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Maurice Mwita Range, Dr. Agnes Njeru, Prof. Gichuhi. A. Waititu (Jkuat)

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Using Altman's Z score (Book Value of Equity/Total Liabilities) Ratio Model in Assessing Likelihood of Bankruptcy for Sugar Companies in Kenya.

Maurice Mwita Range, Dr. Agnes Njeru,
Prof. Gichuhi. A. Waititu (Jkuat)
Jomo Kenyatta University of Agriculture and Technology Kenya.

Abstract

The objective of the study was the use of the book value of equity/total liabilities ratio as one of the Altman's z score ratio model in predicting the likelihood of bankruptcy of sugar companies in Kenya. The study was triggered by financial difficulties facing sugar companies in Kenya. Miwani and Muhoroni sugar companies are under receivership, Chemelil Sugar Company is struggling with immature cane supplies and Mumias Sugar Company is struggling to pay its debts. The study adopted descriptive research design because it seeks to determine and report the way things are. The target population consists of all the 12 sugar companies in Kenya as per Sugar Directorate (2016) reports. Purposive sampling was used where all the 6 public owned sugar companies in western Kenya and South Nyanza were selected and the 4 private owned sugar companies whose secondary data was available. Data was collected with the aid of data collection sheet from the company's published financial statements which included statement of financial position and income statements for the years 2007 to 2016 for public owned sugar companies and from 2011 to 2015 for private owned sugar companies. Data was analyzed using the statistical package of social sciences (SPSS) where discriminant analysis was used. The findings were presented in form of tables and figures. The study was enriched by pecking order theory and the static trade off theory (STT). The study established that the book value of equity/total liabilities ratio had a significant discriminating power skewed towards likelihood of bankruptcy low in predicting likelihood of bankruptcy of sugar companies in Kenya. The study concluded that all the 6 public owned sugar companies in Kenya should reduce their debts and increase their equity since they are heavily externally financed, hence increased their likelihood of bankruptcy.

Keywords: *Likelihood of Bankruptcy, Discriminant Z Score, Book Value of Equity/Total Liabilities ratio, Kenya Sugar Companies, Cut off Score.*

Introduction

Bankruptcy is a situation where a company finds itself in a situation it cannot operate as a going concern (Bhurnia & Sarkar, 2011). Going concern assumption gives investors' confidence in order to continue investing in the company. Therefore the going concern does not consider that the company likelihood of bankruptcy will be high at any given time. While going concern is the ability of the business to continue in business for foreseeable future (Gibson, 2011).

Friendman and Mile (2006) stated that it's important for organisations 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 investment in a particular organization therefore, when their interests and risks is not minimized it will result into agency problems which will reduce the financial performance of the organization and reduce the value of the discriminant z score ratios model and hence increasing the likelihood of bankruptcy of sugar companies in Kenya.

A reliable bankruptcy model with consistent predictive ability is essential in today's Kenyan environment. Altman's Z score formulae use various financial ratios to measure the financial health of a company and diagnose the likelihood that a company will go bankrupt within two-three years period. Financial statements users are interested in analyzing and interpreting the financial statements in order to determine financial viability of companies for investment decisions and other resource allocation decisions. (Fawad, Iqtidar, Shakir, & Madad, 2014). Financial Viability is also checked by shareholder to know whether the firm has the ability to pay off their expected rate of return. Firm's Creditors are interested to know the firm's debt paying ability. Firm's Performance assessment 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 company's profitability, growth and risk likelihood of bankruptcy as a term used to indicate a condition when businesses or companies are unable to meet their obligation to creditors or meet them with difficulties hence leading to bankruptcy. In a more general and basic sense, likelihood of bankruptcy leads to a reduction in financial efficiency that results from shortage of cash (Korteweg, 2007). It is a condition where firms' obligations are not met or met with difficulty. The disadvantage of a firm taking on higher debt ratio is that it increases the risk of financial distress which is detrimental to equity and debt holders. The extreme form of financial distress is insolvency, which could be very expensive for it involves legal costs and may force a firm to sell its assets at distress prices. According to Alareeni & Branson (2013) most statistical failure prediction models have been developed for and tested in developed countries like USA and European countries). Among the most common statistical models are the Altman Z-scores. The study focused on the use of the Z score ratios model to predict the likelihood of bankruptcy of sugar companies, which will enable the various stakeholders to take early corrective action before the actual bankruptcy.

Simic, Kovac & Simic (2012,) stated corporate failure prediction as essential for the prevention or mitigation of negative economic fluctuations in a national economy. Particularly after the collapse of large banks during the great depression such as Fannie Mae, Citigroup New York, Merrill Lynch, Lehman Brothers and Anglo Irish Bank. The z score ratios performs better with manufacturing companies than with any other industries (Grice and Ingram, 2011) and sugar companies in Kenya are in the category of manufacturing company. The ability to predict likelihood of bankruptcy benefits many stakeholders, shareholders, managers, employees, lenders, suppliers, clients, the community, researchers and analysts since those companies that can be salvaged mitigating factors for salvage will be initiated and those that cannot be salvaged be liquidated Bragham and Daves (2010),hence the need of this study.

Statement of the Problem

Companies are assumed to have perpetual life but in reality companies have become bankrupt and others are unable to meet their obligations and this has made this assumption not to hold (Gibson, 2012). Companies experience financial constraints from time to time and some of these financial constraints do result to bankruptcy (Gibson, 2011; Sormunen & Laitinen, 2012).

According to Alareeni and Branson (2013) most statistical failure prediction models have been developed tested and used in developed countries like USA and European countries. Among the most common statistical model are the Altman z score model hence the need of this study to apply the model in developing country like Kenya.

June Li, Reza Rahgozar (2012) used the z score model to predict the corporate bankruptcy in the United States and established that the z score model was valuable in predicting corporate bankruptcy for both manufacturing and non-manufacturing company's , Bhatt (2012) carried a study to test the reliability of the z score model in Indian market and established that the model was a reliable tool, Alkhatib and Bzour (2011) carried out a study to establish the predictability of the z score model in the Jordanian listed companies and concluded that the model was a reliable tool for predicting bankruptcy.

Uchenna and Okelue (2012), applied the z score model in Nigerian banks and concluded that the model was a reliable tool of predicting business failure in the Nigerian banking industry. Kidane (2004), used the z score model to predict financial distress in IT and service companies in South Africa listed on the Johannesburg security exchange where the model achieved 74% correct classification. Past researchers who applied the z score model in Kenyan companies concluded that the model was appropriate in Kenyan industries. However the studies focused on other sectors for example Mamo (2011),Taliani (2010),and Kariuki (2013) carried out studies on financial distress 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 distress in Kenya sacco's. Cheluget,(2014) used financial ratios to predict the financial distress in insurance companies in Kenya where he concluded that profitability, leverage, liquidity and firm size as the main determinants of financial

distress of insurance companies in Kenya. Kipruto (2013) and Shisia et al (2014) used the z score model to predict likelihood of bankruptcy of Uchumi supermarket and the study revealed that the z score model was capable of predicting failure up to over 90% a year prior to failure.

Limited studies have been done in Kenya on the use of the z score ratios model in predicting likelihood of bankruptcy especially in the sugar industry despite the fact that the privatization commission of Kenya report (2015), indicates that the Government of Kenya seeks to privatize a significant public sector shareholding/interest in five sugar companies which included (South nyanza, Miwani, Chemelil, Muhoroni and Nzoia),this is because they believe that privatization will 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 problem facing sugar companies in Kenya is high cost of production because 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. Also the market price per share of Mumias Sugar Company which is the only public quoted sugar company in the Nairobi stock exchange has been decreasing over the 10 years of the study from kshs.29 in 2007 to kshs.1.30 in 2016 which was 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 (Sugar Directorate strategic plan,2006-2010) and Baseline study for sugar agribusiness in Kenya (2014),hence the need of this study to establish likelihood of bankruptcy 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 (Bragham and Daves,2010).The study by (Omete, Asakania and Amwayi,2015),on the impact of financial health and continuity of a firm: The case study of Mumias sugar company for the period (2003-2011)where the study established that the company was in grey area, the study by(Kungu,2015) on creative accounting and financial distress Using the Altman's model: The case study of Mumias sugar company for the period (2009-2013) established that the company was financially distressed and 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 in Kenya. The fact which made this study to be different from the prior studies. The results of the study of either likelihood of bankruptcy high or low will assist the various stakeholders of the companies to put mitigating factors early to salvage those sugar companies which can be salvaged and liquidate those that cannot be salvaged Bragham and Daves (2010).

Objective and Hypothesis

The general objective of the study was to model the likelihood of bankruptcy of sugar companies in Kenya using Altman's Z score ratios approach. The specific objective of the study was to establish the effect of book value of equity/total liabilities ratio in predicting the likelihood of bankruptcy of sugar companies in Kenya. The study achieved the above objectives by testing the null hypothesis which stated that

H0₁: The ratio (Book Value of Equity / Total Liabilities) has no significant influence in predicting the likelihood of bankruptcy of sugar companies in Kenya?

Theories

This study to establish the effect of book value of equity/total liabilities ratio as one of the Altman's z score ratio model in predicting likelihood of bankruptcy of sugar companies in Kenya was enriched by the following two theories.

Pecking Order Theory

Pecking order theory of capital structures developed by Myers C.S. et al (1983) states that firms have a preferred hierarchy for financing decisions. Firms will borrow instead of issuing equity when internal cash flow is not sufficient to fund capital expenditure (since borrowing increases the probability of financial distress which eventually will increase the likelihood of bankruptcy). The highest preference is to use internal financing before resorting to any form of external funds.

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

The pecking order theory advocates for a negative relationship between profitability and debt ratio. A profitable firm will accommodate situations of economic recession; creditors prefer to lend more to profitable firms. According to the tradeoff theory and pecking order theory, firm's with a high total assets in relation to debt are associated with lower costs of financial distress, since tangible assets are less likely to be subjected to a big loss of value in case of bankruptcy (Drobetz et al, 2013).

Internal funds 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 will reflect the firms' cumulative need for external funds. A firm's capital structure is the product of it's financing requirements over a period of time and it's 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 is external equity financing firm's issue new shares only if they have extra ordinary profitable investments that cannot be postponed or financed by debt or if the top managers belief that the shares are overvalued (Alzomaia,2014).

The theory has two key assumptions about financial managers. The first one is the chances that a firm's financial managers know more about the company's proposed earnings and future growth opportunities that are available than outside investors. There is a strong

desire to keep such information proprietary. The use of internal funds prevents managers from having to make 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 forgo 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/total assets, book value of equity/total liabilities and retained earnings/total assets because the firm with high levels of equity financing the low the likelihood the company going into bankruptcy. However (Frank and Goyal 2009) 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, 2007) used the pecking order theory and concluded that companies prefer utilizing internal funding than external funding because internal funding is obtained at a minimum costs. Which helps to maximize the value of the firm and hence reduces the likelihood of the firm's bankruptcy.

The Static Trade Off Theory: STT

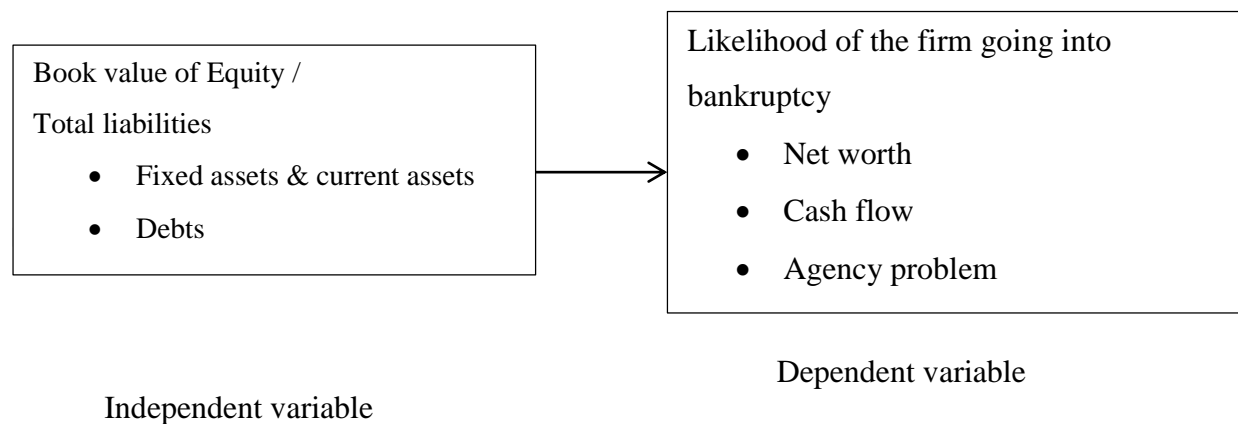
Trade off theory suggested by Myers (1984) emphasizes a balance between tax saving arising from debt and interest payment obligations. Theories suggest that there is an optimal capital structure that maximizes the value of the firm in balancing the costs and benefits of an additional unit of debt, are characterized as models of trade-off. According to Sheikh & Wang (2010), 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 assumptions that each source of funds has its own costs and returns and these are related with 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 financial distress and benefit from tax shield are balanced (Chen, 2011).

According to (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. When the company borrows heavily in order to take advantage of tax benefits, but in doing so the company should consider excessive interest costs thereon. Therefore, when the company diverge 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 hence increase the likelihood of bankruptcy. Zeitun and Tian (2007) argue that capital structure of the company has a major effect on the company's performance and overlooking of bankruptcy costs may lead companies to borrow heavily which will results into more debts in the company's capital structure which will increase the likelihood of bankruptcy since it will reduce the value of book value of equity/total liabilities and hence reducing the value of discriminant z score.

The trade-off model can be categorized into: models of trade-off which are respectively connected to the bankruptcy costs and agency costs. This theory supports the following

independent variables; retained earnings /total assets, and book value of equity/total liabilities. Because firm's that rely so much on external funding had their retained earnings very low or negative retained earnings, book value of equity and very high total liabilities a situation which reduced the value of discriminant z score and increased the likelihood of bankruptcy of such firm's.

Conceptual Framework



Research Methodology

The study used both quantitative and qualitative research design because data for public owned sugar companies were collected both via questionnaires and from the companies' financial statements where the five key ratios of the Altman's z score model were computed by the help of Statistical Packages for Social Sciences (SPSS) for a period of ten years (2007 to 2016). For private owned sugar companies the study used quantitative research design because the data collected was from the companies' financial statements hence qualitative in nature. The target population of this study consisted of the 12 sugar companies in Kenya regulated by the Sugar Directorate. The researcher applied purposive sampling technique which is a non-probability sampling, based on the researchers knowledge on the geographical location of the sugar companies in Kenya (Freedman et al., 2007), where most of them are located in Western and Nyanza. The study applied the Altman's z score ratio model where the book value of equity/total liabilities ratio was applied in predicting the likelihood of bankruptcy of sugar companies in Kenya.

The study categorized the sugar companies in Kenya into two;

Those that are partly or fully owned by the Government as public owned sugar companies which were 6 in number and those that are not owned by the Government as private owned sugar companies whose secondary data were obtained which were 4 in number out of 6. Public owned sugar companies. The study used secondary data from audited financial statements from 2007 to 2016 and for private owned sugar companies from the audited financial statements from 2011 to 2015 where with the aid of the data collection sheet the book value of equity/total liabilities was computed for the last ten years for public owned sugar companies and for a period of five or six years for private owned sugar companies depending on when the company was established. The data was collected from the

companies websites, Sugar Directorate, Commodity Fund and personally from the sugar companies under study. The researcher collected the secondary data with the aid of data collection sheet. Likelihood of bankruptcy which was either low or high was adopted by the study as the dependent variable.

Use of Book Value of Equity/Total liabilities

Book value of equity of a company is the ownership or the stockholders investment in the company (Cornett, et al, 2012). Book value of equity is normally recognized in the statement of financial position and it includes: share capital, general reserves, retained earnings and revaluation reserves it can also be measured as the difference between the total assets and the total liabilities. Liabilities are obligations that the company has to payback they include: long term loans, deferred tax, short term loans, creditors, unpaid salaries, unpaid taxes Cornett, et al,(2012). The long term debt of a company is an obligation that will exist for a period of more than one accounting period (Burnia & Sarkar,2011;BurkSaitiene & Mazintiene,2011). A higher gearing ratio will increase borrower security charges and claim on firm's cash flows and hence increasing the likelihood of going into bankruptcy (Saunders and Cornett, 2011).

According to Addae et al, (2013), firms should be able to make decisions on gearing positions that will maximize the firm's value and hence reducing the possibility of going into bankruptcy. Optimal capital structure of the firm is where the cost of capital is minimized and the value of the firm maximized Narayanan, (2008). Firm's performance is mostly determined by its capital structure. When the firm borrows heavily in order to take advantage of tax benefits, but in doing so the firm should consider excessive interest costs thereon. Therefore when the firm diverges from an appropriate capital structure its bankruptcy costs and interest payments costs will outweigh the tax benefits related with the tradeoff between debt and equity and hence increase the likelihood of the firm going into bankruptcy. Zeitunand and Tian (2007) argues that capital structure of the firm has a major effect on the firm's performance and overlooking of bankruptcy costs may lead firm's to borrow heavily and lead to high debts in the firm's capital structure which will increase the likelihood of going into bankruptcy.

Investors are aware of the potential financial difficulties related to leveraged firms. Consequently, investors worry about the costs of likelihood of bankruptcy, something that is believed to be reflected in the proposed market value of the firm. Even if the firm is not classified as likelihood of bankruptcy high in financial distress, investors include the potential for future distress into their assessment of the market value. Thus, if there is a possibility of bankruptcy, the firm's proposed market value is reduced by the present value of these potential financial distress costs Berk and De Marzo, (2011). Therefore the Management of the firm should ensure that market value of equity and net worth are maximized and total liabilities are minimized so that $x4$ market value of equity / total liabilities can have a positive effect on the overall z score ratios model.

Increase in the cost of debts will lead the company to be financially overstretched due to high payment of interests which will reduce profitability and cash flows and hence leading to financial distress (Frank and Goyal, 2005). Firm's which are highly geared are likely to be

bankruptcy than lowly geared firm's because of high payment of interests and other financial obligations (Khalid,2012).

Klammer (2011) asserts that the use of debts by a firm is one way of improving the performance of the firm if used properly and into productive units. Stewart (2011) states that if the firm is paying out interests and other costs than it's receiving it's likelihood of going into bankruptcy will be high. Firm's apply a mixture of debt capital and equity capital in different ratios in order to maximize the value of the firm (Abor,2007).Increased in the cost of debt will lead the company to be financially overstretched due to high payments of interest which will reduce profitability and cash flows and hence leading to increased likelihood of bankruptcy (Frank and Goyal,2005) . (Narayanan (2008), asserts that optimal capital structure of the firm is where the cost of capital is minimized and the value of the firm maximized. Firm's performance is mostly determined by its capital structure. When the firm borrows heavily in order to take advantage of tax benefits, but in doing so the firm should consider excessive interest costs thereon. Therefore, when the firm diverge from an appropriate capital structure it's bankruptcy costs and interest payment costs will outweigh the tax benefits related with the tradeoff between debt and equity hence increasing the likelihood of the firm going into bankruptcy. Zeitunard and Tian (2007) argue that capital structure of the firm has a major effect on the firm's performance and overlooking of bankruptcy costs which may lead firms to borrow heavily, and high debt in the firm's capital structure which will increase the likelihood of going into bankruptcy.

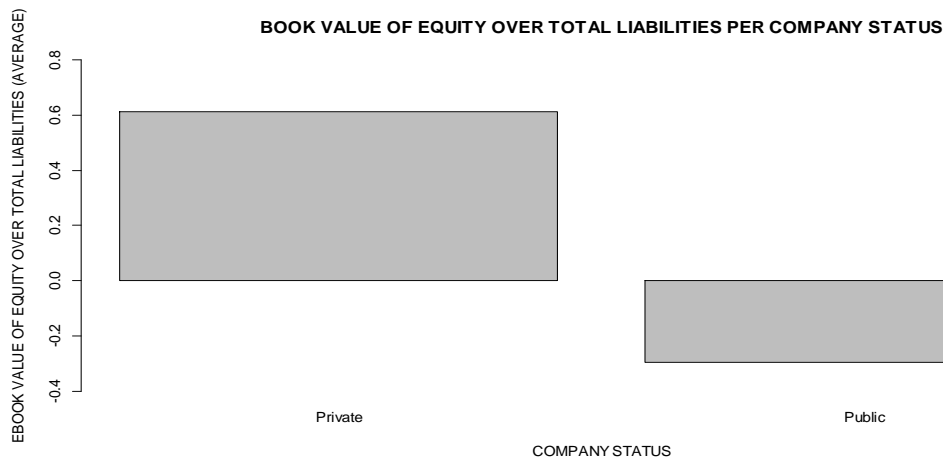


Figure 2: Book value of equity over total liabilities per company status

Group

1. Private 0.6124286
2. Public -0.2950078

Book value of equity/Total Liabilities ratio and likelihood of bankruptcy

The study aimed to find out the effect of book value of equity/total liabilities ratio to predict likelihood of bankruptcy of sugar companies in Kenya. The findings of the study as indicated in figure 2 above indicate that the public owned sugar companies in Kenya had an average of book value of equity/total liabilities ratio which ranged from 0 to -0.295, while the private owned sugar companies had an average book value of equity/total liabilities ratio

ranging from 0 to 0.6124 . Which meant that on average public owned sugar companies total assets were 129.5% externally financed while the private owned sugar companies were 61.24% internally financed and 38.76% externally financed. Since this ratio had a strong discriminating power (discriminant coefficient z score) value of 1.669 as per table 3 below. All the public owned sugar companies were classified by the study as likelihood of bankruptcy high while the private owned sugar companies were classified as likelihood of bankruptcy low

Table 1: Standardized Canonical Discriminant Function Coefficients

	Function 1
Book values of equity / total liability	1.017

Standardized Canonical Discriminant function coefficients was as shown in table 1 above. The Canonical relation is a correlation between the discriminant scores and the level of the dependent variable. A high correlation indicates a function that discriminate well. From the results it was indicative that book value of equity/total liabilities ratio was significant in discriminating likelihood of bankruptcy of sugar companies in Kenya skewed towards likelihood of bankruptcy low, because it had a discriminant score of 1.017 which was positive and above 1 which was conclusive that the ratio discriminates well and was skewed towards likelihood of bankruptcy low as per table 1 above.

Table 2: Structure Matrix

	Function 1
Book Values Of Equity / Total Liability	.932

Pooled within-groups correlations between discriminating variables and standardized canonical discriminant functions

Variables ordered by absolute size of correlation within function.

Table 2 above gave the output of the structure matrix of each independent variables and the factor loading of book value of equity/total liabilities ratio was 0.932 which was above the minimum cut off score of 0.30 (Hair, Black & Babin,2010 & Kothari,2004).There was an indication that the ratio was significant in predicting the likelihood of bankruptcy of sugar companies in Kenya, since the value was above the cut off score of 0.30.

Table 3: Tests of Equality of Group Means

	Wilks' Lambda	F	df1	df2	Sig.
Book values of equity / Total liability	.531	69.774	1	79	.000

The results of the test of equality of group means as in table 3 above indicated that the Wilks' Lambda (which is similar to F-test) was 0.531 which was closer to 0.50, which was an indication that the ratio discriminates well, the P value was also 0.000 which was less than 0.05, which was an indication that statistically the ratio book value of equity/total liabilities can significantly predict the likelihood of bankruptcy of sugar companies in Kenya. The study therefore rejected the null Hypothesis (H_{01}) at 95% confidence level, meaning that there was a significant relationship between book value of equity/total liabilities ratio and likelihood of bankruptcy of sugar companies in Kenya.

Table 4: Canonical Discriminant Function Coefficients (z - score)

	Function
	1
Book Values Of Equity / Total Liability	1.669
(Constant)	-.205

Unstandardized coefficients

Table 4 above gave the output of canonical discriminant function coefficient (z score) and the coefficient of book value of equity/total liabilities ratio which was 1.669 which was an indication that for every increase by one unit of book value of equity/total liabilities ratio the z score value increases by 1.669 unit which in turn increased the value of the discriminating z score and reduces the likelihood of bankruptcy. This was evidenced by highly geared companies reporting low or negative profits and low cash flows which was an indication that book value of equity/total liabilities significantly influences the likelihood of bankruptcy of sugar companies in Kenya. Hence the discriminant equation was modeled as follows;

$$Z = -0.205 + 1.669x_4$$

where z is the discriminant z score and x_4 is the book value of equity/total liabilities ratio. Therefore, when all the independent variables were to be removed from the model the value of the discriminant z score will be -0.205 (table 4 below) which will be closer to -0.685 an indication of likelihood of bankruptcy high. When we include the independent variable book value of equity/total liabilities ratio the value of discriminant z score become 1.464 (-0.205+1.669) which will be closer to 1.449 (table 4 below) an indication of likelihood of bankruptcy low, an indication that the ratio significantly influences the likelihood of bankruptcy of sugar companies in Kenya.

Book value of equity/Total Liabilities and Likelihood of bankruptcy

Bankruptcy is a situation where a company finds itself in a situation of not able to operate as a going concern hence not able to meet its obligations when they fall due Bhunia and Sarkar (2011). The study used book value of equity/total liabilities as one of the Altman's Z score ratio model to predict the likelihood of bankruptcy of sugar companies in Kenya, and the study established that the ratio was key in influencing the likelihood of bankruptcy of sugar companies in Kenya. Since sugar companies which applied appropriate ratio of debt to equity (lowly geared) were classified by the study as likelihood of bankruptcy low, and

those which did not apply the ratio appropriately (highly geared) were classified as likelihood of bankruptcy high as evidenced in figure 2 above.

Average book value of equity/Total liabilities per company status

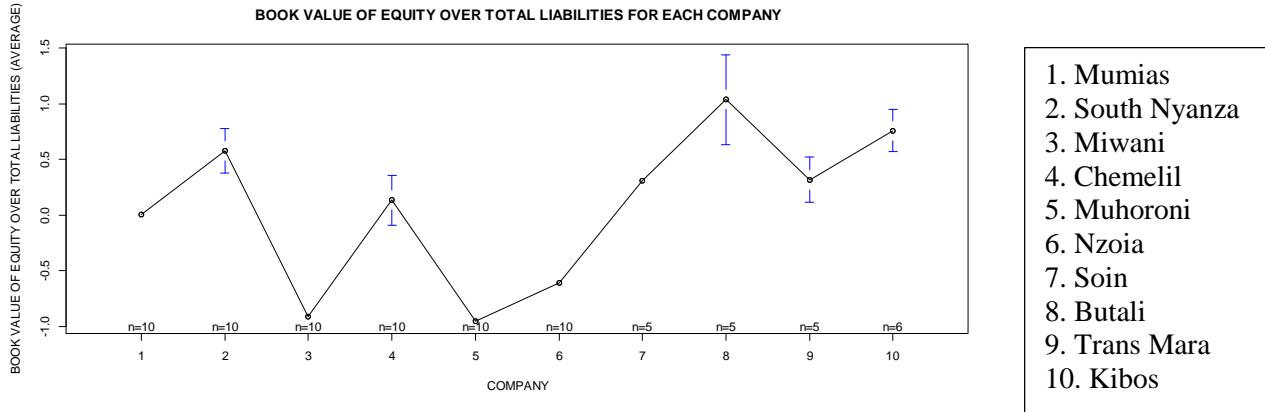


Figure 3: Average book Value of Equity/Total Liabilities for Each Company

Figure 3 above gives the results of average book value of equity/total liabilities ratio for each of the sugar companies where 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 meant that Nzoia, Miwani and Muhoroni are highly geared companies and their assets are financed more than 100% by external borrowings. The figure 3 also give the average book value of equity/total liabilities ratio for the private owned sugar companies and 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 book value of equity/total liabilities ratio of 0.306. From the results of the study it implied that all the private owned sugar companies total assets were financed by both equity and external borrowing and this is what has contributed to their classification by the study as likelihood of bankruptcy low in comparison to the public owned sugar companies whose the study has classified as likelihood of going bankruptcy high. The findings of this study agree with (Loncan and Caldeira, 2014) who argued that the higher the gearing the less the liquidity the company is therefore highly geared companies should reduce the risk of financial distress which lead to bankruptcy.

Data was analyzed using SPSS where discriminant analysis was used and (0) was taken as low likelihood of bankruptcy and (1) was taken as high likelihood of bankruptcy.

The study revealed that by removing all the study revealed that by removing all the independent variables from the model the value of discriminant Z score will be -0.205 an indication that the likelihood of bankruptcy will be high, but when the independent variable x4 (book value of equity/total liabilities) is included in the model the value of the z score become positive 1.464 (-0.205+1.669) which is above the mean score of likelihood of bankruptcy low of 1.449 which was an indication that the ratio significantly determine the likelihood of bankruptcy of sugar companies in Kenya.

Table 5: Functions at Group Centroids

	Function 1
Likelihood Of Bankruptcy	1
Bankruptcy Low	1.449
Bankruptcy High	-.685

Unstandardized canonical discriminant functions evaluated at group means

Table 5 above gives the results of the findings of the group centroids where likelihood of bankruptcy low was 1.449 and likelihood of bankruptcy high was -0.685 and the cutoff score was 0.382.

Motivation and Contribution of the Study

Companies are assumed to have perpetual life, but in reality companies have become bankrupt and others are financially distressed and this has made this assumption not to hold (Gibson,2012).Sugar companies are not exemptions because according to Baseline study for sugar agribusiness in Kenya (2014) the Government of Kenya should privatize all the public owned sugar companies since expansion of capacity cannot take off easily under the current financial situation because Muhoroni and Miwani sugar companies are under receivership, Chemelil sugar company is struggling with immature cane supplies, Mumias sugar company is struggling to pay its debts and Ramisi sugar company was closed and reopened in 2013 as Kwale international sugar company. Hence the need of this study to establish the likelihood of bankruptcy of sugar companies in Kenya so that mitigating factors can be put early to salvage those sugar companies which can be salvaged and liquidate those that cannot be salvaged Bragham and Daves,(2010).

According to Alareeni and Branson (2013) most statistical failure prediction models have been developed, tested and applied in developed countries like U.S.A and European. Among the most common statistical model is the Altman's z score model hence the need of this study to apply the model in developing country like Kenya especially in the sugar industry where few studies have been carried out. Mak'abongo (2013) studied price and weather risk management practices in the sugar industry in Kenya and concluded that weather conditions was a serious threats to farmers of sugar in Kenya.

Asakania and Amwayi (2015) studied financial health on continuity of firm using the z score model to evaluate the financial health of Mumias sugar company for the periods from 2003 to 2011 and established that the chances of the company falling to grey area (area of cautious) were very high. Where from that time this current study has established that the Mumias sugar company financial position has been deteriorating over the years and the current status as per this study was that the likelihood of bankruptcy of the company was high. Therefore this study is different because it has incorporated all the sugar companies in Kenya both public owned sugar companies and private owned sugar companies. The study applied the pecking order theory where it established that those sugar companies which relied so much on external funding had the likelihood of bankruptcy high and those companies which relied so much in internal funding had their likelihood of bankruptcy high low which was in line with the pecking order theory. The second theory which the study

used was the static trade off theory (STT).Where the study found out that those sugar companies which were highly geared had reduced profitability and insufficient cash flows which was as a result of high payment of interests which outweighed the tax savings and hence increased their likelihood of bankruptcy.

If the recommendations of this study are implemented then the sugar companies whose likelihood of bankruptcy are high will be able to control their cost of sales and other operating costs which will help in increasing profitability and cash flows which in turn, will reduce their likelihood of bankruptcy hence ensuring continuity in the production of goods and services which will increase the gross domestic product of the economy, creation of more employment opportunities, those companies which cannot be salvaged will be liquidated which will assist in elimination of wastage and inefficiencies and finally the findings of this study will enable other researchers and scholars to replicate the study to other industries of the Kenyan economy e.g. Airline industry, Construction industry, Supermarkets, Banking industry and the Hotel industry since stakeholders of any company are always interested with the going concern ability of their company.

Public owned Sugar Companies discriminant Z score/cut off score for the 10 Years of Study

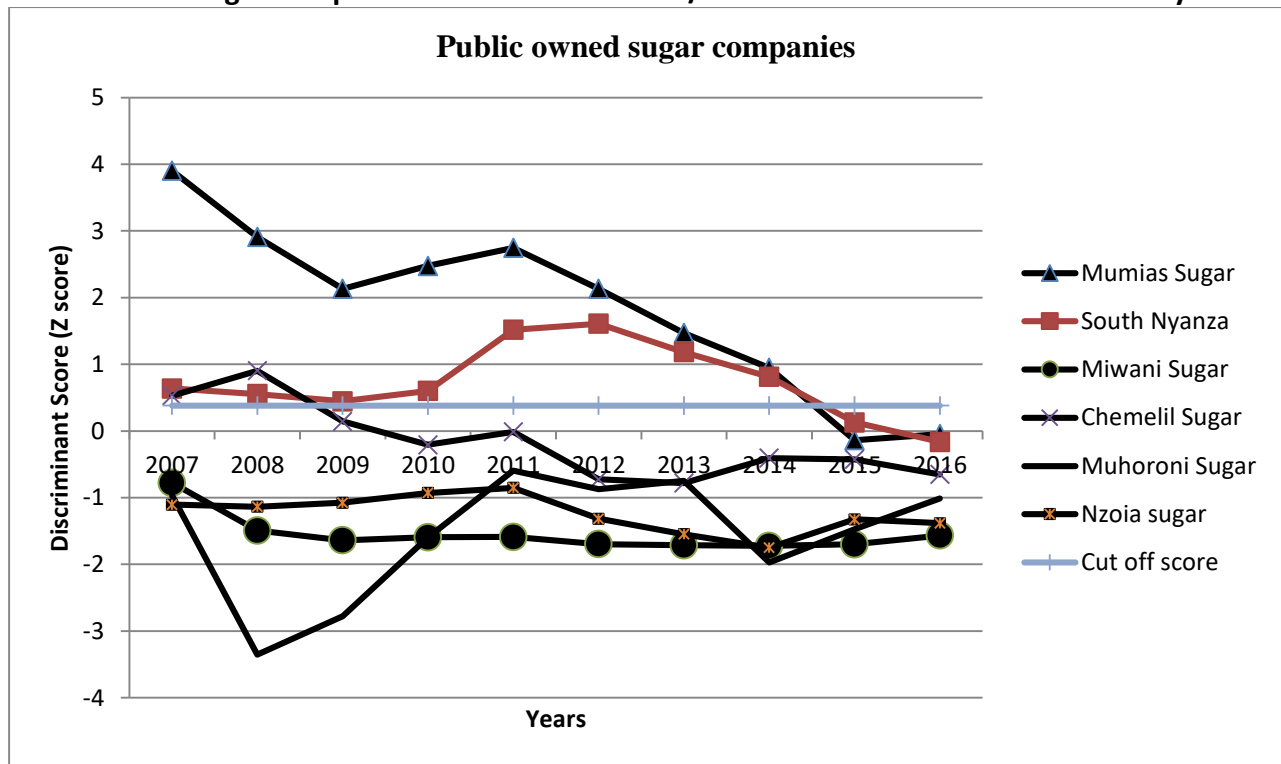


Figure 4: Public owned sugar companies discriminate score (Z Score)

Figure 4 above indicated the graph of each of the public owned sugar companies and their respective discriminate score for the ten years of the study. In 2007 Mumias Sugar Company had a score of 3.903 which kept on dropping and in 2015 and 2016 the discriminant score was below the minimum cut off score of 0.382 hence the company was classified as likelihood of bankruptcy 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 above, hence the study classified the company as likelihood of bankruptcy high. Miwani sugar company had a score of -0.777 in 2007 which had dropped to -1.566 in 2016, and 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 likelihood of bankruptcy high for the entire period of the study which will 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 above, hence for the last 8 years the study classified the company as likelihood of bankruptcy 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 likelihood of bankruptcy was high hence complete overhaul is required to salvage the company and finally in the public owned sugar 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 likelihood of bankruptcy high for the entire period of the study which means that for the survival of the company complete overhaul will be required.

Private owned sugar companies discriminant Z score/cut off score for the 5-6 years of study

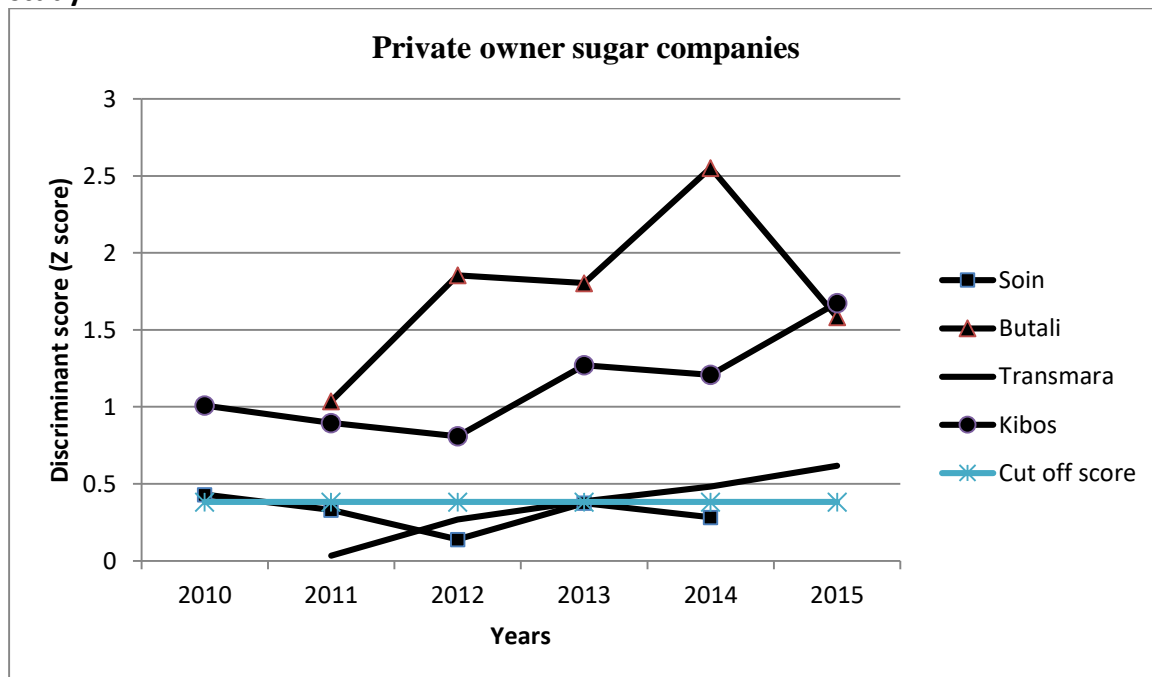


Figure 5: Private owned sugar companies discriminate score (Z Score)

Figure 5 above gave the private owned sugar companies in Kenya and their discriminant score 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 as can be evidenced from the figure 5 above the discriminant Z score was above the minimum thresholds of 0.382 in

2010 only from there the score was below the minimum thresholds score of 0.382 up to 2014 when the company was liquidated the score was below the thresholds 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 2014. Butali Sugar Company had a score of 1.037 which had increased to 1.582 in 2015, hence for the entire period of the study the score of the company was above the minimum thresholds of 0.382 hence the study classified the company as likelihood of bankruptcy low. Transmara Sugar Company had a score of 0.034 in 2010 which had increased to 0.638 in 2015 hence for the last three years the discriminant Z score of the company was above the minimum thresholds of 0.382 hence the company was classified as likelihood of bankruptcy 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 likelihood of bankruptcy low. Therefore all the private owned sugar companies in Kenya except Soin which was liquidated in 2014, 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 the study classified them as likelihood of bankruptcy high.

Testing of the Hypothesis

Data was collected and analysed, the results indicated that the public owned sugar companies status although had an average of -0.295 book value of equity/total liabilities ratio compared to private owned sugar companies status which had an average ratio of 0.612, which was an indication that the ratio was a good discriminator of likelihood of bankruptcy low because the study classified all the public owned sugar companies as likelihood of bankruptcy high while on the other had most of the private owned sugar companies were classified as likelihood of bankruptcy low. Standardized canonical discriminant function coefficient of the ratio of book value of equity/total liabilities was 1.017 which was the highest and also above the minimum cut off score of 0.382, the structure matrix of the ratio book value of equity/total liabilities was 0.932 which was also above the minimum cut off score of 0.30, the results of the test of equality of the group means showed that the Wilks' Lambda of the ratio book value of equity/total liabilities was 0.531 which was closer to 0.50 and the P value was 0.000 which was less than 0.05 and the canonical discriminant function coefficient (Z Score) gave the output of the score of the score of the book value of equity/total liabilities ratio was 1.669 which was above the score of the constant which was -0.205, above the mean score likelihood of bankruptcy low of 4.449 and also above the minimum cut off score of 0.382. Therefore based on this results, the null hypothesis (H_{01} : the ratio book value of equity/total liabilities has no significant influence in predicting the likelihood of bankruptcy of sugar companies in Kenya) was rejected at 95% confidence level, meaning that there was a significant relationship between book value of equity/total liabilities ratio and likelihood of bankruptcy of sugar companies in Kenya.

Motivation of the Study

The researcher was triggered to carry out this research of using the z score ratio model in predicting likelihood of bankruptcy of sugar companies in Kenya because according to Alareeni & Branson (2013), most statistical failure prediction models have been developed for and tested in developed countries like USA and European countries and among the most common statistical models are the Altman Z-score, hence the need to apply the model in developing countries like Kenya especially the sugar industry which has generally been experiencing liquidity problems.

The privatization commission of Kenya report (2015), asserts that The Government of Kenya seeks to privatize a significant public sector shareholding/interest in five sugar companies, which included (South Nyanza, Miwani, Chemelil, Muhoroni and Nzoia) which is aimed at enhancing profitability and cash flows in these public owned sugar companies. Also 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 because 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. In addition the market price per share of Mumias sugar company which is the only public quoted sugar company in the Nairobi stock exchange has been decreasing over the 10 years period of study since in 2007 the market price per share was kshs.29 and in 2016 the market price per share was Kshs. 1.30. Which was 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 (Sugar Directorate strategic plan, 2006-2010) and Baseline study for sugar agribusiness in Kenya (2014), hence the need of this study to establish likelihood of bankruptcy of sugar companies in Kenya so that corrective actions can be taken to salvage those that can be salvaged and liquidate those that cannot be salvaged (Bragham and Daves, 2010).

Despite the above challenges facing the sugar industry in Kenya limited studies have been done in these areas on the use of the Z score ratios model in predicting likelihood of bankruptcy of these sugar companies. The study by (Omete, Asakania and Amwayi, 2015), on the impact of financial health and continuity of a firm: The case study of Mumias sugar company for the period (2003-2011), where the study established that the company was in grey area, the study by (Kungu, 2015), on creative accounting and financial distress Using the Altman's model: The case study of Mumias sugar company for the period (2009-2013) established that the company was financially distressed and hence the need for this study which took a comprehensive view of all the public owned sugar companies and more than 50% of the private owned sugar companies in Kenya. The fact which made this study to be different from the previous studies. The results of the study of either likelihood of bankruptcy high or low will assist the various stakeholders of the companies to put mitigating factors early to salvage those sugar companies which can be salvaged and liquidate those that cannot be salvaged Bragham and Daves (2010).

Contributions of the Papers

In Kenya the previous studies focused on other sectors like Banking, Sacco's, Insurances and Municipal councils for example Mamo (2011),Taliani (2010),and Kariuki (2013) carried out studies on financial distress 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 distress in Kenya Sacco's. A critical review of the literature has also shown that few studies on sugar companies in Kenya has been done but mostly on non-financial factors for example a study by Boaz Arias Otieno Mak'abongo (2013) on price and weather risk management practices in the sugar industry in Kenya which concluded that weather conditions was a serious threats to farmers of sugar in kenya, Kegonde and Ochola (2013) concluded that problems affecting sugar millers in kenya were inefficient factory operations, politics and conditions under which the Chief Executive Officers are appointed .However Omete, Asakania and Amwayi (2015) on impact on financial health on continuity of a firm used the z score ratios to evaluate the financial health of mumias sugar company for the periods 2003 to 2011 and concluded that the chances of the company falling to grey area (area of cautious) were very high,Kungu (2015),study on detecting creative accounting and financial distress using the Altman's model: The case study of mumias sugar company for the period (2009-2013) established that the company was financially distressed .Therefore no study has been done in kenya to cover majority of the sugar companies despite the fact that Ramisi Sugar Company has since been closed (KSB Strategic Plan, 2006 - 2010).

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 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, Baseline study for sugar agribusiness in Kenya (2014), hence the need of this study that has taken a comprehensive view of public owned sugar companies in Kenya both quoted and unquoted and more than 50% of the private owned sugar companies so that the findings of this study will assist stakeholders of the respective sugar companies to salvage those companies which can be salvaged although likelihood of bankruptcy high.

The empirical studies reviewed also applied linear regression model in the analysis of the data. In this study the Discriminant Analysis was applied to analyze the secondary data where the sugar companies were categorized into two groups (likelihood of bankruptcy low or high),this was because the researcher felt, that two classifications will be useful to stakeholders in making the correct economics decision about the bankruptcy status of their companies. Finally this study has linked the likelihood of bankruptcy with the pecking order theory and established that the pecking order theory is real and practical because all the sugar companies which had relied mostly on external funding had their likelihood of bankruptcy high due to reduced profitability and cash flows. Also the static trade off theory (STT), was established by the study to be real and practical because those sugar companies which had more external borrowing had high likelihood of bankruptcy due to more

obligations to pay interests which eventually outweighed tax savings as per the static trade off theory (STT).

Summary, Conclusions and Recommendations

The results of the study shows that book value of equity/total liabilities ratio had a major role in the prediction of likelihood of bankruptcy of sugar companies in Kenya as measured by the discriminant z score ratios model. In addition book value of equity/total liabilities had the highest discriminating power of 1.669 which was above 1 skewed towards likelihood of bankruptcy low. The results also indicated that book value of equity/total liabilities had a significant impact on the profitability and cash flows position of sugar companies in Kenya. This was revealed by the study because all the companies which were highly geared had also low or negative earnings before interest and tax, low cash flows and the value of their discriminant z score was low. The findings of the study show that the public owned sugar companies' likelihood of going bankruptcy was high.

Conclusions

From the results of the study it was concluded that book value of equity/total liabilities ratio was a key ratio in the prediction of likelihood of bankruptcy of sugar in Kenya since it had the highest discriminating power skewed towards likelihood of bankruptcy low. Sugar companies in Kenya especially public owned sugar companies are advised to reduce their debts and increase their equity so that they reduce their likelihood of going bankruptcy. Therefore the study concluded that book value of equity /total liabilities was a key ratio in the predication of likelihood of bankruptcy of sugar companies in Kenya. This was because all the sugar companies which were highly geared led to high payments of interests which in turn reduced the profits and cash flows of those sugar companies and increased their likelihood of going bankruptcy. The management of sugar companies in Kenya especially public owned are advised from the results of the study to maximize the book value of equity/total liabilities ratio by either reducing their debts, increasing their equity or both so that their discriminant z score value can improve and the high likelihood of bankruptcy can be minimized. Finally the study concluded that the following public owned sugar companies (Miwani, Muhoroni, Nzoia and Chemelil) will require a complete overhaul for them to survive possibility of bankruptcy this was because for 80-100% of the period of the study which was 10 years from (2007-2016) the company's likelihood of bankruptcy was high. While Mumias and South Nyanza sugar companies their likelihood of bankruptcy was high for the last two years (2015-2016), hence these two sugar companies can be salvaged if proper mitigating factors as recommended by the study below are initiated and implemented.

Recommendations

Companies are required to assess their going concern ability for the benefits of all stakeholders. There are various methods both financial and nonfinancial which can be used to carry out the assessment. Altman's z score ratios model is one of the financial methods used to carry out such assessment and this study has recommended the model as a reliable assessment tool. The study has also revealed that likelihood of bankruptcy prediction is as

a result of many ratios with different discriminant power. However the study established that book value of equity/total liabilities was the key ratio contributing to likelihood of bankruptcy skewed toward likelihood of bankruptcy low. This was because high gearing reduces profitability and cash flows due to high interest payment. The study therefore recommends management of sugar companies to use the z score ratios model and other models in predicting the likelihood of bankruptcy of their respective companies so that corrective actions are taken before things get out of control, the study also recommend to the Kenya Government to intervene and salvage those public owned sugar companies which can be salvaged and liquidate those that cannot be salvaged since maintaining some of them at their current financial difficulties is costly to the economy.

Areas of Further Research

For those public owned sugar companies whose the study has classified as likelihood of bankruptcy high for the entire period of the study, other researchers should carry out a similar study from the year 2006 backward so that it can be clearly established the time when these companies started experiencing high likelihood of bankruptcy and for how long has this high likelihood lasted.

Researchers should carry out a similar study in the future using nonfinancial factors in order to establish if the same findings can be reached using the nonfinancial factors.

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