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Assessing the Financial Failure Using Z-Score and Current Ratio: A Case of Sugar Sector Listed Companies of Karachi Stock Exchange

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Abstract: Since 1968, after the development of multivariate model, financial health of the corporate sector to predict their financial failure is heavily studied. Altman Z-Score is the most efficient model to judge the financial failure of the companies. This study uses Altman's Z-Score and current ratio to assess the financial status of sugar sector companies listed at Karachi stock exchange. Sugar sector is the second largest slice among all sectors listed at Karachi stock exchange. Total population sampling technique was used in this study and all thirty five sugar sector listed companies at KSE were included in this study to get the deep insights of the issue. *State* bank's balance sheet analysis and companies' financial reports were used to compile the data for the years 2009 and 2010. The results of the study showed that current ratio and Altman's Z-Score are the reliable tool of assessing financial health of sugar sector listed companies of Karachi stock exchange. This study further explores that there are financially distressed companies among sugar sector listed companies.

Key words: Current ratio · Z-Score · Karachi stock exchange · Financial failure

INTRODUCTION

Failure of business causes huge financial and non financial losses. Therefore, timely prediction of the financial health of business is very crucial for stakeholders of the business including internal and external customers [1]. One of the pioneers of this subject says that financial distress including liquidation as well as legal proceedings involved in the reorganization of bankrupt companies is the starting point of the way to corporate death [2].

Financial distress is a state of failing to meet financial obligations by companies to their creditors. Any corporation which is facing problems in maintaining its liquidity and fulfilling its credit promises is ranked as financially troubled or distressed company. There are many events which may take the corporations in to the tough financial position. Continuous and heavy fixed cost expenditures, less liquid assets and revenues and sensitivity to economic depression are some key factors which increase the probability of financial distress [3]. Thus, it is a situation in which payments due on business to their creditors are prolonged and not paid out timely and leads to bankruptcy of company.

The costs of financial distress are typically classified as either direct or indirect. Indirect costs are mainly due to the diversion of the company's managerial attention because they are involved in saving the life of company with their full concentration and also due to losing its key human resource by company. Whereas direct cost includes cost of advisory services for restructuring, accountant's fee, legal expenses of court filing, lawyer's fee and other professionals' fee. Another characteristic of direct cost is its positive relationship with the time a company spent in winding up. It goes on increasing with the increase in time spent in winding up process [2]. Warner [4] reports payment of legal fee, trustee's fee and professional service charges as direct cost and also describes that on average; direct costs of financial distress are four percent of firm's value one year prior to

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failure. Higgins [5] argued that managers of financially distressed companies cut down marketing research budget and research and development cost, get less favorable terms of credit and are prone to aggressive strategies of competitors.

Outecheva [6] states that failure is not a sudden event rather it is a complete life cycle of corporate bankruptcy and it continuously grows up in phases. Before reaching to its entire failure, company passes through different stages. These stages of bankruptcy become more serious with the passage of time and each level of its life cycle is associated with distinct characteristics. So, the studies regarding the failure prediction are crucial in this regard. The company can adopt impulsive protective measures in order to maintain its liquidity if it sees itself moving toward the total bankruptcy phase according to bankruptcy life cycle. Companies can also save its high bankruptcy cost through timely prediction of financial failure.

Altman and Hotchkiss [2] describes four basic terms of bankruptcy, default, insolvency and failure which are noticeably dissimilar from their formal use. Dun and Bradstreet adopted business failure for the first time to describe unsuccessful business enterprises and it is still in use. According to DandB, this term means cession of business with loss to creditors, foreclosure or execution; ending of business after bankruptcy and voluntarily withdraw from business with unpaid promises. Technical insolvency is a situation in which a company is unable to fulfill its current obligations due to liquidity. Walter [7] advances the theory of technical insolvency and suggests the relative measurement of cash flows to current liabilities as primary criterion to measure the technical insolvency rather to use traditional measurements of working capital. It might be temporary or an immediate cause of actual bankruptcy.

Default is another term which is closely related with financial distress. Debtor and creditor relationship always exists in technical as well as in legal default. Violations of contract terms by debtor are legally actionable and classified as technical default. As compared to temporary condition, insolvency in the sense of bankruptcy is harmful. It occurs when fair valuation of the assets of the company fall shorter than total liabilities. Therefore, the actual net worth of the company is negative. It is difficult to detect than technical insolvency as it requires complete valuation analysis. Bankruptcy itself is a formal declaration of bankruptcy by court as a result of a petition of bankruptcy reorganization or liquidation of assets. Legal procedure of bankruptcy reorganization is definitely a last attempt in the series of remedial measures.

Business failure is a global phenomenon which occurs in developing countries as well as in developed countries. It cannot be separated from doing business. But it occurs at higher rate in developing economies as compared to developed ones. The reasons behind the corporate bankruptcy are different across countries due to dissimilarities in accounting practices, social, political and economic environment and diverse capital structure [8-10].

Altman [11] argues that early warning signals should be employed in advance to forecast and avoided financial distress and to save the high cost of bankruptcy. From the view point of firm, both indirect and direct costs are included in bankruptcy and it affects all stakeholders. In the absence of early warning signals, there will be no check on the identification of financial distress and bankruptcy. This situation leads to the heavy direct and indirect cost and it becomes difficult for the enterprises to restore its financial position.

Use of financial ratios by creditors, business investors, employees of the business and other stakeholders is very common from several years. In the area of predicting financial health and business failure, worldwide researches are being continuously conducted. Most of these researches use financial ratios to develop forecasting models for business failure. Many types of industries like manufacturing, wholesale and retail are studied in different business failure studies and now prediction models are available for these industries [12]. Almost all financial ratios can be categorized in to five categories. These categories are profitability ratios, liquidity ratios, activity ratios, financial leverage ratios or leverage ratios and market ratios. Liquidity ratios are the most effective because credit rating of the company is assessed through these ratios and also it has the ability to assess liquidity position of the business. On the other hand liquidity ratios of current, quick and cash produce a number, which can be used to evaluate the strong or weak financial position [13].

Over the last few years, firms in Pakistan have failed at an alarming rate, prompting some parties in the business community to call for government intervention, specifically by reforming insolvency law. The Securities and Exchange Commission of Pakistan has responded by proposing an amendment to Pakistan's bankruptcy code [14].

Pakistan is a developing country and continuously facing business failure. Large number of bankruptcies has occurred in recent years. There are many reasons behind this failure. Economy of Pakistan is badly affected by

the financial crisis of 2008. Security threats and political instability is also cause of throwing several enterprises out of business. According to Rassid and Abbas [15] analytical studies regarding the business failure on Pakistani companies listed on Karachi stock exchange are still lacking. Even there was no study in this area before 2011. In current study Altman Z-Score and current ratio is used to differentiate financially failed or non-failed company. To analyze that there is significant difference between the use to Z-Score and current ratio, paired sample t-test is used. This study will provide the guidance to businesses and investors regarding the best method of judging financial health of business.

Literature Review: The use of financial data and accounting numbers to analyze performance dates back to almost hundred years. The accounting and finance literature is abundant with studies that attempt to explain or predict certain behaviors or actions. Most of the earlier studies concentrated on bankruptcy explanations and predictions. Probably the earliest study employing accounting data for making decisions about the credit position of the firm was published in 1908. The main concern of the study was the extension of bank loans to companies and their ability to repay these loans; it included financial statement analysis to find rates of gross profit, bad debts, dividends and the ratio of quick assets to liabilities [16].

Beaver [17] explores the accounting data which is extracted from financial statements has the predictive ability to forecast financial distress. Previous bankruptcy studies had identified different financial ratios of the bankrupt companies that are important in predicting bankruptcy. A review of previous empirical work indicated that these studies had differed in their selection of variables used in the prediction model and most of the studies reported good predictive powers of their ratios.

Current ratio depicts that firm has or have not enough recourses to meet its short term commitments and it gives a comparison between the current assets and liabilities. Higher current ratio is much desired by short term creditor because it lessens their risk. On the contrary, shareholders of the company like lower current ratio more because they are want to grow the business by investing more in the long term assets as they are working for this purpose. Another point to note is that typical values of the current ratio are not same to all business it varies industry to industry [18, 19].

In 1968 significant development in the area of bankruptcy prediction occurred when Edward Altman abandoned the use of only cash flow to total debt ratio and formulated a statistical model to predict insolvency. This method was altogether changed and comprehensive as compared to Beaver's [17] single ratio and used multiple discriminant analysis. Altman was the first person ever who used stepwise multiple discriminant analysis to develop such an accurate bankruptcy prediction model and considered as a dean of bankruptcy studies [20].

Brigham and Gapenski [21] discussed the practical application of the technique used by the Altman [22] and stated that the multiple discriminant analysis is successfully used by the analysts to formulate probabilities of default. They used this technique for personal loans of consumers and also for corporate loan applicant and made policies in accordance with their default probabilities. Portfolio managers adopted this technique to evaluate the bond as well as stock investment. Further, use of this technique was also done in evaluating reorganization program feasibility. O'Leary [23] stated that perhaps predicting corporate financial distress is most crucial aspect of decision making problems. It affects the whole life span of the business and result in high cost of both direct and indirect nature for the firm and stakeholders. It also affects society and whole country's economy.

Gentry *et al.* [24] found that model using several cash flow variables together with some financial ratios yields better bankruptcy perdition than model using either cash flows or financial ratios alone. The findings of Ward and Foster [25] suggested that the use of a dichotomous variable, healthy versus loan default as dependent variable in generating the prediction model provides a better measure than the bankruptcy dependent variable in terms of predicting the ability of firm to fulfill its obligations when due. Their results indicate that four accrual ratios, three cash flows variables and firm size have significant predictive power one year before the firm experience a loan default.

Altman challenged the worth of univariate analysis and had investigated a new statistical tool of MDA to draw a linear combination of most significant ratios that can able to best discriminate between the two group of financially healthy and non healthy companies. Following function was developed by using this technique and with the Z as overall score.

$Z = 0.012X_1 + 0.014X_2 + 0.033X_3 + 0.006X_4 + 0.999X_5$

Where,
X_1 = Working capital / Total assets
X_2 = Retained Earnings / Total assets
X_3 = Earnings before interest and taxes / Total assets
X_4 = Market value equity / Book value of total debt
X_5 = Sales / Total assets
Z = Overall Index

Working capital is the difference between current assets and current liabilities. X_1 is the ratio between the net liquid assets and total assets of the company and is found in most of the finance problem. This ratio explicitly considers the liquidity situation and the size of the company. Altman states that this ratio is the most significant in both univariate and multivariate analysis among all three ratios. Other two ratio of this class were quick and current ratio. Another rationale for this ratio is that it contracts if company is in loss because its nominator decreases due to shrinkage in current assets. As examined by Chuvakhin and Gertmenian [20] an enterprise having a negative working capital is quite probable to encounter situations gathering its short-term commitments. On the other hand, with a positive working capital firm infrequently has a situation of unpaid bills.

X_2 represents the accumulated earnings over the entire life of the enterprise reinvested in the business. It explicitly measures the cumulative profitability of the firm and implicitly considers the age of the firm. This ratio will be less for a firm which is new in the business it did not have any time to accumulate its annual earnings. At this point, it might be argued that in this analysis young enterprise is somewhat discriminated and chances of its failure are higher. This is also as per the actual situation of the world that failure is higher is early years of firm. Accumulated retained earnings may show the company's monetary solidness or feebleness. Another rationale of using this ratio in the computation of z score is that high retained earnings represent the history of profits and ability of the enterprise to face the periods of losses. Whereas, low retained earnings represents losses and even a loss of one quarter or a year can throw the company out of the business.

Excluding the tax and leverage effects, X_3 is the measure of the productivity of the firm's assets. It is calculated through dividing the EBIT to total assets of the company. This ratio shows the earning power of the assets which is an important factor for the existence of the company and in predicting bankruptcy. Insolvency in the sense of bankruptcy occurs when fair valuation of the assets of the company falls shorter than total liabilities determined by the asset's earning power. Therefore, the actual net worth of the company is negative.

For X_4, market value of equity is measured by multiplying the total number of shares outstanding with total number of share. It is different from book value which remains constant. But the market value is the product of two numbers and is subject to change in the value if anyone of two components changes. Book value of total debt is the book value of total liabilities. This fourth ratio incorporates market dimension to the model of bankruptcy prediction. X_5 measures the utilization of asset to generate sales of the company. Altman states that this ratio is least significant among other variables of the model. But it comes at number second in the model for its contribution to the overall score due to its relationship with other variables.

Following Hypotheses Are Formulated for the Empirical Verification:

H1: There is significant difference in using Z-Score and current ratio to assess financial health of the company.

H2: There is financially distressed company among sugar sector listed companies at Karachi stock exchange.

MATERIALS AND METHOD

Forewarning corporate financial distress and insolvency gained huge interest for researchers in the late 1960. Beaver [17] used a prediction model to evaluate the firm failure quantitatively; he developed a dichotomous classification test based on simple t-test in a univariate analysis. Between the sample period of 1945 to 1964, 79 failed and non-failed companies and then matched the both groups by industry and assets size and found the most significant ratio in predicting the distress was cash flow total debt. Z-Score model was determined by the multiple discriminant analysis. Then the cutoff points for healthy, gray area and distressed position was identified. MDA provided a high forecast accuracy of 95 percent, one year prior to actual failure. Therefore, for the same reason MDA model was used extensively by researchers in predicting failure [7, 14, 16, 22].

Nine in-depended variables were selected by Ohlson thinking that all should be helpful for bankruptcy, but he did not provide theoretical justification for the selection. Then he had chosen 205 industrial firms for a period of 1970-76 that had been traded on a US stock exchange for at least 3 years. He finished it with 2000 non failed and 105 failed firms. Three types of different models were developed to forecast bankruptcy in one year, to forecast the failure in two years and to estimate failure in one or two years. Then to estimate the likelihood of the models, logistic function was used.

After discussing the methodological literature, we notice that bankruptcy prediction models are still remains as challenge, especially in the economic downturns. In this situation, predicting financial distress and bankruptcy as an early warning signal is of great help.

This study falls in the category of applied research and follows inductive reasoning method that constructs and investigates the general proposition that are extracted from the specific example of sugar sector of Karachi stock exchange. Like other studies of social sciences, it follows ex-post-facto design (which is the analytical descriptive research based on past experiences).

This study uses Altman Z-Score and current ratio to investigate the financial health of the sugar sector companies listed at Karachi stock exchange. Total population sampling technique is used in this study. It is a sub type of purposive sampling technique [26, 27]. The benefit of this technique is that it provides deep insights to the problem faced because it includes all the member of the interest population.

Sugar sector is the second largest sector listed at Karachi stock exchange. Total population sample consisting of all sugar sector companies is used in this study. There are total 35 companies in sugar sector listed at KSE. All 35 companies were include in the analysis which represents hundred percent of the sector. Data for the year 2009 and 2010 was extracted from State Bank Publication "Balance Sheet Analysis of Listed Companies on KSE" and companies financial statement for this empirical study. For these thirty five companies, Z-Score and current ratio was calculated for the year 2009 and 2010.

Current ratio is the fundamental test of assessing the liquidity of the company. If the current ratio is less than one it shows that the company would not be able to meet its short term commitments and if it is higher, it shows that financial position of the company is strong [28, 29].

Table 1: Criteria for Failure and Non-Failure Companies

Method	Failure Company	Non-Failure Company
Current Ratio	<1.1	>=1.1
Altman Z-Score	<1.81	>2.99

Following table summarizes the criteria of being financially failure and non failure company under current ratio and Z-Score.

According to both criterions, a company would be considered financially healthy if its current ratio is equal to or greater than 1.1 and Z-Score is greater than 2.99. On the other hand, it would be considered as financially distressed if current ratio is less than 1.1 and Z-Score is less than 1.81. Z-Score and current ratio is calculated for thirty five companies. To test the first hypothesis, paired sample t test was conducted using SPSS and to test the second hypothesis, number of failed and non-failed companies as per the basis of criteria mentioned in table 1.

RESULTS AND DISCUSSION

Profile of the Companies Included in the Analysis Is as Follows: Table 2 represents the paid-up capital of the companies studied. Out of total thirty five companies, five companies had paid-up capital less than Rs. 100m. Paid-up capital of sixteen companies was between Rs. 100m and Rs. 200m. Seven companies were with paid-up capital between Rs. 200m and Rs. 300m. Two companies exist between the each slab of Rs. 300m to Rs. 400m and Rs. 400m to Rs. 500m and three companies were with the paid-up capital above Rs. 500m.

Figure 1 shows the industry averages of current ratio and Altman's Z-Score for the year 2009 and 2010. In 2009, current ratio was 1.00 and Z-Score was 1.13. Both the results were showing that overall industry is facing liquidity problems. In 2010, current ratio was 1.16 which was better than previous year and Z-Score was 1.58 which was unsatisfactory. Different economic and political

Table 2: Paid-up Capital of Companies Studied

Paid-up capital (in millions of rupees)	No. of Companies
Less than 100	5
Between 100 and 200	16
Between 200and 300	7
Between 300and 400	2
Between 400and 500	2
Above 500	3
Total	35

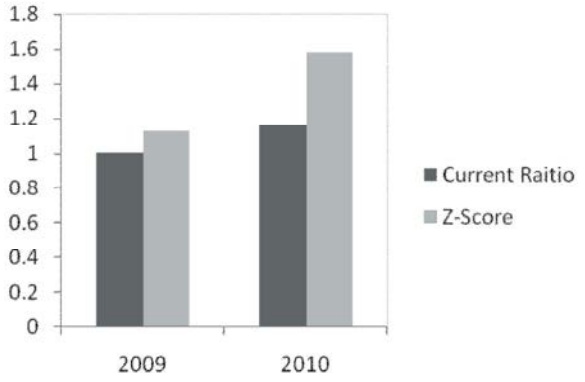

Fig. 1: Industry Average for Current Ratio and Z-Score

factors like electricity crisis, security threats and political instability could be identified as the reason behind this unsatisfactory position.

Test of Hypothesis: Based on table 3, at 5 percent alpha it can be said that there is no significant difference in using current ratio and Z-Score based on Altman's 1968 model as an indicator of financial failure and non failure in 2009.

Table 4 represents that there exits significant difference in using current ratio and Z-Score based on Altman's 1968 model as an indicator of financial failure and non failure in 2010 at 5 per cent significance level.

Table 5 represents the financial status of the companies as per set criteria of current ratio and Z-Score. To test the second hypothesis codes are assigned to judge the financial status. For current ratio, 0 represents the financially sound company and 1 represent financially distressed companies. For the Z-Score both the criteria are same except and additional code 2 represents gray area or zone of ignorance if the Z-Score of the company is greater than lower criteria and lower than upper criteria.

According to current ratio there were twenty six financially failed companies and nine financially distressed companies in 2009 and in 2010 same results are observed. Z-Score adds another dimension which is the companies that fall in the zone of ignorance or gray area and five companies were ranked in this zone. According to Z-Score, in 2009 twenty eight companies were ranked as financially failure and four companies are financially healthy. Remaining five companies are ranked in zone of ignorance. In 2010, twenty three companies were financially failed and four companies were non-failed. Remaining eight companies were ranked in the gray area. These results supported the hypothesis that there are financially distressed companies in sugar sector which are listed on the Karachi stock exchange.

This study uses the Altman's Z-Score model and current ratio for the investigation of the financial status of the sugar sector companies listed on the Karachi stock exchange. Sugar sector is the second largest slice listed on KSE and total thirty five companies of this sector were analyzed in this study. Original model of Altman [22] was used in this study to analyze the significant difference between Z-Score and current ratio. Cutoff points of current ratio and Z-Score to rank the companies as financially distressed and non distressed were in line with the Altman [22] and Courtis [30] respectively. Z-Score and current ratio was selected and computed for the analysis of this study. The result of the study showed that the application of these tools is significantly successful for judging the financial health of the sugar sector companies listed at KSE and it can also be used as a powerful tool for future research [18].

Table 3: Comparison of Current Ratio and Altman's Z-Score Using Paired T-Test in SPSS for the year 2009

No	Variables Compared	N	Mean	T	Significant Level (p)
Pair 1	Current Ratio and Altman Z-Score	35	0.12200	0.867	.392

Table 4: Comparison of Current Ratio and Altman's Z-Score Using Paired T-Test in SPSS for the year 2010

No	Variables Compared	N	Mean	T	Significance Level (p)
Pair 1	Current Ratio and Altman Z-Score	35	0.41743	2.05869	0.047252

Table 5: Financially Failed and Non-failed Status as per Current Ratio and Z-Score

	2009		2010	
	Failed Companies	Non Failed Companies	Failed Companies	Non Failed Companies
Current Ratio	26	9	26	9
Z-Score	28	4	23	4

After the development of Altman's multivariate model, a number of research studies are conducted using Z-Score. Currently, this model is constantly analyzed and applied by researchers all over the world. However, only a few studies are conducted using the Z-Score model of Altman and liquidity ratios to test the reliability of the model practically [19]. These models provide reliable results to determine the financial health of the company.

CONCLUSION

All thirty five companies of sugar sector are investigated in this study and the results of the study explored that the Z-Score and current ratio is significantly different between financially filed and non failed companies in 2010 and in 2009 it is not significant. There exist significant positive correlation between the Altman's Z-Score and current ratio in 2009 and 2010. This positive correlation also supports the purpose of the study and adds the credibility to the analysis.

Findings suggest that using current ratio and Z-Score is good predictor of assessing the financial health of the companies of sugar sector listed at Karachi stock exchange. This study provides an evidence for the acceptably of these models as a reliable tool. The findings of this study are similar to the Jones, [13] and Scott, [31]. The results also explored that there are financially distressed companies in sugar sector listed at Karachi Stock Exchange.

This study can be further expanded by the inclusion of other liquidity ratios. Another model of assessing financial health can also be used to test the reliability of the model. Ohlson model is another efficient model of judging the financial health of the companies that could be used for the analysis. This study can also be expanded in other sector like textile sector, which is the biggest slice of the KSE listed companies. This study recognized the need for the development of new models in order to assess the financial health of the KSE listed companies with the higher accuracy.

REFERENCE

1. Byrne, H.S. and Barron, 1993. Accounting and Tax Periodicals, National Business and Financial Weekly. Investment news and Views, pp: 47.
2. Altman, E.I. and E. Hotchkiss, 2006. Corporate Financial Distress and Bankruptcy. 3rd ed., John Wiley and Sons, Inc., pp: 1.
3. Investopedia, Financial Distress. [Online] Available at <http://www. investopedia.com/terms// financial_distress.asp#axzz268bBX2WU> [Accessed 03 September 2012].
4. Warner, J.B., 1977. "Bankruptcy Costs: Some Evidence," Journal of Finance, pp: 337-47.
5. Higgins, R.C., 2007. Analysis for Financial Management. 8th ed. McGraw-Hill Irwin, New York.
6. Outecheva, N., 2007. Corporate Financial Distress: An Empirical Analysis of Distress Risk. (Unpublished). University of St. Gallen. Russia. Dissertation, pp: 3430.
7. Walter, J.E., 1957. Determination of technical solvency. Journal of business, (Jan.), pp: 30-43.
8. Newton, G., 2009. Bankruptcy and insolvency accounting: practice and procedure. 7th ed., (1) Wiley and Sons.
9. Argenti, J., 1976. Corporate Collapse: The Causes and Symptoms, London: McGraw-Hill.
10. Her, Y.W. and C. Choe, 1999. A comparative study of Australian and Korean accounting data in business failure prediction models. La trobe university. Working, pp: 99-07.
11. Altman, E.I., 1983. Corporate financial distress: A complete guide to predicting, voiding and dealing with bankruptcy. New York: John Wiley and Sons.
12. Jones, F.L., 1987. Current techniques in bankruptcy prediction. Journal of Accounting Literature, 6: 131-164.
13. Platt, H.D. and M.B. Platt, 1990. Development of a class of stable predictive variables: The case bankruptcy prediction. Journal of Business Finance and Accounting, 17 (1): 31-51.
14. Hasanain, A. and S.A.A. Shah, 2012. Investigating the Proposed Changes to Pakistan's Corporate Bankruptcy Code. CREB, LSE. Working, pp: 01-12.
15. Rassid, A. and Q. Abbas, 2011. Predicting Bankruptcy in Pakistan. Theoretical and Applied Economics, 9(562): 103-128.
16. Rosendale, W., 1908. Credit Department Methods. The Bankers Magazine, pp: 186-187.
17. Beaver, W., 1966. Financial ratios as predictors of failure. Journal of Accounting Researc., 4: 71-111.
18. Ali, K.A., 2008. Financial Analysis and Its Uses to Control the Performance and Detect Deviations. Arab Open Academy in Denmark College, Master's Thesis.
19. Mahmood, J.A. and A. Talal, 2009. Research presented to the Seventh International Scientific Conference of Zarqa Private University.

20. Chuvakhin, N.V. and L.W. Gertmenian, 2003. Predicting bankruptcy in the WorldCome age: How to determine when it is safe to grant credit. Graziado Business Report. 6(1). [available online at: < http://gbr.pepperdine.edu/2010 /08/predicting-bankruptcy-in-the-worldcom-age/>]
21. Brigham, E.F. and L.C. Gapenski, 1996. Intermediate Financial Management. 5thed. Orlando: Dryden Press, Harcourt Brace College Publishers.
22. Altman, E.I., 1968. Financial ratio, discriminant analysis and prediction of corporate bankruptcy. Journal of Finance, pp: 589-610.
23. O'leary, D.E., 1998. Using neural networks to predict corporate failure. International Journal of Intelligent Systems in Accounting, Finance and Management, 7: 187-197.
24. Gentry, J.A., P. Newbold and D.T. Whitford, 1985b. 'Predicting Bankruptcy: If Cash- flow's Not The Bottom Line, What Is?', Financial Analysts Journal, pp: 47-56.
25. Ward, T. and Foster, 1997. A Note on Selecting a Response Measure for Financial Distress. Journal of Business Finance and Accounting, 24(6): 869-879.
26. Patton, M.Q., 1990. Qualitative Evaluation and Research Methods 2nd ed. Newbury Park, CA: Sage Publications, Inc.
27. Kuzel, A.J., 1999. Sampling in Qualitative Inquiry, In Doing Qualitative Research, B. F. Crabtree and W. L. Miller. 2ed. Sage Publications, Thousand Oaks, CA, pp: 33-45.
28. Cowen, S.S. and J.A. Hoffer, 1982. Usefulness of financial ratios in a single industry. Journal of Business Research, 10(3): 80-89.
29. Courtis, J.K., 1978. Modeling a Financial Ratios Categoric Framework. Journal of Business finance and Accounting, 5(4): 371-386.