

Z-Score Model: Analysis and Implication on Textile Sector of Pakistan

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Abstract

Altman developed a Model named Z-Score in 1968 in order to predict financial distress of firms. Z-Score Model is a predictor of bankruptcy that predicts the financial viability of the firms in advance with the help of five ratios. More accurate predictability nature of Z-Score among bankruptcy models and continuous decline in growth of Pakistan textile industry; the major economic contributor, play motivational role for conducting this study. Current study based on two objectives; i. Examine the strength of financial ratios for measuring textile Z values by using Pearson correlation and linear regression analysis. ii. Examine the financial health of Pakistan textile sector with the help of Altman Z-Score (1968) model. Sample of 97 KSE listed textile firms have been taken for study and time period divided into two segments on the basis of textile growth. First time period called crises period that is from 2007 to 2009 and second period called Recovery Period that is from 2010 to 2012. Results of Z-score model shows that overall textile sector of Pakistan is facing financial distress during 2007-2012. Textile sector is failed to survive in the international market during the time period of study. Z-Score Model also concludes that Recovery period (2010-2012) is comparatively better in financial health as compare to Crises Period (2007-2009). Textile sector of Pakistan had faced many internal and external crises and it affect very badly on the growth of textile sector. Pearson correlation resulted that all variables comprised in Model are positively correlated with each other. No one relationship is found very strongly correlated in the study.

Key Words: Z-Score Model, Pearson Correlation, Regression, Pakistan Textile Sector

1. Introduction

There is a dire necessitate for prediction of business failures since the results of business failure leads to heavy loss both financially and non-financially. Thus, accurately predicting business failure in time would be pretty useful to the managers, shareholders, government, suppliers, employees and others. The prediction of business failure is an essential for taking well-timed corrective and remedial measure for protecting the business firm from the problem of bankruptcy. The prediction of bankruptcy probably is one of the most important business decision making and proper utilization of financial resources of the firm. The trouble of insolvency can be caused by poor administration, inappropriate sales prediction, and inexperienced management, fraud changes in tastes and preferences of customers and rapid technological advances in the field of business. So there are many forms of business failures. The first one is economic failure, this occurs when an organization is not able to produce profit that would be adequate enough to meet creditor's obligations and various expenses associated with the operations of the firms. Financially failure may take the form of bankruptcy or

insolvency. Financial Bankruptcy refers to where a firm is not able to pay its obligations to its creditors or in other words when total liabilities exceeded from its total assets.

Z-Score Model was developed by Edward Altman in 1968. Z-Score Model is the forecaster of insolvency that predicts the financial distress of the companies by using the five specific ratios. Z-score model was developed under multiple discriminant analysis. Multiple Discriminant analysis is a method to classify the different variables under a certain group with discriminant coefficients. Prediction of Bankruptcy is the very captivating factor for all investors and researchers to get the knowledge about the financial viability of the firms. Altman used 22 ratios in the process of developing Z-score Model and finalized five ratios which predict financial distress. Selected ratios were Liquidity ratio, Profitability ratio, Productivity ratio, leverage ratio and asset turnover ratio. In this sense, the Z-Score measures corporate financial health and provides a foundation for more secure investment decisions and better assessments of firms' credit worthiness. It should be noted that the original Z-Score model is primarily for manufacturers. Altman's results suggest that the Z-Score is an accurate forecaster of bankruptcy up to two years prior to distress and that accuracy diminishes substantially as the lead time increases.

1.1 Textile Sector of Pakistan

Textile industry of Pakistan has been considered to play a vital role in the economy of country since independence. There were simply two textile mills at the time of independence named Okara textile mills and Lyallpur cotton mills located at Faisalabad. Growth in the textile sector and in the production of cotton has been very remarkable in Pakistan since 1947. In 1947, cotton bales production was 1.1 million and it was increased to 10 million bales in 2000. Number of Mills increased from 3 to 600 and spindles increased from 177,000 to 805 million similarly looms and finishing units increased.

Pakistan is the largest exporter of textile commodities in Asia. This sector contributes 9.5% into the GDP of Pakistan. Along with this, it is biggest sector of Pakistan which provides 30% employment to the 49 million workforce of the country. Total trading volume of world textile trading is around US \$18 trillion per annum but Pakistan is lagging behind by huge gap. However, Pakistan is the 4th largest producer of cotton and has third biggest spinning capacity in Asia after China and India. The foremost buyers of Pakistani textile products are United States and Europe and its exports toward these countries is about to 63% of the total exports of country and it contributes 8.5% to the GDP of Pakistan[1]. Textile sector of Pakistan also played a very important role in the economic development and the main purpose of each country either it is developed or developing country should be to widen the industry which contributes a greater share in the exports, tax revenue, employment to the work force and GDP.

1.1.1 Growth of Textile Industry

Pakistan has distinctive edge related to the textile sector due to its production and consumption. Pakistan is the 4th largest producer of cotton and 3rd largest consumer in the world.

Table 1.1: Economic contribution of Textile Industry

Exports	60%
Manufacturing	46%
Employment	38%

Source: Economic Survey of Pakistan

Due to these contributions, textile sector is significantly contributing to Gross Domestic Product of Pakistan. Growth of textile industry faced difficulties in last decades. Here is trend analysis of textile growth in last few years in the table.

Table 1.2: Trends of Textile Growth

Trend of Textile Growth		
S/No	Years	Growth
1	2002-03	5.20%
2	2003-04	20%
3	2004-05	24.50%
4	2005-06	11.23%
5	2006-07	8.40%
6	2007-08	4.05%
7	2008-09	-0.70%
8	2009-10	-1.78%
9	2010-11	1%
10	2011-12	0.80%

Source: Economic Survey of Pakistan & State Bank of Pakistan

Growth of textile from 2002-2012 is given in this table, which is showing that first five years of this period were positively contributing in the economy of Pakistan. As in 2002-03 annual textile growth was 5.20% and it increased by 14.80% in 2003-04. Highest growth has been achieved by textile sector in 2004-05, which was 24.50%. At that time, Pakistan achieved 6.6% GDP and it was the 2nd highest GDP of Pakistan during 1947 to till now. Significant growth has been noticed in each industry of Pakistan from

2000 to 2007. There were number of reasons behind this high growth in that era like lower interest rate and less duties and taxes by the Govt. for promoting manufacturing industries of Pakistan.

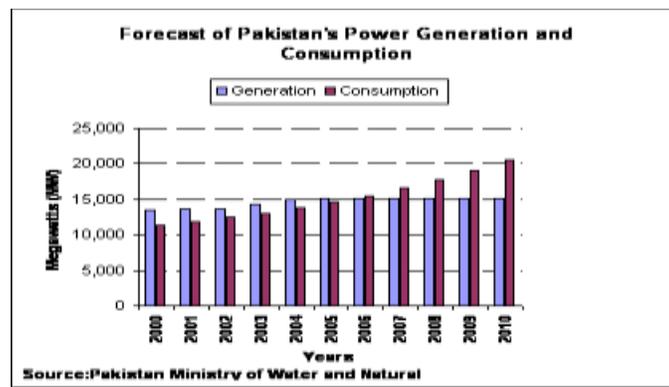
1.1.2 Challenges Faced by Textile Industry of Pakistan

Textile sector is faced many severe problems during these years so affected badly. Here is the brief discussion on challenges and problems faced by textile sector that were the major reasons of declining growth.

1.1.2.1 Electricity Crises

In 1947, Pakistan was having 60 MW power generating capacity for 31.5 million people. This was extended to 119 MW by 1959 as country was entering in the period of development and building its infrastructure. WAPDA expanded its capacity of electricity generation to 636 MW, 3,000 MW in 1970, 7,000 MW in 1990, and 19,550 MW in 2005 and in 2010 it increased to 22,263 MW [2]. However, this expansion was comparatively low according to the development of textile sector of Pakistan. Demand of Electricity was too high by the units working in Pakistan during the last decades. The loadshedding of electricity caused the rapid decrease in the production that also reduced the export orders. Cost of production also increased due to the increase in electricity tariff.

Graph 1.1: Electricity Consumption and Generation



As shown in the graph 1.4, capacity expansion of power generation is lower than consumption. This trend is presenting a major difference between consumption and generation of electricity. In 2010, Total generation of electricity was 15,000MW but the consumption was 20,000MW approximately.

1.1.2.2 Gas Shortage

With the crises of Electricity, shortening of gas energy also increased in the country. The Supply of Gas for confined generations cut down to 8-12 hours in a day for the domestic level customer. In winter the demands for Gas increase by the domestic users that also cause gas shortage for textile industry of Pakistan. Tariffs of Gas increased to double in 2008-09 as compared to 2004-05.

1.2 Research Gap

Pakistan Textile Industry is facing tough rivalry in the international market due to increase in cost of production, which is making it less competitive than the neighboring countries India, Bangladesh & China. More than 40% of the Pakistan textile industry and 0.2 million power looms have shifted to Bangladesh. As it was discussed already in this chapter that Pakistan textile sector is facing very severe situations so it became necessary to predict the financial viability of the whole textile sector during that crisis. Although numerous studies have been done on Altman Z-Score Model, but there are just few studies conducted on Z-score Model in Pakistan. Most of Researchers applied Z-Score model to check its applicability and accuracy in the specific markets but in the present study, Z-Score Model is applied to predict the financial health and financial soundness of the Pakistan Textile sector with a greater sample.

1.3 Objectives of the Study

Growth of Pakistani textile industry is decreasing haphazardly; it is an alarming situation for economy of the country, investors, and textile sector. There are two basic objectives of present study; i. Examine the strength of financial ratio's for measuring textile Z values by using pearson correlation and linear regression analysis. ii. Examine the financial health of Pakistan textile sector with the help of Altman Z- Score (1968) model. Moreover, economic situation of textile industry, crises and challenges and overall financial performance is discussed briefly in thus study. There are some other objectives of the study which are given below:

- 1) The objective of the study is to predict the financial health of textile sector during 2007-2012.
- 2) To examine the financial health of textile sector during 2007-2009 when this sector was in troubled
- 3) To examine the financial health of textile sector during 2010-2012 to check the difference after crises period.
- 4) To examine the relationship of z-value and among its five ratios consisted in Model.

2. Literature Review

Today in the world, bankruptcy prediction became a matter of great concern for every type of organization. Financial statement users are interested in financial viability of companies for investment and other purposes [3]. Financial viability or purpose of performance assessment is basically to create distinction between good and worse [4]. Financial viability of firm is checked by the shareholder to know either firm can pay off their expected rate of return. On the other hand firm's creditor 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. It is matter of great concern for the management as well as employees thus assessing the financial capability of the business provides lots of information to the institution and people in the firm's environment [5]. According to Farlex financial dictionary:

“The business failure or bankruptcy refers to a company ceasing its operation following its inability to make a profit or to bring in enough revenue to cover its expenses”.

There are number of approaches for the prediction of bankruptcy. Purpose of those approaches is to identify those financial characteristics which become the reason for failure [6]. In the past traditional ways of ratio analysis were used for estimating the failure of firms in near future. According to Altman, most significant ratios are those which measure solvency, liquidity, and profitability. Yet it seems hard which ratios are more important as different researcher proposed different ratios for the prediction of bankruptcy. For example poor liquidity ratios may show the sign of liquidation but its comparatively good profitability may reduce the potential risk of liquidation that is underlined by the bad liquidity ratio. Consequently traditional ratio analysis may provide the incorrect results [7]. The purpose of financial ratio analysis is to detect company operating as well as financial difficulties. Qualitative information was used for assessing creditor worthiness provided by agencies established for this purpose before the quantitative measure development. Formal initiative was taken in 1930’s regarding the study of business collision. Studies of that period concluded that the firm which collapse show ratio measurement that is different from those which are continuing firm [8]. The ratios which are commonly used by the researcher for the analysis are; net income to total asset, total liabilities to total asset [9] [10].

Table 2.1: Statistical Bankruptcy Models

Models	Author	Year
Univariate	Fitzpatrick	1932
	Merwin	1942
	Walter	1957
	Beaver	1966
Multiple Discriminant Analysis	Edward Altman	1968
	Deakin	1972
	Edmister	1972
	Blum	1974
	Moyer	1977
	Altman, Alderman & Naarayanan	1977
	Edward Altman	1983
	Booth	1984
	Rose & Giroux	1985
	Lawrence & Bear	1986
	Poston, Harmon & Gramlich	1994
Grice & Ingram	2001	

Three other types of bankruptcy prediction model that are significant those are Logit & Probit Analysis, Neural Networks & Recursive Portioning algorithm but these models are not sufficiently discussed in literature. Major literature is on multiple discriminants Model (MDA) Actually Altman Z-Score Model was developed after failure of Univariate analysis that is being used with up to date method like neural network [11].

2.1 Altman's Z-Score Model

Altman by combining set of Ratios developed bankruptcy prediction model that is called Z-Score Model. He expanded his study by providing to more models; sometimes called Model A & Model B [12]. Model A was formulated for the private manufacturing firms. In this model Ratios are weighted differently and overall predictability measurement different from the previous one. In addition, equity / debt formula calculation for the model A used shareholder equity from the balance sheet, while on the other hand equity market value was used in original model. Model B was formulated for used with private general firms and service sector. In this model, sales/total assets was not used, weighting and scoring in this model was also different. Although only weighting and scoring can be done through statistical model, but the purpose of each ratio can be understand by using their common sens. Result of initial test shows 72% accuracy in bankruptcy prediction (2years prior bankruptcy events) with 6% Type II Error (false positives).

Successively 3 tests performed in this model within a period of 31 year (up to 1999). Results of these tests showed the accuracy of bankruptcy prediction (one year prior to event) between 80% to 90% with 15%-20% Type II error [8]. Since 1985 Z-score model gained popularity among auditor, management accountant, database system for loan evaluation, courts [12]. Basically this approach is designed for those manufacturing companies which are publically held and having assets limit which is more than \$1million. But after that this formula with some variation has also been applied on private firms which is indicated as Altman Z'- Score and for non manufacturing firms or companies ,it is presented as Altman Z''-Score. The model presented as:

$$Z = 1.2X_1 + 1.4X_2 + 3.3X_3 + 0.6X_4 + 9.9X_5$$

Suhail and Muslim khan conducted another study on Z-score to test the soundness of financial condition of PSO for a period of 2007 to 2012. It is evident from the results that company is good in financial position. Z-score values are higher than 3 for all six years so it shows that company is financially strong while if score are lower than 1.8 that shows its weak financial condition [13]. Another study published in 2013 on assessment of bankruptcy with the help of current ratio z-score model of listed companies from sugar sector. Total of the 35 companies were selected for testing purpose. Result of the study shows that z-score results and current ratio significantly differ between bankrupt and non-bankrupt firms for a period of 2009 and 2010. There is positive and significant relationship between Z-Score and current ratio in a period of 2009 and 2010. Positive relation not only serves the purpose of the study but also enhance the credibility of study. So it can be concluded both current ratio and Z-score are good predictor of bankruptcy for the sugar sector of Pakistani listed companies. Study also provides evidence of the acceptance of these tools as reliable for the assessment of financial health [14]. Hayes and Hughes investigated the application of Altman's model to a contemporary study in frequently varying environment. Sample was selected on the basis of this criteria that only public retail companies were taken which were declared insolvent during 2007 and 2008, moving further out of these only those firms were preferred which had 1-above

\$1000000 assets 2- fully availability of financial information 3- bankruptcy was not filed at least 10 year prior to this period. 4 pairs of firms fulfilled the criteria and were taken for analysis purpose. The results of this study show that while analyzing the 8 companies bankrupt vs. non bankrupt, Z-Score predicted accuracy for the filing of bankruptcy is 94% while 90% accuracy in prediction of financial distress [15]. In India a study was conducted to test the financial soundness of MMTC for a period of five years. Results showed that z-score value is 4.24-6.30 for period of 2007-2012 which is greater than 3 so it indicate that Indian MMTC sector is financially sound so attractive for an investor [16].

Another studies conducted for the evaluating the financial soundness of Cipla, Dr Reddys laboratories and Ranbaxy Laboratories Ltd for a period of 2001-2011. Results of this study revealed that Cipla and Dr Reddy'S Laboratories are financially sound but there is uncertainty in the prediction of bankruptcy of Ranbaxy Laboratories. The study is quite beneficial for the stakeholder of Pharmaceutical industry [17].

. Another study was conducted to evaluate the financial distress of 22 textile firms of Pakistan. Z-score model and current ratio were used to predict the financial distress. Paired Sample T-Test was implemented to check to asses the financial health of Pakistan textile sector. Results of the study showed that Z-score and current ratio are the good tools to forecast financial viability of the textile firms in Pakistan [18].

Another study carried out to predict the corporate default. Data for a period of 2007-2010 was taken having following characteristics American public listed companies which have been filed for bankruptcy during 2007-2010 having minimum \$100 million of asset before bankruptcy. Total 90 firms were selected for testing purpose excluding financial institute. The finding of this study showed that it's difficult to clarify that whether z-score model is satisfactory predictor of bankruptcy [19].

A study conducted by the Roil Paradhan applied two step processes. In first step internal parameter for the prediction of bankruptcy regarding z-score was developed. In next section; steps followed by using neural network for z-score prediction. Finding suggest that Model is able to forecast the financial health of company for the situation of loan value enhancement and repayment period extension effective in policy designing related to credit viability [20].

One more study conducted by taking 350 failed companies data for a period of 2001-2010. The sample consists of each industry sector. Results showed that Model is significantly effective tool for bankruptcy prediction by using financial statement of Nigerian firms prior to failure.

It also indicated that in developed economy z-score predictive ability in industrial sector is significantly different. This model is significantly effective for different sectors like Agriculture, oil service and manufacturing sector but not effective for in General services, transport and aviation [21].

For the determination of Quality of asset growth in PT banking sector after the declarence of Papua province as autonomous, a research study was conducted to determine the model which is appropriate for analysis of financial health and the factors that may or may not affect the model. Data was taken for the purpose of study from financial statement from 2003-2011.four variable proved that papua banks were in Grey area during period of 2003-2011 by using CAEL. While the results were totally different by using CAMEL

which indicated that model is not suitable for assess while the results were totally different by using CAMEL which indicated that model is not suitable for assessing the financial health. But results also indicated that Papua bank is in position of Bankruptcy, third party funding is more dominant in Papua bank showed by current account and this number reaches to the maximum point. So it can be concluded that Z-Score model is less suitable for Papua bank but it has ability to show the critical position of papua bank in history [22].

2.2 Research Hypothesis

H1: There is financial distress among textile sector of Pakistan.

H2: Pakistani Textile sector adversely affected during Crisis period.

H3: Pakistani Textile sector grow-up during Recovery period.

H4: All Ratios Used in Z-Score have significant relationship for measuring firm's financial health.

3. Research Methodology

Altman's original model has been taken to check the financial health and soundness of the firms.

$$\text{Equation: } Z = 1.2X_1 + 1.4X_2 + 3.3X_3 + 0.6X_4 + 0.99X_5$$

Where,

$X_1 = \text{Working Capital} / \text{Total Assets}$

$X_2 = \text{Retained Earnings} / \text{Total Assets}$

$X_3 = \text{Earnings before Interest and Taxes} / \text{Total Assets}$

$X_4 = \text{Market Value of Equity} / \text{Book Value of Debt}$

$X_5 = \text{Sales} / \text{Total Assets}$

These five independent variables will compute the Z-Value in order to quantify the financial viability of the firms. With this Model Altman has given the cut off scores to differentiate the bankrupt and non-bankrupt firms.

3.1 Cut off Scores

Cut off Scores (Altman 1968)		
Failed Firms	Grey Area	Non Failed Firms
<1.81	1.81 to 2.99	>2.99

The calculated Altman Z-Score can be classified and interpret into different three categories: firms that are expected to fail will have scores below 1.81 and companies that are financially strong will have scores greater than 2.99. Grey area falls between; 1.81 to 2.99 and it shows the critical situation of the firm where a firm have possibility to enter in failed and non-failed zone. On the basis of these cut of scores given by Altman, the present study predicted financial position of textile sector in Pakistan

3.2 Population and Sample Selection

Textile Sector of Pakistan is the largest manufacturing sector of Pakistan. There are 180 textile companies listed in the Karachi Stock Exchange that have been selected as a population for this study

3.2.1 Sample Description

Large sample has been selected in the present study to diminish the errors. With the intention of forecasting the financial health of the textile sector listed in Pakistan Stock Exchange for period of 2007 to 2012, 97 KSE listed Textile Firms have been chosen. Selected period has been classified into two segments.

- 1) Crises Period 2007-2009
- 2) Recovery Period 2010-2012

Total 180 textile Firms are listed in Pakistan Stock Exchange during the sample period of 2007 to 2012 and 97 firms out of 180 have been selected under the specified criteria

- Each Company Should be listed in PSE during the period of Study and Share Prices of the selected companies must be available on PSE website in each year of the study
- Sales numeral of the each firms must be given in State bank Analysis during the sample period of 2007 to 2012

3.2.2 Data Collection and Arrangement

Data is collected from the financial statement analysis published by State Bank of Pakistan. Share Prices of companies have been taken from the website of Pakistan Stock Exchange Pakistan. After the completion of the required data to compute variables, the whole data is rearranged into panel data to take the desired outputs.

In this Study, Regression and Pearson Correlation analysis have been used to test the hypothesised relationship. SPSS has been used to implement these statistical techniques. Excel based analysis hve been also used to calculate the Z-Values of the firms.

4. Results and Discussion

4.1 Descriptive Statistic

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Z_Score	582	-4.22	8.50	1.3947	1.30071
X1	582	-2.12	1.13	-.0818	.32026
X2	582	-5.39	2.42	-.0162	.29585
X3	582	-1.92	5.73	.1424	.45099
X4	582	-.28	2.10	.1234	.19290
X5	582	.01	7.53	1.2270	.77715
Valid N (listwise)	582				

As it was already discussed that 97 firms have been selected for this study, according to the table 4.1, 582 observations have been studied against each variable. With this, Minimum and Maximum values of all ratios are given in this table. Standard deviations of all ratios are also given and results shows that all ratios are slightly deviating from the mean which is good sign.

Most Important descriptive statistics in this study is mean values of the variable that helps to observe the analytical part of this table. Mean of the Z-Score is 1.3947 that is less than 1.88 during selected period that shows textile sector was facing overall financial distress (as per the Cut off scores presented by Edward Altman). Two major ratios are contributing negatively in the z-value of textile sector making it low. Mean value of X1 is -0.0818 and X1= Net Working Capital / Total Assets, It shows that during the selected period textile firms were not able to meet their short term obligations and it was the major reason of the failure. Mean of X2 is -0.0162 and X2 = Retained Earning / Total Assets, This Ratio is also playing negative role in the resulting low mean value of Z-Score and it shows that firms didn't have adequate retained earnings for the future expansion of the business.

H1: There is financial distress among textile sector of Pakistan.

H2: Pakistani Textile sector adversely affected during Crisis period.

H3: Pakistani Textile sector have grown up during Recovery period.

These three hypotheses are tested by the implementing Z-Score model on the selected companies to calculate the z-values for assessing health of companies.

4.1 Summary of Z-Score Result

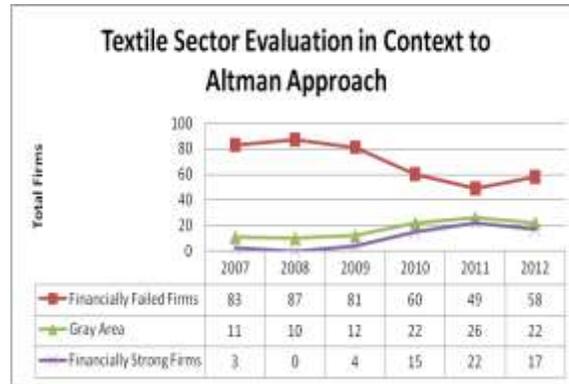
Table 4.1: Z-Score Results

Results of Z-Score Model					
Period	Year	Financially Failed Firms	Gray Area	Financially Strong Firms	Total
Crises Period	2007	83	11	3	97
	2008	87	10	0	97
	2009	81	12	4	97
Recovery Period	2010	60	22	15	97
	2011	49	26	22	97
	2012	58	22	17	97

Table 4.2 Shows , In 2007 there were 83 financially failed firms, 11 firms were in gray area which could enter into failed or non failed phase anytime and just 3 firms out of 97 firms that were financially strong which is only 3% of the whole sample. 83 firms out of 97 were in bankruptcy zone that is 85.56% of the selected sample. In 2008, 87 firms were financially failed and 10 firms were in the Gray Area. Result of z-score model shows there were no single firm that was financially strong in this year. In 2009 which is last year of crises period according to the present study, 81 firms were financially failed which is 83.50% of the sample and 12 firms were falling in Gray area, Similarly there are only 4 firms that were financially strong and it is 4% of the whole selected sample.

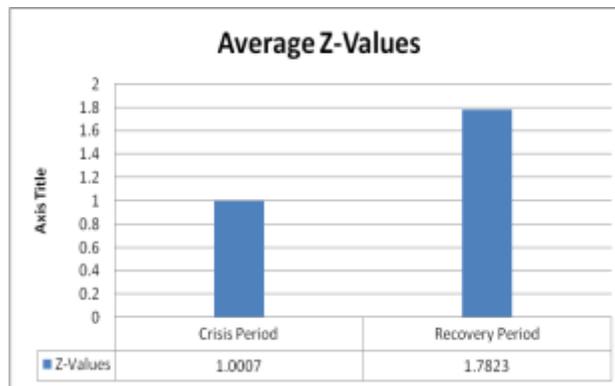
There is significant positive change in the financial health of selected textile firms in the recovery period. As given in the above table, there is major difference between crises and recovery period. In 2010, 15 firms were financially strong which is 15.46% of sample, 22 firms were in gray area and 60 firms were financially failed according to the calculations of Z-Score model. The year 2011 was showing maximum positive change in the financially strong firms that shows 22 strong firms out of total 97 firms, which is 23% of the sample. 26 firms were laying in the Gray area that could possibly be enter into financially strong firms or bankruptcy zone at anytime and 49 firms were financially distressed in this year. In Last year of the Recovery period, Table 4.2 shows that 58 firms of 97 were in bankruptcy zone, 22 firms were in Gray area and 17 firms were financially strong this is 17.52% of total firms.

Graph 4.1: Textile Evaluation in Context to Altman Approach



Here 4.3 Graph showed that financially distress companies were large in numbers during each year of the study as compared to gray and financially strong firms. Similarly, financially strong or non-bankrupt firms were lower than from other categories. Hence, according to the summary of results, overall Textile Sector of Pakistan was facing weak financial position during the period of the study. 2008 was the most hazardous year for the textile sector according to the Z-Score in which all selected sample were financially failed and falling in Gray area. Not even single firm was financially strong in the year of 2008. Arithmetic mean of financially strong firms in the period of 2007-2009 is just 2.33, which mean only two firms in each year were financially strong in 2007-2009. In the period of 2010-2012, Arithmetic mean of financially strong firms is 18 so it shows that there were 18 financially strong firms in each year of recovery period.

Graph 4.2: Average Z-Score Values



Graph 4.4 is clearly showing that during the crises period of the study, Average value of the z-score is 1.0007 which is very low as compared to recovery period. Average value of z-score in recovery period is 1.7823 and it is greater than crises period. Even both values are less than 1.88 but recovery period is much better than the crises period.

H4: All Ratios Used in Z-Score have significant relationship for measuring firm’s financial health.

4.2 Regression Analysis

Table 4.2: Model Summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	1.000 ^a	1.000	1.000	.00279
a. Predictors: (Constant), X5, X4, X2, X1, X3				

In Table 4.2, Model Summary of Multiple Regression Analysis is given which shows that value of R-Square is 1.000. R-Square is the indicator that tells the robustness of the model. Therefore, Z-Score Model of E. Altman is best regarding fitness to predict the financial viability of the textile sector of Pakistan. Value of R-square explains that how strongly related variables will facilitate to forecast the financial health of the textile firms.

Table 4.3: Multiple Regression Results

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.000	.000		-1.224	.221
	X1	1.000	.000	.246	2.599	.000
	X2	1.000	.000	.227	2.071	.000
	X3	1.000	.000	.347	2.974	.000
	X4	1.000	.001	.148	1.567	.000
	X5	1.000	.000	.598	6.429	.000
a. Dependent Variable: Z_Score						

Table 4.3 is the output of regression analysis where coefficients of the all variable are given. Beta value of X1 is .246 that is representing that it has positive impact on the dependent variable. Significant relationship exists when T-Value increase from 1.96 similarly X1 has 2.599 which is greater than 1.96. X1 is also significant at 1%, 5%, and 10% according to the P value (sig) which is .000. Beta Coefficient of X2 is .227 that is representing that X2 has a positive impact on the dependent variable. T value of X2 is 2.071 showing the significant relationship between X2 and Z-Score. P Value of X2 is .000 that means X2 has significant relationship with z-score at 1%, 5%, and 10%.

Beta Coefficient of X3 is .347 and it is the value that elaborates the contribution of X3 in determining the value of Z-Score (Dependent Variable). T-value of X3 is also greater than 1.96. This ratio is significant at 1%, 5%, 10%. In the table 4.9.1, Values of X4 and X5 are given. Both values have positive beta coefficient and the values of T are greater than 1.96. According to Regression Analysis, All ratios included in the z-score model have significant relationship with the z-value at 1%, 5%, and 10%.

4.3 Pearson Correlation Analysis

Table 4.4: Pearson Correlation Analysis

Correlations							
		Z_Score	X1	X2	X3	X4	X5
Z_Score	Pearson Correlation	1	.482**	.541**	.736**	.359**	.753**
	Sig. (2-tailed)		.000	.000	.000	.000	.000
	N	582	582	582	582	582	582
X1	Pearson Correlation	.482**	1	.186**	.244**	.273**	.114**
	Sig. (2-tailed)	.000		.000	.000	.000	.006
	N	582	582	582	582	582	582
X2	Pearson Correlation	.541**	.186**	1	.575**	.074	.096*
	Sig. (2-tailed)	.000	.000		.000	.074	.020
	N	582	582	582	582	582	582
X3	Pearson Correlation	.736**	.244**	.575**	1	.241**	.272**
	Sig. (2-tailed)	.000	.000	.000		.000	.000
	N	582	582	582	582	582	582
X4	Pearson Correlation	.359**	.273**	.074	.241**	1	.073

	Sig. (2-tailed)	.000	.000	.074	.000		.080
	N	582	582	582	582	582	582
X5	Pearson Correlation	.753**	.114**	.096*	.272**	.073	1
	Sig. (2-tailed)	.000	.006	.020	.000	.080	
	N	582	582	582	582	582	582
**.					Correlation is significant at the 0.01 level (2-tailed).		
*.					Correlation is significant at the 0.05 level (2-tailed).		

Here in table 4.3, Pearson Correlation is describing the relationship between the Z-Score and all ratios. X1 has a positive correlation with the z-score as the value is 0.482 and correlation between z-value and X1 is significant. X2 is showing correlation with z-score at 0.575 and also representing the significant relationship with z-value. The Correlation between X3 and Z-Score is high at 0.736 and relationship of X4 is positive but comparatively showing low strength at 0.359. Pearson Correlation analysis is showing high relationship between Z-Score and X5.

With this, Correlation analysis is indicating that all the ratios are positively correlated with each other and with Z-Score in this model.

Concluding Remarks

Descriptive statistics was performed to get the description about the observations of the present study. Mean and standard deviation has been calculated in the descriptive statistics. Mean of z-value during 2007-2012 is less than 1.88 that signifies overall textile sector is facing financial distress as per the cut off scores presented by Edward Altman. In the descriptive statistics, mean of all ratios were calculated. X1 (Working Capital / Total Assets) and X2 (Retained Earnings / Total Assets) were showing negative mean during the selected sample period. X1(Working Capital / Total Assets) is the liquidity ratio and its negative value shows that during the sample period of study, textile firms were not able to meet its short-term obligations. Second ratio which is X2 (RE / Total Assets) also called profitability ratio was showing negative arithmetic mean due to negative retained earning by the textile sector of Pakistan. The maximum numbers of textile industries were going in losses during 2007-2012. In 2007, 85% firms were found financially failed out of 97 firms, only 3% firms were financially strong, and 12% firms were in gray area. The year of 2008 was the worst year for the textile sector and also affected overall economy of Pakistan. Not even a single firm was found financially sound in this year and bankruptcy ratio was 90% that was utmost distress situation during time period of study. In 2009, bankruptcy ratio was 83% in 97 selected firms and 4% firms were financially strong. Total 62% firms were found financially bankrupt and 16% firms were strong in the year of 2010. Textile sector of Pakistan started recovering its financial viability from 2010 and achieved positive change in growth

of textile as well as gross domestic product of Pakistan. Year of 2011 showed a significant positive change in financial health of firms, bankruptcy ratio started to decline. 23% firms were found financially strong in 2011 and in 2012 it was 18% of total selected firms.

Overall results showed that Pakistan textile sector was unproductive during these six years and had faced financially weakness, instability, and distress. 72% of the total observations confirmed the financial distressed situation so it can be concluded that Pakistan textile sector was failed and also failed to revive its financial health to get its position back as it was strong sector of Pakistan. The reasons of its failure were already discussed in the introduction of the present study. Therefore, this whole discussion is supporting the hypothesis that during crises period Pakistan textile sector was financially distressed. But contrary 2010-2012 were better than the crises period and in this period textile sectors started to recuperate its financial viability. Table 4.6 presented the average values of z-score during both periods (crises and recovery periods). Both periods are showing z-value less than 2.99, which is also supporting the overall financial weakness of textile sector. Results also proved that Z-value of crises period (2007-2009) is lower than the recovery period (2010-2012).

Pearson correlation analysis was performed to check the relationship between variables and results showed that all variables were positively correlated with each other. In the correlation, no one variable was found highly correlated with any other variable it shows there is no multicollinearity factor between variables. Multiple regression analysis was also applied on regression equation through SPSS to check the significance and contribution of five ratios in order to predict z-score of the textile firms. Results depict that model robustness is very high and all five ratios are significant at 1%, 5% and 10% level. Linear Regression was performed on each ratio individually to check its impact on z-score. It can be concluded based on results that all five ratios are contributing in the prediction of z-value. Statistical results support the hypothesized relationships that X1, X2, X3, X4 and X5 have significant positive relationship with z-value.

Pakistan's textile industry is going through one of the toughest period in decades. The global is not only the cause of concern for recession in textile industry. Numbers of critical issues are hitting the textile sector such as continuous hike in electricity tariff, the increasing interest rate, energy crisis, devaluation of Pakistani rupee, rising prices of inputs, political fluctuation, elimination of subsidy & internal clashes affected Pakistan's textile industry seriously. Primary cause of concern is the rising cost of production due of energy crises, which results in instant rise in energy prices. Cost of imported input prices rose significantly due significant devaluation in Pakistani rupees during last few years. Besides this, double-digit inflation and sky-scraping cost of financing has badly affected textile industry's growth.

Limitations

Besides these results and findings, there are also some limitations present in the study that must be considered while interpreting the results and conclusion. Like sample size, financial distress definition used in this study and Model that has been implemented in this study can limit its generalizability over the population. So the results and findings of this study cannot be generalized over any other

study with different sample and time period. Data for this study has been collected from state bank of Pakistan (SBP) survey, Karachi stock exchange (KSE) sites, World Bank, Economic Survey of Pakistan, Pakistan bureau of Statistics, Websites of Ministry of Textile, and All Pakistan Textile Mill Association (APTMA) and from Ministry of Finance.

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