

Financial Performance of Manufacturing Firms of Pakistan Using Z-Score Model (Listed Firms on Karachi Stock Exchange)

Qismat Ullah Khan, Nawsher Khan
Abdul Wali Khan University Mardan, Pakistan
qismatuk007@gmail.com, nawsher@awkum.edu.pk

Abstract

In this study researcher examined the financial performance of public listed firms on Karachi Stock Exchange in Pakistan for the period of six years (2006 to 2011). The nature of the data is secondary and selected four firms from the private sectors of Karachi stock exchange. Financial performances of private firms by using Z-score model of Edward Altman. The results of Z-score model shows that the profitability, liquidity, solvency, leverage and activity of the firm in which all the firm in green zone. It means that no bankruptcies indicate. We conclude with the help of Z-score model that in industrial firms the Pak. Data com Ltd is top performance, Pakistan International Container Terminal Ltd is second performance, the third performer is Pakistan National Shipping Corp Ltd and fourth performer is Pak International Airline Corp Ltd. Is the last because the profitability, liquidity, solvency, leverage, and activity position is low in these period. In the solvency all the firms are impressive in these periods.

Keywords: Altman's Z-score Bankruptcy, Liquidity, Solvency and Financial performance.

Introduction

In this research we have examined the financial performance of public banks in Pakistan by using the model of Z-Score design by Edward I Altman for the firms of manufacturing and public in nature. The banking sector play important role in any economy of development, most of the economies functions are bank based finance. Such as in Pakistan, We know that risk is important factor involve in any type of business and anywhere. Banking sector is more risky form of business it is dealing in money for all times. Edward Altman designs the model first time for public and manufacturing business than he modified it for non-manufacturing its model is discussed in research methodology portion of this work.

According to Lahiri, M that's important in this competitive era to measure the financial soundness of business. Financial soundness can be measure by a number of proxies which are closely related with each other. It is generally observed that performance of firms depend on some key financial indicators, which have close interdependencies on each other and such indicators are part of firm's balance sheets. For the performance measures often use the ratios such ratios are more than forty in number to use for performances measurement. As a single ratio cannot determine good result that way Altman combined a number of accounting ratios as a form of index for profitability, which is a good indicator to measure the financial soundness. On the basis of this model in this work used the Z-Score to analyze the oil industry selected companies.

Pak Data com Limited (PDL) is one of the largest and most reliable data network operators in Pakistan. They operate more than 55 cities across the country. Soon in near future, PDL will also be facilitating its customers in Middle East, Africa, and Afghanistan as a part of its expansion. Providing the best possible and highly redundant services to the valuable clients in financial, telecom, airline, energy and other sectors, PDL intends to grow both in terms of coverage and technology. Pak Data com is a member of Islamabad chamber of commerce and Industry .Pak Data com is specializes I providing end-to-end high quality data communication solutions through application of Optical Fiber, Radio and Satellite technologies. We have equipped the remote offices of many multinational and national companies in Pakistan with reliable, user-friendly and state-of-the-art data communication.

Pakistan International Container Terminal Ltd (PICT). Karachi Port Trust, in order to maintain its edge over Port Qasim as the primary Port of Pakistan, sought proposals from private sector investors to develop the second modern, fully equipped international standard container terminal at East Wharf, Karachi Port. Pakistan International Container Terminal (PICT) was formed as the Terminal Operating Company and took over dedicated container terminals on October 15th, 2002. PICT achieved successful completion of all contractual obligations of Phase-I development earlier than schedule on March 31st, 2004.

Pakistan National Shipping Corporation is the national flag carrier managing a fleet of 09 vessels and head office in Karachi which is listed in Karachi stock exchange in 1980. The regional office based in Lahore for the up

country shipping needs and corporation business is worldwide shipping. This corporation which work under the control of ministry of Ports and shipping Government of Pakistan.

Air transport has probably never been more important to the development of a new nation than in the case of Pakistan. In June 1946, when Pakistan was still in the offing, Mr. Mohammad Ali Jinnah, the Founder of the upcoming nation, instructed Mr. M.A. Ispahani, a leading industrialist, to set up a national airline, on a priority basis. With his singular vision and foresight, Mr. Jinnah realized that with the formation of the two wings of Pakistan, separated by 1100 miles, a swift and efficient mode of transport was imperative. On 23rd October 1946, a new airline was born. Initially registered as a pilot project in Calcutta, Orient Airways Ltd. had at its helm Mr. M.A. Ispahani as Chairman and Air vice Marshal O.K. Carter as General Manager. The new carrier's base remained in Calcutta and an operating license was obtained in May 1947. Pakistan was born. The birth of a new nation generated one of the largest transfers of population in the history of mankind.

The year 1955 also marked the inauguration of the fledgling airline's first scheduled international service - to the glittering, glitzy capital city of London, via Cairo and Rome. Initially, there was much criticism, as the public could not comprehend or justify the need to operate an international route when, in their opinion, other projects vital for a developing country should have been given a higher priority. However, PIA's focus was, and continues to be, to serve the Pakistani community at large. The provision of transportation to expatriates has remained one of the foremost priorities of the national airline. Moreover, PIA earned substantial foreign exchange through international services, which it invested in the purchase of aircraft and spare parts, as fleet expansion was a grave necessity for the airline. In 1962, finding the upper winds forecast favorable, PIA set out to break the record for the fastest flight between London and Karachi. In 1964, PIA achieved another historic first, regarded as a major milestone in the cheered history of the airline. On 29th April, 1964, with a Boeing 720B, PIA earned the distinction of becoming the first airline from a non-communist country to fly into the People's Republic of China. PIA's first service to China was from Karachi to Shanghai via Canton. PIA played a major role in providing logistical support to the Armed Forces by operating special flights using Boeings.

Problem Statement

The public listed firms play important role in economic development under a state but most of the studies are available on the other sectors of this economy that's way we have selected this area for study. The numbers of public banks in Pakistan are less than privet banks in Pakistan that's way we consider this sector for this study.

Objectives

Objectives of the study design are: To examine Financial Performance of Public Banks of Pakistan Using Z-Score Model for the period of (2006-2011).

- To investigate the bankruptcy and non-bankruptcy of the firms.

Review of Literature

The Altman I. Edward (1968) to evaluate and took the research, used multiple discriminant analysis (MDA) to developed the "Z score model" that might correctly classify firms which would fail within one year, 95 percent of the time of the initial sample and 79 percent of the time for the validation sample with an expected chance prediction of 50 percent. On the other hand, the function are derived by Altman had ability to classify 8 out of 10 firms correctly as compared to 5 out of 10 firms which would have been correctly classified by chance.

In Indian the context, L.C.Gupta (1999) attempted a refinement of Beaver's method with objective of predicting the business failure. Jonah Aiyabei (2002) evaluated the theoretical aspect of a financially distressed firm based on a cyclical concept and investigate the financial performance of small business firms based in Kenya using Z score model. And According to Mansur, A Mulla in (2002) to investigate and study in Textile mill with the help of Z score model for checking the financial health with five financial ratios and followed by Selvam M, (2004) had revealed about cements Industry's financial health especially India Cements Ltd. Krishna.

In this paper the researchers Pongsat, Ramage, & Lawrence in (December 2004), to investigate the results of our research study examining the comparative ability of Ohlson's Log it model and Altman's variance model for predicting bankruptcy of large and small firms in Thailand. A matched pair sample of 60 bankrupt and 60 Non bankrupt firms were examined over the years 1998 to 2003. The study classify that each of the two methods have predictive ability when applied to Thai firms, there is no significant difference in their respective predictive abilities for either large asset or small asset Thai firms.

According to Ben McClure in (2004) to investigate and confirmed the Z-score model through his research study and concluded that to keep eye on their investments, and investors should consider checking their companies' Z-score on a regular basis. The Z-score model can trouble ahead and provide a simpler conclusion than the mass of ratios. The Z is probably better used for relative financial health rather than as a predictor, it is best to use the model as a quick check of financial health, but if the score indicates a problem, it's a good idea to conduct a more detailed analysis.

Chai Tanya (2005) used Z-score model to measure the financial position of Industrial Development Bank of India (IDBI) and concluded that IDBI is likely to become insolvent in the years to come.

In this study the researchers Chowdhury & Suborna (2009) to investigate the financial distress of companies of Dhaka Stock exchange by using Z-score model. There are of 53 companies used in which five are out of bankruptcy situations, seven of them in gray area and 41 are in high financial distress position. In this study Reddy & Hari in (2012) to examine the financial position of sugar companies in Andhra Pradesh, India by using Z score model. After analysis the result concluded that working capital, turn over ratios, and Liquidity of firms are not show good position. On the basis of Z score model it's finding that these companies will Face financial distress situation and move towards bankruptcy position.

In this research KALAISELVI in (September, 2011) to evaluate the changing scenario, every business have survival competitor and Survival of business in the modem world is possible, finance is must for every business have long-term and short-term commitments. Finance is the Back bone of any business. Any business without finance is a wingless bird. Therefore, the financial analyst is responsible to monitor the financial position of the business regularly. The performance of the company is measured by its financial ratios, which show financial position of the company. Due to intense competition, between the business communities, everyone is doing something better than the other to capture the business, for this purpose financial health of a company by checking its sales and profit growth is not sufficient today.

The researcher's anjum & Kurnool in (2012) to investigate Businesses enterprises which produce goods services for profit motive. Financial soundness of a business is important and research works on this. Financial ratios are an important indicator for financial soundness of a business. Financial ratios are tools that determine the operational & financial efficiency of business activities. The researcher evaluate and used Altman Z-score model which predict financial efficiency to Bankruptcy up to 2-3 years in advance. Altman prepared regular changes to achieve the perfect model which could predict bankruptcy. The authors said that Altman's Z-score Model can be useful for modern economy to calculate distress and bankruptcy one, two & three years in advance.

According to Reddy & Reddy (January 2013) to investigate Financial Distress is a situation of where a firm's operating cash flows are insufficient to satisfy current obligations and the firm is forced to take corrective actions. A firm in financial distress may also face bankruptcy or liquidation to meet its liabilities. Financial Distress may be caused by losses and dividend saving. The researcher used the Altman's Z-score model to forecast the risk of financial distress of select sugar manufacturing units in Andhra Pradesh, India. They conclude clearly that the liquidity, working capital turnover efficiency and solvency position of the companies is not good. The Z-Score analysis also shows the companies are suffering from the financial distress and attention towards bankruptcy.

The investigators Selivi & Dheendhayalan (July, 2014) to examined the Solvency or financial ratio contains all ratios which straight financial position of the concern. Financial Ratio is calculated on the basis of firm Balance Sheet. The financial position usually refers to short-term and long-term solvency of the business. The researcher has evaluated the Z score analysis on the sample of selected Indian bulk drugs and formulation pharmaceuticals companies. The researchers concluded that Financial Health in Cipla is good among the other pharmaceutical companies in India followed by Aurobindo Pharma, Cadila Healthcare, Ipca, Reddy's, Ranbaxy and Sunpharma.

In this study examined the researcher Rajangam and Solaraj (April-June) the financial health of west coast paper mill limited for the period of twelve years from 2000 to 2012 and they investigate the financial health of west coast paper by using the z-score model and observed that the overall position is satisfactory during the period. And according to Cardwell, McGregor, & Synu In this paper the researchers used the Altman's Z-Score model of bankruptcy predictor to the textile industry. Generally, firms benefited from the North American Free Trade Agreement (NAFTA) but suffered financially after the Asian currency crisis. The study are consist of two parts finds that part one is classification errors support prior research while part two is classification errors are much higher than previous works findings. The results specify a need for a reformed bankruptcy predictor for the textile industry.

Research Methodology

We explained the methodology of our research work in this section of research. Population of this study is the public listed firms of Pakistan data collected from the financial statement analysis. We used nonprobability sampling in the nonprobability sampling we selected purposive sampling. The sample for this study was select public listed firms and top four public firms in all branches of Pakistan. The banking sector is one of the major service sectors in Pakistan there are different categories of banks and firms in Pakistan but we have selected public listed firms for this research.

In this research we use different financial variables such as; the first variable Earnings before interest and taxes to total assets ratio is a measure of the true profitability of the assets of a firm. It reflects the earning power of the assets that determines the value of assets. In a sense of bankrupt, insolvency occurs when the total liabilities exceed this fair value. The second variable Net Working capital to total assets ratio is a measure of the net liquid assets of the firm relative to the total capitalization. Net Working capital is defined as the difference between current assets and current liabilities. The third variable Sales to Total Assets ratio is the standard capital-turnover ratio illustrating the sales generating ability of the assets of a firm. It refers to the capability of management in dealing with competitive conditions. The fourth variable Market value equity to Book value of total liabilities ratio shows how much the assets of a firm can decline in value (measured by market value of equity plus debt) before the liabilities exceed the assets and the firm becomes insolvent. This ratio adds a market value dimension to the model. The reciprocal of this ratio – the familiar Debt to Equity ratio – is used to measure financial leverage and the last five variable Accumulating Retained Earnings to total assets ratio refers to the earned surplus of a firm over its entire life. This measure of cumulative profitability over time is one of the two (the other is the use of the market value of equity, in X5, instead of the book value) “new” ratios evaluated by Altman. It considers implicitly the age of the firm due to its cumulative nature and the use of leverage in the firm’s financing of its asset growth.

Source of Data

Secondary data was collected from the annual reports of public listed firms by using the consolidated balance sheet and profit and loss accounts of the banks for the period six years 2006 to 2011. Some other data were collected from the journal, library and different papers, articles and relevant past studies through references.

Variables used in this research

The Z-score model used in this research which consists of different variables such as; The Earnings before interest and taxes to total assets ratio is a measure of the true profitability of the assets of a firm. It reflects the earning power of the assets that determines the value of assets. In a sense of bankrupt, insolvency occurs when the total liabilities exceed this fair value. And the 2nd Net Working capital to total assets ratio is a measure of the net liquid assets of the firm relative to the total capitalization. Net Working capital is defined as the difference between current assets and current liabilities. 3rd Sales to Total Assets ratio is the standard capital-turnover ratio illustrating the sales generating ability of the assets of a firm. It refers to the capability of management in dealing with competitive conditions. 4th Market value equity to Book value of total liabilities ratio shows how much the assets of a firm can decline in value (measured by market value of equity plus debt) before the liabilities exceed the assets and the firm becomes insolvent. This ratio adds a market value dimension to the model. The reciprocal of this ratio – the familiar Debt to Equity ratio – is used to measure financial leverage and the last 5th Accumulating Retained Earnings to total assets ratio refers to the earned surplus of a firm over its entire life. This measure of cumulative profitability over time is one of the two (the other is the use of the market value of equity, in X5, instead of the book value new ratios evaluated by Altman. It considers implicitly the age of the firm due to its cumulative nature and the use of leverage in the firm’s financing of its asset growth.

Model of this research

We used the model of Edward I. Altman in this study, which is known as Z-score model and use for the measuring of prediction of companies bankruptcy. From such model get a single number, in this model use total five different ratios from financial statements. Based on such Multiple Discriminate Analysis in this model forecasts financial position of firms in manufacturing sectors.

The mathematical form of model as;

$$Z - \text{Score} = 3.3 \left(\frac{\text{Earnings before Interest and Taxes}}{\text{Total Assets}} \right) X_1 + 1.2 \left(\frac{\text{Net Working Capital}}{\text{Total Assets}} \right) X_2 + 1.0 \left(\frac{\text{Sales}}{\text{Total Assets}} \right) X_3 + 0.6 \left(\frac{\text{Market Value of Equity}}{\text{Total Liabilities}} \right) X_4 + 1.04 \left(\frac{\text{Accumulated retained earnings}}{\text{total assets}} \right) X_5$$

Where

Standard are sit for decision making on the basis of this model such as;

If $Z < 1.81$ indicates a bankruptcy prediction,

$1.81Z \geq 2.99 \leq$ indicates a gray area,

And $Z > 2.99$ indicates no bankruptcy.

Results and Dissections

Table-A-1: Net Working Capital of Pak Data com Ltd

Years	CA	CL	NWC	TA	X ₁ =NWC/TA
2006	351,365	258,728	92,637	590,380	0.156910803
2007	390,527	275,069	115,458	676,845	0.17058263
2008	475,435	356,485	118,950	832,988	0.142799176
2009	595,909	340,265	255,644	1,001,176	0.255343716
2010	683,000	322,734	360,266	1,080,197	0.333518793
2011	597,918	246,561	351,357	970,546	0.362019935

In Table-A-1 the $X_1 =$ Net Working Capital to Total Assets this ratio explain the liquidity position of the company about the total capitalization. Net Working capital is defined as the difference between current assets and current liabilities. The total intended value of Pak Data com is 1.421175053 and this value will be put in the z-score model. Now there are some similarities with other researcher such as Melinda Lahiri, Altman, Rajangam, Salvi, and Ramama Reddy all the ratio value are positive in net-working capital to total assets.

Table-A-2: Net Working Capital of Pakistan International Container Terminal Ltd

Years	CA	CL	NWC	TA	X ₁ =NWC/TA
2006	1,216,658	702,543	514,115	3,661,653	0.140405167
2007	1,349,662	917,730	431,932	4,392,173	0.098341299
2008	1,749,615	1,393,366	356,249	5,754,282	0.061910244
2009	1,882,786	1,097,705	785,081	7,723,120	0.101653347
2010	2,355,973	1,152,357	1,203,616	8,305,005	0.144926583
2011	2,944,117	1,266,718	1,677,399	9,030,640	0.185745307

In Table-A-2 the $X_1 =$ Net-Working Capital to Total Assets this ratio explain the liquidity position of the company about the total capitalization. Net Working capital is defined as the difference between current assets and current liabilities. The total intended value of Pakistan International Container Terminal is 0.732982 and this value will be put in the z-score model. . Now there are some similarity with other researcher such as Melinda Lahiri, Altman, Rajangam, Salvi, and Ramama Reddy all the ratio value are positive in net-working capital to total assets.

Table-A-3: Net Working Capital of Pak. International Airlines Corp. Ltd

Years	CA	CL	NWC	TA	$\chi_1 = \text{NWC/TA}$
2006	27,829,332	44,102,589	- 16,273,257	106,891,769	-0.15224051
2007	23,172,948	55,420,255	- 32,247,307	118,773,574	-0.27150237
2008	24,546,376	76,073,376	- 51,527,000	139,669,867	-0.36891995
2009	21,276,576	70,022,689	- 48,746,113	209,192,864	-0.23301996
2010	23,131,594	93,743,316	- 70,611,722	182,337,891	-0.38725753
2011	20,819,068	106,993,507	- 86,174,439	180,067,440	-0.47856758

In Table-A-3 the $\chi_1 = \text{Net-Working Capital to Total Assets}$ this ratio explain the liquidity position of the company about the total capitalization. Net Working capital is defined as the difference between current assets and current liabilities. The total intended value of Pak. International Airlines Corp is -1.89151 and this value will be put in the z-score model. All the value are negative so there is no similarity with other.

Table-A-4: Net Working Capital of Pakistan National Shipping Corp. Ltd

Years	CA	CL	NWC	TA	$\chi_1 = \text{WC/TA}$
2006	6,160,521	1,673,151	4,487,370	13,599,691	0.329961173
2007	8,350,578	1,898,097	6,452,481	16,391,602	0.393645539
2008	12,603,513	7,443,597	5,159,916	13,614,336	0.379006071
2009	8,070,341	9,763,834	-1,693,493	16,799,979	-0.10080328
2010	2,826,872	11,096,488	-8,269,616	18,521,319	-0.44649174
2011	3,309,308	14,802,251	- 11,492,943	29,613,134	-0.38810289

In Table-A-4 the $\chi_1 = \text{Net Working Capital to Total Assets}$ this ratio explain the liquidity position of the company about the total capitalization. Net Working capital is defined as the difference between current assets and current liabilities. The total intended value Pakistan National Shipping Corp is 0.167214866 and this value will be put in the z-score model. In the Pakistan National shipping corporation the first three years have some similarity with Melinda Lahiri, Altman, Rajangam, Salvi., and Ramama Reddy because in time period the value are positive in net-working capital to total assets.

Table-A-1: Accumulating Retain Earning of Pak Data com Ltd

Years	ARE	TA	$\chi_2 = \text{ARE/TA}$
2006	115,203	590380	0.195133643
2007	66,279	676845	0.097923454
2008	100,916	832988	0.121149404
2009	105,362	1001176	0.10523824
2010	94,836	1080197	0.087795097
2011	(6,367)	970546	-0.006560225

In the above Table-A-1 the $\chi_2 = \text{Accumulating Retained Earnings to Total Sales}$ this ratio specifies the amount reinvested, the earnings or losses, which returns the extent of the company's leverage. In other words, the amount assets, which have paid by company profits. The calculated value of Pak Data com is 0.600679612 and this value will be put in the z-score model. Now there are some similarity with other researcher such as Melinda Lahiri, Altman, Rajangam, Salvi, and Ramama Reddy the first five years value are positive in Retain earning to total assets.

Table-B-2: Accumulating Retain Earning of Pakistan International Container Terminal Ltd

Years	ARE	TA	$\chi_2=ARE/TA$
2006	423,980	3661653	0.115789235
2007	509,187	4392173	0.115930543
2008	308,847	5754282	0.053672552
2009	718,138	7723120	0.092985477
2010	625,159	8305005	0.07527497
2011	776,875	9030640	0.086026572

In Table-B-2 the $\chi_2 =$ Accumulating Retained Earnings to Total Sales this ratio specifies the amount reinvested, the earnings or losses, which returns the extent of the company's leverage. In other words, the amount assets, which have paid by company profits. The calculated value of Pakistan International Container Terminal is 0.539679 and this value will be put in the z-score model. Now there are some similarity with other researcher such as Melinda Lahiri, Altman, Rajangam, Salvi, and Ramama Reddy all the value are positive in Retain earning to total assets.

Table-B-3: Accumulating Retain Earning of Pak. International Airlines Corp

Years	ARE	TA	$\chi_2=ARE/TA$
2006	(13,368,014)	1.07E+08	-0.12506121
2007	(13,423,325)	1.19E+08	-0.113016091
2008	(39,987,775)	1.4E+08	-0.286302091
2009	(12,496,765)	2.09E+08	-0.059738008
2010	(9,117,866)	1.82E+08	-0.050005328
2011	(28,007,954)	1.8E+08	-0.155541468

In Table-B-3 the $\chi_2 =$ Accumulating Retained Earnings to Total Sales this ratio specifies the amount reinvested, the earnings or losses, which returns the extent of the company's leverage. In other words, the amount assets, which have paid by company profits. The calculated value of Pak. International Airlines Corp. is -0.789664196 and this value will be put in the z-score model. There is no similarity with the other because all the value are negative.

Table-B-4: Accumulating Retain Earning of Pakistan National Shipping Corp. Ltd

Years	ARE	TA	$\chi_2=ARE/TA$
2006	822,851	13599691	0.060505125
2007	2,162,026	16391602	0.131898395
2008	2,618,902	13614336	0.19236355
2009	860,950	16799979	0.051247088
2010	518,794	18521319	0.02801064
2011	598,574	29613134	0.020213126

In Table-B-4 the $\chi_2 =$ Accumulating Retained Earnings to Total Sales this ratio specifies the amount reinvested, the earnings or losses, which returns the extent of the company's leverage. In other words, the amount assets, which have paid by company profits. The calculated value of Pakistan National Shipping Corp. is 0.484238 and this value will be put in the z-score model. There are some similarity with other such as Melinda Lahiri, Altman, Rajangam, Salvi, and Ramama Reddy all the value are positive in Retain earning to total assets.

Table-C-1: EBIT of Pak Data com. Ltd

Years	EBIT	TA	$\chi_3 = \text{EBIT/TA}$
2006	331652	590380	0.5617602
2007	401776	676845	0.5936012
2008	476503	832988	0.5720407
2009	660911	1001176	0.6601347
2010	757463	1080197	0.7012267
2011	723985	970546	0.7459564

In the Table-C-1 the $\chi_3 = \text{Earnings before Interest and Taxes to Total Assets}$ this ratio identifying the company's operating performance and it also specifies the earning power of the company. In addition, this ratio measured of the efficiency of the firm's assets, independent of any tax on advantage factors. Since a firm's final existence is based on the earning power of its assets, this ratio give the idea of mainly appropriate for studies dealing with credit risk. The total value of Pak Data com is 3.834719872 and this value will be put in the z-score model. There are some similarity with other researcher such as Melinda Lahiri, Altman, Rajangam, Salvi, and Ramama Reddy all the value are positive in EBIT to total assets.

Table-C-2: EBIT of Pakistan International Container Terminal Ltd

Years	EBIT	TA	$\chi_3 = \text{EBIT/TA}$
2006	2959110	3661653	0.808135
2007	3474443	4392173	0.7910533
2008	4360916	5754282	0.7578558
2009	6625415	7723120	0.8578677
2010	7152648	8305005	0.8612455
2011	7763922	9030640	0.8597311

In the Table-C-2 the $\chi_3 = \text{Earnings before Interest and Taxes to Total Assets}$ this ratio identifying the company's operating performance and it also specifies the earning power of the company. In addition, this ratio measured of the efficiency of the firm's assets, independent of any tax on advantage factors. Since a firm's final existence is based on the earning power of its assets, this ratio give the idea of mainly appropriate for studies dealing with credit risk. The total value of Pakistan International Container Terminal is 4.935888 and this value will be put in the z-score model. There are some similarity with other researcher such as Melinda Lahiri, Altman, Rajangam, Salvi, and Ramama Reddy all the value are positive in EBIT to total assets.

Table-C-3: EBIT of Pak. International Airlines Corp

Years	EBIT	TA	$\chi_3 = \text{EBIT/TA}$
2006	62789180	1.07E+08	0.5874089
2007	63353319	1.19E+08	0.5333957
2008	63596491	1.4E+08	0.4553344
2009	1.39E+08	2.09E+08	0.6652721
2010	88594575	1.82E+08	0.4858813
2011	73073933	1.8E+08	0.4058142

In the Table-C-3 the $\chi_3 = \text{Earnings before Interest and Taxes to Total Assets}$ this ratio identifying the company's operating performance and it also specifies the earning power of the company. In addition, this ratio measured of the efficiency of the firm's assets, independent of any tax on advantage factors. Since a firm's final existence is based on the earning power of its assets, this ratio give the idea of mainly appropriate for studies dealing with credit risk. The total value of Pakistan International Airlines Corp is 3.133106713 and this value will be put in the z-score model. There are some similarity with other researcher such as Melinda Lahiri, Altman, Rajangam, Salvi, and Ramama Reddy all the value are positive in EBIT to total assets.

Table-C-4: EBIT of Pakistan National Shipping Corp. Ltd

Years	EBIT	TA	$\chi_3 = \text{EBIT}/\text{TA}$
2006	11926540	13599691	0.8769714
2007	14493505	16391602	0.8842031
2008	6170739	13614336	0.453253
2009	7036145	16799979	0.4188187
2010	7424831	18521319	0.4008803
2011	14810883	29613134	0.5001457

In the Table-C-4 the χ_3 = Earnings before Interest and Taxes to Total Assets this ratio identifying the company's operating performance and it also specifies the earning power of the company. In addition, this ratio measured of the efficiency of the firm's assets, independent of any tax on advantage factors. Since a firm's final existence is based on the earning power of its assets, this ratio give the idea of mainly appropriate for studies dealing with credit risk. The total value of Pakistan National Shipping Corp is 3.534272179 and this value will be put in the z-score model. There are some similarities with other researcher such as Melinda Lahiri, Altman, Rajangam, Salvi, and Ramama Reddy all the value are positive in EBIT to total assets.

Table-D-1: Market Value of Equity of Pak Data com Ltd

Years	MVE	TL	$\chi_4 = \text{MVE}/\text{TL}$
2006	331652	258728	1.2818558
2007	401776	275069	1.4606371
2008	476503	356485	1.3366705
2009	591274	409902	1.4424765
2010	687641	392556	1.7517017
2011	654184	316362	2.0678337

In the Table-D-1 the χ_4 = Market Value of Equity to Book Value of Total liabilities in this ratio the long-term solvency of a company is measured. It is the opposite of debt-equity ratio. Equity shows the combined market value of all shares. While debt show both, current and non-current liabilities, this ratio evaluate that how much assets of an enterprise can decline in value before the liabilities exceed the assets and concern with insolvent and the total value of Pak. Data com is 9.341175392 and this value will be put in the z-score model. There are some similarities with other researcher such as Melinda Lahiri, Altman, Rajangam, Salvi and Ramama Reddy all the value are positive in MVE to total liability.

Table-D-2: Market Value of Equity of Pakistan International Container Terminal Ltd

Years	MVE	TL	$\chi_4 = \text{MVE}/\text{TL}$
2006	1505889	772344	1.9497646
2007	1808538	987531	1.8313734
2008	2319798	1463167	1.5854636
2009	2964604	1167506	2.5392623
2010	3707793	1222158	3.0338082
2011	4678933	1336519	3.5008354

In the Table-D-2 the χ_4 = Market Value of Equity to Book Value of Total liabilities in this ratio the long-term solvency of a company is measured. It is the opposite of debt-equity ratio. Equity show the combined market value of all shares. While debt show both, current and non-current liabilities, this ratio evaluate that how much assets of an enterprise can decline in value before the liabilities exceed the assets and concern with insolvent and the total value of Pakistan International Container Terminal is 14.44051 and this value will be put in the z-score model. There are some similarity with other researcher such as Melinda Lahiri, Altman, Rajangam, Salvi, Ramama Reddy all the value are positive in MVE to total liability.

Table-D-3: Market Value of Equity of Pak. International Airlines Corp

Years	MVE	TL	$\chi_4 = \text{MVE/TL}$
2006	138288	44172390	0.0031306
2007	-1.1E+07	55490056	-0.197
2008	-3.3E+07	76143177	-0.437724
2009	-718080	70092490	-0.010245
2010	-3.4E+07	93813117	-0.365068
2011	-5.5E+07	1.07E+08	-0.510959

In the Table-D-3 the χ_4 = Market Value of Equity to Book Value of Total liabilities in this ratio the long-term solvency of a company is measured. It is the opposite of debt-equity ratio. Equity shows the combined market value of all shares. While debt show both, current and non-current liabilities, this ratio evaluate that how much assets of an enterprise can decline in value before the liabilities exceed the assets and concern with insolvent and the total value of Pakistan International Airlines is -1.51787 and this value will be put in the z-score model. In the first year the value are positive similar with the Melinda Lahiri, Altman, Rajangam, Salvi, and Ramama Reddy.

Table-D-4: Market Value of Equity of Pakistan National Shipping Corp. Ltd

Years	MVE	TL	$\chi_4 = \text{MVE/TL}$
2006	11452519	1742952	6.5707598
2007	14277862	1967898	7.2553872
2008	6170739	7513398	0.821298
2009	6816251	9833635	0.6931568
2010	7133543	11166289	0.6388464
2011	7548794	14872052	0.5075825

In the Table-D-4 the χ_4 = Market Value of Equity to Book Value of Total liabilities in this ratio the long-term solvency of a company is measured. It is the opposite of debt-equity ratio. Equity show the combined market value of all shares. While debt show both, current and non-current liabilities, this ratio evaluate that how much assets of an enterprise can decline in value before the liabilities exceed the assets and concern with insolvent and the total value of Pakistan National Shipping Corp is 16.48703079 and this value will be put in the z-score model. There are some similarity with other researcher such as Melinda Lahiri, Altman, Rajangam, Salvi, and Ramama Reddy all the value are positive in MVE to total liability.

Table-E-1: Sales of Pak. Data com

Years	Sales	TA	$\chi_5 = \text{SALES/TA}$
2006	513,770	590380	0.87023612
2007	523,473	676845	0.77340159
2008	690,469	832988	0.8289063
2009	1,042,099	1001176	1.04087493
2010	1,058,618	1080197	0.98002309
2011	675,119	970546	0.69560742

In the Table-E-1 the χ_5 = Sales to Total Assets this ratio is a standard turnover measure. Inappropriately, it differs greatly from one industry to another. In this ratio the sales generating form the company's assets and measured by management's to deal with competitive conditions. The calculated value of Pak Data com is 5.189049. And this value will be put in the z-score model. There are some similarity with other researcher such as Melinda Lahiri, Altman, Rajangam, Salvi and Ramama Reddy all the value are positive and show increasing in this period in the Sales to total asset.

Table-E-2: Sales of Pakistan International Container Terminal Ltd

Years	Sales	TA	$\chi_5 = \text{SALES/TA}$
2006	1,707,760	3661653	0.46639045
2007	2,218,850	4392173	0.50518274
2008	3,194,529	5754282	0.55515684
2009	4,564,256	7723120	0.59098603
2010	5,125,117	8305005	0.61711185
2011	6,123,776	9030640	0.67811096

In the Table-E-2 the $\chi_5 = \text{Sales to Total Assets}$ this ratio is a standard turnover measure. Inappropriately, it differs greatly from one industry to another. In this ratio the sales generating form the company's assets and measured by management's to deal with competitive conditions. The calculated value of Pakistan International Container Terminal is 3.412939 and this value will be put in the z-score model. There are some similarities with other researcher such as Melinda Lahiri, Altman, Rajangam, Salvi, and Ramama Reddy all the value are positive in the Sales to total asset.

Table-E-3: Sales of Pak. International Airlines Corp

Years	Sales	TA	$\chi_5 = \text{SALES/TA}$
2006	76,435,189	1.07E+08	0.71507086
2007	70,480,734	1.19E+08	0.59340417
2008	88,863,258	1.4E+08	0.63623787
2009	103,250,358	2.09E+08	0.49356539
2010	117,602,938	1.82E+08	0.64497257
2011	127,476,192	1.8E+08	0.70793583

In the Table-E-3 the $\chi_5 = \text{Sales to Total Assets}$ this ratio is a standard turnover measure. Inappropriately, it differs greatly from one industry to another. In this ratio the sales generating form the company's assets and measured by management's to deal with competitive conditions. The calculated value of Pak. International Airlines Corp is 3.791187 and this value will be put in the z-score model. . There are some similarity with other researcher such as Melinda Lahiri, Altman, Rajangam, Salvi, and Ramama Reddy all the value are positive in the Sales to total asset.

Table-E-4: Sales of Pakistan National Shipping Corp. Ltd

Years	Sales	TA	$\chi_5 = \text{SALES/TA}$
2006	7,924,614	13599691	0.58270545
2007	9,089,124	16391602	0.55449882
2008	10,753,528	13614336	0.78986797
2009	3,491,783	16799979	0.20784449
2010	2,077,947	18521319	0.11219217
2011	3,084,361	29613134	0.10415517

In the Table-E-4 the $\chi_5 = \text{Sales to Total Assets}$ this ratio is a standard turnover measure. Inappropriately, it differs greatly from one industry to another. In this ratio the sales generating form the company's assets and measured by management's to deal with competitive conditions. The calculated value of Pak. national shipping Corp is 2.351264 and this value will be put in the z-score model. . There are some similarity with other researcher such as Melinda Lahiri, Altman, Rajangam, Salvi, and Ramama Reddy all the value are positive in the Sales to total asset.

Now the Z-Score Model Will Be Used for Each Firm First Pak. Data com

$$Z - \text{Score} = 3.3 \left(\frac{\text{Earnings before Interest and Taxes}}{\text{Total Assets}} \right) X_1 + 1.2 \left(\frac{\text{Net Working Capital}}{\text{Total Assets}} \right) X_2 + 1.0 \left(\frac{\text{Sales}}{\text{Total Assets}} \right) X_3 + +.6 \left(\frac{\text{Market Value of Equity}}{\text{Total Liabilities}} \right) X_4 + 1.04 \left(\frac{\text{Accumulated retained earnings}}{\text{total assets}} \right) X_5$$

Where

$$X_1 = 1.421175053, X_2 = 0.600679612, X_3 = 3.834719872, X_4 = 9.341175392, X_5 = 5.189049$$

$$Z = 3.3(1.421175053) + 1.2(0.600679612) + 1.0(3.834719872) + .6(9.341175392) + 1.4(5.189049)$$

$$Z = 22.1147869$$

For Pakistan International Container Terminal Ltd

$$Z - \text{Score} = 3.3 \left(\frac{\text{Earnings before Interest and Taxes}}{\text{Total Assets}} \right) X_1 + 1.2 \left(\frac{\text{Net Working Capital}}{\text{Total Assets}} \right) X_2 + 1.0 \left(\frac{\text{Sales}}{\text{Total Assets}} \right) X_3 + +.6 \left(\frac{\text{Market Value of Equity}}{\text{Total Liabilities}} \right) X_4 + 1.04 \left(\frac{\text{Accumulated retained earnings}}{\text{total assets}} \right) X_5$$

Where

$$X_1 = 0.732982, X_2 = 0.539679, X_3 = 4.935888, X_4 = 14.44051, X_5 = 3.412939$$

$$Z = 3.3(0.732982) + 1.2(0.539679) + 1.0(4.935888) + .6(14.44051) + 1.4(3.412939)$$

$$Z = 21.444764$$

For Pak. International Airlines Corp

$$Z - \text{Score} = 3.3 \left(\frac{\text{Earnings before Interest and Taxes}}{\text{Total Assets}} \right) X_1 + 1.2 \left(\frac{\text{Net Working Capital}}{\text{Total Assets}} \right) X_2 + 1.0 \left(\frac{\text{Sales}}{\text{Total Assets}} \right) X_3 + +.6 \left(\frac{\text{Market Value of Equity}}{\text{Total Liabilities}} \right) X_4 + 1.04 \left(\frac{\text{Accumulated retained earnings}}{\text{total assets}} \right) X_5$$

Where

$$X_1 = -1.89151, X_2 = -0.789664196, X_3 = 3.133106713, X_4 = -1.51787, X_5 = 3.791187$$

$$Z = 3.3(-1.89151) + 1.2(-0.789664196) + 1.0(3.133106713) + .6(-1.51787) + 1.4(3.791187)$$

$$Z = 4.296059161$$

For the Pakistan National Shipping Corp. Ltd

$$Z - \text{Score} = 3.3 \left(\frac{\text{Earnings before Interest and Taxes}}{\text{Total Assets}} \right) X_1 + 1.2 \left(\frac{\text{Net Working Capital}}{\text{Total Assets}} \right) X_2 + 1.0 \left(\frac{\text{Sales}}{\text{Total Assets}} \right) X_3 + +.6 \left(\frac{\text{Market Value of Equity}}{\text{Total Liabilities}} \right) X_4 + 1.04 \left(\frac{\text{Accumulated retained earnings}}{\text{total assets}} \right) X_5$$

Where

$$X_1 = 0.167214866, X_2 = 0.484238, X_3 = 3.534272179, X_4 = 16.48703079, X_5 = 2.351264$$

$$Z = 3.3(0.167214866) + 1.2(0.484238) + 1.0(3.534272179) + .6(16.48703079) + 1.4(2.351264)$$

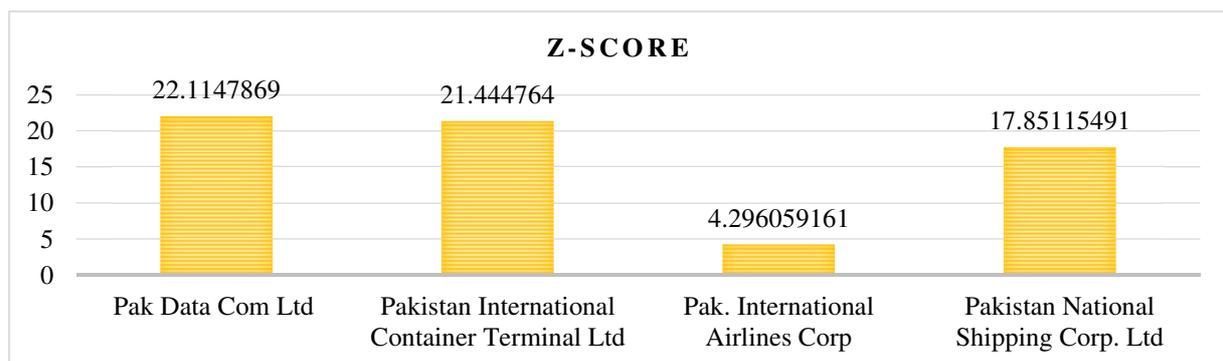
$$Z = 17.85115491$$

Table-F-1: Edward Altman Guidelines for zones

No	Z-score	Zones	Situation
1	1.81	Red Zone	Indicates bankruptcy prediction
2	Between 1.81 to 2.99	Yellow zone	Indicates a Gray area
3	Above 2.99	Green zone	Indicates on bankruptcy

According to Edward Altman guidelines the overall financial health of Pak. Data com Ltd, Pakistan International Container Terminal Ltd, Pak. International Airlines Corp. Ltd, Pakistan National Shipping Corp. Ltd is measured for the period of (2006-2011). We have calculated and measured all the Z-Score ratios and the result show in zone. The value Pak. Data com. Ltd is $Z = 22.1147869$ which is greater than 2.99 which are in green zone it means that no bankruptcy indicate. Pakistan International Container Terminal Ltd the value is 21.444764 which indicate no bankruptcy. Pakistan international Airline Corp. Ltd the value is 4.296059161 which is also indicates no bankruptcy. The Pakistan National Shipping Corp. Ltd the value is 17.85115491 which indicate no bankruptcy the overall performance of public listed firms of Karachi stock exchange in Pakistan is good and show in green zone at means that no bankruptcy indicate. There are some similarity among the papers like Table-F-1 all the firm are in green zone Seliv, and Dheenadhayalan, Rajangam and Selvaraj have also in green zone.

Figure 1: Z-Score Model for four Companies



In Figure 1 explore the Z-Score model for the given four firms and results indicate that the Pak. Data com. Ltd is top performance, Pakistan International Container Terminal Ltd is at second performance, Pakistan National Shipping Corp. Ltd is at third performance and four Pakistan International Airlines Corp is at four performance. The results which indicate green zone has no bankruptcy and the financial position of four firms is good.

Conclusion

In this research it is clearly mentioned that the main purpose of this research work is to examine the financial performance of public sector in Pakistan by using Edward Altman Z-Score model in 1968. According to the Z-Score model the value Pak. Data com. Ltd is equal to 22.1147869 which are greater than 2.99 it means that no bankruptcy indicates. The financial position of a firm is good. Pakistan International Container Terminal Ltd the Z-Score value is equal to 21.444764 which indicate no bankruptcy because the Z-Score value is greater than 2.99. Pakistan international Airline Corp. Ltd the value of z-score model is equal to 4.296059161 which is also indicates no bankruptcy. The Pakistan National Shipping Corp. Ltd the Z-Score value is equal to 17.85115491 which indicate no bankruptcy the overall financial performance of public lasted firms of Karachi stock exchange is good and no bankruptcy indicate. Future direction research plan is recommended for new researchers to consist of new sectors of Karachi stock exchange in Pakistan for this kind of investigation and study link.

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