TESTING FINANCIAL DISTRESS OF MANUFACTURING FIRMS IN TANZANIA: AN APPLICATION OF ALTMAN Z-SCORE MODEL

Omary J. Ally; College of Business Education – Dodoma Campus, Accountancy Department, P. o. Box 2077 Dodoma

and

Kembo M. Bwana (PhD), College of Business Education – Dodoma Campus, Accountancy Department, P. o. Box 2077 Dodoma

Corresponding Email: omary_lly@yahoo.co.uk

ABSTRACT

There are several indicators of poor financial performance and one of them is financial distress. If financial distress is not predicted on time and quick measures been taken then bankruptcy is likely to occur. The costs associated with bankruptcy are enormous and normally tend to affect all stakeholders of the firm. The study applies Multi Discriminant Analysis (MDA) which involves consolidation of effects from all ratios which are measuring the key aspects of financial health. Keeping the above view in mind, the model has been employed to test the financial distress of six (6) manufacturing firms listed in Dar es Salaam Stock Exchange (DSE) in Tanzania from 2010 -2014. The study was based on the published secondary data extracted from annual financial report. Findings revealed that five firms were experiencing financial healthy (average Z-score above 2.99) while the remaining two manifested financial distress (average Z-score is less than 1.88) over the study period. Further findings shows that, management needs special attention on those variables which are very sensitive with regards to financial health of the firms under discussion.

Keywords: *Financial distress, Altman's Z-score, manufacturing firms, Tanzania.*

1.   INTRODUCTION

Financial distress implies the situation where the firm is facing financial difficulties to an extent of failing to carry out smoothly day to day operating activities. The word financial distress can also refer to the inability of the firm to meet short term financial obligations as they come due (Altman, 1993). According to Platt and Platt (2006) a company is said to be in financial distress when it cannot honor its financial obligations when they come due whether it is financially, operationally or legally. They provide multiple approaches of determining whether an entity is financially distressed by checking whether it has reported negative earnings before special items such as interest, depreciation, amortization and tax. This implies that entities which were financially distressed often reported a loss from their key operational activities.

Most of the studies conducted during these recent years show the annual flow of business failure of companies is increasing especially during the periods of financial crisis (Sami, 2013). Specific case can be seen on Enron Corp, WorldCom, Xerox, Lehman Brothers, AIG, and Freddie. In Ghana, recent cases of business failures include the Gateway Broadcasting Services, Ghana Co-operative Bank, Bank for Housing and Construction, National Savings and Credit Bank (Appiah, 2011). In Kenya, recent cases of corporate failure include Uchumi Supermarket as shown in the study by Kipruto (2011) and Shisia et al., (2014).

Manufacturing sector in Tanzania is relatively small and over the long period it has failed to develop. According to Dinh and Monga (2013) manufacturing sector in Tanzania today contributes less to GDP than it did in 1970`s. Analysis on different sectors in Tanzania indicates that, from 2001 to 2011, the service sector contributed 57%, whereas industry contributed 27%.The contribution of agriculture to GDP was 16%(Africa Develop Bank group, 2014). Literature show that less attention have been given to research on the financial distress of manufacturing firms in Tanzania with regard to Altman's Z score model. Therefore this study endeavors to bridge the gap by applying Altman (1968) Z score model on Dar es salaam Stock Exchange (DSE) listed manufacturing firms in Tanzania.

1.1. Research Problem

The study conducted by Koes Pranowo et al. (2010) revealed that financial distress actually has a negative effect on profitability, efficiency and liquidity of manufacturing firms. If financial distress is not predicted on time and quick

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1

measures not taken then bankruptcy is likely to occur. The costs associated with bankruptcy are enormous and normally tend to affect all stakeholders of the firm (Altman 1984; Andrade & Kaplan, 1998; Altman & Hotchkiss, 2006; Natalia, 2007; Opler & Titman, 1994). Early prediction allows the firm to make appropriate measures to reduce the risk (Natalia, 2007). Given the fact that manufacturing sector in Tanzania is still at infancy stage this study finds it necessary to focus on prediction of financial distress of the manufacturing firms in Tanzania

1.2. Research Objective
General objective of this study is to test financial distress of listed manufacturing companies on DSE. Specifically, the study aims at :
   i.   Determining how inadequate working capital, inability to generate profit, amount of earnings reinvested, change in total liability in relation market value of the firm and inefficient use of the assets may lead to financial distress of firms under the review
   ii.   Identifying the best performing as well as worst performing listed manufacturing firms.
   iii. Identifying factors that contributing to the performance of the worst performing firms

1.3. Significance of the study
The study is significant since it involves prediction of the financial distress of the listed manufacturing firms. Testing of financial distress enables the management to act proactively before the situation go beyond control. When the firm undergoes financial distress, there are some costs associated with financial distress such as restructuring fees, auditor`s remuneration, consultancy fee paid to lawyers and management compensation. Finding of the study will enable shareholders to know about the status of companies listed on the DSE. Testing financial distress brings benefits to company such as reduction in losses by providing a pre-warning to stakeholders of firms (Shah, 2014). As contended by Ray (2011), financial distress prediction assist manager to keep track of a firm's performance over a number of years and act proactively in identifying important trends. Therefore, testing financial distress in manufacturing firms in Tanzania will allow managers to have a close follow up on the performance and to take actions before things get worse. This is very important since manufacturing firms are publicly owned; this study will serve the entire public interest.

Researchers and scholars may use this study as a base for further research in the domestic market. The study will contribute to the existing body of knowledge on financial distress prediction in Tanzania. It will also stimulate prospective researchers to replicate the study in other sectors of the economy for those firms listed on DSE.

2. LITERATURE REVIEW
The testing of financial distress has attracted the attention of academic researcher, auditors, investors and business management. Numbers of prediction models have evolved over a long period. Since late 1960's a lot of studies have been conducted on business failure prediction models to help reduce enormous loss resulting from business bankruptcy (Altman, 1984; Dimitras, et al, 1996, Altman and Narayanan 1997). Altman Z-score model is a Multivariate Discriminate Analysis (MDA) technique that can handle prediction of firms' financial distress. Studies show that descriptive analysis has been used in reporting the findings of Altman Z score model. For example, study conducted by Mohamed (2013) using descriptive analysis was used to present the result from Altman Z score model which was conducted on listed Kenyan firms. In another similar study by Kariuki (2013), Mamo (2011), Shisia et al. (2014) and Mohamed (2012) Altman Z score model was used in testing financial distress of listed companies in Kenya. With the list of mentioned studies in Kenya, it shows that studies on the financial distress of the listed firms had been widely conducted in Kenya compared to the Tanzania counterpart. Evidence from the literature show that the prediction of financial distress of the listed firms in Tanzania had been overlooked; something which brings the gap which the quest for the study is built upon. To make sure that findings revealed from the Altman Z score model are genuine and important, researchers have tested the power of the model. For example, Kipruto (2013) tested the validity of Altman's Z score model for predicting financial distress in Uchumi supermarkets and the findings concluded that the model was an accurate predictor of firms' financial distress. Findings show that, 21 firms recorded declining of Z score values which implies that they were facing financial distress and hence the reason for firms to be delisted from the NSE in 2006.

Therefore, MDA is one of the most popular quantitative techniques in identifying business failure as it sets standard for comparison of bankruptcy prediction models (Altman et al., 2000). Literature reveal that MDA models rank number 1 out of 16 model types and is expected to provide a reliable bankruptcy prediction method. According to

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2

Aziz et al, (2006) the MDA model has an average accuracy of more than 85% in bankruptcy prediction (Aziz et al., 2006). Building on recommendation from Gerantonis and Christopoulos (2009), managers, researchers, lenders, credit bureaus, regulatory organs are also urged to use model and particularly in managing risks associated with lending as well as regulating the listed companies, particularly those experiencing unsound financial status.

According to Altman et al., (2014) the financial ratios engaged in model building were extracted from the balance sheet and income statement data. In previous studies, a very large number of variables were found to be significant indicators of financial difficulties. Therefore, Altman compiled a list of 22 potentially important financial ratios for evaluation. He classified these variables into five standard ratio categories: liquidity, profitability, leverage, solvency, and activity ratios. The ratios were chosen on the basis of their 1) popularity in the literature and 2) potential relevancy to the study. The list included only a few "new" ratios. In addition, Altman did not consider cash flow ratios because of the lack of consistent and precise depreciation data. From the original list of 22 financial ratios, Altman selected five ratios for the profile as doing the "best" overall job in the prediction of corporate bankruptcy. This profile did not contain all of the most significant variables measured independently. Instead, the contribution of the entire profile was evaluated. To arrive at a final profile of variables, Altman utilized the following procedures: 1) observation of the statistical significance of various alternative functions including determination of the relative contributions of each independent variable, 2) evaluation of inter-correlations between the relevant variables, 3) observation of the predictive accuracy of the various profiles, and 4) judgment of the analyst.

3. METHODOLOGY
This part comprises the techniques applied in this study. Specifically, the techniques include research design, data collection techniques and data analysis techniques.

3.1 Research Design
The study employed a data set extracted from six manufacturing firms in Tanzania, covering the period from 2010 to 2014. Descriptive research analysis was used to present the result from the Multivariate Discriminate Analysis (MDA) technique. Descriptive analysis mainly involved specific prediction and narration of facts, it also included the use of tables, figures and charts in presenting the facts. In previous similar study the descriptive research design was used by Shisia et al. (2014) in analyzing the financial distress in Uchumi supermarkets limited in Kenya.

This study employed the Altman (1968) Z-score model in testing financial distress of listed manufacturing firms in Tanzania. Altman suggested MDA as the appropriate statistical technique for testing distressed and non-distressed firms. The Multivariate Discriminate Analysis (MDA) technique is used to determine significant level on a set of variables provided for a single group, it classifies an observation into one of several priori groupings dependent upon individual characteristics of observations. For the adaption of the MDA model, it is crucial how the sample of the firm for the two groups of interest, distressed and non-distressed, and the variables of the model were originally selected. In this study variables were selected based on the requirements of the Atman Z-score model. The financial distress model score sorts firms into distressed and non-distressed categories based on their characteristics.

3.2 Population, Variables Selection and Model Specification
The population of this study consists of six manufacturing firms listed on DSE. The study adopted a census for the companies listed on DSE as at 31st December 2014. Relevant variables included can be categorized into dependent and independent variables. Dependent variable is Z which is the discriminate variable that was used to measure financial distress. Its result determines whether the firm is financially distressed or healthy. It is a dichotomous variable that is used in classification of mutually exclusive events. Along each independent variables *X1, X2, X3, X4 and X5* there is corresponding coefficient value which remains unchanged, and this is according to requirement of the Altman Z score model. The Z-Score can be characterized as a linear combination of 4-5 common business ratios. These ratios are weighted by coefficients which are estimated by spotting a set of firms which had declared a bankruptcy. Thereafter, a matched sample of firms is collected for the surviving firms, with matching by industry and estimated assets. This formula for Altman Z-Score is helpful in calculating and predicting the probability that a company will go into bankruptcy within two years.

$Z=1.2X_1+1.4X_2+3.3X_3+0.6X_4+1.0X_5$ Where:
- X_1 - is the ratio of working capital to total assets (WC/TA)

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3

It measure net liquidity assets of the company in relation to the total assets of the firm. Generally, working capital plays very important role since it is used in financing day to day activities of the firm. It is normally determined by the level of current assets and current liabilities. Current assets comprise cash in hand, accounts receivable and inventory while Current liabilities involves firm's financial obligations, short term debt and accounts payable which will be met during the operating cycle. A positive or increase in working capital is an indication of an increase in the firm's ability to settle the bills. A negative or decrease working capital implies difficulties in meeting short term financial obligations. The working capital to total assets ratio is a measure of liquidity assets of the firm in relation to total capitalization.

- X_2 - is the ratio of retained earnings to total assets (RE/TA)

Retained earnings are profit not distributed to shareholders as dividend, instead plough back in the firm as the internal source of financing. The ratio gauges the degree of financing of total assets via surplus profits. It also measures the degree of leverage of a company. In other words the ratio gauge cumulative profitability of a firm and indicates the firm's earning power as well as age. The higher the ratio, the healthier the company is financially.

- X_3 - is the ratio of earnings before interest and tax to total assets (EBIT/TA)

Earnings before interest and taxes (EBIT) implies to the earnings resulting from the core function of the firm or operating activities of the firm. The ratio measures the efficiency of assets in generating profits. Low ratio indicates that the firm is not using the assets efficiently in generating profits. This ratio estimates the cash supply available for allocation to the creditors/lenders, government and shareholders

- X_4 - is the ratio of market value of owners' equity to book value of total liabilities (MC/TL).
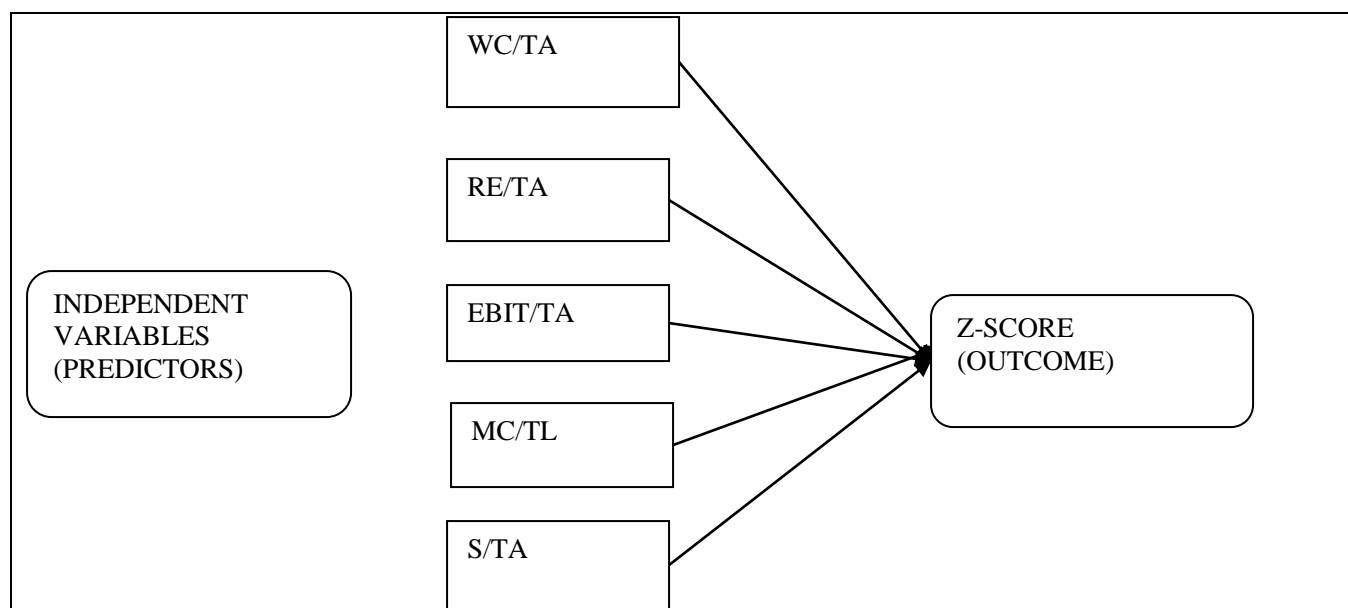
Equity is gauged by the total value of preference shares and ordinary shares. The ratio MC/TL measures the extent to which the assets must decline in value before the firm is rendered insolvent. This ratio incorporates the market dimension to the model of financial distress prediction.

- X_5 - is the ratio of sales to total assets (S/TA)

The ratio shows the ability of the firm in utilizing assets in generation of revenues, the lower the ratio of X_5, the greater the chance of the company not being able to fight competition. Generally, a company is considered to be healthy if the Z score exceeds 2.99. If the score is lower than 1.81, then the company is considered to be in financial distress. If a company's Z value lies in between, then the company is referred to be on grey zone and it needs to be monitored closely (Makini, 2015). Discrimination zones are summarized below:

$Z > 2.99$, "Safe" zone,

$1.81 < Z < 2.99$ "Grey" zone,

$Z < 1.81$ "Distress" zone

The models have gained wide acceptance for the past two decades by auditors, management consultants, courts of law and even used in database systems used for loan evaluations (Eidleman, 1995; Mohamedi, 2012). Some of the advantages that many practitioners argue for the use of Z-scores approach include: It is more precise and leads to clearer conclusions than contradictory ratios as well as they measure the extent of uncertainty. It is uniform and leaves less room for inaccuracies of judgment. It is more reliable and can be evaluated statistically. It is faster and less costly to work with than traditional tools. Figure 1 below depicts the relationship between the independent variables (predictors) and the Z-score (outcome)

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4

Figure 1: Relationship between Independent Variables and Outcome

4.   FINDINGS AND DISCUSSION

Table 2 summarizes Z -score of six companies employed in this study, companies which were involved include Tanzania Breweries Limited (TBL), Tanzania Cigarette Company (TCC), Tanga/Simba Cement Company (TCCL), Tanzania Portland Cement Company (TPCC), Tanzania Tea Parkers (TATEPA), and Tanzania Oxygen Limited (TOL).

Table 2: Z-score of Listed Manufacturing Companies in Tanzania

	TBL Z-score	TCC Z-score	TCC/SIMBA Z-score	TWIGA Z-score	TATEPA Z-score	TOL Z-score
2010	4.095528	7.471018	3.312627	3.44298	3.307544	-0.28202
2011	4.655505	8.240235	3.086704	3.117559	3.111619	0.910871
2012	4.773639	10.36368	3.429394	3.434833	-0.04831	0.823164
2013	9.183636	12.31782	3.050637	2.638027	0.418562	0.605327
2014	15.91455	19.42077	1.90804	1.910059	-0.06737	0.957634
Average Z-Score	*7.724571987*	*11.56270599*	*2.957480652*	*2.908691649*	*1.344407931*	*0.602994297*

Based on Altman Z-score model, TBL, TWIGA, SIMBA/TANGA and TCC were considered to be financially healthy since they have Z-score above 2.99 throughout the years under the study (2010-2014). On the other hand, TOL was experiencing financial distress during the period under the study, findings also revealed that TATEPA in the first two years (2010 and 2011) had Z-score of 3.307544 and 3.111619 respectively, indicating financial health under the same period while in the subsequent years the company was experiencing financial distress (Z-score of less than 1.81)

Specifically, decomposition of the Model (Z-score) revealed that an improvement in financial health of TBL has partly been contributed by consecutive increase in total assets of the company from 442,552,000 in 2010 to 732,471,000 in the year 2014. As far as retained earnings, earnings before interest and tax,(EBIT), Equity, sales are

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5

concern there was an increase from 120,220,000 ; 130,942,000; 525,000,000; 462,830,000 respectively in the year 2010 to 469,393,000; 278,040,000; 4,155,540,000; 818,695,000 respectively in the year 2014 an increase of 74.4%;52.9%;87.4%; and 43.5% respectively. On the other hand findings revealed that financial health of TBL was also largely attributed to the decline of liability from 247,493,000,000 to 199,200,000,000 in the year 2010 and 2014 respectively, which is equivalent to 24.2%. (*Ref: Appendix 1*). Tanzania Cigarette Company (TCC) manifested change in working capital, retained earnings, EBIT, equity at market value, sales and liabilities from 44,308,000; 126,807; 84,059,000; 222,000,000; 321,777,000 and 47,972,000 in year 2010 to 97,671,000; 125,348,000; 112,137,000; 1,674,000,000; 461,720,000 and 68,842,000 in the year 2014 meaning an improvement in the value of all components of the model including a slight increase in the liabilities which was covered by substantial increase in the value of equity at market value *(Appendix 1)*.
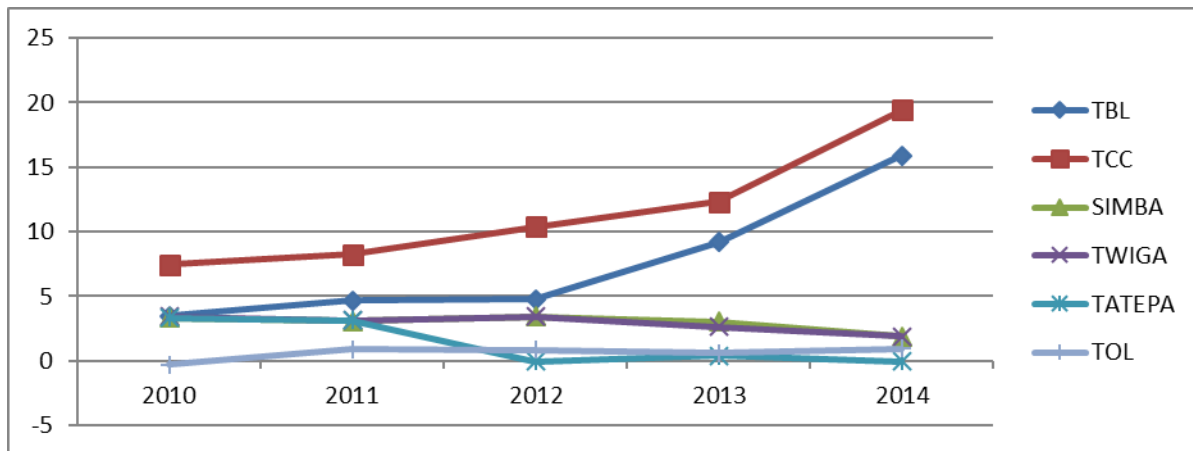

Fig.2: *Trend of the Financial Health of Listed Manufacturing Company 2010-2014*

Findings revealed that Tanga Cement Company (TCC) (also known as SIMBA Cement) experienced a decline in the financial healthy; meaning that there was a decline in the ability of the company to settle financial liability as they fall due. Records show that, based on the analysis of the relationship between working and liabilities during the period under review deterioration of financial health of Tanga Cement Company was largely contributed by decline of the working capital, earnings before interest and tax (EBIT) from 23, 051,309,000; 45,509,442,000 in 2010 to 19,389,678,000; 38,071,923,000 in 2014 a decline of 18.9% and 19.5% respectively. The company's decline in the financial health was also contributed by an increase in liabilities from 34,995,536,000 in 2010 to 128,749,086,000 in 2014 an increase of 72.8%. As it was in the case of TANGA Cement Company, TWIGA Cement experienced decline in the financial health during the period under the study. Specifically, the company's financial health need to be monitored in the last two years under consideration as the Z-score was ranging between 2.99 and 1.81. When compared to Rayasut Cement Company in Oman, the findings show that cement industry in Tanzania (especially those listed companies) were starting to experience difficulties between 2012-2014 while the same sector was growing in Oman, While there was a decline in profitability and use of retained earnings in SIMBA and TWIGA cement in the last two years of study, profitability of Rayasut in Oman was expanding and there was an increase in the use of retained earning between 2007-2014 (Mohamedi, 2016). Mizan and Hossain's (2014) conducted a study to examine the financial health of cement industry of Bangladesh using Z score. The study revealed that among the five firms, two firms were financially sound as they have higher Z score than the benchmark (2.99). Another three firms were in the grey area that is the firm is financially sound, though the management needs special attention to improve the financial health of those firms. Cement companies in Tanzania are in financial sound but they need management attention (close monitoring) since they have average Z score falling under 1.81<Z< 2.99, this conforms to one cement company in Bangladesh which manifested the same result. Decline in financial health of TWIGA was largely contributed by decline in working capital and sales from 55,178,573: 199,600,699 in 2010 - 19,389,678; 194,992,804 in 2014 a decline of 184.5% and 2.4% respectively, result also shows that TWIGA Company also experience significant increase in liabilities from 48,840,708 in 2010 to 128,749,086 in 2014 respectively an increase of 62.1%.

TATEPA experienced financial distress from 2012 to 2014 since the Z- score was less than 1.81 during the mentioned period. Deterioration in company's financial health was largely contributed by decline in working capital,

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6

EBIT and sales from 622,794; 8,600 and 9,353,000 in 2010 to 52,330; -209,446; 142,658 in 2014. Result also shows that TATEPA Company also experience significant increase in liabilities from 172,483 in 2010 to 558,930 in 2014 an increase of 69.1%. TCC and TBL manifested improvement in financial health throughout the years under consideration since their Z- score was above 2.99. Improvement in company's financial health was largely contributed by growth in sales, working capita EBIT and other indicators/measures of financial health. Lastly, the findings record that Tanzania Oxygen Ltd (TOL) was experiencing deterioration in financial health/ financial distress over the study period, the deriving cause of the financial distress was primarily caused by inadequate working capital and serious increase in the company's liabilities. Though there was a slight increase in sales and EBIT but this could not keep pace with increase in the liabilities and working capital requirement. The two companies were out rightly distressed since their average Z-score values were less than 1.81. The two companies were TATEPA and TOL with Z-score of 1.3444 and 0.6029 respectively, the average Z-scores of the individual companies are reflected in the *figure: 3* below
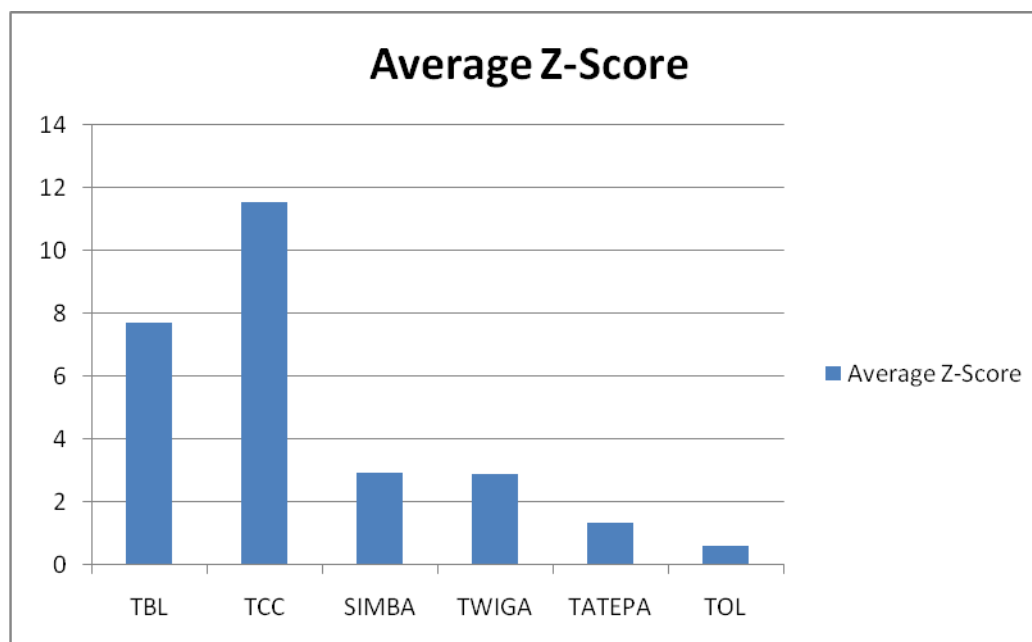

Fig.3: *Average Z-score of Listed Manufacturing Company 2010-2014*

5. CONCLUSSION AND RECOMMENDATIONS

This study aimed at testing financial health of manufacturing firms listed on DSE. Six (6) companies were examined throughout the study period (2010 – 2014). The study employed Altman Z-score model. The model is well known as one of the powerful techniques that can predict firms' bankruptcy or insolvency. It is further contended that, the findings can be used by management of the company for financing decisions, by regulatory organs and by portfolio managers in stock selection.

The findings hold that TCC and TBL were the most performing manufacturing firm compared to other selected companies. The deriving factor for the improvement in the company's financial health was due to increase in sales, working capital, earnings before interest and tax (EBIT) and decline of total liabilities over the study period. On the other hand, TOL and TATEPA were experiencing financial difficulties over the study period. The deterioration in the financial health was primarily derived by the substantial increase in the total liabilities though sales, EBIT and required working capital were declining over the study period.

The study recommends that management of TOL and TATEPA should revisit their cost structures and sources of their working capitals so as to enhance production capacity. The two firms can use information from the finding to compare their companies to common best practices. Since their performance is below the standard, the firms can scrutinize and find how other companies have solved the problem in the market.

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7

The study suggests that natural extension of this work should focus on the use of alternative model of bankruptcy predictions so as to confirm the validity of the findings of this study. The future study should also include other companies apart from manufacturing companies only.

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8

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9

Appendix 1: Data Set for the Tanzania Manufacturing Companies Listed at Stock Exchange 2010-2014

	A	B	C	D	E	F	G	I
1	YEAR	ITEMS/VARIABLES	TBL	TCC	SIMBA	TWIGA	TATEPA	TOL
2	2010	Working capital	(65,454)	44,308	23,051,309	55,178,573	622,794	(3,258,218)
3	2010	Retained earnings	120,220	126,807	103,821,719	164,730,799	3,748,429	-
4	2010	EBIT	130,942	84,059	45,509,442	75,881,736	(44,163)	(1,195,184)
5	2010	Equity at market value	525,000	222,000	121,000	323,860	8,600	9,981
6	2010	Sales	462,830	321,777	149,181,278	199,600,699	9,353,000	5,846,726
7	2010	Total liabilities	247,493	47,972	34,995,536	48,840,708	172,483	5,496,920
8	2010	Total assets	442,552	176,779	142,687,474	217,169,969	4,638,237	7,089,874
9	2011	Working capital	42,398	68,136	28,819,642	60,710,134	136,804	(1,530,821)
10	2011	Retained earnings	230,306	147,749	113,713,675	183,277,390	3,748,429	-
11	2011	EBIT	162,335	101,375	38,248,401	72,771,794	(172,740)	749,352
12	2011	Equity at market value	595,755	314,000	151,537	374,240	8,482	8,495
13	2011	Sales	543,922	376,778	161,435,718	217,258,974	9,234,305	7,352,088
14	2011	Total liabilities	200,550	56,182	39,495,986	65,792,553	233,380	7,063,624
15	2011	Total assets	505,695	204,616	156,087,997	252,668,405	4,555,690	8,776,545
16	2012	Working capital	87,287	95,402	54,695,483	91,628,558	221,293	(2,634,522)
17	2012	Retained earnings	329,555	173,690	143,959,986	209,431,151	-	-
18	2012	EBIT	219,127	123,728	51,967,209	91,159,862	(408,172)	1,609,630
19	2012	Equity at market value	884,790	420,000	152,810	467,800	2,679	11,040
20	2012	Sales	675,265	422,594	195,603,983	249,111,727	842,345	9,555,089
21	2012	Total liabilities	284,084	50,065	39,843,069	64,800,670	331,383	11,564,936
22	2012	Total assets	676,269	222,982	185,076,476	277,830,283	4,496,953	14,229,958
23	2013	Working capital	49,752	93,993	46,471,360	76,608,039	325,616	(3,546,068)
24	2013	Retained earnings	404,097	176,748	169,737,752	220,203,808	68,700	-
25	2013	EBIT	233,987	112,137	46,733,600	49,156,619	220,721	1,356,640
26	2013	Equity at market value	2,359,428	860,000	128,616	478,595	11,607	11,539

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10

27	2013	Sales	729,663	445,633	182,784,033	213,775,188	752,214	10,832,491
28	2013	Total liabilities	230,921	67,980	35,781,488	70,887,904	350,979	13,979,111
29	2013	Total assets	696,741	248,749	206,792,661	294,690,174	4,934,572	18,276,353
30	2014	Working capital	79,550	97,671	19,389,678	19,389,678	52,330	(2,558,154)
31	2014	Retained earnings	469,393	175,348	189,426,280	189,426,280	52,560	-
32	2014	EBIT	278,040	112,137	38,071,923	38,071,923	(209,446)	3,424,174
33	2014	Equity at market value	4,155,540	1,674,000	286,520	719,690	12,130	13,214
34	2014	Sales	818,695	461,720	194,992,804	194,992,804	142,658	14,610,979
35	2014	Total liabilities	199,200	68,842	128,749,086	128,749,086	558,930	9,674,305
36	2014	Total assets	732,471	247,258	319,448,787	319,448,787	5,126,383	23,871,888

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11

Appendix 2: Computation of Z-Score For Each Firm Under The Study

TBL	
2010	=1.2*(C2/C8)+1.4*(C3/C8)+3.3*(C4/C8)+0.6*(C5/C7)+1*(C6/C8)
2011	=1.2*(C9/C15)+1.4*(C10/C15)+3.3*(C11/C15)+0.6*(C12/C14)+1*(C13/C15)
2012	=1.2*(C16/C22)+1.4*(C17/C22)+3.3*(C18/C22)+0.6*(C19/C21)+1*(C20/C22)
2013	=1.2*(C23/C29)+1.4*(C24/C29)+3.3*(C25/C29)+0.6*(C26/C28)+1*(C27/C29)
2014	=1.2*(C30/C36)+1.4*(C31/C36)+3.3*(C32/C36)+0.6*(C33/C35)+1*(C34/C36)

TCC	
2010	=1.2*(D2/D8)+1.4*(D3/D8)+3.3*(D4/D8)+0.6*(D5/D7)+1*(D6/D8)
2011	=1.2*(D9/D15)+1.4*(D10/D15)+3.3*(D11/D15)+0.6*(D12/D14)+1*(D13/D15)
2012	=1.2*(D16/D22)+1.4*(D17/D22)+3.3*(D18/D22)+0.6*(D19/D21)+1*(D20/D22)
2013	=1.2*(D23/D29)+1.4*(D24/D29)+3.3*(D25/D29)+0.6*(D26/D28)+1*(D27/D29)
2014	=1.2*(D30/D36)+1.4*(D31/D36)+3.3*(D32/D36)+0.6*(D33/D35)+1*(D34/D36)

SIMBA	
2010	=1.2*(E2/E8)+1.4*(E3/E8)+3.3*(E4/E8)+0.6*(E5/E7)+1*(E6/E8)
2011	=1.2*(E9/E15)+1.4*(E10/E15)+3.3*(E11/E15)+0.6*(E12/E14)+1*(E13/E15)
2012	=1.2*(E16/E22)+1.4*(E17/E22)+3.3*(E18/E22)+0.6*(E19/E21)+1*(E20/E22)
2013	=1.2*(E23/E29)+1.4*(E24/E29)+3.3*(E25/E29)+0.6*(E26/E28)+1*(E27/E29)
2014	=1.2*(E30/E36)+1.4*(E31/E36)+3.3*(E32/E36)+0.6*(E33/E35)+1*(E34/E36)

TWIGA	
2010	=1.2*(F2/F8)+1.4*(F3/F8)+3.3*(F4/F8)+0.6*(F5/F7)+1*(F6/F8)
2011	=1.2*(F9/F15)+1.4*(F10/F15)+3.3*(F11/F15)+0.6*(F12/F14)+1*(F13/F15)
2012	=1.2*(F16/F22)+1.4*(F17/F22)+3.3*(F18/F22)+0.6*(F19/F21)+1*(F20/F22)
2013	=1.2*(F23/F29)+1.4*(F24/F29)+3.3*(F25/F29)+0.6*(F26/F28)+1*(F27/F29)
2014	=1.2*(F30/F36)+1.4*(F31/F36)+3.3*(F32/F36)+0.6*(F33/F35)+1*(F34/F36)

TATEPA	
2010	=1.2*(G2/G8)+1.4*(G3/G8)+3.3*(G4/G8)+0.6*(G5/G7)+1*(G6/G8)
2011	=1.2*(G9/G15)+1.4*(G10/G15)+3.3*(G11/G15)+0.6*(G12/G14)+1*(G13/G15)
2012	=1.2*(G16/G22)+1.4*(G17/G22)+3.3*(G18/G22)+0.6*(G19/G21)+1*(G20/G22)
2013	=1.2*(G23/G29)+1.4*(G24/G29)+3.3*(G25/G29)+0.6*(G26/G28)+1*(G27/G29)
2014	=1.2*(G30/G36)+1.4*(G31/G36)+3.3*(G32/G36)+0.6*(G33/G35)+1*(G34/G36)

TOL	
2010	=1.2*(I2/I8)+1.4*(I3/I8)+3.3*(I4/I8)+0.6*(I5/I7)+1*(I6/I8)
2011	=1.2*(I9/I15)+1.4*(I10/I15)+3.3*(I11/I15)+0.6*(I12/I14)+1*(I13/I15)
2012	=1.2*(I16/I22)+1.4*(I17/I22)+3.3*(I18/I22)+0.6*(I19/I21)+1*(I20/I22)
2013	=1.2*(I23/I29)+1.4*(I24/I29)+3.3*(I25/I29)+0.6*(I26/I28)+1*(I27/I29)
2014	=1.2*(I30/I36)+1.4*(I31/I36)+3.3*(I32/I36)+0.6*(I33/I35)+1*(I34/I36)

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12

Appendix.3

NAME OF THE FIRM	YEAR ESTABLISHE	YEAR LISTED	OWNERSHIP	NUMBER OF SHARES	IPO PRICE	MARKET PRICE AS AT 10 NOVEMBER, 2017. 07:45AM	NATURE OF THE BUSINESS
TBL	1933	9th Sept, 1998	1.SABMILLER-57.54% 2.PENSION FUNDS& INVESTMENTS FUNDS-19.04% 3.INDIVIDUALS- 10.32	294,928,463	550	13,300	Production, marketing and distribution of beverages in Tanzania
TCC	1961	16th Nove,2000	1.JIT- 75% 2.KINGSWAY- 9.3% 3.PENSION FUND- 4% 4.URT – 2.2% 5.PUBLIC & OTHERS-9.5%	100,000,000	410	16,800	Manufacturing, marketing, distribution and sale of cigarettes.
SIMBA	1981	26th Sept,2002	1.AFRISAM-62.5% 2INSTITUTIONS & PUBLIC 36% 3.EMPLOYEES TRUST- 0.75%	63,671,045	300	1200	Production, sale and marketing of cement.
TWIGA	1966	29thSept,2006	1.HEIDELBERG – 69.25% 2.PUBLIC – 30.75	179,923,100	435	1520	Production, sale and marketing of cement.
TATEPA	1995	17th Dec,1999	1.CDC – 54.43% 2.INSTITUTIONS- 16.26% 3.FOUNDER- 14.25%	18,657,254	330	600	Growing, processing, blending, marketing and distribution of tea and instant.
TOL	1950	15th Ap, 1998	1.SAAMI HOLDINGS -58% 2. INSTITUTIONS &INDIVIDUAL – 32%	55,835,490	500	780	Production and distribution of industrial gases, welding equipment, medical gases

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13