A MODEL FOR BUSINESS FAILURE ANALYSIS

A Thesis

by

MIRZA SHAH NOWAZ

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CERTIFICATE

This is to certify that this work has been done by me and it has not been submitted elsewhere for the award of any degree or diploma.

Countersigned

(Supervisor) 20-7-1984.

Signature of the Candidate

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Approved as to style and content by:

_____

(Dr. A.B.M. Zohrul Kabir)   : Chairman
Asstt. Professor,
Dept. of IPE, BUET, Dhaka.

_____

(Dr. A.F.M. Anwarul Hoque)   : Member
Professor and Head,
Dept. of IPE, BUET, Dhaka.

_____

(Dr. M. Anwarul Azim)   : Member
Professor,
Dept. of IPE, BUET, Dhaka.

_____

(Dr. M. Mizanur Rahman)   : Member
Professor,
Dept. of IPE, BUET, Dhaka.

_____

(Dr. A.H.M. Habibur Rahman)   : Member
Professor,   (External)
Department of Finance,
University of Dhaka.

July, 1984

ALL PRAISES ARE FOR ALLAH, THE ALMIGHTY

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ABSTRACT

A general mathematical model based on conventional
financial ratios has been derived for analysing business
performance and its trend. The financial ratios can be
calculated from the published accounts of an enterprise.
The model is in the form of a single linear function
consisting of seventeen ratios found to be significant by a
2-way discriminant analysis. In all, thirty six ratios and
seventy nine cases have been analysed. DISCRIMINANT sub-
programme of IBM SPSS package has been used to isolate the
significant ratios with their relative weightages. The
resultant model produces for an enterprise, a point value
called Z-score in the solvency barometer or Z-scale which
is a continuum with cut-off point at zero. This model
compares favourably with those of Altman and Taffler-Tisshaw.
Multiple regression analyses have been performed to deter-
mine the relationships between the variables of the present
model with those of Taffler-Tisshaw. The significant ratios
have been grouped as profitability ratios, assets turnover
ratios, equity ratios and stock turnover ratios with
respective contributions of 24.69%, 24.18%, 20.29% and
12.07% towards Z-score. Business failure diagnostics have
also been discussed.

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NOTATIONS

N_1 = Number of observations in first sample

N_2 = Number of observations in 2nd sample

α = A linear function of measurements

λ = Function coefficients

D = Difference between the means of two groups

S_{ij} = Sum of squares or products from the means

X_i = Measurements in first group/second group

π_1 = Population of the first group

π_2 = Population of 2nd group

CHAPTER-1

INTRODUCTION

1.1 General Introduction:

The word 'business'[1] refers to all those activities which are connected with the production or purchase of goods and services with the object of selling them at a profit. It includes activities connected with manufacturing, trading, transportation, storing, banking and finance. When an establishment is engaged for the production of goods or provision of services using factors of production viz. machinery, equipment and also workers, it means a 'plant'[1]. The word 'Firm'[1] refers to the concern which owns and manages a plant or plant manufacturing the same product or even different products, and in addition arranges for marketing of the products. The term 'Industry'[1] refers to the aggregation of firms engaged in the manufacture of similar products either for final consumption or for use by another undertaking for further transformation into finished products.

The general belief is that the aim of business is to earn profit. Though this is true to a large extent a truly successful business cannot afford to keep profit as its sole objective. Ford[1] has stated that business is not mere money chasing but it also should have an objective of 'Service to the community'.

However, profit plays an important part as a measure of

success. It is the measuring rod of business performance
and the test of efficient business operations. Moreover,
a firm has to avoid losses if it wants to continue for long.

In modern days owing to the large scale production of
commodities through the joint stock corporations, the
competition among units/companies has become severe not
towards the objective of maximisation of profit but towards
the earning of sufficient profit to cover the risks of
economic activity which are beyond the control of the busi-
nessmen. Thus there has been a race among business units/
companies to improve efficiency and to reduce cost of
production. Again, the demand for products is unpredictable
because the demands are everchanging due to the influence
of fashions and the introduction of substitutes. Because
of these factors running a business is not a very easy jobs
and the businessman must be concerned with the study of the
methods and procedures of promoting the business unit and
furnishing it with the factors of production, producing
quality goods at the lowest possible cost, and supplying to
the consumers at the lowest possible cost and yet earning
adequate profit.

Business is increasingly becoming an important pro-
fession in modern age. It is also becoming more and more
complex and competitive. The knowledge of many things is
essential for acheiving real success in business. The
problems related to the survival of a business are as
follows: (2)

A Financing problem - difficulty in meeting obligations.

A.1   Liquidity deficiency - the company's current liabilities exceed its current assets, which results in difficulty in meeting current obligations.

A.2   Equity deficiency - the company's solvency is questionable because of a retained earnings deficit or in more extreme cases, an excess of total liabilities over total assets (negative net worth).

A.3   Debt default - the company has been unable to meet debt payment schedules or has isolated one or more covenants of its loan agreements.

A.4   Funds shortage - the company has either limited or no liability to obtain additional funds from various capital sources.

B.   Operating problems - apparent lack of operating success.

B.1   Continued operating losses - no net profit has been earned for more than one past period.

B.2   Prospective revenues doubtful - revenue is insufficient for day to day operating needs, or there have been cutbacks in operations such as personnel reductions.

B.3   Ability to operate is jeopardized - legal proceeding related to operations, or suppliers of operating materials may refuse to transact with the company.

B.4   Poor control over operations- the company management
has been unable to control operations, as evidenced by
repetitive, uncorrected problems.

Financial statements quantify information concerning
the financial position of a company and the results of its
operations.

Based on the financial statements, it is essential
to evaluate whether the company will be able to continue
to operate successfully or will face liquidation, bank-
ruptcy or reorganization in future.

Such an evaluation will help management for efficient
financial planning[1] and to appraise the eventual financial
risk. Proper financial planning estimates both the present
and future needs for working and fixed capital and also
devises means to procure the required amount of capital
from different sources. External investors will evaluate
the corporate credit-worthiness of the firm by determining
the total amount of assets held, existing mix of these
assets and the financial risk involved.

Ultimately, the evaluation of a company's future trend
mostly rests upon subjective judgement and experience.
Recognizing the fact that such an evaluation process is a
difficult and imperfect one and the evaluator often fails
to warn of impending disasters. Because of there limitations
and shortcomings of the evaluation process some additional
tools of analysis could be helpful.

1.2 Scope and Objectives:

The objectives of the present research are:

i) To develop a general mathematical model based on conventional financial ratios for analysing business performance and its trend. A single linear function consisting of those ratios will provide a numeric score to give an indication of the corporate health of a company.

ii) To test the adequacy of the derived model.

iii) To compare the derived model with the models formulated by earlier workers.

iv) To identify the probable causes of failure in order to prescribe remedial measures well in advance.

CHAPTER-2

LITERATURE REVIEW

To evaluate the worth and effectiveness of business
activities by adopting 'financial ratio analysis' is not
new and goes back to 1920[3]. The ratios are derived from
financial statements and the more common of them fall into one
of the three generic groupings according to their use. These
main groups of ratios are[4].

1. Measures of profitability.

2. Measures of asset use.

3. Measures of liquidity and the use of debt.

The implication of these ratios in financial analysis,
management policy and decision making is overwhelming. The
topic has received considerable exposure in almost all cost
engineering, management accounting, financial management and
business finance texts.

Ingham and Harrington[5] have arranged a
collection of simple but comprehensive measures into a
logically constructed framework, the presentation resembling
a pyramid of ratios[3]. The frame work has particularly
been used by the organisations conducting interfirm compa-
rison (IFC) for management in England. The term interfirm
comparison (IFC)[3] refers to an organised pooling between
firms of an industry of key business data on an anonymous,
confidential and agreed uniform basis. Each company taking

part is reported as to how its overall success compares with that of others in the same industry and why it differs from others.

Financial ratio analysis[2] has also been utilized a great deal of late in the evaluation of business entity regarding its ability to continue to operate successfully in future. Prior to that the process of evaluation depended entirely on the subjective judgement and experience on the part of the evaluator.

In the last fifty years or so studies have appeared periodically which examined the financial ratios of firms in order to assess the predictability of business failure. Typically these studies examined individual financial ratios of solvent and insolvent business units for their predictive accuracy. The most recent study of the traditional one-variable-at-a-time or univariate approach claimed that certain measures were fairly accurate in forecasting failure as much as five years prior to collapse[6].

In fact, sound liquidity analysis[7] clearly involves (a) considering as many ratios as are relevant (b) comparing each of these ratios with their previous values and (c) comparing each of these ratios with the means (or other averages) for companies in a similar class of business. Though each ratio in (a) may have its weakness, and though (b) may be entirely not valid if there is a general change

of economic climate, and (c) may engeneder false optimism
if all companies in a given class of business are doing
badly, the effect of multiple comparison will largely
cancel out some of these weaknesses.

If this technique is adopted, then no overall ratio
is important. Instead, it is important to assess the
measure of consensus between all useful ratios. For this
purpose 'non-parametric' or 'distribution-free' tests may
be used. The binomial sign-test[8] which is the most
simple of all non-parametric tests helps to assess the
degree of consensus. In sign-test, positive and negative
signs are used rather than quantitave measurements of
variables.

For establishing whether a business unit is showing
a growth or decline, all of its useful financial ratios
will be compared. The differences between the present and
previous values of these ratios will indicate that the
firms position is declining when bulk-of the differences
are represented by negative signs and vice-versa. Such a
test has its weaknesses[7] that we are giving equal weight
to ratios that may not be equally important; that simple
statistics is employed to assess the degree of agreement
between all ratios. In spite of the limitations, it at
least forces management to examine all relevant ratios and
thereby diagnose the real causes of potential failure
more easily.

In 1968, Altman[9] presented a model utili-
zing many financial ratios at a time commonly called a
multivariate approach. The financial ratios were combined
and analyzed with a statistical procedure called "discrimi-
nant analysis". The purpose of this was to discriminate
between a sample of bankrupt firms and a matched (by indus-
try and asset size) sample of healthy firms. A linear model[9,10]
was developed whereby five financial ratios were appropriately
weighted in order to maximize the predictive power of the
model and at the same time adhere to the necessary statistical
assumptions.

Since Altman's model other techniques have been
developed by Hhem, Edminister, Taffler and Tisshaw. Based
on the original work of Altman, Taffler and Tisshaw[11] extensively
constructed a model which is used in U.S.A. To construct
the solvency model, linear discriminant analysis was applied
to two groups of financial ratios. The first set was derived
from 46 firms failing since 1969 (i.e. the bankrupt sample)
and the other from 46 financially sound firms matched by
size and industry (i.e. the solvent sample). Eighty diff-
erent ratios, typical of those, any financial analyst
might use, were calculated for each of the 92 firms. Extensive
statistical analysis finally isolated four ratios which
discriminated best between the two sets of firms. Based on
four significant ratios, the model produces an overall
discriminant score or z value and hence known as 'z model',
Zero value in the z scale in the cut off point separating

the solvent and insolvent region. The higher up the scale, the more sound the enterprise; the more negative its rating the more insolvent it looks. The power of the model is nearly 100% as indicated from applying the model to the 92 firms from which it was derived.

Although the model appears very simple since the numeric solvency index can be determined from only four ratios taken together but for any remedial action it is essential to consider each ratio in isolation. Extensive statistical analyses are required to discover the 'contribution' of those ratios towards failure. The previous authors did not make this sort of attempt to identify the causes of failure in particular.

Regarding the universality of the Taffler-Tisshaw's model, one point needs further clarification. The formula proposed by the authors for unquoted companies[11] consists of five ratios which are not similar to those ratios of the early model. Nothing has been mentioned to clarify the discrepancies between the two formulae which at least indicates that there is no single model to apply in all situations.

CHAPTER-3

FORMULATION OF THE MATHEMATICAL MODEL

3.1 General Statement of the Business Performance Analysis:

With the growing complexity of industries as well as the rapid change of business environment, periodic systematic evaluation regarding the existing trend of a particular business is very essential. In general the appraisal should consider all factors related to allocating of scarce resources and also efficient utilization of the resources leading to high financial returns. In this context, a business is viewed as a mechanism[4] for adding value to the resources it utilizes and its success is measured by the difference between the value of its output (sales of goods and services) and the cost of the resources used in creating that output.

From time to time accountants produce statements which give a picture of the position of the firm at a given moment. The balance sheet[12] is a summary of assets and liabilities at a particular date. It is possible to look at two balance sheets to see what progress the firm has made. But the route it has taken in changing its position is set out to a certain extent by income statement or profit and loss statement[12]. It summarizes the revenue items,the expense items and the difference between them (net income) for an accounting period. In a technical sense the income statement[4] is subordinate to the balance sheet in that it shows in some

detail the items that together account for the change
during an accounting period in one balance sheet category,
owner's equity, and more specifically in one item in that
category, retained earnings. Nevertheless, the information
on the income statement is usually more important than
information on the balance sheet since the former reports
the results of operations and indicates reasons for busi-
ness profitability or lack thereof.

However, both the income statement and the balance
sheet can be combined into a package that discloses impor-
tant information about the events of an accounting period.
Such a package commonly known as a statement of funds
flows[4] would be developed through a number of steps
viz,

(i) The net cash inflows from operations during the
period is noted from the income statement.

(ii) The net changes in the asset, liability and
net worth are classified from the balance sheet at the
beginning and end of the year.

In this way, the financial data can be structured
to appraise a firm's financial position at year-end. But
it is not possible to get an overview of the financial
picture from the funds flow statement alone. A purposeful
ratio analysis provides sufficient scope for further
analysis.

3.2 Role of Financial Ratios in Business Failure Analysis:

The term financial ratios[12] or accounting ratios
is commonly used to mean relationships drawn from sets of
accounts. The ratios form a pattern of information which
is intended to give a picture of what has really happened
from the'shadow' information given in the accounts. They
will be meaningful and useful and will form the basis of
systematic method of analysis when a significant set of
ratios are selected - ratios that provide management with
valuable pointers in terms of liquidity, funds and profit-
ability. Theoretically, there are no limits to the no. of
ratios that can be derived. Foulk[13] suggests that five
hundred or more can be made. A brief description of the
thirty-six ratios which comprise the data inputs for the
present analysis is given below. Scarce financial infor-
mations limited the scope for determining other relevent
ratios.

1. Operating profit/operating capital[3]

Operating profit is the profile (before tax) earned
through the normal operations of the business. Operating
capital includes land and buildings, plant and machinery
and other fixed assets plus its current assets. This is
synonomous with total assets. This ratio reflects the
earning power of a business and shows whether profitable
use has been made of its total operating capital. A favourable

ratio helps the business to show a satisfactory return on
shareholders capital.

2. Operating profit/net sales[4]

Absolute figures for profit take on more meaning when
compared with sales. This ratio is often used as a measure
of profitability of a firm and indicates gross profit
margin on sales. Usually an increase in sales widens the
profit margin, since fixed costs need not rise in direct
proportion to sales. For the same reason, profits tend to
increase more rapidly percentagewise than do sales.

3. Net sales/operating capital[12]

The ratio measures the utilization of a firm in
obtaining from the funds or resources employed in the
business. It has got importance as one of the return on
investment ratios and tells whether the management is
able to make effective use of the resources at their
command.

4. Operating profit/capital employed[12]

Capital employed can be defined in a number of ways.
Here it is defined as fixed assets plus current assets
less current liabilities. The usefulness of the ratio is
obvious because management is more concerned with the rate
of profit earned on each $ 1 of capital employed rather
than the absolute profit.

5. Net profit/working capital[14]

Net profit in the present case is the retained earnings
after all deductions have been made from the operating
profit. Working capital represents the equity of owners
in the company's current assets: the difference between
total current assets and total liabilities. This margin
represents the cushion available to the business for
carrying receivables and for financing day-to-day opera-
tions. The ratio is useful in measuring the profitability
of firms whose operating funds are provided largely through
borrowing, or whose permanant capital is usually small in
relation to volume of salas.

6. Not profit/net worth[14]

Net worth is defined as the balance sheet values
attributable to total equity sources in the investment of
capital. This ratio, therefore, represents the efficiency -
with which invested capital has been employed. The return
on net worth figure for a company gives a rough indication
of what constitutes a minimum acceptable return on a new
investment for that company. Certainly, any investment
proposal indicating a return lower than what the company
is presently earning cannot be considered a particularly
attractive investment opportunity.

7. Net profit/total assets[14]

The ratio is closely related to the net profit/net worth ratio, except that here the theory is that return on investment should be measured in terms of all capital employed in the business - whether supplied in the form of equity or debt - and not in terms of equity interest only. For evaluating different investment appraisals, this ratio plays a significant role.

8. Net sales/net worth[14]

This ratio is another measure of profitability of widespread use and keen significance, particularly to share capital investors. It relates sales after taxes to the total investment in the form of share capital, reserve/ surplus and accumulated profit/loss. It measures the rate of capital turnover showing how actively the firms capital is being put to work. If the capital is turned over too rapidly, liabilities are apt to build up at an excessive rate; if capital is turnedover too slowly, funds become stagement and profitability suffers. Hence there is an optimum rate which may be significantly diversified for different companies.

9. Net sales/working capital[14]

The rate of working capital turnover can highlight a financial problem if it is either very low or high. If

the ratio is high, the business may owe too much, relying
on credit as a substitute for an adequate margin, of current
operating funds.

10. Sales/fixed assets[14]

The ratio measures the use rate of the firms resources
which is relatively long lived like land and building, plant
and machinery etc. The ratio is less significant in itself
than when compared with the same ratio for previous years.
Such a comparison shows whether, or, not the funds used
to increase productive capacity are being spent wisely.
If comparable sales increases have failed to accompany
sizeable investments in fixed assets, then poor asset
utilization is indicated.

11. Sales/stock[15]

This important ratio indicates the rate of turnover
of stock in trade i.e a measure of the volume of business
being done by the firm. Since a considerable portion of
cash is tied up with the stock in the form of purchased
raw materials, work-in-progress, goods in transit and
finished goods, the greater the ratio, the more cash
released and the greater possibility of accumulation of
profit in the business. On the other hand, slowdown of
stock turnover can of course, hinder a company's ability
to meet its current obligations and can affect its costs,

particularly through the incurrence of charges to support the luxury of excessive inventory or through the loss of purchase discounts which may result from the slowdown of cash flow.

12. Finished stock/sales[15]

Finished stock is a part of current assets and its utilization is compared with sales figure. The finished stock turnover ratio is an important indication of how long goods are kept before being sold. Clearly the quicker the finished goods can be disposed of, the better profit is likely to the maximised. Any reduction in the ratio indicating that the turnover is slower may call for action to increase sales. Alternatively, if there is over-production there may have to be curtailment of output. In short, sales and production will have to be coordinated. If the turnover rate increases too much there may be a danger that customers needs cannot be met promptly - this fact may prevent maximum profit being earned.

13. Materials stock/sales[15]

The ratio is similar to the previous one except that finished stock is substituted by raw materials stock. When there is no marked fluctuation in sales revenue, a rise in this ratio will manifest as a fall in the previous one. Since the usage of raw materials often is not known with certainty,

a higher ratio ensures the possibility of running out of
stock. When a manufacturer runs out of raw materials he
will lose production and his cost per unit may rise.
However, in same companies there is often a marked vulnera-
bility brought about by the possibility of price fluctuations
in raw materials. If a business is carrying large stocks
experiencing wide fluctuations in prices and there is price
fall, serious consequences may result.

14. Profit before tax/total liabilities[11]

The ratio indicates the ability of an enterprise to
cover both current liabilities and long-term obligations
through its gross margin.

15. Net production cost/cost of output[16]

Gross production cost in the case of an industrial
plant includes costs of material, labour, fixed and vari-
able overheads, capital charges etc. When material cost is
excluded from the figures indicates net production cost.
Cost of output accounts for sales and distribution overheads
together with gross production cost plus adjustment due to
finished stock. The ratio expresses the fraction of total
cost of output on production purposes.

16. Materials cost/cost of output[15]

The ratio indicates the percentage breakdown of cost
of output as raw materials cost item.

17. Gross production cost/cost of output[16]

This ratio is directly influenced by the previous two ratios and can be controlled by excersing suitable ‑control over both of them.

18. Cost of output/average stock[12]

Stock turnover is sometime expressed by this ratio since cost of output is nothing but sales at cost price and stock figure is usually an average figure for the year. If the cost of output is not known, sales figure is subs‑tituted by a more precise measure of physical turnover can be obtained by using cost of output rather than sales.

19. Opreciation/net production cost[15]

Tangible fixed assets are depreciated and the ratio points out the relative percentage in relation to net production cost.

20. Value added/factory employee[15]

Value is added to materials by the process of production and is obtained by subtracting the raw materials expenses from the total sales value. The ratio stands as a measure of output per employee. It indicates whether the management is utilizing its factory labour efficiently or not.

21. Current assets/current liabilities[12]

The most commonly used ratio also known as current ratio compares assets which will become liquid in approximately

twelve months with liabilities which will be due for payment
in the same period. The current ratio is used by creditors
as a measure of the extent that current asset values could
shrink in liquidation of the firm and still be adequate
to cover liabilities and the eventuality of losses. It is
hard, however, to say exactly what is satisfactory, a 2:1
ratio being considered a standard, but many good firms show
a lower margin, whilst some ones, by over valuing assets,
show a much higher margin. In general the more liquid the
current assets, the less margin needed to cover current
liabilities.

22. Current assets less stock/current liabilities[12]

In order to refine the analysis of the current ratio
this ratio is used which is known as acid test or net quick
ratio. It is similar to current ratio but takes only those
current assets which are cash or will convert very quickly
to cash. It indicates the firm's immediate ability to meet
current obligations. If a large proportion of the current
assets remains in the form of stock in trade, the liquid
position does not provide adequate safety margin to cover
more than current liabilities. Hence this ratio should·be
always greater than one expressing that provided creditors
and debtors are paid at approximately the same time, the
company has sufficient liquid resources to meet its current
obligations.

23. Current assets/total liabilities[11]

This is related to the conventional current ratio and is a measure of the working capital position of the firm. The greater the ratio, the sounder the enterprise.

24. Profit before tax/current liabilities[11]

This is a profitatbility measure indicating the ability of an enterprise to cover its current liabilities through its earning power. If it has a low or negative value for this ratio, its downside risk is clearly greater than that for the average manufacturing company.

25. Working capital/total assets[7]

Since working capital provides a basis for current recurring financing, the particular ratio is important for evaluating risk of lenders. Lenders for short term debt will be interested to see the company's present ability for repayment of loans rather than its fixed assets.

26. Revenue before tax and interest/total assets[7]

The ratio is similar to sales/operating capital except that income other than sales has been included in the present ratio. It highlights the overall return on total investment in the enterprise.

27. Net worth/total assets[17]

The ratio shows what stake the equity capital has in
the total assets of the business in comparison with long
term and current obligations. Lenders might be doubtful
about lending more until the existing percentage of equity
capital is sufficiently sound. Because the larger the
proportion of the assets of a business that has been furni-
shed by the stock holders, the bigger the decline that can
t ake place in assets while still affording protection for
creditors. Two types of companies can have a higher propor-
tion of debt: those that have very liquid assets that are
transformed into cash continuously as part of the business
process and those compamies whose assets although liquid,
produce steady flow of income. Since a low ratio will
hamper additional borrowing, but there is little seasonal
requirements, short term debt is a low cost method of
temporary funds. Long term debt in reasonable amounts will
raise the return for the common stock holder as long as
the earnings on such funds exceed their cost.

28. Fixed assets/net worth[14]

The ratio shows the extent to which the owners funds
are tied up in assets with a low turnover. A firm's tendency
to overinvest in fixed assets can often be identified by
this ratio. A high value of the ratio results in heavy
depreciation and interest burdens, which can lead to serious
profit problems should any sales difficulties be encountered.

29. Fixed assets/operating capital[17]

The total capital should be put to effective use in
order for the concern to perform its business purpose and
to assure its survival and prosperity. To accomplish these
ends, management should decide wisely regarding the appor-
tionment of the total capital among current assets, fixed
assets and miscellaneous assets. The particular ratio
measures the extent to which a company's total capital is
tied up in nonliquid, permanent, depreciable assets. A
disproportionate high investment in fixed assets places
burden on the company because it limits current assets and
productive miscellaneous assets, increases debt position.

30. Current liabilities/total assets[11]

The ratio is measuring the company's current liabilities
position, and is a financial-leverage ratio. The greater
its magnitude, the more serious the problems the company
has to face in financing the cost of its debt and the
acquisition of additional debt.

31. Total liabilities/capital employed[4]

The ratio reflects the financial condition of the
company by comparing its total obligations with its total
capitalization. It is a tool to assess the creditworthiness
of a firm and is useful to lenders for long term debts.

32. Immediate assets/capital employed[12]

. The ratio expresses the immediate or liquid position
of a firm in relation to the total capitalization. Some
firms can afford lower level of liquid reserves while
others cannot. Firms experiencing insufficient immediate
or cash balances face strong temptation to lean on their
suppliers by delaying payment of trade obligations. The
tolerence of suppliers is not unlimited and thereby the
trading efficiency of the subject firm is hampered consi-
derably.

33. Current liabilities/net worth[14]

The ratio provides a means of evaluating a company's
financial condition by comparing what is owed with what
is owned. The company with a lower than average ratio which
denotes a strong ownership interest or position - enjoys
relative freedom from creditors demanding repayment of
debt or attempting to impose their wills on the company's
management decisions. A higher ratio - any value over 0.80 -
indicates that the firm is overly dependent on its creditors.
Again financial obligations which is current in status
carries with it more immediate danger to the company's
operating freedom - because of its early maturity. From
the point of view of time, the current ratio is the more
pressing.

34. Total liabilities/net worth[17]

The operating freedom of every company is conditioned by the relative stake creditors have in the business in constrast with that of the owners. Whenever this particular ratio exceeds 1.00 it indicates that the creditors have a greater equity in the firms assets than do the owners. Such top heavy liabilities make the business extremely vulnerable to any unexpected contigencies and management may be compelled by creditors to courses of action that rob the company of valuable initiative and innovation.

As compared with short term debt, long term obligations has its own peculiar peril in that it is generally more exactly fixed as to maturity and repayment requirements. Moreover, repayment of long term debt is usually more enforceable because almost all long term obligations is backed by pledge of specific collateral.

35. Immediate assets-current liabilities/operating cost - depreciation[11]

The ratio is also known as no - credit interval and akin to the acid test. It calculates the time for which the company can finance its continuing operations from its immediate assets if all other sources of short-term finance are cut off and is a ratio relatively new to accounting literature.

36. Equity/total debt[4]

Comparison of borrowed funds with ownership fund is
of much interest to many analysis. This ratio summerizes
the relationship between total equity and total debt. The
creditors can regard the ownership funds as representing
a buffer protecting him from loss. From creditors view
point, the higher the percentage of equity, the better
because the assets could shrink in liquidation considerably
and still be sufficient to cover debt claims, since cre-
ditors are entitled to be paid out in full before the
owners are entitled to be paid anything. Of course, the
amount of debt that the business can reasonably endure
depends on many factors. A view generally expressed is
that indebtedness should not exceed the equity i.e a ratio
of 1:1 is preferred. But this is not a rigid rule flexible
with the nature of business and general economic condition.
A public utility with stable earning and favourable pros-
pects many safely finance a much lower ratio than can
say, a manufacturer with a past record of erratic profit-
ability who produces a single speciality product of uncer-
tain long-term demand.

In times of prosperity there is a tendency for a larger
volume of borrowing to be undertaken and for this to be
regarded as being quite normal. On the other hand, in a
trade recession total indebtedness would be expected to be
much lower than the equity capital.

3.3 Model Construction Approach

3.3.1 Derivation of discriminant function

A multivariate statistical technique known as discriminant analysis[10] is adopted in constructing the model. The objective of discriminant analysis is to weigh and linearly combine the discriminating variables (financial ratios of the firms in the present analysis) in such a way as to obtain a single dimension on which solvent firms are clustered at one end and insolvent firms at the other end. The single dimension is a particular statistic known as discriminant function which is derived to maximize the remaining distance between the square of the difference between group means and the variance within groups. The mathematical treatment for the derivation of the discriminant function is given in Appendix-E. The meaning of the function will be illustrated with the help of an example[10].

Suppose one wishes to discriminate between good and bad loans by a family loan agency. The variables are

X_1 = age nearest 5 years

X_2 = logarithm of number of years (plus one) with present employer

X_3 = ratio of total debt to total annual earnings, in per cent

Calculated measures for two groups

	Good accounts	Bad accounts
N	6	5
ΣX_1	240	160
$\overline{X}_1$	40	32
ΣX_2	5.46	1.68
$\overline{X}_2$	0.91	0.336
ΣX_3	73	118
$\overline{X}_3$	12.2	23.6
ΣX_1^2	10,250	5,250
ΣX_2^2	237.90	51.90
ΣX_3^2	2,025	3,710
$\Sigma X_1 X_2$	5.7876	0.7704
$\Sigma X_1 X_3$	943	2,892
$\Sigma X_2 X_3$	61.90	43.44

d_1 8.00

d_2 0.574

d_3 -11.40

Solving the equations (E.10)

$$\begin{bmatrix} 780.00 & 17.640 & -161.00 \\ 17.64 & 1.02492 & -0.738 \\ -161.00 & -0.738 & 162.033 \end{bmatrix} \begin{bmatrix} \lambda_1 \\ \lambda_2 \\ \lambda_3 \end{bmatrix} = \begin{bmatrix} 8.00 \\ 0.574 \\ -11.4 \end{bmatrix}$$

the discriminant function is obtained as

$$D = 0.0352X_1 + 1.0932X_2 - 0.1003X_3$$

$$D_1 = 1.637 \quad \text{for good accounts}$$

$$D_2 = 3.126 \quad \text{for bad accounts}$$

If the cut-off point is choosen as the mid-point between these two figures, it may be estimated that any account with discriminant value above 2.382 to be bad and below this value to be good.

To test the hypothesis of no discriminating capability, F is calculated to be 9.45 with 3 and 7 degrees of freedom. Reference to the F table shows this value to be significant at the 0.01 level, hence it may be concluded that the variables used as discriminators have some ability to discriminate between good and bad loans.

3.3.2 Isolation of ratios

Quite often there are more discriminating variables than necessary to achieve satisfactory discrimination. To select the most useful of these the stepwise procedure[18] is followed. The procedure will be discussed in article 3.3.4.

3.3.3 Classification of cases

To classify the original set of cases to see how many are correctly classified is an overall measure of the adequacy of the discriminant function. The procedure for classification will be discussed in article 3.3.4.

3.3.4 Application of the computer program is SPSS

Subprogram DISCRIMINANT[18] performs discriminant analysis

through a variety of stepwise methods selecting the best set of

discriminating variables. The user indicates the stepwise selec-

tion criterion to be used through the METHOD specification. Present

criterion (METHOD = RAO) is Rao's V, a generalised distance

measure. The variable selected is the one which contributes the

largest increase in V when added to the previous variables. This

amounts to the greatest overall separation of the groups. A vari-

able which contains a large amount of information already included

in the previous selected variables may actually cause a decrease

in the value of V. This implies a decline in discriminating power

since the groups are being brought more closely together. Such

a variable is not included. Moreover, the change in V has a chi-

square distribution with one degree of freedom facilitating

statistical significance testing.

As variables are selected for inclusion, some variables

selected may lose their discriminating power. Such variables

are redundant and should be eliminated. Thus, at the beginning

of each step, each of the previously selected variables is

tested to determine if it still makes a sufficient contribution

to discrimination. The variable making the least contribution

is eliminated. To test the adequacy of the derived discriminant

function, classification of the original set of cases is done

by the same program. Classification is achieved through the

computation of classification functions, one for each group

using a separate linear combination of the discriminating variables.

Under the assumption of multivariate normal distributions, derived

classification score for each case can be converted into proba-

bilities of group membership.

CHAPTER-4

DATA COLLECTION AND ANALYSES

4.1 Preparation of Input Data for the Subprogram DISCRIMINANT

To provide data for the SPSS DISCRIMINANT subprogram,
36 financial ratios of 79 enterprises of BCIC and BSEC were
worked out from the balance sheets and profit and loss
accounts. In order to get a generalised model, it was
tried to include enterprises from private sectors and
other corporations. But unfortunately most of them lack
in regular published accounts and the authorities of the
private sectors were reluctant to show their books of
accounts.

The total sample of 79 firms were classified into
two groups, the first being apparently financially solvent
(subfile GO) and the other being apparently losing (subfile
NGO). Balance sheet and profit and loss account of the
firms are provided in Appendix-A and Appendix-B. 36
financial ratios-are listed in Appendix-C and discussed
in details in Chapter 3. A listing of the SPSS DISCRIMINANT
subprogram is given in Appendix-D.

4.2 Output from Subprogram DISCRIMINANT

Since there are only two groups i.e subfile GO and
subfile NGO only one discriminant function is possible.

The standardized and unstandardized coefficients for this function are reported in Table 4.1. The standardized function coefficients are computed by conveting the original discriminating variables in standard form. When the sign is ignored, each coefficient represents the relative contribution of its associated variable to that function. The sign merely denotes whether the variable is making a positive or negative contribution. The unstandardized function coefficients when multiplied by the raw values of the associated variables, summed together and added on to the constant produce a discriminant score.

The average of the scores for the cases within a particular group is referred to as group centroid. This is the most typical location of a case from a group in the discriminant function space.

The summary table provided by the program is shown in Table 4.2. It illustrates the stepwise procedure based on the selection criterion (Rao's V) discussed in article 3.3.4. Cannonical correlation[18] measures the degree of association between the single discriminant function and significant variables. It is a measure of the functions ability to discriminate among the groups. Wilks' lambda[10] is a criterion to test the discriminating power of the significant variables. The chi-square approximation of the distribution of wilks' lambda provides a probability level (significance level) for accepting

the null hypothesis of equality of populations on the assumption of equality of dispersions. A decrease in the value of lambda increases the confidence to reject the null hypothesis.

The discriminant scores for each case are printed with the probabilities of group membership in Table 4.3. The procedure for computing the probabilities is discussed in Article 3.3.4. The largest and the second highest probabilities are printed as P(G/X). Another probability P(X/G) is the probability that a member of the predicted group would be as far from the centroid as the case being considered.

The individual case is located on the continuum representing the function in Fig. 4.1. The plots take the form of histograms and numbers 1 and 2 signify two group identifications.

The classification results are provided in Table 4.4.

TABLE 4.2

DISCRIMINANT ANALYSIS

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SUMMARY TABLE

STEP	ACTION ENTERED REMOVED	VARS IN	WILKS' LAMBDA	SIG.	RAO'S V	SIG.	CHANGE IN V	SIG.	LABEL

CANONICAL DISCRIMINANT FUNCTIONS

FUNCTION	EIGENVALUE	PERCENT OF VARIANCE	CUMULATIVE PERCENT	CANONICAL CORRELATION	: AFTER FUNCTION	WILKS' LAMBDA	CHI-SQUARED	D.F.	SIGNIFICANCE
					0	0.2141516	124.07	17	0.0000
1*	3.67632	100.00	100.00	0.8873381					

* MARKS THE 1 CANONICAL DISCRIMINANT FUNCTIONS TO BE USED IN THE REMAINING ANALYSIS.

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TABLE 4.3

DISCRIMINANT ANALYSIS

CASE SUBFILE SEQNUM	MIS VAL	SEL	ACTUAL GROUP	HIGHEST PROBABILITY GROUP P(X/G) P(G/X)		2ND HIGHEST GROUP P(G/X)		DISCRIMINANT
GO	1		1	1	0.7309 0.9999	2 0.0002	1.9363
GO	2		1	1	0.5771 0.9994	2 0.0006	1.6210
GO	3		1	1	0.2989 0.9594	2 0.0442	0.4533
GO	4		1	1	0.4692 0.9990	2 0.0110	0.8669
GO	5		1	1	0.4957 1.0000	2 0.0000	2.4595
GO	6		1	1	0.4591 0.9884	2 0.0116	0.8521
GO	7		1	1	0.0744 1.0000	2 0.0000	2.3077
GO	8		1	1	0.7969 0.9961	2 0.0039	1.3235
GO	9		1	1	0.5164 0.9999	2 0.0005	1.6974
GO	10		1	1	0.1139 0.8447	2 0.1531	0.1310
GO	11		1	1	0.4178 1.0000	2 0.0000	2.4025
GO	12		1	1	0.5290 0.9995	2 0.0005	1.7055
GO	13		1	1	0.1425 1.0000	2 0.0000	3.0231
GO	14		1	1	0.2789 1.0000	2 0.0000	2.6751
GO	15		1	1	0.8253 0.9997	2 0.0003	1.8131
GO	16		1	1	0.8239 0.9993	2 0.0014	1.3697
GO	17		1	1	0.1285 0.8132	2 0.1904	0.0722
GO	18		1	1	0.1204 0.7043	2 0.2947	0.3202
GO	19		1	1	0.2649 0.9521	2 0.0100	2.4754
GO	20		1	1	0.4018 1.0000	2 0.0000	2.4669
GO	21		1	1	0.5504 0.9193	2 0.0027	1.5803
GO	22		1	1	0.7773 0.9679	2 0.0021	1.3096
GO	23		1	1	0.5120 0.9994	2 0.0001	3.1203
GO	24		1	1	0.3195 1.0000	2 0.0000	2.5555
GO	25		1	2	0.3205 1.0000	2 0.0000	0.5858
GO	26		1	1	0.9071 0.9589	2 0.0511	1.4668
GO	27		1	1	0.6168 1.0000	2 0.0000	3.9843
GO	28		1	1	0.0343 0.9914	2 0.0045	1.0013
GO	29		1	1	0.5722 0.9992	2 0.0009	1.5576
GO	30		1	1	0.6467 0.9699	2 0.0004	1.7349
GO	31		1	1	0.1311 0.7976	2 0.1024	0.2558
GO	32		1	1	0.2071 0.5211	2 0.2799	0.3309
GO	33		1	1	0.3732 0.9612	2 0.0313	0.5629
GO	34		1	1	0.8791 0.9992	2 0.0003	1.5562
GO	35		1	1	0.4716 0.9992	2 0.0118	4.8725
GO	36		1	1	0.2573 0.9971	2 0.0073	1.2833
GO	37		1	1	0.2650 1.0000	2 0.0000	2.5157
GO	38		1	1	0.9151 0.9999	2 0.0001	2.2433
GO	39		1	1	0.6037 0.9989	2 0.0011	1.4714
GO	40		1	1	0.1557 1.0000	2 0.0000	3.0119
GO	41		1	1	0.5369 0.9995	2 0.0005	1.6679
GO	42		1	1	0.5749 0.9999	2 0.0001	3.1533
GO	43		1	1	0.4250 0.9899	2 0.0020	0.7945
GO	44		1	1	0.7795 0.9699	2 0.0029	1.3124
GO	45		1	1	0.5165 0.9993	2 0.0004	2.3411
GO	46		1	1	0.8155 0.9993	2 0.0014	1.3591
NGO	1		2	2	0.9952 0.6499	1 0.3510	-0.4942
NGO	2		2	2	0.1726 0.7550	1 0.2910	-0.6757

DISCRIMINANT ANALYSIS

CASE SUBFILE SEQNUM	MIS VAL	SEL	ACTUAL GROUP	HIGHEST PROBABILITY GROUP P(X/G) P(G/X)		2ND HIGHEST GROUP P(G/X)		DISCRIMINANT
NGO	3		2	2	0.6521 0.9998	1 0.0002	-2.6145
NGO	4		2	2	0.2991 1.0000	1 0.0000	-3.0024
NGO	5		2	2	0.5295 0.9125	1 0.0075	-2.3132
NGO	6		2	2	0.6943 0.9999	1 0.0002	-2.6127
NGO	7		2	2	0.1509 0.8633	1 0.1378	-0.7960
NGO	8		2	2	0.3517 1.0000	1 0.0001	-3.0774
NGO	9		2 ***	1	0.1191 0.8540	2 0.1450	0.1495
NGO	10		2 ***	1	0.1268 0.8312	2 0.1608	0.1045
NGO	11		2	2	0.6592 0.9986	1 0.0014	-2.1423
NGO	12		2	2	0.6741 0.9999	1 0.0001	-2.6333
NGO	13		2	2	0.5464 0.9918	1 0.0082	-1.6463
NGO	14		2	2	0.6975 0.7610	1 0.2730	-0.5627
NGO	15		2	2	0.5421 0.9997	1 0.0003	-2.4445
NGO	16		2	2	0.2399 1.0000	1 0.0000	-3.4063
NGO	17		2	2	0.0233 1.0000	1 0.0001	-4.3529
NGO	18		2	2	0.0040 0.9994	1 0.0006	-2.8878
NGO	19		2	2	0.5936 0.9999	1 0.0001	-2.2402
NGO	20		2	2	0.7141 0.9940	1 0.0120	-1.9456
NGO	21		2	2	0.1366 1.0000	1 0.0000	-3.7061
NGO	22		2	2	0.1281 1.0000	1 0.0001	-3.6347
NGO	23		2	2	0.6168 0.9994	1 0.0031	-1.8301
NGO	24		2	2	0.8815 0.9997	1 0.0000	-3.6832
NGO	25		2	2	0.1125 1.0000	1 0.0000	-3.9487
NGO	26		2	2	0.4169 1.0000	1 0.0000	-3.0226
NGO	27		2	2	0.1946 0.9100	1 0.3121	-2.4159
NGO	28		2	2	0.5183 0.9599	1 0.3090	-1.1421
NGO	29		2	2	0.2102 0.7990	1 0.1000	-1.5601
NGO	30		2	2	0.1707 1.0000	1 0.0000	-1.5515
NGO	31		2	2	0.2409 1.0000	1 0.0000	-1.5137
NGO	32		2	2	0.4707 1.0000	1 0.0000	-1.1811
NGO	33		2	2	0.2107 1.0000	1 0.0000	

FIG. 4.1

DISCRIMINANT ANALYSIS

ALL-GROUPS STACKED HISTOGRAM

-- CANONICAL DISCRIMINANT FUNCTION 1 --

CLASSIFICATION 2222222222222222222222222222222222222
GROUP CENTROIDS

FREQUENCY

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TABLE 4.4

CLASSIFICATION RESULTS --

ACTUAL GROUP	NO. OF CASES	PREDICTED GROUP MEMBERSHIP	
		1	2
GROUP SUBFILE GO 1	64	64 100.0%	0 .0%
GROUP SUBFILE NGO 2	23	2 8.6%	21 91.3%

PERCENT OF GROUPED CASES CORRECTLY CLASSIFIED   97.47%

CLASSIFICATION PROCESSING SUMMARY

    79 CASES WERE PROCESSED.
    79 CASES WERE USED FOR PRINTED OUTPUT.

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ELAPSED TIME REQUIRED..   202.64 SECONDS.

    16 END FINISH DATA

CHAPTER-5

RESULTS AND DISCUSSIONS

5.1 Interpretation of Results and Discussions

The stepwise analysis of the financial ratios for the business failure model has produced a discriminant function, which is of linear form as in the following:

$$Z = K_0 + K_1(VAR01) + K_2(VAR02) + K_3(VAR03) + K_7(VAR07)$$
$$+ K_8(VAR08) + K_{11}(VAR11) + K_{12}(VAR12) + K_{13}(VAR13)$$
$$+ K_{18}(VAR18) + K_{19}(VAR19) + K_{23}(VAR23) + K_{24}(VAR24)$$
$$+ K_{26}(VAR26) + K_{27}(VAR27) + K_{31}(VAR31) + K_{32}(VAR32)$$
$$+ K_{33}(VAR33)$$

where Z = Z-score or discriminant score

K_0 = a constant

K_1, K_2, K_3 ...... K_{33} = coefficients

VAR01, VAR02,..... VAR33 = selected financial ratios.

The ratios are presented in decreasing order of their contribution towards Z-score in Table 5.1. Contribution percentage of each variable is its standardized coefficient expressed as a percentage of the total sum of coefficients of all variables (ratios).

The proposed model seems to be cumbersome since the deri-
vation of its Z-score involves too many financial ratios.
To calculate the Z-score, 17 financial ratios will have
to be worked out and the whole process is definitely
laborious and time consuming. But a closer look into the
list of the ratios presented in the Table 5.1 reveals that
different facets of a business have been taken into consi-
deration by them. The selected ratios have covered a broad
spectrum of business performance criteria regarding profi-
tability, utilization of assets, turnover of stocks and
financing criteria regarding liquidity, capital structure,
creditworthness etc.

It can, therefore, be concluded that Z-score provided
by the model is sufficiently reliable since it tries to
evaluate a business entity in its broader context rather
than peeping into the narrow segment of its operations.

The predictive power of the model is further supple-
mented by an analysis of its statistical significance which
is discussed below.

The results of the analysis indicate that a single
discriminant function of 17 variables produce a very high
degree of separation as indicated by the final Wilk's lamda
(0.21615) and a cannonical correlation of 0.88535. At this
stage tolerence level has become insufficient for further
calculation. This minimum tolerence is equivalent to 5
percent significance level[18].

Further evidence about the fact that the selected
variables are effective discriminantors can be derived
from the group centroids and a plot of cases. The group
centroids are reported in Table 4.1. These are the mean
discriminant scores for each group. The centroids are
quite apart from each other. These are further visualized
from the plotting of cases in Fig. 4.1. The zero point
for the abscissa is the grand mean of all the classified
cases. The clustering of the cases represented by their
group identification number (i.e 1 for GO sample and 2
for NGO sample) proves that initial classification is
sufficiently correct. It may be remembered that the ini-
tial classification was based upon the earning potential
(net profit/loss) of the firms. Only two firms namely
HABIB MATCH(80) and BBC(80) were misclassified with the
insolvent sample. This minority cases of misclassification
can actually be supported by a closer look at the signi-
ficant financial ratios of those firms. Although they have
incurred net losses but the two ratios namely VAR01 (i.e
operating profit/operating capital) and VAR02 (i.e
operating profit/net sales) taking care of the negative
operating profit contribute only 12.86% to the discrimi-
nant function shown in Table 5.1. The bulk of the contri-
bution from the rest 15 ratios has upgraded the financial
poisition of the firms akin to solvent sample.

5.2 Comparison of the Present Model with the Models of Altman and Taffler-Tisshaw

5.2.1 Comparison of the present model with Altman's model

The model developed by Altman produces an overall discriminant score or Z-value, so that

$$Z = 0.010(VAR03)+0.014(VAR07)+0.012(VAR25)$$

$$+0.003(VAR26)+0.006(VAR36)$$

where variables VAR01..... VAR36 have been referred to Appendix-C.

A score of 2.675% was established as a practical cutoff point. But Argenti's modification of Altman's formula states that if the total of all these factors(Z) falls below 1.0% (i.e. 0.018) there is a high probability that the business is nearing failure.

The discriminant scores of 79 cases of the present model together with the Z-scores of Altman's model have been presented in Table 5.2. From the comparison it is found that only 2 cases (namely Ispahani-81 and Mehar-81) of the solvent set have scored below critical level of Altman's model (i.e. 1.8%) and 9 cases (namely TSP-80, KNM-80, KPM-80, TSP-81, CCC-81, BBC-81, BELLA-81 & CSM-81) of the insolvent set have produced a higher score than the critical value. Ignoring the anomalies of the solvent set since its probability is very low (2' out of 46) it

may be concluded that the critical level of Altman's model
is lower relative to the critical level of the present
model. Altman's model fails to account for the turnover
of stock of commodities with respect to sales which has
been duly taken care of in the present model by the
variables VAR11 (i.e Sales/stock), VAR12 (i.e Finished
stock/sales). Thus differences in cash inflow from turn-
over to rescue a business from cash shortages have been
apportioned in the model. Liquidity ratios to assess the
financial condition of the firm derived by Altman's model
i.e VAR25 and VAR36 seem to be less informative than the
liquidity ratios of the present model i.e. VAR32 and VAR33.
VAR25 (i.e working capital/total assets) is a crude index
of liquidity since the financing capital is compared against
total assets-of-the firm. Also VAR36 or Equity/total indeb-
tness, (though it reveals the capital structure neatly)
may be influenced by stock exchange values of shares
comprising the equity capital. This has little to do with
the financial standing of the firm.

It has been stated above that liquidity ratios of the
discriminant function of the present model i.e. VAR32 and
VAR33 are more appropriate. Since VAR32 (i.e. immediate
assets/capital employed) expresses the liquid reserve in
respect of total capitalization of a firm and VAR33 (i.e.
current liabilities/net worth) evaluates the financial
condition of the firm by comparing what it owed with what

it owned. It may be mentioned that the ratios have also
ranked higher in their contribution towards Z-score.
Besides these, a number of measures of profitability,
viz. ratios VAR01, VAR02 and of liquidity, viz. ratios
VAR23, VAR27 and VAR31 have been included in the present
model providing a more realistic basis for evaluating
business performances.

5.2.2 Comparison with Taffler-Tisshaws   model

The model is represented by the formula .

$$Z = C_o + C_1 R_1 + C_2 R_2 + C_3 R_3 + C_4 R_4$$

where Z = Z-sore

C_o = a constant

$C_1 \ldots C_4$ = coefficients

and R_1 = VAR24

R_2 = VAR23

R_3 = VAR30

R_4 = VAR35

where VAR23.... VAR35 are referred in Appendix-C.

Two ratios VAR23 and VAR24 have already appeared
in the proposed model and the remaining two variables
VAR30 and VAR35 were regressed individually with the 17
variables selected by the present analysis. The results
of the bivariate regression analysis is presented in Table 5.3.

From the Table 5.3 it is found that VAR30 is signi-
ficantly correlated with VAR01, VAR03, VAR18, VAR19, VAR26
and VAR27 and VAR35 with VAR11, VAR13, VAR19 and VAR24.
Next, a multiple regression run was performed to quantify
the contribution of those significant variables with VAR30
and VAR35. The output of the multiple regression run is
presented in Table (5.4 & 5.5). It is evident from the
Table 5.4 that when VAR30 is regressed with VAR01, VAR03,
VAR18, VAR19, VAR26 and VAR27 only VAR01 is significant
at 5% level. Similarly from Table 5.5 it is found that
when VAR35 is regressed with VAR11, VAR13, VAR19 and VAR24
two of them namely VAR13 and VAR19 come out to be signi-
ficant at 5% level. From the above analysis it may be
concluded that some of the redundant ratios which are less
informative may be dispensed with.

The Z-scores of this model could not be computed
since the values of the constants and coefficients are
not known.

5.3 Identification of Probable Causes of Business Failure

The analysis has produced a total of seventeen financial
ratios which are appropriately suited and prperly weighted
as shown in Table 5.1. The ratios may be grouped facilitating
further examination as (i) profitability ratios (ii) assets
turnover ratios (iii) liquidity ratios and (iv) stock turnover

ratios. The contribution of the ratios towards z-score in groups are mentioned in Table 5.6.

In order to identify the probable causes leading to failure, it is essential to scrutinize each ratio fully in isolation. It appears from Table 5.6 that the ratios having major contribution are return on total investment, profit margin on sales, turnover of operating and equity capital relative to sales/income, proportion of current liabilities in equity capital, liquid resources position and stock turnover ratios. Relevant factors affecting the ratios may be noted as saleability and resulting profit margin of commodities, utilization rate of firm's tangible and intangible resources, inventory planning, capital budgeting etc. which interact in a very complex manner. It is very difficult to quantify relative magnitudes of the factors towards growth potential or corporate collapse since they largely depend on the financial status and operational performances of an enterprise.

TABLE 5.1

Rank/order	Subname	Financial ratio	Contribution percentage
1	VAR07	Net profit/Total assets	11.83
2	VAR03	Net sales/Operating capital	10.45
3	VAR11	Sales/Stock	8.90
4	VAR33	Current liabilities/Net worth	8.83
5	VAR02	Operating profit/Net sales	8.36
6	VAR08	Net sales/Net worth	7.92
7	VAR26	Revenue before tax and interest/Total assets	5.81
8	VAR32	Immediate Asset/Capital employed	5.40
9	VAR12	Finished stock/Sales	4.65
10	VAR18	Cost of output/Average Stock	4.52
11	VAR01	Operating profit/Operating capital	4.50
12	VAR19	Depreciation/Net production cost	4.36
13	VAR31	Total liabilities/Capital employed	4.04
14	VAR24	Profit before tax/Current liabilities	3.36
15	VAR13	Material stock/Sales	2.90
16	VAR27	Net worth/Total asset	2.33
17	VAR23	Current asset/Total liabilities	1.82

TABLE 5.2

Z-scores of the Firms
(Solvent sample)

Name of the firms	Z-scores of the present model cutoff point(0.00)	Z-scores of the Altman's model cutoff point(0.018)
UFFL(80)	1.935	0.028
NGFF(80)	1.621	0.027
KHBM(80)	0.483	0.033
SPBM(80)	0.866	0.034
BPP (80)	2.459	0.061
EAGLE(80)	0.852	0.065
ALBERT(80)	2.307	0.070
KCC (80)	1.323	0.067
KBM (80)	1.697	0.073
CRECENT(80)	0.131	0.049
USMANIA (80)	2.402	0.078
OH. MATCH(80)	1.705	0.077
DADA MATCH(80)	3.023	0.107
LIRA(80)	2.675	0.039
UFFL(81)	1.813	0.031
NGFF(81)	1.368	0.028
KPM(81)	0.072	0.034
KHBM(81)	0.039	0.035
SPPM(81)	0.476	0.033
BPP(81)	2.466	0.077
EAGLE(81)	1.580	0.042
ALBERT(81)	1.309	0.066
KCC(81)	2.128	0.082
KBM(81)	2.555	0.114
USMANIA(81)	2.585	0.093
OH. MATCH(81)	1.466	0.876
DADA MATCH(81)	3.984	0.040
UJALA MATCH(81)	1.001	0.073
HA.MATCH(81)	1.557	0.046

Name of the firms	Z-scores of the present model cutoff point(0.00)	Z-scores of the Altman's model cutoff point(0.018)
LIRA(81)	1.734	0.561
KSL(81)	0.255	0.056
ATLAS(80)	0.330	0.068
ATLAS (81)	0.562	0.045
BCAN(80)	1.566	0.078
BCAN(81)	0.673	0.074
CSM(80)	1.283	0.033
ECABLE(80)	2.515	0.033
ECABLE(81)	2.243	0.029
ETUBE(80)	1.471	0.065
ETUBE(81)	3.011	0.051
ISPAHANI(80)	1.667	0.638
ISPAHANI(81)	2.153	-0.0007
MEHAR(81)	0.794	-0.405
PROGATI(80)	1.312	0.093
PRINCE(80)	2.241	0.113
PRINCE(81)	1.359	0.079
HA. MATCH (80)[*]	0.149	0.053
BBC (80)[*]	0.104	0.028
(Insolvent sample)		
TSP(80)	-0.498	0.035
KNM(80)	-0.675	0.032
KPM(80)	-2.614	0.038
NBPM(80)	-3.082	0.004
SPPM(80)	-2.313	0.0007
KRC(80)	-2.612	0.013
CCC (80)	-0.796	0.023
NCI (80)	-3.077	-0.0006
BELLA(80)	-2.042	0.017
RD & BE(80)	-2.633	0.005
TSP(81)	-1.646	0.027
KNM (81)	-0.562	0.010

Name of the firms	Z-scores of the present model cutoff point(0.00)	Z-scores of the Altman's model cutoff point(0.018)
NBPM(81)	-2.444	0.0005
SPPM(81)	-3.406	0.005
KRC(81)	-4.352	0.011
CCC(81)	-2.887	0.070
NCI(81)	-2.240	-0.009
BBC(81)	-1.945	0.035
BISF(81)	-3.708	0.005
BELLA(81)	-2.634	0.024
BDP(80)	-1.830	0.004
BDP(81)	-2.419	0.001
BMTF(80)	-3.683	0.001
BMTF(81)	-2.948	0.001
CSM(81)	-0.922	0.024
HUSSAIN(80)	-2.835	0.010
HUSSAIN(81)	-1.342	0.010
MEHAR(80)	-3.565	0.013
GEMCO(80)	-3.081	0.001
GEMCO(81)	-1.510	0.003
PROGATI(81)	-3.188	0.017

* Misclassified cases of the present model

TABLE 5.3

Summary of the results of the bivariate regression
between significant ratios of the present and
Taffler-Tisshaw's models. F statistics are presented
pairwise.

Significant ratios

Of the Present model	Values of F-2 statistics	
	VAR30	VAR35
VAR01	9.503	1.490
VAR02	1.278	2.601
VAR03	10.679	0.367
VAR07	1.144	3.076
VAR08	0.033	0.0004
VAR11	0.929	7.752
VAR12	2.223	0.898
VAR13	0.0126	18.962
VAR18	17.514	2.180
VAR19	11.551	7.664
VAR23	1.180	0.662
VAR24	0.025	5.674
VAR26	10.843	0.393
VAR27	13.145	2.419
VAR31	0.020	2.751
VAR32	0.0007	0.239
VAR33	0.101	0.516

(Critical value of F at 5% significance level is 3.97)

TABLE 5.4

* * * * * * * * * * * * * * * * * *   M U L T I P L E   R E G R E S S I O N   * * * * * * * * * * * * * * * * *

FILE   ACNAME   (CREATION DATE = 19/06/84)

DEPENDENT VARIABLE.. VAR20

VARIABLE(S) ENTERED ON STEP NUMBER 1..

VAR01
VAR03
VAR15
VAR26
VAR27

MULTIPLE R   0.58066
R SQUARE   0.46232
ADJUSTED R SQUARE 0.41860
STANDARD ERROR   0.33056

ANALYSIS OF VARIANCE

	DF	SUM OF SQUARES	MEAN SQUARES	F
REGRESSION	5	6.79150	1.47830	
RESIDUAL	74	7.91748	0.10794	

---------------- VARIABLES IN THE EQUATION ----------------

VARIABLE	B	BETA	STD ERROR B	F
VAR01	-1.610264	-0.56017	0.38409	17.577
VAR03	0.233735	0.33202	0.25662	8.891
VAR15	-0.53619210-01	0.15105	0.25422	0.985
VAR26	-0.1696681	-0.15086	0.14475	2.186
VAR27	-0.72991240-01	-0.11178	0.21083	0.120
(CONSTANT)	0.6918720D-03	-0.00100	0.37962	0.000

---- VARIABLES NOT IN THE EQUATION ----

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F

ALL VARIABLES ARE IN THE EQUATION.

STATISTICS WHICH CANNOT BE COMPUTED ARE PRINTED AS ALL NINES.

MULTIPLE REGRESSION RUN

* * * * * * * * * * * * * * * * * *   M U L T I P L E   R E G R E S S I O N   * * * * * * * * * * * * * * * * *

FILE   ACNAME   (CREATION DATE = 19/06/94)

DEPENDENT VARIABLE.. VAR20

19/06/84   PAGE   6

SUMMARY TABLE

VARIABLE	MULTIPLE R	R SQUARE	RSQ CHANGE	SIMPLE R	B	BETA
VAR01	0.43145	0.18096	0.18096	-0.43145	-1.610264	-0.56017
VAR03	0.50400	0.25402	0.07304	-0.34900	0.223735	0.33202
VAR15	0.56607	0.42030	0.04630	-0.26001	-0.53619210-01	0.15105
VAR26	0.66968	0.44850	0.02817	-0.25118	-0.1696681	-0.15086
VAR27	0.58060	0.46232	0.01382	-0.13610	-0.72991240-01	-0.11178
(CONSTANT)					0.6918720D-03	-0.00100

19/06/84   PAGE   7

MULTIPLE REGRESSION RUN

FILE   ACNAME   (CREATION DATE = 19/06/94)

TABLE 5.5

* * * * * * * * * * * * * * * * * M U L T I P L E   R E G R E S S I O N * * * * * * * * * * * * * * * * *

DEPENDENT VARIABLE..   VAR35

VARIABLE(S) ENTERED ON STEP NUMBER 1..

MULTIPLE R ....
R SQUARE ....
ADJUSTED R SQUARE ....
STANDARD ERROR ....

ANALYSIS OF VARIANCE
                      DF   SUM OF SQUARES   MEAN SQUARE   F
REGRESSION
RESIDUAL

------------------ VARIABLES IN THE EQUATION ------------------   ------ VARIABLES NOT IN THE EQUATION ------

VARIABLE   B   BETA   STD ERROR B   F   VARIABLE   BETA IN   PARTIAL   TOLERANCE

(CONSTANT)

ALL VARIABLES ARE IN THE EQUATION

STATISTICS WHICH CANNOT BE COMPUTED ARE PRINTED AS ALL NINES.

MULTIPLE REGRESSION RUN

FILE   NONAME   (CREATION DATE = 10/06/81)

* * * * * * * * * * * * * * * * * M U L T I P L E   R E G R E S S I O N * * * * * * * * * * * * * * * * *

DEPENDENT VARIABLE..   VAR35

SUMMARY TABLE

VARIABLE   MULTIPLE R   R SQUARE   RSQ CHANGE   SIMPLE R   B   BETA

(CONSTANT)

MULTIPLE REGRESSION RUN

TABLE 5.6

Group	Financial Ratios	% Contribution	% cumulative contribution
Profitability	Net profit/Total asset	11.83	
	Operating profit/ Net sales	8.36	24.69
	Operating profit/ Operating capital	4.50	
Assets turnover	Net sales/Operating capital	10.45	
	Net sales/Net worth	7.92	24.18
	Revenue before Tax and interest/Total asset	5.81	
Liquidity	Current liabilities/ Net worth	8.83	.
	Immediate asset/Capital employed	5.40	20.29
	Total liabilities/ Capital employed	4.04	
	Current asset/Total liabilities	1.82	.
Stock turnover	Finished stock/Sales	4.65	
	Cost of output/Stock	4.52	12.07
	Material stock/Sales	2.90	

CHAPTER-6

CONCLUSIONS

From the study of the business failure analysis, the following conclusions can be made:

1. The model developed in the study is sufficiently reliable to predict the corporate health of a firm by measuring its Z-score from 17 conventional financial ratios. A list of the ratios is provided in Table 5.1.which shows that most of the significant ratios of Taffler-Tisshaw's model for both quoted. and unquoted companies have been included to derive the Z-score of the proposed model.

2. Periodic evaluation of Z-score from the financial statements of an enterprise will indicate the trend of the business and give a prior warning of an impending disaster.

3. For investigating into the causes of failure of an enterprise, factors affecting its profitability must be analyzed first, viz. utilization rate of firm resources, stock turnover rate, profit margin on sales and rate of return on total investment.

4. The present model compares favourably with those of Altman and Taffler-Tisshaw.

5. Multiple regressions of the ratios of Taffler-
    Tisshaw's model (not included in the present model)
    with the selected ratios of the present analysis
    (which come out significant when regressed indivi-
    dually with Taffler-Tisshaw's ratios) are as follows:

    VAR30 = 0.422 - 1.610(VAR01)+0.223(VAR03)+0.0536(VAR18)

    - 0.169(VAR19)+0.0729(VAR26)-0.0006(VAR27)

    VAR35 = -4.289+0.086(VAR11)-12.754(VAR13)+9.807(VAR19)

    + 6.170(VAR24).

CHAPTER-7

SCOPE FOR FUTURE WORK

The following list may provide a helpful guide for pursuing further research in this area.

i) More number of firms both from private sectors and different corporations should be included in the analysis.

ii) The research should be pursued for an extended period of time to check the actual trend of sample firms with the predicted trend in order to test the sensitivity of the derived model.

iii) Firms choosen for analysis should be grouped by the size of asset and nature of industry and discriminant run should be conducted for each group to discover similarities and dissimilarities among derived.models.

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APPENDIX-A

BALANCE SHEETS OF ENTERPRISES

UNDER BCIC

AND BSEC

CONSOLIDATED BALANCE SHEET AS AT 30TH JUNE 1981 OF THE ENTERPRISES

(Taka in Lacs)

PARTICULARS	UFFL	NGFF	TSP	KNM	KPM	NUPM	SPPM	RRC	KHM	SPBM	BPP	EAGLE BOX	C.C.C.	ALBERT	K.C.C.
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A. CURRENT ASSETS :															
Cash & Bank balance	18.56	111.62	70.52	113.84	10.54	1.09	89.79	2.50	0.58	—	3.95	1.68	94.10	31.68	238.61
Trade Debtors	306.87	456.95	349.51	1,089.33	270.88	315.37	1,132.19	9.40	1.52	—	37.70	87.63	213.99	61.49	125.31
Loans & Advances	1,514.30	97.55	88.71	706.40	177.23	228.41	457.78	9.15	23.00	9.55	89.59	41.06	249.60	140.74	1,106.78
Finished Goods	4.78	272.51	827.54	825.21	689.81	422.35	51.07	67.21	19.29	48.46	128.50	148.56	148.56	176.52	181.42
Raw Materials	374.47	4.08	614.54	540.09	276.48	72.27	48.68	2.48	82.88	—	103.46	190.20	10.58	116.01	64.59
Stores & Spares	2,392.45	1,524.04	1,246.51	1,548.24	930.50	273.45	458.91	97.30	16.30	30.57	16.30	56.65	115.82	—	1,956.46
BCIC & Inter-project	8,361.37	2,821.92	161.66	49.80	1,134.95	—	5.06	0.74	2.31	—	9.96	6.62	362.67	—	—
TOTAL OF 'A'	12,972.80	5,298.67	3,378.99	4,322.91	3,813.36	1,812.94	2,278.43	188.77	189.27	225.45	225.25	363.81	1,053.35	362.67	1,956.46
B. CURRENT LIABILITIES :															
Bank Overdraft & Loan	—	—	—	199.64	185.77	157.48	597.74	0.11	19.30	17.47	10.13	6.73	78.36	238.14	
Creditors for goods	1,160.27	236.32	750.58	1,735.52	1,891.18	675.18	278.87	9.27	8.16	47.65	1.14	99.90	34.75	62.07	
Creditors for expenses	1,607.78	215.74	112.99	263.60	172.87	16.61	42.59	41.77	19.76	34.97	8.98	186.21	15.71	335.11	
Creditors for other finance	2,182.97	1,189.88	51.48	199.84	429.78	675.18	2,113.91	17.81	34.19	9.49	116.65	85.11	39.93	175.84	
			1,478.43	392.44	1,189.25	673.36	395.81	19.03	118.61	59.40	199.59	601.84	67.88	780.65	
BCIC & Inter-project	—	11.20	2,392.83	2,791.04	3,868.80	2,404.09	3,428.92	87.99	200.02	168.99	326.49	979.79	236.65	1,591.91	
TOTAL OF 'B'	4,951.02	1,653.14	2,392.83	2,791.04	3,868.80	2,404.09	3,428.92	189.27	189.27	225.25	363.81	1,053.35			
C. WORKING CAPITAL : (A-B)	8,021.78	3,645.53	980.16	1,531.87	(54.56)	(591.15)	(1,150.49)	(10.78)	(10.75)	56.27	37.92	73.54	126.02	384.65	
D. FIXED & OTHER ASSETS :															
Fixed Assets (at cost)	6,476.11	5,621.46	3,169.11	2,357.80	2,936.12	2,819.77	9,838.61	192.88	171.19	67.13	124.17	838.00	101.43	111.05	
Fixed Assets (at written down value)	2,416.62	3,168.73	978.85	976.75	716.49	2,050.28	7,771.45	114.78	93.24	31.28	50.89	373.29	54.03	98.89	
Capital work-in-process	54.56	23.54	9.19	387.02	211.65	5.34	9.34	—	—	—	—	—	0.20	5.95	
Investment/Intangible	59.24	2.02	2.02	95.70	35.88	2.55	1.29	114.78	93.24	31.28	50.89	373.29	54.23	104.84	
TOTAL OF 'D'	2,532.42	3,192.27	900.06	1,459.47	963.97	2,058.12	7,782.08								
E. CAPITAL EMPLOYED : (C+D)	10,554.20	6,827.80	1,970.22	2,991.34	1,406.53	966.97	6,631.59	215.51	82.49	87.55	88.21	446.83	180.25	439.49	
F. REPRESENTED BY :															
Share Capital	—	1,000.00	—	1,686.60	460.00	350.00	—	62.57	—	45.30	20.00	70.00	32.60	—	
Reserve, Surplus & Fund	9,262.41	1,074.16	255.10	969.81	—	—	0.62	—	225.45	42.25	20.34	292.19	53.73	485.02	
Accumulated Profit/(Loss)	577.00	822.81	(881.74)	(843.77)	(1,405.57)	(1,786.55)	(2,699.74)	3.77	(142.96)	87.65	26.96	(1,012.05)	98.72	(45.58)	
			(881.74)	1,097.98	24.84	1,536.55	(2,699.12)	66.34	82.49	67.20	67.20	(649.86)	180.25	439.49	
EQUITY (a)	3,839.41	2,896.97	2,532.72	150.98	375.01	2,030.18	3,153.00	41.56	—	—	196.08	196.08	—	—	
ADP Loan	1,798.43	830.18	279.24	1,742.48	1,009.38	478.39	3,158.00	107.61	—	21.01	21.01	900.61	—	—	
Other Long Term Loan	4,976.36	3,100.70	1,742.48	1,893.41	1,009.38	2,508.52	6,177.71	149.17	—	21.01	21.01	1,096.69	—	—	
TOTAL DEBT (b)	6,714.79	3,930.88	2,801.96	1,893.41	1,394.29	2,508.52	9,330.71	149.17	—	—	—	1,096.69	149.49	439.49	
TOTAL OFF (a+b)	10,554.20	6,827.80	1,970.22	2,991.34	1,408.59	966.97	6,631.59	215.61	82.49	87.55	88.21	446.83	180.25	439.49	

BCIC

CONSOLIDATED BALANCE SHEET AS AT 30TH JUNE, 1981 OF THE ENTERPRISES (CONTD.)

(Taka in Lacs)

PARTICULARS	KBM	CRES-CENT	US-MANIA	NCI	DACCA MATCH	DADA MATCH	UJALA MATCH	ABIB MATCH	DBC	KARIM RUBBER	LIRA	BELLA	RD & BE	KSL	TOTAL
	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
A. CURRENT ASSETS :															
Cash & Bank Balance	56.03	47.27	12.80	5.04	71.75	31.35	2.00	16.63	29.90	12.16	2.08	1.40	40.77	3.37	1,081.54
Trade Debtors	6.55	21.79	0.42	0.52	0.91	20.21	0.83	3.71	69.29	23.05	19.77	4.02	0.22	6.25	4,674.35
Loans & Advances	57.94	108.18	11.59	3.20	54.76	25.44	27.51	18.38	122.36	21.87	37.85	12.02	150.98	2.80	4,883.86
Finished Goods	54.73	353.66	66.89	6.81	38.55	24.72	7.93	14.09	110.82	76.39	79.59	50.11	112.72	—	5,663.55
Raw Materials	466.67	89.60	52.58	13.44	99.40	74.93	35.91	45.92	136.92	80.22	51.28	6.08	—	—	4,046.00
Stores & Spares	88.34	74.08	41.58	6.58	20.49	22.25	13.38	25.00	23.90	—	—	0.41	376.31	20.05	10,353.88
BCIC & Inter-projects	—	2.73	—	0.88	20.50	8.44	17.23	20.29	13.93	0.60	0.17	6.03	127.51	10.40	12,983.51
TOTAL OF 'A'	730.26	697.31	185.86	36.47	306.36	207.34	104.79	143.03	507.12	314.29	180.74	80.07	808.51	42.87	43,686.69
B. CURRENT LIABILITIES :															
Bank Overdraft & Loan	139.82	—	—	31.94	37.98	15.01	—	72.93	—	5.04	0.45	—	—	—	2,232.56
Creditors for goods	15.57	31.59	6.68	6.98	9.56	3.75	6.79	30.53	1.24	17.64	—	0.61	1.17	2.57	7,052.34
Creditors for expenses	15.86	24.97	11.11	10.97	36.66	104.32	3.24	34.07	10.37	22.97	3.67	5.71	16.50	13.52	4,810.85
Creditors for other finance	123.34	4.96	113.21	19.58	160.00	62.70	90.69	18.65	122.04	9.15	44.80	13.60	39.32	6.66	8,499.52
BCIC & Inter-projects	227.93	3.88	8.64	126.41	52.97	75.84	66.69	107.16	337.50	386.98	64.04	40.62	186.39	62.29	8,571.46
TOTAL OF 'B'	522.52	504.40	139.59	195.88	297.17	261.82	167.41	263.34	471.15	441.78	112.96	60.54	243.28	85.04	31,156.73
C. WORKING CAPITAL (A-B) :	207.74	192.91	46.27	(159.41)	9.19	(54.28)	(62.62)	(120.32)	35.97	(127.49)	67.78	19.53	565.23	(41.17)	12,529.96
D. FIXED & OTHER ASSETS :															
Fixed Assets (at cost)	167.55	77.13	199.96	59.57	135.88	66.88	26.03	90.78	72.76	63.65	40.70	31.70	421.15	22.85	40,380.58
Fixed Assets (at written down value)	97.51	49.95	56.02	48.23	84.68	37.26	25.93	34.16	27.89	16.87	19.77	14.86	296.32	3.52	21,710.96
Capital work-in-process	0.49	2.06	26.45	—	—	—	0.76	—	—	—	—	—	5.94	3.66	778.03
Investment/Intangible	—	—	0.03	—	1.46	—	—	—	0.06	—	0.02	—	109.75	—	308.15
TOTAL OF 'D'	98.00	52.01	82.50	48.23	86.14	37.26	26.69	34.16	27.95	16.87	19.79	14.86	412.01	7.18	22,797.14
E. CAPITAL EMPLOYED (C+D) :	305.74	244.92	128.77	(111.18)	95.33	(17.07)	(35.93)	(86.16)	63.92	(110.62)	87.57	34.39	977.24	(34.99)	35,327.10
F. REPRESENTED BY :															
Share Capital	—	—	55.00	33.00	29.00	19.38	—	20.00	14.00	10.29	4.56	15.00	—	5.00	4,237.20
Reserve Surplus & Fund	7.89	63.19	0.87	0.88	56.31	15.37	42.79	45.96	22.25	3.29	—	2.91	—	—	8,187.40
Accumulated Profit/(Loss)	216.20	(29.13)	44.95	(352.11)	10.02	(51.77)	(78.72)	(215.14)	27.67	(124.20)	83.01	16.48	(240.05)	(39.99)	(10,553.37)
EQUITY (a)	224.09	34.06	100.82	(318.23)	95.33	(17.02)	(35.93)	(149.18)	63.92	(110.62)	87.57	34.39	(240.05)	(34.99)	1,871.23
ADP Loan	—	—	3.00	—	—	—	—	—	—	—	—	—	837.76	—	11,914.38
Other Long Term Loan	81.65	210.86	24.95	207.05	—	—	—	63.02	—	—	—	—	379.53	—	21,541.49
TOTAL DEBT (b)	81.65	210.86	27.95	207.05	—	—	—	63.02	—	—	—	—	1,217.29	—	33,455.87
TOTAL OF 'F' (a+b)	305.74	244.92	128.77	(111.18)	95.33	(17.02)	(35.93)	(86.16)	63.92	(110.62)	87.57	34.39	977.24	(34.99)	35,327.10

BALANCE SHEET OF ENTERPISES AT 30TH JUNE, 1980

PARTICULARS	Atlas Bangladesh Ltd	Bang Diesel Plant	Bang. Cycle Industries Ltd	Bengal Metal Indus.	Bang. Welding Electrodes Ltd	Bang. Can Co. Ltd	Chand Fittings	Ctg. Steel Mills Ltd.	Dacca Radio Elect.	Dockyard & Engg Works Ltd.	Dacca Steel Works Ltd (Group)	Eastern Tubes Ltd.
	Lac Tk.	Lac Tk	Lac Tk.	Lac Tk.	Lac Tk	Lac Tk.	Lac Tk	Lac Tk.	Lac Tk.	Lac Tk.	Lac Tk.	Lac Tk.
A. CURRENT ASSETS												
Cash & Bank Balance	0.11	5.26	0.52	0.03	5.80	0.53	0.05	867.30	0.07	38.58	3.86	0.22
Trade Debtors	19.97	187.68	4.25	13.65	37.40	13.29	—	419.91	0.01	293.95	106.70	15.43
Advance, Deposits & Pre-payments	8.43	111.73	27.45	11.43	1.15	48.26	0.63	1656.87	27.85	184.80	55.44	32.02
BSEC C/A	—	—	—	—	—	—	—	—	—	—	1.14	—
Finished Goods	49.97	40.37	63.89	14.86	31.57	28.81	1.19	704.19	19.64	—	100.53	12.08
Work-in-Process	2.09	173.81	28.62	—	—	12.59	1.57	907.36	0.92	359.44	1.21	0.65
Raw materials & other Stores	114.61	260.10	97.09	95.85	24.16	94.70	7.24	4654.06	0.84	325.47	169.66	58.56
Total Current Assets	195.18	778.95	221.82	135.82	100.08	198.18	10.68	9209.69	49.33	1202.24	438.54	118.96
B. CURRENT LIABILITIES												
Bank Overdraft & Loans	80.11	421.75	95.58	16.70	15.19	21.66	10.65	—	20.15	162.62	189.13	24.91
Creditors for Goods Supplied	1.13	1.80	12.88	—	0.33	2.35	0.53	37.63	0.09	155.31	8.48	16.08
Creditors for Expenses	25.20	181.37	—	0.31	9.41	26.77	0.19	123.83	0.60	71.17	13.79	4.81
Creditors for other finance	32.74	34.35	8.34	5.80	1.11	5.55	—	4706.55	3.76	94.91	*35.48	4.67
BSEC C/A	3.68	79.00	10.50	4.84	9.04	17.40	27.14	102.13	4.89	27.67	13.29	4.84
Workers Participation Fund	0.76	—	0.13	2.36	3.05	0.70	—	9.15	—	5.61	1.45	1.12
Advance & Deposits	1.98	144.33	31.44	79.57	10.96	21.67	—	832.44	16.41	369.72	250.61	0.44
Provisions & Accruals	3.23	14.75	14.30	2.68	14.16	11.29	—	1012.72	1.16	84.86	—	0.73
Provision for Income Tax	19.73	—	24.28	1.70	1.91	54.36	0.10	—	5.89	107.53	30.67	36.68
Total Current Liabilities	168.56	877.35	197.45	113.96	65.16	161.75	38.61	6824.45	52.95	1079.40	462.90	94.28
NET CURRENT ASSETS	26.62	(98.40)	24.37	21.86	34.92	36.43	(27.93)	2385.24	(3.62)	122.84	(24.36)	24.68
C. FIXED & OTHER ASSETS												
Fixed Assets	81.04	947.29	29.97	16.07	16.25	71.48	10.52	7255.45	0.88	240.41	77.27	39.64
Less: Depreciation	39.58	-134.26	19.38	5.55	8.74	38.21	5.68	3300.82	0.47	99.35	31.99	23.63
	41.46	813.03	10.59	10.52	7.51	33.27	4.84	3954.63	0.41	141.06	45.28	16.01
Capital Work-in-Progress	—	*63.51	—	—	—	8.14	—	14.58	—	—	—	—
Investment	—	—	—	—	—	—	—	—	—	0.48	—	—
Others	—	5.26	—	—	3.87	—	—	54.53	0.02	—	—	0.60
Total	41.46	881.80	10.59	10.52	11.38	41.41	4.84	4023.74	0.43	141.54	45.28	16.61
D.	68.08	783.40	34.96	32.38	46.30	77.84	(23.09)	6408.98	(3.19)	264.38	20.92	41.29
E.												
Long Term Loan	20.88	960.21	—	—	—	6.48	—	6822.30	—	65.25	2.70	0.17
Rehabilitation Grant	—	2.89	—	—	—	1.50	—	—	—	10.87	—	0.83
Share Capital	25.20	—	10.00	—	—	—	10.00	1000.25	1.00	159.00	24.87	17.00
Reserves	4.86	7.67	10.88	—	—	—	—	0.44	—	9.95	0.12	2.07
Profit & Loss app. a/c	17.14	(187.37)	14.08	20.36	26.09	18.82	(31.36)	(1414.01)	(4.19)	19.31	(6.77)	21.22
Capital Fund	—	—	—	12.02	20.21	51.04	*(1.73)	—	—	—	—	—
Total	68.08	783.40	34.96	32.38	46.30	77.84	(23.09)	6408.98	(3.19)	264.38	20.92	41.29

*Includes Tk. 60.91 lac under heading Capital overhead (BDP).

*Deficit Assets.

*Includes Tk. 5.65 lac under head suspense Account (DSW)

BALANCE SHEET OF ENTERPISES AT 30TH JUNE 1980

PARTICULARS	Eastern Cables	Fecto Industries Ltd.	Fecto Yamagen Ltd.	Fecto Agencies Ltd.	Facto Trading Co. Ltd.	Fecto Ltd.	Gazi Wires Ltd.	G.M. Stools Ltd.	Husen Indus. Ltd.	Ispahani Marshall Ltd.	K.I.T.C Ltd. Ltd.	Khulna Shipyard Ltd.	Mehar Industries (B) Ltd.
	Lac Tk.	Lac Tk.	Lac Tk.	Lac Tk.	Lac Tk.	Lac Tk.	Lac Tk.	Lac Tk.	Lac Tk.	Lac Tk.	Lac Tk	Lac Tk.	Lac Tk
A. CURRENT ASSETS													
Cash & Bank Balance	63.86	0.09	0.11	—	—	10.62	37.54	19.23	3.70	3.98	36.12	0.66	10.21
Trade Debtors	147.79	0.22	0.93	4.71	0.38	17.14	14.39	15.67	6.56	50.35	14.83	530.15	22.48
Advance, Deposits & Pre-payment	276.91	45.57	27.46	0.33	20.87	41.76	188.00	205.19	1.18	8.09	19.08	299.19	7.48
BSEC C/A	—	—	—	—	—	5.82	32.56	25.96	2.36	3.31	63.16	—	23.73
Finished Goods	359.48	10.94	29.61	—	—	—	2.57	69.76	37.33	92.59	—	409.80	10.58
Work-in-Process	86.54	0.36	3.79	—	—	—	—	—	—	—	—	—	—
Raw materials & other Stores	752.14	25.63	8.97	—	—	—	181.92	313.96	68.65	60.82	70.28	746.22	112.09
Total Current Assets	1676.72	82.81	70.87	5.04	21.25	75.34	456.98	649.77	119.78	218.52	203.47	1986.02	186.57
B. CURRENT LIABILITIES													
Bank Overdraft & Loans	166.70	19.87	24.32	—	—	1.60	26.58	—	53.55	53.50	2.89	338.82	109.35
Creditors for Goods Supplied	193.51	0.16	2.70	0.03	0.09	2.00	116.99	184.39	5.19	48.81	7.24	239.99	5.00
Creditors for Expenses	7.82	1.12	14.56	0.16	0.02	20.56	34.80	0.49	23.39	40.47	3.11	36.88	9.31
Creditors for other Finance	221.66	8.93	10.40	1.56	1.00	7.57	34.34	—	27.80	56.29	2.73	62.82	76.46
BSEC C/A	11.83	20.77	—	—	1.41	—	3.56	2.54	—	8.28	113.72	27.58	129.95
Workers Participation Fund	5.20	—	14.41	5.44	—	63.67	2.72	89.33	14.82	1.17	1.25	540.78	0.33
Advance & Deposits	276.93	40.21	3.74	0.22	22.09	0.15	14.62	30.53	2.83	—	—	76.53	3.20
Provisions & Accruals	76.93	—	—	—	—	0.74	—	217.48	—	—	23.61	270.45	130.20
Provisions for Income Tax	250.58	—	—	—	—	—	163.01	—	—	10.74	—	1.11	—
Total Current Liabilities	1210.53	91.06	70.13	7.41	24.61	96.29	396.62	524.76	127.58	219.26	154.55	1594.96	463.80
C. NET WORKING CAPITAL (A-B)	466.19	(8.25)	0.74	(2.37)	(3.36)	(20.95)	60.36	125.01	(7.80)	(0.74)	48.92	391.06	(277.23)
D. FIXED & OTHER ASSETS													
Fixed Assets —	499.60	10.17	5.81	0.01	0.02	4.08	46.41	34.48	20.85	49.99	22.40	414.65	29.11
Less Depreciation	226.83	3.41	2.52	—	—	1.05	24.46	15.91	11.92	34.79	10.36	203.70	12.44
Capital Work-in-Progress	272.77	6.76	3.29	0.01	—	3.03	21.95	18.57	8.93	15.20	12.04	210.95	16.67
Investment	—	—	—	—	—	1.26	—	—	—	—	—	0.05	—
Others	—	2.12	0.33	—	2.36	9.80	6.45	—	2.45	—	—	—	1.71
Total	272.77	8.88	3.62	0.01	2.38	14.09	28.40	18.57	11.36	15.20	12.04	211.00	18.38
E. CAPITAL EMPLOYED (C+D)	738.96	0.63	4.36	(2.36)	(0.98)	(6.86)	88.76	143.58	3.56	14.46	60.96	602.06	(258.85)
F. REPRESENTED BY													
Long Term Loan	608.85	11.45	—	—	—	—	—	3.50	—	2.00	—	177.71	4.50
Rehabilitation Grant	3.46	—	—	—	—	—	3.50	—	—	16.23	—	3.00	—
Share Capital	—	1.00	5.00	1.00	1.00	5.32	12.50	25.00	—	0.19	8.20	300.00	30.00
Reserves	—	—	2.55	0.21	—	—	2.91	21.27	—	(3.96)	0.22	1.02	—
Profit & Loss app. a/c	126.65	(11.82)	(3.19)	(3.57)	(1.98)	(12.18)	69.85	93.81	(28.42)	—	52.54	120.33	(293.35)
Capital Fund	—	—	—	—	—	—	—	—	31.98	—	—	—	—
Total	738.96	0.63	4.36	(2.36)	(0.98)	(6.86)	88.76	143.58	3.56	14.46	60.96	602.06	(258.85)

APPENDIX-B

PROFIT AND LOSS ACCOUNTS OF

ENTERPRISES UNDER BCIC

AND BSEC

BCIC

(RELATED WITH B.C.I.C. OF DTE ENTERPRISES)

CONSOLIDATED PROFIT & LOSS ACCOUNT FOR THE

(Taka in Lacs)

PARTICULARS	UFFL	NGFF	TSP	KNM	KPM	NRPM	SPPM	IRC	KFM	SPRM	BPP	EAGLE BOX	C.C.C.	ALBERT	K.C.C.
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A. SALES REVENUE:															
Sales	6,062.89	3,265.92	3,446.65	3,228.00	4,137.32	1,036.25	1,174.05	1,829.40	180.06	221.59	342.56	429.60	855.97	638.04	3,066.4
Other Income	484.75	163.03	23.35	320.62	18.58	7.22	6.69	—	2.58	9.34	4.48	5.99	43.64	9.75	14.1
Total of 'A'	6,547.64	3,428.95	3,470.00	3,548.62	4,155.90	1,043.47	1,181.64	1,829.40	182.64	230.93	347.04	435.59	899.61	637.79	3,080.51
B. COST OF SALES:															
Materials	2,395.93	1,038.27	2,572.73	1,239.84	2,287.86	777.81	712.98	771.97	23.03	59.33	226.06	288.00	545.80	389.56	2,811.12
Consumed	287.85	298.15	172.14	301.16	415.97	115.90	145.54	338.23	34.06	55.84	45.64	57.36	109.96	77.00	320.89
Salary & Wages	—	16.35	132.92	—	935.52	437.71	147.97	590.83	95.19	10.07	1.62	6.92	135.01	1.76	32.99
Power & Fuel	624.95	143.89	206.55	1,977.01	212.72	90.38	176.91	311.96	37.16	17.78	9.72	8.83	108.32	45.82	103.72
Factory Overhead	144.71	133.59	182.92	56.48	183.80	30.67	44.49	101.96	14.37	9.99	14.57	15.21	24.11	15.92	15.99
Administrative Overhead	133.59	59.68	—	—	26.84	4.46	0.01	14.71	2.04	1.13	4.83	2.46	0.56	31.52	29.17
Selling & Distribution Overhead	186.21	945.84	2.01	67.51	239.28	113.10	234.93	15.43	4.86	17.57	8.18	19.78	164.27	17.21	156.82
Financial Charge	159.80	398.16	321.83	94.12	—	—	590.69	155.24	6.04	5.83	3.14	8.88	40.17	7.07	12.16
Depreciation	772.80	17.14	46.57	110.13				1.15	0.40	0.08	0.86	0.47	—	1.32	—
Workers Participation fund	35.48							—						587.18	
Sub-Total of 'B'	4,557.73	2,450.57	3,587.67	3,846.25	4,301.99	1,570.05	2,052.92	2,286.77	217.75	177.61	316.62	407.91	1,118.20	587.18	2,981.86
Adjustment of Finished Stock	370.93	283.94	4.56	(85.13)	(91.09)	(289.13)	(14.92)	(116.47)	(54.02)	49.98	(4.18)	9.39	(199.92)	(2.34)	86.75
Total of 'B'	4,928.66	2,733.91	3,592.23	3,761.12	4,210.90	1,280.92	2,038.00	2,170.30	163.73	227.59	312.44	417.30	918.28	584.94	3,068.61
Profit/(Loss) before tax	1,618.98	695.04	(122.23)	(212.50)	(55.00)	(237.45)	(856.36)	(340.90)	18.91	3.34	34.60	18.29	(13.67)	52.85	11.90
Tax	780.44	14.05	—	—	—	—	—	—	—	—	19.03	9.14	—	25.91	0.34
Contribution to NE	200.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Post Tax Profit/Loss	638.54	680.99	(122.23)	(212.50)	(55.00)	(237.45)	(856.36)	(340.90)	18.91	3.34	15.57	9.15	(13.67)	26.94	11.56
Profit (Loss) upto previous year	1765.02	141.82	(781.23)	(634.31)	(1321.73)	(1584.39)	(1843.38)	(2,378.29)	(12.36)	(146.30)	26.68	17.81	(995.75)	66.78	(39.58)
Previous year's Adjustment	—	—	71.72	3.04	(28.84)	(14.71)	—	—	(2.78)	—	—	—	(2.63)	—	(17.51)
Accumulated Profit/(Loss) transferred to Balance Sheet	2,403.56	823.81	(831.74)	(843.77)	(1405.57)	(1786.55)	(2699.74)	(2,619.19)	3.77	(142.96)	42.25	20.90	(1,012.05)	93.72	(45.53)

CONSOLIDATED PROFIT & LOSS ACCOUNT FOR THE YEAR ENDED 30TH JUNE, 1981 OF THE ENTERPRISES (CONTD.)

PARTICULARS	KBM	CRES-CENT	USMA-NIA	NCI	DACCA MATCH	DADA MATCH	IJALA MATCH	HABIB MATCH	BBC	KARIM RUBBER	LIRA	BELLA	RD & BE	KSL	TOTAL
	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
A. SALES REVENUE:															
Sales	1,008.70	770.49	334.38	32.45	702.95	615.21	256.76	307.25	343.30	359.77	156.55	35.65	243.39	77.31	35,129.76
Other Income	24.59	7.31	2.13	5.71	2.19	6.34	3.68	3.70	4.09	0.21	0.60	6.40	16.03	1.06	1,218.17
Total 'A'	1,033.29	777.80	336.51	38.16	705.14	621.55	260.44	310.95	347.39	359.98	157.15	42.05	259.42	78.37	36,347.93
B. COST OF SALES:															
Materials Consumed	586.45	647.07	73.71	15.34	289.84	248.29	107.16	158.02	210.14	242.85	119.83	43.62	—	5.57	18,386.77
Salaries & Wages	178.14	51.54	45.50	25.81	278.51	214.97	131.17	137.16	63.03	64.00	14.22	10.40	82.52	32.60	3,055.07
Power & Fuel	1.96	43.07	95.07	9.56	16.45	7.38	8.65	9.41	17.79	7.88	0.94	3.49	0.68	14.73	2,773.93
Factory Overhead	48.67	15.29	15.71	5.62	34.07	24.95	2.28	6.68	9.32	0.60	2.80	1.60	129.99	18.59	4,386.65
Administrative Overhead	33.90	15.67	9.51	6.14	21.65	23.74	8.60	10.60	22.52	8.46	6.98	2.65	18.42	3.79	1,131.21
Selling & Distribution Overhead	43.93	30.97	13.75	0.03	5.76	5.27	2.45	0.50	3.14	2.40	2.31	1.19	—	—	546.54
Financial Charges	48.45	64.11	5.34	31.86	9.55	11.74	7.38	15.39	41.99	47.53	4.84	3.07	67.00	0.84	2,411.82
Depreciation	40.27	2.77	21.15	11.34	4.48	6.16	2.10	3.08	3.10	2.96	1.75	1.39	85.62	—	2,188.96
Workers Participation Fund	1.39	0.06	1.40	—	0.68	14	—	—	—	—	0.88	—	—	0.05	61.55
Sub-Total of 'B'	976.06	871.15	281.20	105.80	663.19	543.59	269.80	331.50	377.03	382.68	154.55	67.47	384.23	76.47	35,942.50
Adjustment of Finished Goods	(0.55)	(95.56)	(9.55)	7.71	6.86	32.16	9.91	(10.21)	(18.58)	9.95	(32.49)	(18.97)	8.81	—	(153.64)
Total of 'B'	977.51	775.59	290.65	113.21	670.05	575.77	279.71	321.29	358.45	392.63	122.06	48.50	393.04	76.47	35,788.86
Profit/(Loss) before tax	55.78	2.21	55.86	(75.14)	35.09	45.76	(19.27)	(10.34)	(11.06)	(32.65)	35.09	(6.45)	(133.62)	1.90	559.07
Tax	30.68	—	31.74	—	10.02	22.59	—	—	—	—	16.56	—	—	—	960.80
Contribution to NE	—	—	—	—	—	—	—	—	—	—	—	—	—	—	200.00
Post tax Profit/(Loss)	25.10	2.21	24.12	(75.05)	25.07	23.89	(19.27)	(10.34)	(11.06)	(32.65)	18.53	(6.45)	(133.62)	1.90	(601.73)
Profit/(Loss) upto previous years	191.10	(31.34)	10.83	(257.06)	(14.95)	(75.60)	(59.45)	(204.80)	38.73	(32.35)	60.25	22.93	(106.13)	(42.59)	(8,079.94)
Previous years adjustment	—	—	—	—	(10.10)	0.94	—	—	—	(59.20)	4.23	—	—	0.70	(45.14)
Accumulated Profit /(Loss) Transferred to Balance Sheet	216.20	(29.13)	44.95	(332.11)	10.2	(51.77)	(78.72)	(215.14)	27.67	(124.20)	83.01	16.48	(240.05)	(39.99)	(8,726.81)

TRADING AND PROFIT & LOSS ACCOUNT OF THE ENTERPISES AT 30TH JUNE 1980

PARTICULARS	Atlas Bangladesh Ltd	Bang Diesel Plant	Bang. Cycle Industries Ltd	Bengal Metal Indus.	Bang. Welding Electrodes Ltd	Bangladesh Can Co. Ltd.	Chand Fittings	Chittagong Steel Mills Limited	Dacca Radio Electronics	Dockyard & Engineering Works Ltd	Dacca Steel Works Ltd. (Group)	Eastern Tubes Ltd
	Lac Tk.	Lac Tk.	Lac Tk.	Lac Tk.	Lac Tk.	Lac Tk.	Lac Tk.	Lac Tk.	Lac Tk.	Lac Tk.	Lac Tk.	Lac Tk.
A. INCOME												
Sales	403.44	294.09	116.54	421.48	84.10	272.03	—	10637.42	14.24	384.16	838.97	203.49
Misc. Income	0.87	0.99	1.84	1.75	0.57	5.00	—	109.63	—	8.97	18.00	1.01
Total Income	404.31	295.08	118.38	423.23	84.67	277.03	—	10747.05	14.24	373.13	856.97	204.50
B. EXPENSES												
Raw Materials Consumed	304.66	439.16	92.14	326.72	58.30	196.85	—	9508.30	16.75	204.19	740.52	86.21
Consumable & Other Stores	8.91	1.07	8.40	6.53	3.86	3.57	—	775.54	—	—	—	1.94
Power, Fuel, Oil etc	0.59	2.89	3.27	7.02	0.79	5.47	—	1222.65	0.05	10.31	19.15	2.86
Salaries & Wages	20.34	25.21	40.41	20.39	9.04	46.47	0.76	837.11	4.27	124.10	47.64	18.44
Repairs & Maintenance	1.70	—	0.84	0.81	1.24	2.89	—	353.79	—	28.08	1.49	1.82
Depreciation	2.29	51.52	1.26	0.85	0.63	3.18	0.42	397.24	0.06	7.37	3.22	3.53
Corporation Charges	2.77	3.73	1.58	3.25	0.84	2.02	—	45.17	0.28	3.10	6.71	1.87
Interest	8.45	29.01	12.16	2.27	1.18	6.03	2.45	348.42	2.01	60.10	8.89	2.32
Other Expenses	8.50	11.06	8.57	14.27	5.71	6.70	0.50	947.17	4.07	21.93	38.11	43.21
Total Expenses	358.21	563.65	168.63	381.91	81.59	273.18	4.13	10435.39	27.49	459.18	863.73	162.20
Change in Stock	27.34	(205.07)	(52.64)	10.29	(8.84)	(23.57)	—	16.36	(10.09)	(147.53)	(12.95)	(2.48)
C COST OF SALES	385.55	358.58	115.99	392.20	72.75	249.61	4.13	10451.75	17.40	311.65	850.78	159.72
D Net Profit/Loss A/C	18.76	(63.50)	2.39	31.03	11.92	27.42	(4.13)	295.30	(3.16)	61.48	6.19	44.78
PROFIT & LOSS / APPROPRIATION ACCOUNT												
Net Profit/Loss B/F from previous year	8.70	(116.95)	13.40	5.46	25.65	8.76	(28.35)	(1347.95)	(0.80)	33.66	(9.86)	8.30
Adjustment in respect of Previous years		(6.92)	(0.40)	(1.22)		(0.62)	1.22	(195.71)	(0.23)	(18.55)	—	0.17
Profit/Loss for the year	18.76	(63.50)	2.39	31.03	11.92	27.42	(4.13)	295.30	(3.16)	61.48	6.19	44.78
Total	27.46	(187.37)	15.39	35.27	37.57	33.56	(31.26)	(1248.36)	(4.19)	78.59	(3.67)	53.25
Provision for Taxation	10.32	—	1.31	14.91	6.39	14.74	0.10	158.45	—	24.34	3.10	24.63
Provision for W.P.P. Fund	—	—	—	—	0.30	—	—	7.20	—	—	—	—
Provision for Contribution	—	—	—	—	4.79	—	—	—	—	34.94	—	7.40
Profit/Loss C/F to Balance Sheet	17.14	(187.37)	14.08	20.36	26.09	18.82	(31.36)	(1414.01)	(4.19)	19.31	(6.77)	21.22
Total	27.46	(187.37)	15.39	35.27	37.57	33.56	(31.26)	(1248.36)	(4.19)	78.59	(3.67)	53.25

TRADING AND PROFIT & LOSS ACCOUNT OF THE ENTERPRISES AT 30TH JUNE, 1980

PARTICULARS	Eastern Cables	Fecto Industries Ltd	Fecto Yamagen Ltd	Fecto Agencies Ltd	Facto Trading Co Ltd
	Lac Tk.	Lac Tk.	Lac Tk.	Lac Tk.	Lac Tk.
A. INCOME					
Sales	1447.17	56.91	55.62	—	—
Misc. Income	13.08	0.03	0.26	—	—
Total Income	1460.25	56.94	55.88	—	—
B. EXPENSES					
Raw Materials Consumed	902.61	26.65	53.00	—	—
Consumable & other Stores	20.00	—	—	—	—
Power, Fuel, Oil etc	6.88	0.29	0.22	—	—
Salaries & Wages	37.76	3.67	7.85	—	—
Repairs & Maintenance	15.58	1.43	0.11	—	—
Depreciation	26.08	0.58	0.34	—	—
Corporation Charges	14.50	0.45	0.69	—	—
Interest	51.04	1.21	2.24	—	—
Other Expenses	382.72	22.24	12.70	0.01	0.01
Total Expenses	1457.17	56.52	77.15	0.01	0.01
Change in Stock	(198.71)	3.51	(23.29)	—	—
C. COST OF SALES	1258.46	60.03	53.86	0.01	0.01
D. Net Profit/Loss (A-C)	201.79	(3.09)	- 2.02	(0.01)	(0.01)
PROFIT AND LOSS					
Net Profit/Loss B/F from previous year	77.78	(8.19)	(0.92)	(3.56)	(1.97)
Adjustment in respect of previous years	0.75	(0.54)	0.12	—	—
Profit/Loss for the year	201.79	(3.09)	2.02	(0.01)	(0.01)
Total	280.32	(11.82)	1.22	(3.57)	(1.98)
Provision for Taxation	108.68	—	0.67	—	—
Provision for W.P.P. Fund	4.94	—	—	—	—
Provision for Contribution	40.05	—	3.74	—	—
Profit/Loss C/F to Balance Sh.	126.65	(11.82)	(3.19)	(3.57)	(1.98)
Total	280.32	(11.82)	1.22	(3.57)	(1.98)

PARTICULARS	Facto Ltd	Gazi Wires Ltd	G.M. Steels Ltd	Husein Industries Ltd	Ispahani Marshall Ltd	K.I.T.C. Ltd	Khulna Shipyard Ltd	Mehar Indus.(B) Ltd	Metalex Corporation Ltd
	Lac Tk.	Lac Tk.	Lac Tk.	Lac Tk.	Lac Tk.	Lac Tk.	Lac Tk.	Lac Tk.	Lac Tk.
A. INCOME									
Sales	139.98	367.12	841.16	14.16	198.42	552.37	667.44	166.22	370.05
Misc. Income	1.00	4.36	3.88	0.15	3.29	2.36	21.73	1.75	2.44
Total Income	140.98	371.48	845.04	14.31	201.71	554.73	689.17	167.97	372.49
B. EXPENSES									
Raw Materials Consumed	134.58	218.94	675.37	16.60	140.49	494.62	479.30	117.20	240.52
Consumable & other Stores	—	3.27	5.24	0.26	1.09	17.51	7.11	0.74	5.60
Power, Fuel, Oil etc	0.07	6.99	24.96	0.46	2.04	2.22	14.68	0.81	4.69
Salaries & Wages	3.22	17.91	33.47	5.19	57.29	14.97	158.73	27.37	43.41
Repairs & Maintenance	0.06	0.53	1.87	1.36	3.16	0.74	44.62	1.86	5.42
Depreciation	0.09	1.72	1.19	0.67	3.45	1.50	10.06	0.94	3.86
Corporation Charges	0.01	2.67	6.60	0.25	1.15	4.16	4.96	1.78	2.75
Interest	—	7.24	—	11.75	6.10	—	33.06	1.08	6.88
Other Expenses	3.27	4.61	13.04	1.12	20.47	9.32	5.02	9.08	24.10
Total Expenses	141.30	263.88	761.74	37.66	235.24	545.04	757.54	160.86	337.23
Change in Stock	—	6.88	(26.97)	(10.33)	(36.80)	(40.19)	(84.64)	(6.21)	(10.76)
C. COST OF SALES	141.30	270.76	734.77	27.33	198.44	504.85	672.90	154.65	326.47
D. Net Profit/Loss (A-C)	(0.32)	100.72	110.27	(13.02)	3.27	49.88	16.27	13.32	46.02
PROFIT AND LOSS ACCOUNT									
Net Profit/Loss B/F from previous year	(11.27)	24.63	44.19	(20.99)	(1.86)	28.94	102.28	(305.79)	59.99
Adjustment in respect of previous years	(0.59)	(0.10)	—	5.59	(3.74)	(2.67)	11.54	(0.88)	4.52
Profit/Loss for the year	(0.32)	100.72	110.27	(13.02)	3.27	49.88	16.27	13.32	46.02
Total	(12.18)	125.25	154.46	(28.42)	(2.33)	76.15	130.09	(293.35)	110.53
Provision for Taxation	—	55.40	60.65	—	1.63	23.61	9.76	—	25.31
Provision for W.P.P. Fund	—	—	—	—	—	—	—	—	—
Provision for Contribution	—	—	—	—	—	—	—	—	—
Profit/Loss C/F to Balance Sh.	(12.18)	69.85	93.81	(28.42)	(3.96)	52.54	120.33	(293.35)	85.22
Total	(12.18)	125.25	154.46	(28.42)	(2.33)	76.15	130.09	(293.35)	110.53

APPENDIX-C

LIST OF FINANCIAL RATIOS USED

IN THE ANALYSIS

APPENDIX-C

List of Financial Ratios (variables) used
in the analysis

Sub-name	Name of the financial ratios
VAR01	OPERATING PROFIT/OPERATING CAPITAL
VAR02	OPERATING PROFIT/NET SALES
VAR03	NET SALES/OPERATING CAPITAL
VAR04	OPERATING PROFIT/CAPITAL EMPLOYED
VAR05	NET PROFIT/WORKING CAPITAL
VAR06	NET PROFIT/NET WORTH
VAR07	NET PROFIT/TOTAL ASSET
VAR08	NET SALES/NET WORTH
VAR09	NET SALES/WORKING CAPITAL
VAR10	SALES/FIXED ASSET
VAR11	SALES/STOCK
VAR12	FINISHED STOCK/SALES
VAR13	MATERIAL STOCK/SALES
VAR14	PROFIT BEFORE TAX/TOTAL LIABILITIES
VAR15	NET PRODUCTION COST/COST OF OUTPUT
VAR16	MATERIAL COST/COST OF OUTPUT
VAR17	GROSS PRODUCTION COST/COST OF OUTPUT
VAR18	COST OF OUTPUT/AVERAGE STOCK
VAR19	DEPRECIATION/NET PRODUCTION COST
VAR20	VALUE ADDED/FACTORY EMPLOYEE

Sub-name	Name of the financial ratios
VAR21	CURRENT ASSET/CURRENT LIABILITIES
VAR22	CURRENT ASSET-STOCK/CURRENT LIABILITIES
VAR23	CURRENT ASSET/TOTAL LIABILITIES
VAR24	PROFIT BEFORE TAX/CURRENT LIABILITIES
VAR25	WORKING CAPITAL/TOTAL ASSET
VAR26	REVENUE BEFORE TAX AND INTEREST/ TOTAL ASSET
VAR27	NET WORTH/TOTAL ASSET
VAR28	FIXED ASSET/NET WORTH
VAR29	FIXED ASSET/OPERATING CAPITAL
VAR30	CURRENT LIABILITIES/TOTAL ASSET
VAR31	TOTAL LIABILITIES/CAPITAL EMPLOYED
VAR32	IMMEDIATE ASSET/CAPITAL EMPLOYED
VAR33	CURRENT LIABILITIES/NET WORTH
VAR34	TOTAL LIABILITIES/NET WORTH
VAR35	IMMEDIATE ASSET-CURRENT LIABILITIES/ OPERATING COST-DEPRICIATION
VAR36	EQUITY/TOTAL DEBT

APPENDIX-D

LISTING OF THE SUBPROGRAM

DISCRIMINANT

```
// JCB PEARSON2 DTA3
// EXEC PGM=SPSS,USPSS
RUN NAME          DISCRIMINANT ANALYSIS OF FINANCIAL RATIOS
VARIABLE LIST     VAR01 TO VAR26
SUBFILE LIST      GO (46) NGO (33)
INPUT MEDIUM      CARD
INPUT FORMAT      FIXED(10F8.3/10F8.3/10F8.3/6F8.3)
RUN SUBFILES      (GO NGO )
DISCRIMINANT      GROUPS = SUBFILES/VARIABLES = VAR01 TO VAR26/
                  ANALYSIS = VAR01 TO VAR26/METHOD = RAO/

OPTIONS           2 , 5 , 6 , 7 , 10 , 11


READ INPUT DATA
```

APPENDIX-E

LINEAR DISCRIMINANT ANALYSIS/CANNONICAL

CORRELATION/WILK'S LAMBDA

LINEAR DISCRIMINANT ANALYSIS

Sometimes the responses which one wishes to predict from
a multivariate analysis are dichotomous, such as, for
example, good or bad, successful or unsuccessful, standard
or substandard, and the like. The particular statistic for
the solution of this type of problem, which is called the
discriminant function because it has the ability to
discriminate between the two classes of interest. The
principle upon which the discriminant function rests is
that the linear functions of the measurements will maximize
the ratio of the difference between the specific means to
the standard deviations within classes.

Let the samples be of N_1 and N_2 observations, respec-
tively which make p measurements $X_1, \ldots, X_p$ on each
individual, consider first the question: what linear func-
tion of the measurements will maximize the ratio of the
difference between the means of the two classes to the
standard-deviation within classes-? The linear function
is represented by

$$\alpha = \sum_i \lambda_i x_i \ (i = 1, \ldots, p) \qquad (E.1)$$

Let the difference between means of x_i be represented by
d_i, where $i = 1, \ldots, p$ for the p measurements. Represent
the sum of squares or products from the specific means

within classes by S_{ij}, where $i,j = 1,...,p$. Then for any linear function, α of the measurements, the difference between the means of α in the two specific groups is

$$D = \sum_i \lambda_i \ d_i \quad (i = 1,....,p) \qquad (E.2)$$

while the variance of α within classes is proportional to

$$S_\alpha = \sum_i \ \sum_j \lambda_i \lambda_j \ S_{ij} \quad (i,j = 1,....,p) \qquad (E.3)$$

The particular function which best discriminates the two groups will be one for which the ratio D^2/S_α is greatest, by variation of the p coefficients, $\lambda_1,....,\lambda_p$, independently. Mathematically, the solution of each λ should be

$$\frac{\partial}{\partial \lambda} \left(\frac{D^2}{S} \right) = 0 \qquad (E.4)$$

which reduces to

$$\frac{D}{S^2} \left(2S \frac{\partial D}{\partial \lambda} - D \frac{\partial S}{\partial \lambda} \right) = 0 \qquad (E.5)$$

and consequently,

$$\frac{1}{2} \frac{\partial S}{\partial \lambda} = \frac{S}{D} \frac{\partial D}{\partial \lambda} \qquad (E.5)$$

where it may be noticed that S/D is a factor common to the p unknown λ's. Therefore, the coefficients required are

proportional to the solutions of the normal equations:

$$S_{11}\lambda_1 + \quad \cdots \quad + S_{1p}\lambda_p = d_1$$

$$\cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot$$

$$S_{p1}\lambda_1 + \quad \cdots \quad + S_{pp}\lambda_p = d_p$$

(E.7)

Let $L_i = \sqrt{S_{ii}}\,\lambda_i \quad (i = 1,\ldots,p)$

(E.8)

In (E.7) the ith equation is divided by $\sqrt{S_{ii}}$, where $i = 1,\ldots$, p. Then the following set of normal equations are obtained:

$$r_{11}L_1 + \cdots + r_{1p}L_p = \frac{d_1}{\sqrt{S_{11}}}$$

$$\cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot$$

$$r_{p1}L_1 + \cdots + r_{pp}L_p = \frac{d_p}{\sqrt{S_{pp}}}$$

(E.9)

Solving (E.9) by Fisher's method by auxiliary statistic, in which unity is substituted for each of the $d_i/\sqrt{S_{ii}}$'s in turn, while the others are made equal to zero as follows:

$$r_{11}L_1 + \cdots + r_{1p}L_p = 1,\ldots,0$$

$$\cdot \quad \cdot \quad \quad \cdot \quad \cdot \quad \quad \cdot \quad \cdot$$

$$r_{p1}L_1 + \cdots + r_{pp}L_p = 0,\ldots, 1$$

(E.10)

Let the means of a for these groups are defined as

follows:

$$\alpha_1 = \sum_i \lambda_i X_{1i} \quad (i = 1,\ldots, p) \qquad (E.11)$$

$$\alpha_2 = \sum_i \lambda_i X_{2i} \quad (i = 1,\ldots, p) \qquad (E.12)$$

when X_{1i} is the mean value of X_i for the first group and X_{2i} is the mean value of X_i for the second group. To test the hypothesis:

$$H_0 : E(\alpha_1) = E(\alpha_2) \qquad E \text{ is the notation for the} \qquad (E.13)$$
$$\text{expectation of a parameter}$$

that is, the hypothesis that there is no significant difference between two groups for the function α. By mathematical deductions, the sums of squares due to 'within groups' and 'between groups' are

'within groups' D with $n_2 = N_1 + N_2 - p - 1$ $\qquad (E.14)$

'between' $\dfrac{N_1 N_2}{N_1 + N_2} D^2$ with $n_1 = p$ $\qquad (E.15)$

Then the test of H_0 is given by

$$F = \frac{N_1 + N_2 - p - 1}{p} \cdot \frac{N_1 N_2}{N_1 + N_2} D$$

If the hypothesis, H_0, is rejected, it may be concluded that the obtained values of λ's are the assigned weights of the measurements which best discriminate these two groups.

Then the next problem arises such that if there is another individual to be observed by making the same measurements, $X_1, \ldots, X_p$, on him, how to know to which group he belongs. By using Wald's criterion, the populations of the first group and second groups are denoted by π_1 and π_2, respectively. The hypothesis tested in this problem is that the individual is drawn from π_1. First calculate:

$$\alpha_1 = \sum_i \sum_j S_{ij} X_{1i} d_j = \lambda_1 X_{11} + \ldots + \lambda_p X_{1p} \qquad (E.16)$$

$$\alpha_2 = \sum_i \sum_j S_{ij} X_{2i} d_j = \lambda_1 X_{21} + \ldots + \lambda_p X_{2p} \qquad (E.17)$$

$$U = \sum_i \sum_j S_{ij} X_i d_j = \lambda_1 X_1 + \ldots + \lambda_p X_p \qquad (E.18)$$

$$i, j = 1, \ldots, p$$

where α_1, α_2, X_{1i}, X_{2i}, S_{ij} and d_j are defined as before X_i is the value obtained by this individual on the ith measurement; and U is the value obtained by the individual for the linear function α. Then the critical region for rejecting the hypothesis with the least risk of both kinds of error, that is, accepting the hypothesis when it is false and rejecting the hypothesis when it is true, is given by

$$U \geq \frac{\alpha_1 + \alpha_2}{2}$$

Cannonical Correlation:-

The cannonical correlation is a measure of association between the single discriminant function and the set of (g-1) dummy variables which define the g group memberships. It tells how closely the function and the 'group variable' are related, which is just another measure of the functions ability to discriminate among the groups. Reversing the logic in someway, the cannonical correlation when squared stands as the proportion of variance in the discriminant function explained by the groups.

Wilk's Lambda:-

Wilk's lambda is an inverse measure of the discriminating power in the original variables which has not yet been removed by the discriminant functions - the larger lambda is, the less information remaining. Lambda can be transformed into a chi-square statistic for an easy test of statistical significance.