

Assessment of Financial Soundness: A Case Study of Beximco Pharmaceuticals Ltd.

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Abstract: *The main objective of the study was to assess the financial soundness of Beximco Pharmaceuticals Ltd (BPL) by using Du Pont Equation & Altman's Model. The firm's management can use the Du Pont system and Altman's model to analyze ways of improving the firm's performance. By applying Altman's Model, it revealed that BPL would be financially unhealthy and would like to go bankruptcy in the near future. The main reasons for such state of affairs are shortage of adequate working capital, shortage of raw materials and their irregular supply, instability in raw material price, lack of requisite research & development activities, shortage of skilled manpower, lack of proper responsibility and accountability, limited market for products, absenteeism of workers from jobs, adverse factory environmental factors, power disruption and troubles in machinery. Therefore in order to improve the financial soundness of the company and to save it from bankruptcy proper steps should be taken to remove those reasons.*

Key words: *Financial Soundness, Performance, Du Pont Equation, Altman's Model, Beximco Pharmaceuticals.*

Statement of the Problem

Beximco Pharmaceuticals Ltd is a leading edge Pharmaceuticals Company based in Dhaka and is a member of the BEXIMCO Group, the largest private sector industrial conglomerate in Bangladesh, registered in 1976 as a company and started to import market and distribute medicine from world-renowned companies like Upjohn Inc. of USA and Bayer AG of Germany. A pharmaceutical manufacturing facility was

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designed and constructed in 1980 under the technical supervision of Upjohn Inc. of USA, to manufacture their products under license. Products made under license of Bayer AG of Germany followed. After its initial years of struggle, BPL broke ground with the launching of its own products in 1983.

The strategic strengths of BPL are its strong brand recognition, highly skilled work force and diversified business mix. BPL brands-Neoceptin R (Rantitide), Napa (Paracetamol), Amdocal (Amlodipine), Neofloxin (ciprofloxin), Bexitrol F (Salmeterol Plus Fluticasone), Bexturn Gold (Multivitamin and Multi Mineral) and Atova (Atorvastatin) are among the most recognized brands in the Bangladesh Pharmaceutical Industry. Today BPL manufactures and markets its own 'branded generics' for almost all diseases from AIDS to cancer, from infection to asthma, from hypertension to diabetes, both nationally and internationally.

BPL manufactures tablets, capsules, dry syrup, powder, cream, ointment, suppositories, large volume intravenous fluids, metered dose inhalers etc. in several world-class manufacturing plants, ensuring high quality standards complying with the World Health Organization (WHO) approved current Good Manufacturing practices (GMP).

The recipient of three times 'gold' national export trophy, BPL is the largest exporter of Pharmaceuticals from Bangladesh, spreading its presence in many developing and developed countries across the globe. BPL is the only company in Bangladesh to receive this highest national accolade for export, for record three times. BPL markets its brands through professional sales and marketing teams in African, Asian and European markets. It also supplies its products to renowned hospitals and institutions in many countries, including Raffles Hospital and K K Women & Children Hospital in Singapore, MEDS and Kenyatta National Hospital (KNH) in Kenya, Jinnah Hospital, Aga Khan Hospital and Shaikat Khanum Memorial Hospital in Pakistan. BPL is also an enlisted supplier of WHO and UNICEF.

Another important business activity of BPL is the contract manufacturing for major international brands of leading multinational companies. That because of BPL is acclaimed domestically and internationally for its outstanding product quality, world class manufacturing facilities, product development capabilities and outstanding service.

BPL has a strong market focus and is anticipating continued future growth by leveraging business capabilities and developing superior product brands and markets. In particular the company is very interested

in developing a strong export market in USA and Europe (table 1). To meet the future demand BPL has invested US \$ 50 million to build a new state – of-the- art manufacturing plant, conforming to USFDA and UK MHRA standards. This new plant will also offer contract-manufacturing facility to leading pharmaceuticals companies, especially from Europe and US.

One of the major events that significantly contributed to the company's progress in 2005 was the successful merger of Beximco Infusions Ltd. with BPL. This merger has been provided synergies across the business-improved organizational capability 'Value for Money' by reducing cost and improving efficiency, and increased sales productivity resulting in increased shareholders' return. Now it has grown to become nations one of the leading pharmaceutical companies, supplying 10% of country's total medicine need and has an annual turnover of US \$60 million.

The evaluation of financial soundness of any firm, whether manufacturing, service rendering, trading etc. is a must in order to know the financial condition of the firm. This assessment needs to be made from time to time. If financial soundness is found to be not up to the market, reasons there of should be identified and necessary measures need to be taken in order to improve the financial soundness. This is also true in case of the selected company. The present study is an effort in the direction.

Objectives of the Study

The following are the objectives of the study

- To analyze the financial performance of BPL
- To recommend on the efficiency and effectiveness of the company
- To assess the financial soundness of BPL by using Du Pont equation.
- To evaluate the overall financial performance of BPL by using Altman's Model.
- To identify the factors adversely affect the financial soundness of BPL and measures to be considered to overcome the limitations.

Methodology

The report is mainly based on secondary data collected from annual reports of BPL. Different financial tools and techniques are used to analyze the financial statements. To present the analysis various statistical tools, tables, graphs, charts etc. are used.

To achieve the set of objectives of the study secondary data of BPL during 1999-2005 have been used. Though a number of techniques are available to assess the financial soundness of a firm, but in this study we have used Du Pont Equation & Altman Model, two vital aspects of ratio analysis.

Scope

The scope of the report is confined with the analysis of financial statements of BPL from 1999 to 2005. Analysis of financial statements covers turnover ratios, liquidity ratio, profitability ratios and market value ratios, Du Pont equation.

Theoretical Framework

Financial soundness is the ability of a firm to meet up its both short-term and long-term obligations as they become due. Short-term obligations are accounts payable, notes payable (short-term), accruals, other accrued expenses etc. and long-term obligations are notes payable (more than one year), bond, & debentures etc. To assess the financial soundness of a firm is so important due to identification of its current strengths and weakness and to suggest actions the firm might enact to take advantage of the strengths and remove the weakness in the future. If the financial soundness of a firm is not assessed, the firm may fall in pre-mature death.

Measures of financial performance reduce a large amount of information into a convenient form for analysis. No single measure of financial performance is adequate for evaluating a firm's business. Evaluation of several financial measures may be more useful in directing the management to ask the right questions and in providing solutions to the financial problems of the business. Both the magnitude of the measure and its relationship to other measures should be evaluated. Decisions made in preparing the balance sheet, cash flow statement, and income statements have important impacts on the financial measures. Some of these decisions include using cost or market values in preparing the balance sheet; determining a specific value for each asset and liabilities on the balance sheet including or excluding accrued expenses, deferred taxes, and personal assets and liabilities from the balance sheet; estimating net income on a cash, accrual adjusted basis; and deciding if income should be before or after taxes. Each of these decisions affects key relationships in the financial statements and impacts the financial measures used to evaluate financial performance and position. The overall performance and position of the business should be evaluated based on a set of criteria that includes liquidity, solvency, profitability, financial efficiency, and repayment capacity. Each of these criteria measures a different aspect of financial performance and / or position.

Liquidity indicates the ability of a business to meet financial obligation when they become due. Timely payment of the obligations of the business, including principal and interest on debt without disrupting the normal operation, is an indication that the business is liquid. Solvency measures the ability of the firm to pay all debts if the assets of the business are sold. Generally, if the market value of total assets exceeds existing debt obligations against those assets, the business is solvent. Profitability is an indication of the level of income produced by the firm's business and is measured in terms of rates of return produced by the labor, management, and capital is used in the business. Efficiency indicates the relationship between inputs and outputs and can be measured in physical or financial terms. Repayment capacity measures the ability of the business to repay existing debt commitments from farm and non-farm income, and it is closely related to the concept of liquidity.

Each of these criteria applied in the analysis of financial performance and position of the BPL Ltd (BPL), and each has alternative measures that are also implied in the BPL Ltd. Balance Sheet

Du Pont System is one, which helps to determine the area in which the firm is having difficulty as well as success. It's an effective measure to evaluate the overall effectiveness of the firm. The Du Pont system is designed to show how the profit margin on sales, the assets turnover ratio, and the use of debt interact to determine the rate of return on equity. The firm's management can use the Du Pont system to analyze ways of improving the firm's performance.

Earning power is calculated by using the following formula

$$\text{Earning Power} = \text{Sales Profitability} * \text{Asset Efficiency}$$

The profit margin times the total assets turnover is called the Du Pont equation, and it gives the rate of return on assets (ROA):

$$\text{ROA} = \text{Net profit Margin} * \text{Total Asset Turnover}$$

$\text{Net Profit after Tax/Total Asset} = [\text{Net profit after Tax/Net Sales} * \text{Net Sales/Total Asset}]$

The Du Pont equation measures:

- Profitability with respect to sales generated
- Efficiency in using assets to generate sales.
- Overall effectiveness in generating profits with available assets

The Extended Du Pont Equation shows how the profit margin, the assets turnover ratio, and the equity multiplier combine to determine the ROE:

Net profit after taxes/Shareholders equity = (Net profit after taxes/Net sales*Net sales/Total assets * Total assets/Shareholders equity)

ROE = Net Profit Margin * Total Asset Turn Over * Equity Multiplier

The Extended Du Pont Equation measures

- Earning power on shareholders book value investment
- Profitability with respect to sales generated
- Efficiency in using assets to generate sales.
- The extent of total asset to equity

Altman's Model was developed by Professor Edward I. Altman to predict the financial distress (i.e. the firm's liabilities exceeds the fair market values of its assets) of a firm.

According to Altman's model, the Z-score model is as follows:

$$Z = 1.2X_1 + 1.4X_2 + 3.3 X_3 + 0.6X_4 + 1.0X_5$$

Where, X_1 = working capital to total assets

X_2 = cumulative retained earnings to total assets

X_3 = EBIT to total assets

X_4 = market value of equity to book value of total liabilities

X_5 = total assets turnover

Altman found that the companies with Z scores below 1.81 already went bankrupt; Z scores above 2.99 presented healthy firms. Firm with Z scores in between are sometimes misclassified, so this represents an area of gray. On the basis of these cut-offs, Altman suggests that one can predict if or not a firm is likely to go bankrupt in the near future.

Findings and Analysis:

From the table-1 and table-2 (please see the annexure), we can summarize the financial position of BPL as follows:

1. Working capital to total assets: Working capital is current assets, which normally include cash, marketable securities, account receivable, and inventories. Total assets are the sum of current assets and fixed assets (i.e. land, building, equipment, & investment etc.) excluding fictitious assets (i.e. preliminary expenses, profit and loss a/c debit balance, & share discount). The more this ratio, the better the liquidity position and vice versa. As there is no standard norm of this ratio; hence it may be compared with the industry average to which the firm belongs.

Working capital to total assets = Current assets ÷ total assets.

Working capital to total assets of the company in 1999, 2000, 2001, 2002, 2003, 2004 and 2005 are 32%, 34%, 28%, 29%, 26%, 29% and 32% respectively. BPL's ratios are relatively somewhat higher. Working capital is necessary to conduct business and the greater the holdings of it, the smaller the danger of running out, hence the lower the operating risk. However, holding working capital is costly- if inventories are too large, then the firm will have assets that earn a zero or even negative return if storage and spoilage costs are high.

2. Cumulative retained earnings to total assets: Retained earnings are the undistributed net earnings i.e. difference between net income available to the common shareholders and dividend paid. The more this ratio, the less cost of capital of the firm because retained earnings is one of the cheaper sources of internal financing in which floatation cost is not applicable. As there is no standard norm of this ratio; hence it may be compared with the industry average to which the firm belongs.

Cumulative retained earnings to total assets = Cumulative retained earnings ÷ total assets.

Cumulative retained earnings of the company in 1999, 2000, 2001, 2002, 2003, 2004 and 2005 are 7%, 20%, 21%, 22%, 19%, 27%, 25%, 22% respectively.

3. EBIT to total assets: EBIT stands for earnings before interest and taxes. A high this ratio is a sign of efficient management since it implies that the management is capable to use the available assets for generating earnings. Since there is no standard norm of this ratio; so it may be compared with the industry average to which the firm belongs.

EBIT to total assets = EBIT ÷ total assets.

EBIT to total assets has been increased during 2000 and 2005 while decreased during 2001 to 2003.

4. Market value of equity to book value of total liabilities: Equity represents the ownership of the given firm. It gives an indication of how much investor regard the company.

Market value of equity to book value of total liabilities = Market value of equity ÷ total liabilities.

Market value of equity to book value of total liabilities has been increased during 2001 to 2002 and 2005 while decreased during 2003 & 2004 and unchanged 2000.

5. Total assets turnover: This ratio measures the efficiency of a firm in managing and utilizing of assets to generate sales revenue. Intensity of

use of physical assets is also reflected in the ratio. Higher the ratio, the more efficiently firm assets are being used to generate firm revenue. Some authors consider 2 times of total assets turnover as the standard norm for the purpose of comparison and control.

$$\text{Total Assets Turn Over} = \text{Sales} \div \text{Total assets.}$$

Total assets turnover of BPL in the year 1999,2000,2001, 2002, 2003, 2004, and in the 2005 are 0.17, 0.20, 0.35, 0.22, 0.27, 0.32, 0.31, and 0.26 respectively. BPL's ratios are relatively somewhat lower, indicating that the company is not generating a sufficient volume of business given its total asset investment. Sales should be increased, some assets should be disposed of, or a combination of these steps should be taken.

6. Net profit margin: Net profit margin is an indication of management's ability to operate the business with adequate success not only to cover from sales revenues of the period, the cost of merchandise or services, the expenses of operating the business and the cost of borrowed funds; but also to leave a margin of reasonable compensation to the owners for providing their capital at risk. This ratio expresses the cost price effectiveness of the operation. A high net profit margin would ensure adequate return to the owners as well as to enable a firm to withstand adverse economic conditions when selling price is declining, cost of production is rising and the demand for the product is falling. A net profit margin of 4 percent to 6 percent has been considered as a standard norm by some authors for the purpose of comparisons and control.

$$\text{Net profit margin} = \text{Net profit after tax} \div \text{Net Sales.}$$

BPL net profit margin is below its gross profit margin .It is a result of its heavy use of debt. We know that net income is income after interest. Because of using higher leverage ratio, it has higher interest charges. Those interest charges pulled net income down. In this case, the low net profit margin would not indicate an operating problem, just a difference in financing strategies. Thus, the firm with low net profit margin ended up with a higher rate of return on its stockholders' investment due to its use of financial leverage.

7. Equity Multiplier: It measures the extent of total asset to equity.

$$\text{Equity multiplier} = \text{Total assets} \div \text{Shareholders equity.}$$

Equity multiplier has been increased during 2001, 2003 to 2004 while decreased during 2002 and 2005 and steady 2000.

8. Return on Investment (ROI) and Return on Equity (ROE): It shows the earning power of the invested capital.

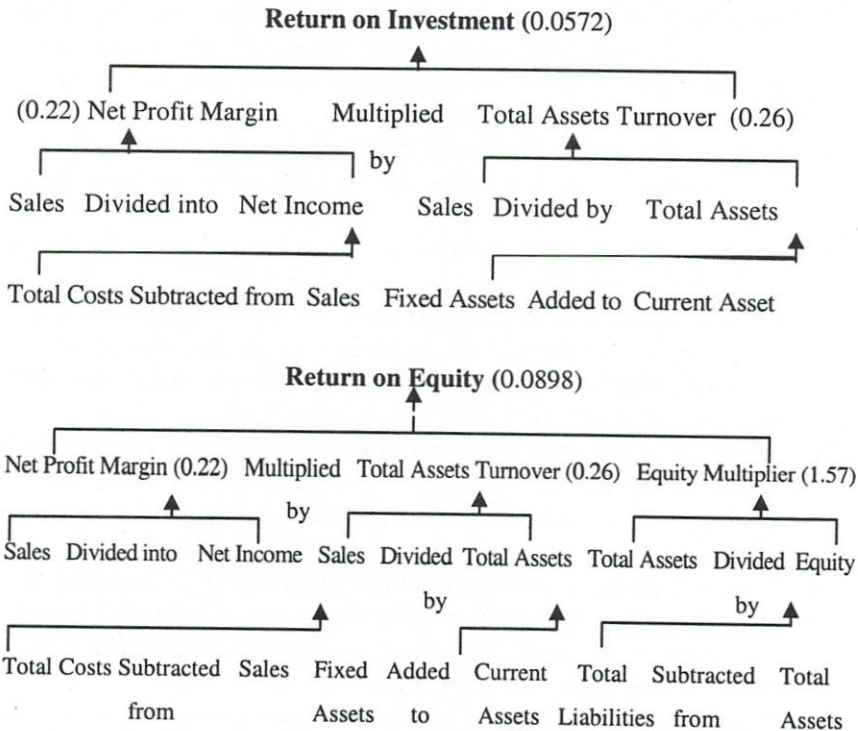
$$\text{ROI} = \text{Net profit after tax} \div \text{Total assets.}$$

ROE shows the earning power of the shareholders book value investment.

$$\text{ROE} = \text{Net profit after tax} \div \text{Equity.}$$

From the above table we get that ROA is below the ROE. This low ROA results from (1) the company's low basic earning power plus (2) high interest costs resulting from its above average use of debt, both of which cause its net income to be relatively low. Stockholders invest to get a return on their money, and the ROE ratio tells how well they are doing in an accounting sense. BPL ROE is much higher than ROA; this better result is due to the company's greater use of debt.

ROI and ROE in terms of average is presented below in the form of Du Pont Equation:



The analysis of the application of Altman's Model can be made as under:

Z score in case of BPL has been increased during 2001 to 2002 and 2004 to 2005 while decreased during 2000, and 2003. But Z score in each year during the study period is below 2.99 which indicates that the firm found to be financial unhealthy i.e. BPL is likely to go to bankruptcy in the near future.

The table-3 (please see the annexure) presents the importance of factors affecting adversely to financial soundness of BPL as opined by the respondents.

Factors affecting adversely to financial soundness of BPL in order of importance are mentioned below:

- i. **Shortage of Adequate Working Capital:** This factor tops the list of all the factors of poor profitability since it ranks first, the weighted average score being 4.30 in the 5 point scaling.
- ii. **Shortage of Raw Materials and Their Irregular Supply:** This factor ranks the second position, the weighted average score being 4.10.
- iii. **Instability in Raw Material Price:** This factor ranks the second position, the weighted average score being 4.10. The prices of raw materials and other supplies especially of imported ones found to be unstable during the study period.
- iv. **Lack of Requisite Research & Development Activities:** This factor ranks the third position, the weighted average score being 3.75.
- v. **Shortage of Skilled Manpower:** This factor ranks the fourth position, the weighted average score being 3.70
- vi. **Lack of Proper Responsibility and Accountability:** This factor ranks the fifth position, the weighted average score being 3.65.
- vii. **Limited Market for Products:** This factor ranks the sixth position, the weighted average score being 3.60.
- viii. **Absenteeism of Workers from Jobs:** It is reported that the trade union leader type of workers remain absent from participating in the production works due to their heavy engagement in trade union activities.
- ix. **Adverse Factory Environmental Factors:** It is reported that adverse factory environmental factors such as unhealthy labor – management relations, unauthorized strikes, undue influence of trade union leaders etc. hamper profitability.
- x. **Power Disruption and Troubles in Machinery:** These factors reported to be other chronic and malignant problems.

Conclusion:

The above study on BPL presents its financial soundness measured in terms of Du Pont Equation & Altman's Model. On the basis of Du Pont Equation ROI had shown both increasing and decreasing trends during the study period. Likewise ROE had also shown increasing as well as decreasing trends during the same period. By applying Altman's Model, it is found that financial soundness of the firm had been on the verge of financial difficulties. The main reasons for such state of affairs reported to be factors such as shortage of adequate working capital, shortage of raw materials and their irregular supply, instability in raw material price, lack of requisite research & development activities, shortage of skilled manpower, lack of proper responsibility and accountability, limited market for products, absenteeism of workers from jobs, adverse factory environmental factors, power disruption and troubles in machinery. Therefore BPL should take immediate steps to remove the stated factors in order to improve the financial soundness of the company. Here we also find that its TATO ratios are relatively somewhat lower, indicating that the company is not generating a sufficient volume of business given its total asset investment. Sales should be increased, some assets should be disposed of, or a combination of these steps should be taken. BPL's working capital turnover ratios are relatively somewhat lower, indicating that the company is not generating a sufficient volume of business given its current asset investment. BPL's net profit margin is below its gross profit margin. It is a result of its heavy use of debt. The firm with low net profit margin ended up with a higher rate of return on its stockholders' investment due to its use of financial leverage. BPL's ROE is higher than ROA; this better result is due to the company's greater use of debt. However, it also needs to examine the quality of the financial data, ensure that the firm is sufficiently diversified to withstand shifts in customers' buying habits, and determine whether the firm has a plan for the succession of its management.

Annexure

Table- 01: Financial Resource Trend of BPL during 1999-2005 (in million Tk.)

Particulars	1999	2000	2001	2002	2003	2004	2005	Average
Authorized capital	1000.00	1000.00	1000.00	100.00	1000.00	1000.00	2000.00	1014.29
Paid-up-Capital	442.50	442.50	442.50	442.50	508.88	559.76	959.22	542.55
Reserves	862.31	1067.09	2233.54	1508.85	25977.96	2785.24	3402.78	5405.40
Sales	2398.98	2452.52	2401.24	2522.94	2183.83	2402.70	3327.02	2527.03
Gross Margin	816.09	895.78	942.13	902.45	828.08	972.11	1558.50	987.878
Total Cost	1965.01	2019.00	1961.10	2148.82	1976.69	2036.95	2824.62	2133.17
Taxes	26.73	24.35	28.64	20.55	56.48	24.29	43.22	32.04
Interest	182.06	154.36	171.40	161.52	143.16	157.39	202.54	167.49
EBIT	433.98	592.60	619.65	545.12	430.08	556.32	724.35	557.44
Net profit before tax	413.31	422.64	430.42	362.23	263.62	318.59	485.37	385.17
Total Assets	4960.26	5410.75	6360.26	6762.69	8012.86	8658.42	10945.48	7301.53
Fixed Assets	3350.91	3572.88	4576.09	4780.46	5940.09	6186.91	7449.63	5122.42
Current Assets	1609.35	1837.87	1784.17	1982.23	2072.76	2471.51	3495.85	2179.12
Current Liabilities	1471.68	1606.43	1490.32	1509.00	1229.86	1659.26	2501.82	1638.34
Total Liabilities	1196.25	1956.53	2194.47	2321.59	3302.62	3822.41	4124.55	2702.63
Shareholders' Equity	3764.01	3454.22	4165.79	4441.10	4834.75	4836.01	6820.93	4616.69
EPS	8.74	9.00	5.74	4.88	2.96	4.71	6.36	6.06
Market price per share	32.31	66.90	49.50	41.83	39.72	92.10	57.80	54.31
Dividend	20%	20%	15%	20%	20%	30%	15%	20%
Operating Expenses	365.74	303.18	322.48	353.74	398.00	467.45	834.14	434.96
Net profit after tax	386.58	398.29	401.78	341.68	207.14	294.30	489.26	359.86
Cumulative retained earnings	862.31	1067.09	1360.38	1510.16	1507.74	2339.88	2693.28	1620.12
Accumulated depreciation	508.45	599.85	687.28	773.05	773.91	779.62	1211.49	761.95

Source: Annual Reports of BPL for the respective year.

Table-02: Results of variables of Du Pont Equation & Altman's Model

Particulars	1999	2000	2001	2002	2003	2004	2005	Average
Working capital to total assets	0.32	0.34	0.28	0.29	0.26	0.29	0.32	0.30
Cumulative retained earnings to total assets	0.17	0.20	0.21	0.22	0.19	0.27	0.25	0.22
EBIT to total assets	0.09	0.11	0.10	0.08	0.05	0.06	0.07	0.08
Market value of equity to book value of total liabilities	3.15	1.77	1.90	1.91	1.46	1.27	1.65	1.87
Total assets turnover	0.17	0.20	0.35	0.22	0.27	0.32	0.31	0.26
Net profit margin	0.45	0.37	0.18	0.23	0.09	0.11	0.14	0.22
Equity multiplier	1.32	1.57	1.53	1.52	1.66	1.79	1.60	1.57
ROI	0.08	0.07	0.06	0.05	0.03	0.03	0.04	0.05
ROE	0.10	0.12	0.10	0.08	0.04	0.06	0.07	0.08

Source: Table -01

Table 3: Importance of major factors of poor profitability in BPL.

S.L.	Major Problems	Responses' Scale Importance					Weighted average score	Remarks
		Not at all important	Below average important	Average important	Above average important	Extremely important		
1	Shortage of adequate working capital	-	-	2(20)	3(30)	5(50)	4.3	1
2	Shortage of raw materials and their irregular supply	-	-	3(30)	3(30)	4(40)	4.1	3
3	Instability in raw material prices	-	-	2(20)	5(50)	3(30)	4.1	3
4	Shortage of Skilled manpower	-	1(10)	3(30)	4(40)	2(20)	3.70	5
5	Use of obsolete plants and technology	-	2(15)	3(30)	3(35)	2(20)	3.60	7
6	Absenteeism of workers from jobs 7	-	2(20)	4(40)	2(20)	2(20)	3.4	10
7	Adverse environmental factors	-	2(10)	3(25)	3(35)	3(30)	3.35	11
8	Poor production planning and control	-	2(15)	3(30)	3(30)	2(25)	3.55	8
9	Inefficient production staff	-	2(20)	3(35)	4(40)	1(5)	3.3	12
10	Power disruption and troubles in machinery	-	2(20)	4(40)	3(30)	1(10)	3.30	12
11	lack of requisite R and D activities	-	-	2(20)	3(25)	5(45)	3.75	4
12	Obstacles in introducing product diversification	-	2(15)	2(20)	4(40)	2(25)	2.75	13
13	Government regulations	-	2(20)	2(20)	4(30)	2(15)	3.50	9
14	Lack of proper responsibility and accountability	-	2(5)	2(15)	3(20)	3(30)	3.65	6
15	Management inattention	-	-	2(10)	3(30)	5(35)	4.25	2
16	Limited markets for products	-	-	2(15)	3(30)	5(25)	3.60	7

Source: Field survey

Notes:

- i. Figures in the first bracket indicate percentage positions.
- ii. Weighted average score is calculated using weights of 1 for "not all important" and 5 for "extremely important."

Altman's Model:

$$\begin{aligned}
 Z_{1999} &= 1.2X_1 + 1.4X_2 + 3.3 X_3 + 0.6X_4 + 1.0X_5 \\
 &= 1.2 * 0.32835 + 1.4 * 0.175934 + 3.3 * 0.0918834 + 0.6 * 0.696378 + 1.0 * 0.489457 \\
 &= 1.85094662 \\
 Z_{2000} &= 1.2X_1 + 1.4X_2 + 3.3 X_3 + 0.6X_4 + 1.0X_5 \\
 &= 1.2 * 0.344091 + 1.4 * 0.199783 + 3.3 * 0.110949 + 0.6 * 0.695655 + 1.0 * 0.459168 \\
 &= 1.6556019 \\
 Z_{2001} &= 1.2X_1 + 1.4X_2 + 3.3 X_3 + 0.6X_4 + 1.0X_5 \\
 &= 1.2 * 0.28414 + 1.4 * 0.216647 + 3.3 * 0.098683 + 0.6 * \\
 &\quad 1.898307 + 1.0 * 0.382411 \\
 &= 1.8623632 \\
 Z_{2002} &= 1.2X_1 + 1.4X_2 + 3.3 X_3 + 0.6X_4 + 1.0X_5 \\
 &= 1.2 * 0.297082 + 1.4 * 0.226332 + 3.3 * 0.082237 + 0.6 * 1.91295 + 1.0 * 0.378121 \\
 &= 2.4748519 \\
 Z_{2003} &= 1.2X_1 + 1.4X_2 + 3.3 X_3 + 0.6X_4 + 1.0X_5 \\
 &= 1.2 * 0.25868 + 1.4 * 0.188166 + 3.3 * 0.053674 + 0.6 * 0.272541 + 1.0 * 0.272541 \\
 &= 1.2926182 \\
 Z_{2004} &= 1.2X_1 + 1.4X_2 + 3.3 X_3 + 0.6X_4 + 1.0X_5 \\
 &= 1.2 * 0.288715 + 1.4 * 0.273338 + 3.3 * 0.058953 + 0.6 * 1.297698 + 1.0 * 0.280677 \\
 &= 1.6002987 \\
 Z_{2005} &= 1.2X_1 + 1.4X_2 + 3.3 X_3 + 0.6X_4 + 1.0X_5 \\
 &= 1.2 * 0.319387 + 1.4 * 0.024602 + 3.3 * 0.066178 + 0.6 * 1.653736 + 1.0 * 0.303963 \\
 &= 1.9322992
 \end{aligned}$$

Reference:

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