0.15 | 0.34 | 0.13 | 1.66 | 0.68 |
| Mumias sugar | 1 | Public | 1 | 2012 | 0.06 | 0.34 | 0.07 | 1.35 | 0.57 |
| Mumias sugar | 1 | Public | 1 | 2013 | -0.05 | 0.26 | 0.06 | 0.96 | 0.44 |
| Mumias sugar | 1 | Public | 1 | 2014 | -0.27 | 0.19 | -0.12 | 0.82 | 0.56 |
| Mumias sugar | 1 | Public | 1 | 2015 | -0.54 | 0.05 | -0.25 | 0.29 | 0.27 |
| Mumias sugar | 1 | Public | 1 | 2016 | -0.33 | -0.09 | -0.19 | 0.28 | 0.23 |
| south nyanza | 2 | Public | 1 | 2007 | -0.3 | -0.5 | 0.03 | 0.48 | 1.13 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | 1 | 2 | | | |
| south nyanza | 2 | Public | 1 | 2008 | -0.46 | -0.45 | 0 | 0.46 | 0.84 |
| south nyanza | 2 | Public | 1 | 2009 | -0.18 | -0.47 | 0.02 | 0.37 | 0.9 |
| south nyanza | 2 | Public | 1 | 2010 | -0.1 | 0.02 | 0.07 | 0.43 | 0.9 |
| south nyanza | 2 | Public | 1 | 2011 | 0.03 | 0.07 | 0.11 | 0.94 | 0.85 |
| south nyanza | 2 | Public | 1 | 2012 | 0.06 | 0.18 | 0.15 | 0.96 | 0.89 |
| south nyanza | 2 | Public | 1 | 2013 | -0.07 | 0.15 | -0.06 | 0.9 | 0.68 |
| south nyanza | 2 | Public | 1 | 2014 | -0.13 | -0.17 | -0.06 | 0.67 | 0.7 |
| south nyanza | 2 | Public | 1 | 2015 | -0.25 | -0.33 | -0.19 | 0.38 | 0.67 |
| south nyanza | 2 | Public | 1 | 2016 | -0.43 | -0.2 | -0.16 | 0.18 | 0.16 |
| Miwani sugar | 3 | Public | 1 | 2007 | -65.35 | -83.61 | -0.27 | -0.99 | 0.3 |
| Miwani | 3 | Public | 1 | 20 | - | - | 0 | - | 0.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| sugar | | | | 08 | 4.66 | 5.41 | | 0.82 | 2 |
| Miwani sugar | 3 | Public | 1 | 2009 | -5.36 | -7 | -0.03 | -0.91 | 0.03 |
| Miwani sugar | 3 | Public | 1 | 2010 | -6.88 | -9.8 | -0.06 | -0.9 | 0.04 |
| Miwani sugar | 3 | Public | 1 | 2011 | -9.13 | -12.39 | -0.06 | -0.92 | 0.03 |
| Miwani sugar | 3 | Public | 1 | 2012 | -14.88 | -15.57 | -0.06 | -0.94 | 0.04 |
| Miwani sugar | 3 | Public | 1 | 2013 | -19.35 | -20.13 | -0.09 | -0.95 | 0.05 |
| Miwani sugar | 3 | Public | 1 | 2014 | -17.51 | -18.46 | -0.09 | -0.95 | 0.07 |
| Miwani sugar | 3 | Public | 1 | 2015 | -19.21 | -20.33 | -0.09 | -0.95 | 0.09 |
| Miwani sugar | 3 | Public | 1 | 2016 | -19.75 | -20.69 | -0.12 | -0.84 | 0.09 |
| Chemelil Sugar | 4 | Public | 1 | 2007 | -0.34 | 0.37 | 0.03 | 0.44 | 0.89 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Chemelil Sugar | 4 | Public | 1 | 2008 | -0.03 | 0.07 | -0.05 | 0.72 | 0.63 |
| Chemelil Sugar | 4 | Public | 1 | 2009 | -0.32 | -0.1 | -0.26 | 0.46 | 0.47 |
| Chemelil Sugar | 4 | Public | 1 | 2010 | -0.6 | -0.26 | -0.15 | 0.15 | 0.44 |
| Chemelil Sugar | 4 | Public | 1 | 2011 | -0.26 | -0.28 | 0 | 0.12 | 0.7 |
| Chemelil Sugar | 4 | Public | 1 | 2012 | -0.34 | -0.53 | -0.22 | -0.11 | 0.47 |
| Chemelil Sugar | 4 | Public | 1 | 2013 | -0.32 | -0.66 | -0.21 | -0.16 | 0.14 |
| Chemelil Sugar | 4 | Public | 1 | 2014 | -0.24 | -0.57 | -0.05 | -0.08 | 0.48 |
| Chemelil Sugar | 4 | Public | 1 | 2015 | -0.29 | -0.71 | -0.1 | -0.05 | 0.36 |
| Chemelil Sugar | 4 | Public | 1 | 2016 | -0.34 | -0.85 | -0.12 | -0.17 | 0.29 |
| Muhoroni Sugar | 5 | Public | 1 | 2007 | -4.9 | -14. | 0.21 | -0.9 | 2.22 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | 5 | 12 | | 3 | |
| Muhoroni Sugar | 5 | Public | 1 | 2008 | -8.21 | -16.78 | -1.32 | -0.94 | 1.66 |
| Muhoroni Sugar | 5 | Public | 1 | 2009 | -8.7 | -17.34 | -0.94 | -0.95 | 1.97 |
| Muhoroni Sugar | 5 | Public | 1 | 2010 | -10.15 | -22.83 | -0.31 | -0.96 | 1.84 |
| Muhoroni Sugar | 5 | Public | 1 | 2011 | -8.09 | -20.33 | 0.36 | -0.95 | 2.66 |
| Muhoroni Sugar | 5 | Public | 1 | 2012 | -8.53 | -26.33 | 0.01 | -0.96 | 2.48 |
| Muhoroni Sugar | 5 | Public | 1 | 2013 | -7.37 | -27.31 | 0.04 | -0.97 | 2.35 |
| Muhoroni Sugar | 5 | Public | 1 | 2014 | -7.46 | -23.75 | -0.65 | -0.96 | 1.86 |
| Muhoroni Sugar | 5 | Public | 1 | 2015 | -12.05 | -36.56 | -0.58 | -0.98 | 3.34 |
| Muhoroni Sugar | 5 | Public | 1 | 2016 | -12.01 | -36.62 | -0.3 | -0.97 | 2.9 |
| Nzoia | 6 | Public | 1 | 20 | - | - | 0.0 | - | 0.2 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 07 | 2.09 | 1.55 | 3 | 0.56 | 7 |
| Nzoia | 6 | Public | 1 | 2008 | -2.07 | -1.52 | 0.01 | -0.56 | 0.27 |
| Nzoia | 6 | Public | 1 | 2009 | -2.07 | -1.53 | 0.05 | -0.56 | 0.39 |
| Nzoia | 6 | Public | 1 | 2010 | -1.48 | -1.6 | 0.04 | -0.48 | 0.39 |
| Nzoia | 6 | Public | 1 | 2011 | -1.5 | -2.9 | 0.05 | -0.48 | 0.37 |
| Nzoia | 6 | Public | 1 | 2012 | -2.96 | -2.79 | 0.04 | -0.71 | 0.48 |
| Nzoia | 6 | Public | 1 | 2013 | -3.25 | -3.07 | -0.09 | -0.73 | 0.45 |
| Nzoia | 6 | Public | 1 | 2014 | -3.7 | -3.48 | -0.19 | -0.76 | 0.33 |
| Nzoia | 6 | Public | 1 | 2015 | -2.38 | -2.25 | -0.05 | -0.63 | 0.34 |
| Nzoia | 6 | Public | 1 | 2016 | -2.23 | -2.17 | -0.09 | -0.63 | 0.3 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Soin | 7 | Private | 2 | 2010 | 0.02 | 0.05 | 0.07 | 0.32 | 0.37 |
| Soin | 7 | Private | 2 | 2011 | 0.01 | 0.06 | 0.07 | 0.26 | 0.36 |
| Soin | 7 | Private | 2 | 2012 | -0.1 | 0.04 | -0.06 | 0.27 | 0.49 |
| Soin | 7 | Private | 2 | 2013 | -0.1 | -0.02 | -0.04 | 0.39 | 0.37 |
| Soin | 7 | Private | 2 | 2014 | -0.1 | -0.13 | -0.01 | 0.3 | 0.05 |
| Butali | 8 | Private | 2 | 2011 | 0.1 | 0.06 | 0.14 | 0.62 | 0.74 |
| Butali | 8 | Private | 2 | 2012 | 0.14 | 0.01 | 0.16 | 1.09 | 0.87 |
| Butali | 8 | Private | 2 | 2013 | 0.12 | 0.04 | 0.15 | 1.07 | 0.83 |
| Butali | 8 | Private | 2 | 2014 | 0.11 | 0.08 | 0.16 | 1.51 | 0.8 |
| Butali | 8 | Private | 2 | 2014 | 0.19 | 0.12 | 0.19 | 0.9 | 0.74 |
| TransMara | 9 | Private | 2 | 2011 | 0.03 | 0.01 | 0.09 | 0.06 | 0.12 |
| TransMara | 9 | Private | 2 | 2012 | 0.04 | 0.06 | 0.01 | 0.28 | 0.45 |
| TransMara | 9 | Private | 2 | 2013 | 0.03 | 0 | 0.01 | 0.35 | 0.65 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| TransMara | 9 | Private | 2 | 2014 | 0.03 | 0.01 | 0.01 | 0.41 | 0.78 |
| TransMara | 9 | Private | 2 | 2015 | 0.03 | 0.01 | 0.01 | 0.49 | 0.69 |
| Kibos | 10 | Private | 2 | 2010 | 0.05 | 0.07 | 0.08 | 0.66 | 0.67 |
| Kibos | 10 | Private | 2 | 2011 | 0.02 | 0.05 | 0.05 | 0.62 | 0.69 |
| Kibos | 10 | Private | 2 | 2012 | 0.11 | 0.22 | 0.05 | 0.57 | 0.54 |
| Kibos | 10 | Private | 2 | 2013 | 0.13 | 0.03 | 0.04 | 0.85 | 0.57 |
| Kibos | 10 | Private | 2 | 2014 | 0.32 | 0.07 | 0.04 | 0.81 | 0.63 |
| Kibos | 10 | Private | 2 | 2015 | 0.39 | 0.08 | 0.08 | 1.05 | 0.54 |

**Appendix XII: World sugar production by regions October 2015 (in metric tonnes)**

| **Years** | **2014/15** | **2013/14** | **2012/13** | **2011/12** | **2010/11** | **2009/10** |
|---|---|---|---|---|---|---|
| EU | 18,604 | 17,005 | 17,448 | 19,070 | 15,894 | 17,518 |
| Europe | 29,501 | 27,477 | 28,607 | 30,828 | 24,735 | 26,463 |
| Africa | 11,979 | 11,497 | 11,248 | 10,346 | 10,336 | 10,178 |
| N. & C. America | 22,394 | 22,147 | 23,549 | 20,475 | 18,848 | 18,856 |
| South America | 43,963 | 47,434 | 48,669 | 43,024 | 46,217 | 48,721 |
| Asia | 66,150 | 68,212 | 67,129 | 66,293 | 61,388 | 51,109 |
| Oceania | 4,757 | 4,638 | 5,241 | 3,820 | 3,949 | 3,700 |
| **Total** | **178,744** | **181,404** | **184,443** | **174,785** | **181,367** | **159,027** |

**Source: International Sugar Journal (ISJ's) world sugar outlook October 2015**

**Appendix XIII: World sugar consumption by regions October 2015 (in 1,000 metric tonnes)**

| | 2014/15 | 2013/14 | 2012/13 | 2011/12 | 2010/11 | 2009/10 |
|---|---|---|---|---|---|---|
| **EU** | 19,173 | 18,856 | 18,948 | 18,955 | 19,072 | 18,714 |
| **Europe** | 31,247 | 30,941 | 30,997 | 30,995 | 30,862 | 30,576 |
| **Africa** | 19,646 | 19,521 | 18,963 | 18,396 | 17,525 | 17,038 |
| **N. & C. America** | 20,687 | 20,952 | 20,696 | 19,608 | 19,501 | 19,598 |
| **South America** | 21,356 | 21,165 | 21,126 | 21,045 | 20,455 | 20,323 |
| **Asia** | 82,184 | 80,086 | 78,665 | 76,146 | 72,393 | 72,803 |
| **Oceania** | 1,715 | 1,712 | 1,706 | 1,703 | 1,703 | 1,690 |
| Total | **176,834** | **175,176** | **172,154** | **167,892** | **162,438** | **162,027** |

**Source: International Sugar Journal (ISJ's) world sugar outlook October 2015**

**Appendix XV: Africa Sugar Production and Consumption from 2009 / 2010 to 2012/2015 (in 1,000 Metric Tonnes)**

| | 2009 /10 | 2010 /11 | 2011/ 12 | 2012/13 | 2013/14 | 2014/15 |
|---|---|---|---|---|---|---|
| African sugar production | 10,178 | 10,336 | 10,346 | 11,248 | 11,497 | 11,979 |
| African sugar consumption | 17,038 | 17,525 | 18,396 | 18,963 | 19,521 | 19,646 |
| African sugar deficit | 6,860 | 7,189 | 8,050 | 7,715 | 8,024 | 7,667 |

**Source: International Sugar Journal (ISJ's) world sugar outlook October 2015**

**Appendix XVI: Kenya Sugar Production, Consumption, Imports and Exports 2007 – 2016 (Metric tonnes)**

| Years | Production | Consumption | Imports | Exports |
|---|---|---|---|---|
| 2007 | 520,404 | 741,190 | 230,011 | 20,842 |
| 2008 | 517,667 | 751,523 | 218,607 | 44,332 |
| 2009 | 548,207 | 762,027 | 184,531 | 1,952 |
| 2010 | 523,652 | 772,731 | 258,578 | 47 |
| 2011 | 490,210 | 783,660 | 139,076 | 16,716 |
| 2012 | 493,937 | 794,844 | 238,589 | 434 |
| 2013 | 600,179 | 841,957 | 238,046 | 104 |
| 2014 | 592,668 | 860,084 | 192,121 | 356 |
| 2015 | 635,674 | 889,233 | 247,389 | 54 |
| 2016 | 639,742 | 635,851 | 334,109 | 98 |

**Source: Sugar Directorate, 2016**