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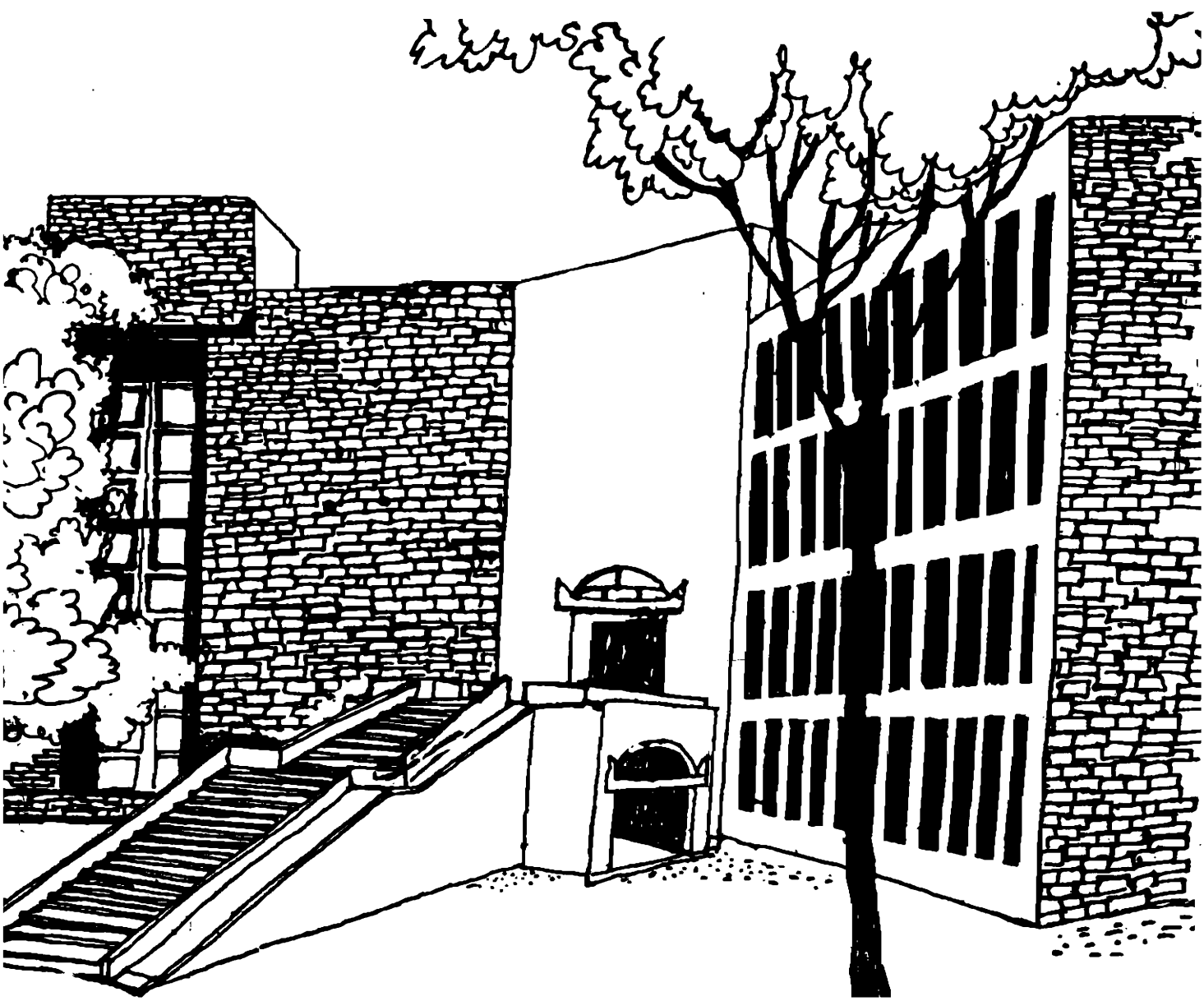

DETERMINANTS OF EFFECTIVE WORKING CAPITAL MANAGEMENT - A DISCRIMINANT ANALYSIS APPROACH

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DETERMINANTS OF EFFECTIVE WORKING CAPITAL MANAGEMENT - A DISCRIMINANT ANALYSIS APPROACH

I ORIGIN OF THE STUDY

A study was initiated in 1975 by James A. Gentry of the University of Illinois and Dileep Mehta of Georgia State University on the perception of managers with respect to the relationship between long-term and short-term objectives in working capital management and variables affecting cash flow predictability. The initial questionnaire for eliciting information was designed by the Survey Research Laboratory of the University of Illinois. In order to facilitate comparison and to gain a deeper insight into the working capital processes, the scope of the study was enlarged to include industrial enterprises in Belgium, France and India besides those from the USA. For the Indian part of the study S.K. Bhattacharyya obtained responses to the questionnaire from 72 relatively large Indian industrial enterprises. Additionally, the Indian enterprises participating in the study were also asked to furnish their latest annual reports incorporating the balance sheets and profit and loss accounts. Robert Cobbaut of the Catholic University of Louvain and Jean-Louis Scaringella at the Centre D'enseignment Superieur Des Affairs, H.E.C. obtained responses from the Belgium and French industrial enterprises respectively. The results of this study together with five other papers were presented

at the Working Capital Management II Conference held at the University of Illinois.[1]

The cross cultural study focussed on the perception of practitioners with respect to the two issues, viz. the relationship between long-term and short-term objectives, and variables affecting cash flow predictability. The data base for their conclusions was exclusively the responses obtained from the questionnaire used by them. They concluded that more than 70 per cent of all managers selected either increasing total profits or increasing the return on shareholders capital as the most important long-term objective. The analysis of the perceptions of the responding managers also showed that financial planning variables were not related to the predictability of cash inflows. Rather, product leadership and market dominance headed the list, followed closely by internal communications between the treasurer and the marketing and production areas.

It could thus be said that the study did not deal with the factors influencing the effectiveness of working capital management.

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1 J.A. Gentry, D.Mehta, S.K. Bhattacharyya, R.Cobbaut, J.L. Scaringella, "A Cross Cultural Analysis of Perceived Corporate Working Capital Process". Collection of papers presented at the Working Capital Management II conference held at the University of Illinois, April 7-9, 1976.

For instance, it did not attempt to identify the relative degrees of effectiveness of management of working capital of the participating companies. Besides, no analysis was done to identify the financial indicators relating to the effective working capital management process since the emphasis was on cross-cultural comparison rather than on the analysis of individual companies participating in the study. The conclusions are based exclusively on the perceptions of the managers. It appears that the reliability of the managers' perceptions vis-a-vis their own management of working capital was not tested by the investigators. Our present study which is independent of the earlier cross cultural study is an attempt to explore some of these issues.

2 BACKGROUND OF THE PRESENT STUDY

While dealing with industrial enterprises in order to determine credit and other requirements, bankers , financial institutions, investors, government agencies and tax authorities look into the effectiveness of the working capital management. This is usually done on the basis of published annual reports or balance sheets and profit and loss accounts,supplemented by additional information relating to specific aspects of the working capital position. Working capital at any point of time, is usually defined as the difference between current assets and current liabilities at that point. Some

departures from this definition are evident in the recent publications relating to the determination by commercial banks and financial institutions of working capital needs of enterprises. For example, the Reserve Bank of India Panel on Bank Credit (usually referred to as the Tandon Panel) defined "working capital gap" for purposes of bank credit as "total current assets less current liabilities other than bank borrowings".[2] In the perception of those who do not have formal financial management training, working capital is often equated with liquidity, i.e. the current level of liquid assets like cash and other readily convertable assets for meeting external payment obligations. The management of working capital by enterprises is one of the most important factors that influence decisions taken by several agencies like suppliers of commodities and goods, commercial banks, financial institutions, stockbrokers, financial analysts and the financial press. In the decision-making process several well known financial ratios are used which provide the required degree of understanding and insight about the effectiveness of the working capital management process. Some of the most commonly used ratios are :

1 Current ratio, i.e. current assets as a ratio of current liabilities;

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2 "Report of the Study Group to Frame Guidelines for Follow-up of Bank Credit", Reserve Bank of India, Bombay, 1975, p.27

2 Debt-Equity ratio, i.e. long-term borrowings as a ratio of equity;

3 Receivable-Sales ratio, i.e. receivables expressed as number of days sales;

4 Finished Goods Inventory-Sales ratio, i.e. Finished goods inventory expressed as number of days of sales;

5 Raw Materials Inventory-Consumption ratio, i.e. raw materials inventory exp ressed as number of days of raw materials consumption;

6 Total Inventory-Sales ratio, i.e. total inventory expressed as number of days sales

In such financial analysis, the desired norms are often established in general or in relation to a specific industry, for example, it is considered that a current ratio exceeding 2:1 or a quick assets ratio (ratio of the difference of current assets and inventory to current liabilities) not below 1:1 is indicative of good working capital management. The Tandon Panel has provided some norms relating to inventories and receivables (usually financed by "working capital" borrowings) to be followed by commercial banks in granting working capital credit.3 (See Appendix I) It has also suggested a three stage requirement for "improving" the performance of working capital management of borrowing companies with reference to current ratio. Industrywise ratios are also put out by the Reserve Bank of India in its reports

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3 Ibid., pp. 20-21

relating to the annual study of 1650[4] and 375[5] large companies. In other countries, specialized agencies provide industry ratios for the use of financial institutions, commercial banks, stock brokers, credit granting agencies and others e.g. Standards and Poor or Dun and Bradstreet in the USA.

From time to time, questions have been raised regarding the validity of these norms. It has been argued that the norms may be substantially different depending on factors like the financial and marketing strategies adopted by a company or the industry context, e.g. in the shipping industry, requirements of funds are traditionally met by borrowings from specialized agencies rather than by equity. Economists and management specialists have questioned rigid norms on the ground of opportunity costs involved in maintaining high current or quick asset ratios. Accountants have questioned the accuracy of computation and comparability of ratios on account of differences in methods relating to valuation of assets of different ages and measurement of profits (e.g. depreciation practices, valuation of inventories, capitalization of current expenses likely to generate future benefits, etc.) A more substantive problem ralates

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4 "Finances of Medium and Large Public Limited Companies, 1973-74", *Reserve Bank of India Bulletin*, September 1975

5 "Finance of Large Public Limited Companies , 1974-75", *Reserve Bank of India Bulletin*, January 1976, pp. 34-60.

to the difficulty in interpreting multiple indicators providing contradictory signals and directions.

However, a purely qualitative or judgmental approach in deciding on the effectiveness of the working capital management may be neither desirable nor acceptable. There is some evidence to believe that perceptions of individuals are substantially influenced by their biases. This was borne out by a small experiment the authors conducted to measure the differences in perceptions of financial analysts external to the company to determine the effectiveness or otherwise of the working capital management of a company. It was also designed to test the consistency of the analysts' judgment at two different time points. Ten companies were selected and five external financial analysts were asked to classify each company as effective or not effective in the management of working capital on the basis of published annual reports. After the lapse of a few days, the financial highlights of each of these companies in the form of certain financial ratios used in the present analysis *and* the balance sheets and profit and loss accounts were presented to the same individuals *without disclosing the name of the company*. They were asked once again to classify each of the companies with reference to the same criterion, viz. the effective management of working capital. The results of the experiment are given in Table 2.1.

Table 2.1

Companies	External Financial Analysts					No.of analysts identifying the company as effective/ not effective			
	1	2	3	4	5	I Stage		II Stage	
						Effective	Not effective	Effective	Not effective
A	(1,0)	(1,1)	(1,1)	(1,0)	(0,0)	4	1	2	3
B	(1,1)	(1,1)	(1,1)	(0,1)	(0,0)	3	2	4	1
C	(1,0)	(1,0)	(1,0)	(0,1)	(0,0)	3	2	1	4
D	(1,1)	(0,0)	(1,1)	(1,1)	(0,1)	3	2	4	1
E	(1,1)	(0,1)	(0,1)	(1,0)	(1,1)	3	2	4	1
F	(1,0)	(0,0)	(0,0)	(0,0)	(1,1)	2	3	1	4
G	(1,1)	(1,0)	(1,1)	(1,1)	(0,1)	4	1	4	1
H	(1,0)	(0,0)	(0,1)	(1,1)	(0,1)	2	3	3	2
I	(0,1)	(1,0)	(0,0)	(0,0)	(1,1)	2	3	2	3
J	(0,0)	(0,1)	(0,0)	(1,0)	(0,1)	1	4	2	3
Total number of times out of ten the perceptions differ in two stages	5	5	3	5	4	—			

Note: '1' indicates 'effective' and '0' indicates 'not effective'. (1,0) would thus indicate that the company under consideration was classified as 'effective' during the first stage when the name of the company was disclosed and 'not effective' during the second stage when the name of the company was not disclosed.

From the last two columns of Table 2.1 it can be seen that the perceptions of analysts vary quite considerably. The results of the first stage of the experiment show that in 7 out of 10 companies, the ratio of agreement between the five analysts was 3:2, i.e. three out of the five analysts classified in the same way. In the second stage, in 6 out of 10 companies, the ratio of agreement between the analysts was 4:1, i.e. four out of the five analysts classified in the same way. It should be recalled that, for the second stage, the analysts *did not* have information about the identity of a company. The table also reveals that the analysts did not show significant consistency in their ability to classify in the two stages of the experiment. A majority of them arrived at the same conclusion in only 5 out of 10 companies. It is interesting to note that a purely random classification in both stages would have produced the same expected number of consistent conclusions. From the results of the experiment, it is clear that an analysis based on perceptions is likely to have much lesser validity than an analytical study based on quantitative methods applied on empirical data.

Given the necessity of making determination of the effectiveness of working capital management, any new knowledge or understanding which would contribute to the resolution of the existing problems and provide new ways of making such determination would be conceptually useful. It would also lead to improvement of current operational

practices in formulating working capital management policies and practices and appraisal of creditworthiness in making working capital loans. The present study seeks to examine the current concepts and beliefs in this area for providing new understanding and insights and making improvements in operational methods and practices referred to earlier.

3 OBJECTIVES OF THE STUDY

Specifically, the objectives of the present study are :

a to identify a method of classifying those companies which manage their working capital more effectively than others;

b to determine the factors which lead to the effectiveness of working capital management process;

c to analyse the perceptions of managers with regard to the effectiveness of the working capital management of their companies, particularly with reference to the processes of such management.

d to analyse the perceptions and current practices of external financial analysts based on published financial statements in assessing working capital position of enterprises; and

e to make recommendations to managers for improving the effectiveness of the working capital management process.

4 METHODOLOGY OF THE STUDY

The well-established Multiple Discriminant Analysis (MDA) technique, based on selected financial ratios as variables, was applied to classify companies in terms of effectiveness or otherwise of their working capital management. The technique has been used by numerous researchers to study some other aspects of financial management problems.[6] MDA was also used to determine the factors leading to effective management of working capital. A factor analysis was carried out to identify the important factors which explain the variations in the financial ratios for the group of companies which manage

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6 D.D. Durand, "Risk Elements in Consumer Instalment Financing", *Studies in Consumer Instalment Financing*, New York : National Bureau of Economic Research, 1941, p p. 105-142.

H. Myers and E.W. Forgy, "Development of Numerical credit Evaluation Systems", *Journal of American Statistical Association*, Vol. 50, September 1963, pp. 797-806.

J.E. Walter, "A Discriminant Function for Earnings Price Ratios of Large Industrial Corporations", *Review of Economics & Statistics*, Vol. XLI, February 1959, pp. 44-52

K.V. Smith, "Classification of Investment Securities using MDA", *Institute Paper* 101, Purdue University, USA, Institute for Research in the Behavioural, Economic and Management Sciences, 1965.

E.I. Altman, "Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy", *Journal of Finance*, Vol. XXIII, No.4, September 1968, pp. 589-609.

R.Y. Awh and D. Waters, "A Discriminant Analysis of Economic Demographic and Attitudinal Characteristics of Bank Charge Card Holders : A Case Study", *Journal of Finance*, Vol. XXIX, June 1974, pp 973-980.

their working capital effectively. Additionally, the results of the analysis of performance by the Reserve Bank of India of 375 large Indian Public Limited companies[7] were used to obtain an alternative classification scheme. Besides, the perceptions of the managers relating to the working capital management process in their own companies were analysed to obtain yet another classification. The classifications were mutually compared to assess the degree of agreement among them. A statistical analysis was also carried out to test the reliability of the perceptions of managers reflected in their responses to the several aspects relating to working capital management process posed in the cross-cultural study questionnaire.

Initially, the balance sheets of all 72 Indian companies for the financial year nearest to the period in respect of which answers were provided in the questionnaire were examined judgmentally. It might be added that no formal ratios were computed for the purpose of this judgement. A classification was done of companies which appeared to manage working capital effectively and those which did not manage working capital effectively. This involved visual comparison of relationships between the following elements :

Sales
Profit
Cash Balances
Receivables
Inventories

7 Ibid

Current Liabilities (including Short-Term Loans)
Depreciation
Capital
Reserves
Borrowings and
Long Term Loans

Thereafter, the responses of company executives to the following questions in the questionnaire were carefully analysed :

2 During the past year has your company experienced financial surprises that have affected your financing alternatives?

Yes, continuous .....

Yes, frequent .....

Yes, but infrequent .....

No. .....

3 Currently, how would you rate the reliability of your company's predictions related to Reliability of Predictions of

	Extremely high	High	Modest	Very low
a Cash inflows?	-	-	-	-

If the answer to question 2 of the questionnaire indicated that the company concerned had not experienced (or experienced infrequently) financial surprises and *also* if the reliability predictions related to cash inflows were 'extremely high' or 'high' the company was classified as a company which managed the working capital effectively. Correspondingly, if the answer for a company indicated that it experienced continuous financial surprises (or frequent financial surprises) and *also* the reliability of that company's predictions related to cash inflows was 'very low' or 'modest', that company was classified as a company which managed its working capital ineffectively. All other companies, in respect of which no clear judgment could be made from the answers to the two questions were classified as not clear companies. The results of classification on the basis of answers were then compared with the initial classification made judgmentally by visual analysis of the balance sheet of the concerned company. If *both* perceptions, i.e. the answers to the questionnaire and the judgmental analysis indicated that the company's working capital management was perceived to be managed effectively, it was finally categorized as an *effective* company. Similarly, those companies, which on the basis of the answers to the questionnaire and initial judgmental analysis were categorized as ineffective were finally classified as *not effective*. If, however, the classifications of a company based on answers to the questionnaire *and* judgmental analysis were

different, they were added to the list of *not clear* companies. The final classification of companies was as follows :

Effective	30	companies
Not Effective	16	companies
Not Clear	26	companies
Total	72	companies

With the help of this classification of the companies into the three categories, *effective*, *not effective* and *not clear*, discriminant analysis could now be done. However, for making such an analysis, variables had to be identified which could be used for the purpose of discrimination.

Since ratios are the basic data used by practitioners in analysing and assessing the working capital management, it was decided that the basic data would be financial ratios of the participating companies. Ratios are used for analysis of working capital management primarily because they provide insights into the relationship between the constituent items, which, in the ultimate analysis, determine whether the working capital management process is effective or not. As an alternative to sequential ratio comparisons, it was hypothesized that a multivariate set-up with ratios as variables would be of greater statistical significance.

This hypothesis is corroborated by Altman in his study of bankrupt companies.[8] No attempt was made during the current study to follow up the results of the ratio analysis or the answers to the questionnaire by having personal interviews with the concerned executives.

Initially, financial ratios were selected on a judgmental basis. In exercising the judgment, the criteria of relevance and criticality of the relationship reflected in the ratios used in the working capital management process were chosen. In that sense, these ratios were clearly focused on the working capital management rather than performance evaluation or optimality of financial structure, etc. The eleven ratios selected for the analysis were :

1. Current assets as percentage of current liabilities, usually referred to as *current ratio*
2. Quick assets (i.e. Debtors+ Loans and Advances+ Free securities + cash) as percentage of current liabilities usually referred to as *liquidity or quick asset ratio*.
3. Average finished goods inventory as number of days' sales
4. Average raw material inventory as number of days of raw material consumption
5. Average receivables as number of days' sales
6. Profit after tax + depreciation (i.e. the cash throwoff) as percentage of sales

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8 op.cit.

7 Sundry creditors as percentage of raw materials consumed and operating expenses othern than wages

8 Profit after tax (PAT) as percentage of sales

9 Sales as number of times of total assets

10 Profit after tax as percentage of total assets also referred to as Return on Investment (ROI) and

11 Debt as percentage of Equity

The assumptions made in computing the financial ratios are given in Appendix II.

Ratios (1) and (2) are indicators which are traditionally used by bankers, financial analysts, the financial press, regulatory agencies, etc. for evaluating the working capital management of enterprises. Ratios (3), (4) and (5) relate to inventories and receivables (with reference to business activities which result in their generation) and represent the value of funds blocked up in current assets in the process of conversion into cash but not presently available for meeting obligations. Ratios (6), (8) and (10) represent cash flow and profitability performance relative to revenue generated and available resources. Ratio (9) measures the ability of the enterprise to utilize its resources for generation of revenues and, therefore, for profits and funds. Ratios (7) and (11) measure obligations to creditors for goods and services, and borrowers relative to expenses incurred and internal funds respectively. It needs to be added that these 11

ratios were carefully selected with a view to highlighting the different aspects of the working capital management process.

The purpose of applying multiple discriminant analysis (MDA) was :

1 to determine whether the 11 selected ratios discriminate the two groups of companies well. i.e. those which are effective and not effective in managing their working capital;

2 to fit a discriminant function with a view to classifying a given company as effective or not effective; and

3 to determine the relative importance of these variables as an aid in the discrimination process

The above mentioned considerationsare directly related to the objective of the study referred to in Section 3 (page 10) and more specifically to objectives (a) and (b).

5 DISCRIMINANT ANALYSIS

Discriminant analysis is a well known multivariate statistical technique applied to discriminate between two groups or populations through a set of given variables (or characteristics). It also enables the user to assess the relative importance of the variables in their discriminatory ability. If a set of variables is denoted by

$x_1, x_2, \ldots, x_p$, discriminant analysis gives a linear discriminant function.

$$D = l_1 x_1 + l_2 x_2 + \ldots + l_p x_p$$

where the discriminant function coefficients $l_1, l_2 \ldots, l$ are determined in such a way that this linear discriminant function's ability to differentiate between the members of two groups is maximized. Speciafically, this is achieved by maximizing the square of the difference of the mean discriminant function scores $\bar{D}_1$ and $\bar{D}_2$ of the groups relative to the variance within the two groups.

Utilizing the coefficients (l's) of the discriminant function, the importance and relative importance values of each variable can be obtained. The "importance value" of the i^{th} variable is obtained as $l_i (\bar{x}_{1i} - \bar{x}_{2i})$ where $\bar{x}_{1i}$ and $\bar{x}_{21}$ are the means of the i^{th} variable for groups 1 and 2 respectively. A relative importance value shows the importance value of a particular variable relative to the sum of the importance values of all variables. Thus, the relative importance of the i^{th} variable is given by[9]

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9 See Frederick Mosteller and David L. Wallace, "Inference in the Authorship Problems", *Journal of the American Statistical Association*, Vol. 58, June 1963, pp. 282-283. and R.Y. Awh and D. Waters, *op.cit.* There seem to be some errors in the latter paper and in this connection see, M. Raghavachari and S.K. Bhattacharyya, " Some Comments on the Paper by Awh and Waters on the Discriminant Analysis of Bank Charge Card Holders (Unpublished)

$$R_i = \frac{l_i\ (\bar{x}_{1i} - \bar{x}_{2i})}{\sum_{i=1}^{p} l_i(\bar{x}_{1i} - \bar{x}_{2i})}$$

The R_i's yield a better means of judging the relative importance of a variable than the l_i's i.e. the discriminant function coefficients. Disparity in units of measurement of the various variables make it impossible to use l_i's for determining the relative importance values of variables. The R_i's are however unit free and thus are more reliable.

The linear discriminant function can be tested on the given sample and the "confusion matrix" so generated gives the number of members of the sample correctly classified by the discriminant function. The computer output of a linear discriminant analysis usually includes :

1. the mean value for each variable in each group along with differences for each variable over the two groups;
2. the discriminant function coefficients for each variable;
3. the mean scores $\bar{D}_2$ and $\bar{D}_2$ as well as the cut off point $(\bar{D}_2 + \bar{D}_2)/2$ to determine the classification into one of the two groups;
4. the confusion matrix showing the efficiency or discriminating ability of the function when applied to members in the sample;

5 the associated Mahalonobis D^2 statistic

($D^2 = \sum_{i=1}^{p} l_i (\bar{x}_{1i} - \bar{x}_{2i})$ which is converted into a variance ratio (F) for the purposes of testing whether the two groups can be considered identical with regard to the variables under consideration; and

6 the probability of misclassification of the discriminant function with regard to a new member not in the original sample.

6 DATA BASE AND OPERATING CHARACTERISTICS

The broad characteristics of the 72 companies participating in the study are given in Appendix III. About 75 per cent of the companies participating in the study are in the private sector, while the rest belong to the public sector. This can be regarded as a fairly representative spread between the sectors.

The industry/business-wise classification shows a wide range. Manufacturing, processing and marketing (or trading) companies constitute almost 85 per cent of the total sample size, reflecting a close similarity to the real life situation.

More than 80 per cent of the companies have sales volume exceeding Rs. 100 million, showing that the study primarily concentrates on

large Indian industrial enterprises. About 10 per cent of the companies have sales volume exceeding Rs. 2000 million.

The total assets of more than 70 per cent of the participating companies exceed Rs. 100 million. More than 10 per cent of the companies' total assets exceed Rs. 2,000 million.

The 11 ratios, identified earlier were calculated for all companies participating in the study. The distribution range of these ratios is given in Appendix IV.

7 ANALYSIS

Using the 11 variables, a discriminant analysis was run in respect of the 30 *effective* and 16 *not effective* companies. We shall call the set of effective companies as Group I and the set of ineffective companies as Group II. The computer output containing the results of this analysis is given in Appendix V. The discriminant function was obtained as :

$$D = 0.028\,x_1 - 0.016\,x_2 - 0.014\,x_3 - 0.009\,x_4 - .042\,x_5 + 0.615\,x_6 + 0.054\,x_7 - 0.634\,x_8 + 1.123\,x_9 + 0.379\,x_{10} - 0.001\,x_{11}$$

($x_1, x_2 \ldots\ldots x_{11}$ correspond to the eleven ratios)

It is seen from the results that the discriminant function classified 41 out of 46 companies in the sample correctly i.e. it achieved about 89 per cent correct classification. The F ratio showed significance at 1 per cent level of significance. The probability of misclassification of the discriminant function was about 0.26. While the discriminating ability of the discriminant function was quite good, the signs of some of the discriminant function coefficients showed some unexpected results. For example, the discriminant function coefficient corresponding to variable x_8, i.e. profit after taxes expressed as percentage of sales was -0.634 whereas the difference in group means (group I - group II) for this same variable was + 3.15. The negative sign of the discriminant functions coefficient for this variable was apparently due to the composite nature of this variable in relation to variable x_6, i.e. PAT + Depreciation as percentage of sales. The discriminant function coefficient for x_6, however, was positive. This latter coefficient apparently explains partly the extent of the discriminatory ability accounted by the variable x_8.

It was also noticed that the data pertaining to the eleven ratios for the two groups of companies had some extreme observations in relation to some of the variables. These extreme observations are usually called *outliers* in statistical practice and the high variation caused by the presence of outliers affects the correct interpretation

of discriminant function coeffieients and the relative importance of the variables. As an example of this phenomenon, for variable x_{11}, debt-equity ratio, the mean of group II was considerably affected by a few extreme observations of some companies in this group. One of the companies in this group had a debt-equity ratio of 45:1 while the average was 1.02 : 1 for the entire sample. The foregoing analysis shows that in order to draw meaningful conclusions about the relative importance of the variables, we should eliminate, as far as possible, the composite variables and outliers. Since this phenomenon may be noticed in any multivariate discriminant analysis, it might be worthwhile to explain in greater detail the impact of the presence of composite variables and outliers on the discriminant analysis. An outlier typically will make the interpretations of discriminant function coefficients difficult for the following reasons :

1 An outlier in a group will have greater effect on the extent of variation of a particular variable within that group.

2 The relative importance value of the variable for which outliers are present will be affected by the values of the outliers in respect of that variable.

3 The presence of outliers in respect of a variable will also increase the difference in variation of the two groups with respect to that variable, resulting in the violation of some standard pre-requisites necessary for multiple discriminant analysis.

Since *a priori* it is not possible to determine the total effect of outliers, the analysis would become meaningful by removing them. Extreme cases obtained by the presence of outliers are usually easier to identify in terms of effectiveness/ineffectiveness of working capital management.

The impact of composite variable on discriminant analysis is of a different order. By a *composite variable* we mean a variable derived through a functional relationship between some other variables already included in the analysis. For example :

$$\text{Profit after tax as percentage of Total Assets (Return on Investment -ROI) } (x_{10}) = \frac{\text{Profit after taxes (PAT)}}{\text{Total Assets}} \times 100 = \frac{\text{PAT}}{\text{Sales}}\ (x_8) \times 100 \times \frac{\text{Sales}}{\text{Total Assets}}\ (x_9)$$

$$\frac{\text{Cash throw off}}{\text{Sales}}\ (x_6) \times 100 = \frac{\text{PAT} + \text{Depreciation}}{\text{Sales}} \times 100 = \frac{\text{PAT}}{\text{Sales}}\ (x_8) \times 100 + \frac{\text{Depreciation}}{\text{Sales}} \times 100$$

The introduction of such composite variables in the analysis will make the interpretation of discriminant coefficients of these individual variables difficult and misleading. It was already pointed out that the coefficient of x_8 (PAT as percentage of Sales) was negative in the discriminant analysis, whereas the coefficient of

x_6 (Cash throw off as percentage of Sales) was positive. Instead of these two variables, if we had included in our analysis PAT as percentage of Sales and Depreciation as percentage of Sales, the discriminant function coefficients would have been different. This can be explained algebraically as follows. From the discriminant function given on page 22 the contribution of x_6 and x_8 to the discriminant function is :

$$0.615\ x_6 - 0.634\ x_8$$

If y denotes the variable Depreciation as percentage of Sales, we have

$$x_6 = \frac{\text{PAT} + \text{Depreciation}}{\text{Sales}} \times 100$$

$$= \frac{\text{PAT}}{\text{Sales}} \times 100 + \frac{\text{Depreciation}}{\text{Sales}} \times 100$$

$$= x_8 + y$$

Thus the relative contribution of the variables x_6 and x_8 to the discriminant function expressed in terms of x_8 and y becomes

$$0.615\ (x_8 + y) - 0.634\ x_8$$

$$= -0.019\ x_8 + 0.615\ y$$

With the new set of variables, the new coefficient of x_8 in the discriminant function has increased to -0.019 from -0.634. *This shows that the sign and magnitude alone of the discriminant function coefficient of a particular variable is no guide to draw inferences about the importance of the variable in determining whether an observation belongs to one of the two groups. The multivariate set up which the discriminant function reflects shows that the variables have to be taken together while interpreting the discriminant function.* The foregoing analysis also shows that if composite variables are not present, the discriminant function coefficients can be better interpreted.

Another important factor to be noted is that the presence of composite variables makes the task of interpreting the relative importance of these variables difficult. The relative importance of a variable included in the MDA is defined on page 20. It was shown on page 25 that the variables x_8, x_9 and x_{10} were functionally related by the equation

$$\text{Profit after tax as percentage of Total Assets (ROI)} = x_{10} = x_8 \, x_9 = \frac{\text{PAT}}{\text{Sales}} \times 100 \times \frac{\text{Sales}}{\text{Total Assets}}$$

The relative importance values and rankings of these variables are given in Table 7.1.

Table 7.1

Variable	Relative Importance (Percentage)	Ranking of variable in terms of relative importance
x_8	19.00	I
x_9	7.07	VII
x_{10}	15.42	II

Variables x_8 and x_{10} get the highest rankings, i.e. first and second respectively, and x_9 is ranked seventh. It is likely that part of the relative importance of variable x_9 gets "confounded" with that of variable x_{10} and it is impossible to separate the individual effects.

The foregoing discussion highlights some of the biases in the interpretation of results of any multiple discriminant analysis. We have included a detailed discussion of these aspects because considerable part of our time was spent on identifying and resolving these issues during the course of our research study.

Accordingly, it was decided to eliminate outliers from the sample and composite variables from the list of variables included in the discriminant analysis. Our analysis was, therefore, reduced to eight variables including the ratio current assets/current liabilities after eliminating the three composite variables viz. quick assets as percentage of current liabilities, cash throw off as percentage of sales, and PAT as percentage of total assets. Since quick assets/current liabilities ratio (also known as the "acid test ratio" or"liquidity ratio") seems to be relevant in the appraisal of working capital management, a separate analysis was also concurrently conducted replacing the current assets/current liability ratio by quick assets/ current liabilities ratio. In view of the composite nature of these two variables, both were not included simultaneously in the analysis.

The removal of outliers reduced our sample to 31 companies, with 23 companies in the *effective* group and 8 companies in the *not effective* group. We ran two sets of discriminant analyses, one with the current assets as percentage of current liabilities ratio and the other replacing that ratio by quick assets as percentage of current liabilities.

Discriminant analysis incorporating Current Assets/Current Liabilities

The results of the analysis are given in Appendix VI. The discriminant function correctly classified 84 per cent of the observations in the sample. The probability of misclassification was 0.32. The F ratio was not significant at 5 per cent level of significance. The calculation of relative importance of the variables having significant relative importance valuesin the discriminant function is given in Table 7.2.

Table 7.2

Variable	Relative importance (Percentage)
PAT as percentage of Sales	40.6
Sales as number of times of Total Assets	32.2
Debt as percentage of Equity	9.5
Average receivables as number of days' Sales	6.5
Sundry creditors as percentage of Raw Material consumption+ operating expenses excluding wages	4.6
	93.4

The remaining variables did not show significant relative importance.

Discriminant analysis incorporating Quick Assets/ Current Liabilities

The results of the analysis are given in Appendix VII. The discriminant function correctly classified 90 per cent of the companies in the sample. The F ratio was significant at 1 per cent level of significance. The probability of misclassification came down to 0.20. The relative importance of variables having significant relative importance values in the discriminant function is shown in Table 7.3.

Table 7.3

Variable	Relative importance (Percentage)
PAT as percentage of Sales	35.9
Sales as number of times Total Assets	24.7
Quick Assets as percentage of Current Liabilities	14.0
Debt as percentage of Equity	7.5
Sundry Creditors as percentage of Raw Material consumption + Operating expenses excluding wages	6.0
Average receivables as number of days' Sales	5.8
	93.9

The remaining variables did not show significant relative importance. Thus it can be seen that both discriminant functions gave approximately similar results. The ordering of the five common important variables were nearly the same in both analyses. The percentage relati importance values also were nearly equal for these variables. Quick Assets as percentage of Current Liabilites became the third important variable in the second discriminant function.

Since the analyses clearly indicated the relative importance of only six variables as given in Table 7.3, it was felt that other variables which might have a significant bearing on the effectiveness of the working capital management of an organization should be identified in order to make the study more comprehensive. The following five additional variables were selected, essentially by a judgmental process :

1 Contribution (i.e. Sales-Variable costs) as percentage of Sales

2 Receivables+ Inventories - Payables as number of times of Debt

3 Incremental short term loans as percentage of PAT+ Depreciation (Cash throwoff)

4 Interest paid for the year as percentage of Profit before interest and taxes (PBIT)

5 Quick Assets as percentage of Current Assets

It was hypothesized that ratio 1 would have a significant bearing on the ability of a company to generate cash relative to its sales volume. Current management literature emphasizes contribution relative to sales as the major determinant, given the assumption of sunk cost nature of most corporate overhead expenses.

Ratio 2 reflects the assumption that given the "pipeline" nature of inventories, receivables and payables, the change in the relative composition of the non-liquid current assets adjusted for payables would reflect the need for long term "pipeline" funds. It was assumed that by measuring these relative changes in relation to increase in long term debt, some indications of the effectiveness of working capital management would be obtained.

Ratio 3 assumes that a company would increase its short term loans only if the current cash throwoff (i.e. profit after taxes plus depreciation) is inadequate. Ideally, the cash throwoff should have included profit after tax and depreciation but excluded dividends paid. However, given the statutory restrictions imposed on payment of dividends on some companies during the period for which the analysis was made (1974 and 1975), it was felt that for the sake of uniformity, cash throwoff measured as the sum of profit after taxes and depreciation would be a more suitable indicator.

Ratio 4 measures the ability of a company to service its interest payments from profits before interest and tax (PBIT).

Finally, ratio 5 hypothesized that the traditional understanding of the *amount* of current assets held was not really a valid indicator of the availability of funds because the relative composition of liquid current assets in the total current assets was a more important measure of the ability of a company to meet demands for current period payments.

We thus generated in all 11 variables for the purpose of carrying out a new discriminant analysis. We shall denote these variables by $z_1, z_2, \ldots z_{11}$. See Appendix VIII for a fuller description of these variables and the results of the discriminant analysis. The discriminant function was found to be

$$\begin{aligned} D = \quad & -0.301\, z_1 + 0.154\, z_2 - 0.010\, z_3 \\ & + 2.555\, z_4 + 11.196\, z_5 \\ & - 0.022\, z_6 + 0.211\, z_7 + 0.002\, z_8 \\ & - 0.130\, z_9 - 0.035\, z_{10} - 0.043\, z_{11} \end{aligned}$$

The cut-off score was 11.81. If for a new company the discriminant function score D obtained by using the above discriminant function is greater than 11.81, that company would be classified as

effective; otherwise as ineffective. The discriminant function was able to classify more accurately than the previous one. In fact, it correctly classified 97 per cent of the companies in the sample. The F ratio was significant at 1 per cent level of significance and the probability of misclassification was low at 0.065. The ranking of the four variables having significant relative importance value are given in Table 7.4.

Table 7.4

Variable	Relative importance (Percentage)
PAT as percentage of Sales	25.2
Sales as number of times of Total Assets	25.2
Quick Assets as percentage of Current Liabilities	15.5
Receivables as number of days' Sales	15.3
	81.2

The results of the analysis are of considerable importance since for the first time it came to be known that the sales to assets ratio (turnover ratio) and profitability ratio (profit in relation to sales) were substantive factors in the discriminant process. This means that unless a company generates adequate sales in relation to

effective; otherwise as ineffective. The discriminant function was able to classify more accurately than the previous one. In fact, it correctly classified 97 per cent of the companies in the sample. The F ratio was significant at 1 per cent level of significance and the probability of misclassification was low at 0.065. The ranking of the four variables having significant relative importance value are given in Table 7.4.

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Receivables as number of days' Sales	15.3
	81.2

The results of the analysis are of considerable importance since for the first time it came to be known that the sales to assets ratio (turnover ratio) and profitability ratio (profit in relation to sales) were substantive factors in the discriminant process. This means that unless a company generates adequate sales in relation to

investment in assets and is able to make such sales at reasonable profit, its working capital management process is likely to be ineffective. Another significant finding is that effectiveness of working capital management is considerably influenced by a company's judgment regarding the level at which the quickly convertible current assets needs to be maintained with reference to the level of current liabilities. The research study also reinforced the current belief that one of the most significant parameters of efficient working capital management was a company's ability to recover payments due from its debtors expeditiously.

Another significant finding was that the ratio of contribution to sales was in fact one of the least important factors in the process of discrimination. This will indicate that whatever might be the value of relative contribution to sales for purposes of decision making in regard to the management of working capital, the ability to earn profits after overheads and taxes in relation to sales, rather than contribution, was a more critical factor. This would mean that the management of overheads relative to sales volume, is perhaps a very critical aspect of the working capital management process since it is this figure which connects the two ratios, Contribution as percentage of sales and Profit after tax as percentage of sales.

The "determining" ability of the four variables with high relative importance values

Those variables with high relative importance values (e.g. the four variables which accounted for 81.2 per cent of the total importance in the discriminant function using eleven variables) differentiate better the companies which manage their working capital effectively from the companies which are ineffective in this regard. In this sense, such variables enable the *determination* of the effectiveness of working capital management. It will be recalled that a cut off score of 11.81 was found for the final discriminant function using eleven variables in relation to 23 companies initially judged to be effective and 8 companies categorized as not effective. This discriminant function had high discriminant power as evidenced by 97 per cent correct classificatory ability with regard to the two groups in the sample. This cut off score, based on the eleven variables, can be used to classify a company as to whether it manages its working capital effectively or not. In view of the high degree of classificatory ability of the discriminant function, based on these variables, and more specifically the four variables with high relative importance value, can be termed to be the *determinants* of effective working capital management.

Factors affecting the variables of the analysis

We give a few remarks and interpretations on the choice of the final 11 variables included in the multiple discriminant analysis. (See Appendix VIII). It was seen that the final 11 variables had good discriminatory power in classifying a company as effective or ineffective in its working capital management. With this choice of 11 variables, we wanted to identify the factors relating to working capital management that influence the values of these 11 variables as well as the variances explained by these factors. We decided to apply the well known multivariate technique of factor analysis for this purpose. Specifically, a varimax rotation of the principal component analysis was used and the varimax rotated factor matrix is shown in Appendix IX.[10] We identified the first three factors along with the variances explained as given in Table 7.5.

Table 7.5

Factor	Percentage of variance explained
Ability to collect or pay	34
Borrowing policy	19
Profitability	14
Total	67

10 See H.H. Harman "Modern Factor Analysis", Chicago, University of Chicago Press, 1968.

The three factors shown in the Table 7.5 accounted for 67 per cent of the total variance. From this analysis, it would be evident that the final 11 variables chosen for the discriminant analysis were closely related to the three factors subsequently identified by the factor analysis i.e. ability to collect receivables and pay liabilities, borrowing policy and profitability in that order. It should be remembered that the relative importance analysis conducted during the multiple discriminant analysis showed a different ordering of these factors. *The factor analysis attempted to relate characteristics of the variables chosen for the multiple discriminant analysis with the sample of companies, while the MDA brought out the factors and variables which discriminate well between the effective and not effective companies.* The factor analysis also corroborates the appropriate choice of variables in their relation to the working capital management of company.

8 AN ALTERNATIVE CLASSIFICATION SCHEME

In order to make the study more meaningful, it was decided to classify the companies in a different manner, and, for this purpose the 31 companies - 23 *effective* and 8 *not effective*-- which were analysed earlier were added to the 19 *not clear* companies to make up a sample of 50 companies. These 19 companies were selected from the original 26 not clear companies after removing the outliers. The objective

was again to classify the sample into two groups, effective and not effective, by an approach different from the one discussed earlier. This has also helped us to compare the new scheme of classification with the earlier one.

The data base used for conducting the new analysis was the RBI study of finances of the 375 large Indian companies[11] with paid up capital of Rs. 10 million and above, the annual accounts of which were finalised during the period April 1974 to March 1975. RBI's study was the only available sample of accepted quality and magnitude in respect of the financial performance data of Indian companies. The discriminant function analysis using 6 original and 5 new variables showed that five variables accounted for 87 per cent of the relative importance value as shown in Table 8.1 (See also Appendix VIII).

Table 8.1

Variable	Relative importance (Percentage)
PAT as percentage of sales	25.2
Sales as number of times of total assets	25.2
Quick assets as percentage of current liabilities	15.5
Receivables as number of days of sales	15.3
Interest paid for the year as percentage of profit before interest and taxes (PBIT)	5.9
	87.1

11 op.cit.

The five variables (Table 8.1) were taken as the predictive variables for the new classification scheme. From data given in RBI study, means were calculated in respect of each of these five variables. Since the RBI study did not give standard deviations of the variables, we estimated them by taking it to be the standard deviation of our sample of 50 companies. Based on the standard deviation of 50 companies applied to RBI average, a linear scaling system was developed. A linear relationship was assumed for each variable to arrive at the score for each company based on mean and standard deviation of each of these variables. In developing the scaling system the following assumptions were made :

a Equal weightage was given to all five variables

b A priori judgment was made about the desired direction (+ ve or - ve) in respect of each variable

c The scores based on standard deviation using the desired direction for each variable were added up for all five variables to compute the total score for a given company.

RBI average, the standard deviations based on the sample of 50 companies and the assumed favourable and unfavourable directions for the five variables for effective or ineffective working capital management process are given in Table 8.2.

Table 8.2

Variables / Measures	Receivables as number of days sales	PAT as Percentage of sales	Sales as number of times of total assets	Interest paid for the year as percentage of PBIT	Quick Assets as percentage of current liabilities
RBI Average (375 companies)	36.93	5.66	1.05	23.73	58.65
Standard deviation - (50 companies)	30.96	2.91	0.73	20.11	30.78
Weightage for working capital management process	(-1)	(+1)	(+1)	(-1)	(+1)

Based on the scores, the 50 companies were rank ordered and a ranking was obtained. The first 23 companies in this rank order were taken as effective, the next 19 as not clear and the last 8 as not effective

companies. This classification will be referred to as the RBI classification. Such a classification was done to facilitate comparison with the original classification used for the multivariate discriminant analysis. Table 8.3 gives the results of the comparison.

Table 8.3

Comparison between Original Classification and RBI Classification

RBI Classification		Original classification (MDA)			Total
		Effective	Not clear	Not effective	
	Effective	13	9	1	23
	Not clear	9	6	4	19
	Not effective	1	4	3	8
	Total	23	19	8	50

Table 8.3 shows that out of the 23 companies classified as effective by the RBI classification scheme, 13 companies belong to the effective companies group in the original classification. Similarly out of 8 companies classified as not effective by RBI classification, 3 belong to the not effective companies group in original classification.

9 PERCEPTION ANALYSIS

Earlier the responses to some questions in the questionnaire relating to the frequency of financial surprises as well as the predictability of cash inflows and outflows were taken into account to classify the companies as effective or ineffective. A further analysis based on the responses were attempted with a view to ranking the same 50 companies in terms of their effective management of working capital. The responses were in the form of scores representing the perception of respondents. A weightage scheme was adopted to obtain a final score for each company which gives the overall perception score. The weightages were 1.5 for question 2 referring to the occurence of financial surprises and 2.0 for question 3(a) and 1.0 for question 3(b) which refers to the predictability of cash inflows and outflows respectively. (See Appendix X for a brief description of these questions). The weightages represent our judgments regarding the relative importance of these questions. Using this weightage scheme, scores were obtained for the 50 companies. The companies were then rank ordered and a ranking obtained. The top 23 companies in the ranking were taken to be effective and the bottom 8 companies as ineffective, and the rest 19 as not clear companies. This classification was then compared with the original classification obtained for the purposes of discriminant analysis.

Table 9.1 gives the results of the comparison.

Table 9.1

Comparison between original classification and classification based on Perception

		Original Classification (MDA)			Total
		Effective	Not clear	Not effective	
Classification based on perception	Effective	16	6	1	23
	Not clear	7	8	4	19
	Not effective	0	5	3	8
	Total	23	19	8	

Table 9.1 shows fairly good agreement between the perception ranking and the original discriminant function ranking. This is to be expected since the responses to the questions used in the perception ranking were also considered to obtain the effective and not effective groups for discriminant analysis.

We also analysed the responses to other questions in the questionnaire to find out whether any significant differences existed

in the perceptions of the 30 originally considered effective companies and the 16 originally considered ineffective companies. (It might be recalled that originally we had started with this classification and after the removal of outliers we had a sample of 23 in the 'effective' group and 8 companies in the 'not effective' group. The presence of outlier companies, however, will not affect the perception analysis). This analysis was intended to throw some light on the reliability of perceptions of executives with regard to the various processes of working capital management. For this purpose, the responses to questions 1(a),1(b), (d), 4, 5, 6, 7, 9, 11, 14, 15, 16, 17 and 18 from the questionnaire were considered. In the opinion of the authors, these questions were considered important and, further the responses were amenable for a valid statistical analysis. We used the test of proportions for analysing questions 1, 4, 14, 16 and 17; rank correlation coefficient analysis for questions 5, 6, 7 and X^2 test for questions 9 and 11. *Except* for the *processes* given below, the perceptions of executives in the effective and not effective groups *did not differ* significantly at 5 per cent leve of significance

1 Rating of their own company with regard to other companies in the same industry regarding liquidity (cash or its equivalent) - *Question 4b.*

2 Management of investments in short-term security in their own company compared to other companies in the same industry - *Question 16b.*

3 Rating of their own company with regard to other companies in the same industry regarding financial mobility (the availability of short term and long term financial and economic resources for response to unexpected changes in cash flows) - *Question 4c.*

4 The effectiveness of internal communication between marketing and finance in their own company - *Question 15b.*

5 Constitution of a group which specializes in managing current assets - *Question 18.*

6 Importance of financial ratio as a tool for making decision concerning the upper and/or lower limits of the extension of trade credit - *Question 17c.*

The analysis indicates that the effectiveness of working capital management process is neither a function of the relative position of the company vis-a-vis its competitors in the areas of market share, technology, efficiency, and product, nor that of clarity of working capital management objectives. It is also evident that the management process of effective and ineffective companies are not significantly different in terms of their ability to forecast sales, materials and supplies, supply of credit, cash inflows and outflows. It appears that both groups of companies i.e. effective and ineffective seem to attach more or less same importance to the major working capital activities and adopt similar techniques in managing fluctuating levels of working capital.

The distinguishing characteristics of the effective companies seem to be that they have more readily available short-term financial and economic resources for responding to unexpected changes and maintain greater liquidity and financial mobility compared to their competitors. It seems that the internal communication between marketing and finance functions in the effective companies is significantly better and that expansion of trade credit is possibly more effective in their cases because of conscious application of financial ratios in making such decisions. Their ability to manage short-term securities also appear to be an important criterion. Structurally, the constitution of a separate group specializing in the management of current assets would appear to be a positive factor in the effective management of working capital.

10 CURRENT OPERATING PRACTICES BY COMMERCIAL BANKS AND FINANCIAL INSTITUTIONS

One of the objectives of this study was to analyse the perceptions of external analysts and current practices of banks and other financial institutions based on published financial statements in assessing working capital position of enterprises. The analysis of the perceptions of external financial analysts has already been reported in section 2. In this section, we shall analyse the current practices by commercial banks and financial institutions in assessing the

effectiveness of working capital management as a part of their credit appraisal process. We selected commercial banks and financial institutions because they are the prime institutions outside companies, who are concerned about the effective use of the working capital. Twelve commercial banks and two financial institutions made available to us details regarding the aspects of working capital management taken into account by them for the credit appraisal process. Appendix XI tabulates the summary of such practices currently followed in terms of the financial ratios used to assess the effectiveness of the working capital management.

A ranking of the financial ratios based on the total number of banks and financial institutions using them (as shown in Appendix XI) in appraising the effectiveness of working capital management is given in Table 10.1.

Table 10.1

Ranking of the Financial Ratios

Ratio	Total Number of banks and financial instituios using the ratio	Ranking
Current Asset/Current Liabilities	14	I
Debt/Equity	14	I
Finished Goods Inventory/Sales	9	II
Receivables/Sales	9	II
Raw Materials Inventory/Raw Materials Consumption	9	II
Total Inventory/Sales	6	III
Retained Profit/Profit after tax	5	IV
Borrowings/Total Liabilities	5	IV
Sundry Creditors/Purchases	5	IV
Profit after tax/Net worth	4	V
Profit after tax/Sales	4	V
Sales/Total Assets	4	V
Raw Materials Inventory/Sales	2	VI
Debt/Sales	1	VII

Table 10.1 shows that all credit granting agencies use two ratios, namely Current ratio (Current Assets/Current Liabilities) and Debt-equity ratio (Debt/Equity), in appraising the effectiveness of working capital management. They invariably look at the liquidity position and leverage of a company while deciding on extension of credit for working capital purposes. The other three ratios used by about 65 per cent of the banks and financial institutions in the study sample are :

Finished Goods Inventory/Sales
Receivables/Sales
Raw Materials Inventory/Raw Materials Consumption

The following financial ratios were used to a lesser extent (30-40 per cent) by the credit granting institions :

Total Inventory/Sales
Retained Profit/'Profit after tax
Borrowings/Total Liabilities
Sundry Creditors/Purchases
Profit after tax/Net worth
Sales/Total Assets
Profit after tax/Sales

11 CONCLUSIONS FROM THE STUDY

The present study establishes that of the 16 ratios studied most of which are commonly used for purposes of analysing the effectiveness of working capital management, two deserve much greater weightage than have been assigned to them in the past. These two ratios, i.e. Profit after tax as percentage of Sales and Sales as number of times of Total Assets, have been applied in management planning and control ever since Donaldson introduced the concept of Return on Investment (ROI) at DuPont and subsequently at General Motors. However, there is good evidence to suggest that most commercial banks and financial institutions do not *formally* incorporate these two variables as substantive determinants of effective working capital management. For instance, all banks and financial institutions participating in the study, only four *formally* used Profit After Tax to Sales percentage and Sales to Total Assets ratios in appraising the effectiveness of working capital management process. In contradistinction, all of them used traditional ratios like current ratio (i.e. current assets to current liabilities) and debt-equity ratio to ascertain the adequacy of working capital and the relative weightage of sources from which companies raised funds. There is empirical evidence to indicate that unless analysts consciously incorporate in their analyses determinants of effective management of working capital, i.e. profitability and ability to employ resources in terms of

generation of sales, such analyses are likely to focus on the end rather than the means. For this reason, such analyses are likely to be counterproductive and possibly misleading.

The study also indicates that those companies which held a reasonable part of their current assets in the form of quick assets, i.e. those which could be reasonably quickly converted into cash (e.g. receivables, marketable securities and cash) with reference to the level of current liabilities (i.e. obligations to be met to outsiders within a period of one year), were able to manage their working capital more effectively. It is necessary to emphasize that the level of quick assets portfolio is not an absolute quantum but a relative one with reference to the level of current liabilities. The determination of this level obviously involves judgment since any excessive holding of quick assets not necessitated by operating or industry characteristics would have penalties attached in terms of opportunity costs. There is, it appears, greater necessity to pay conscious attention to the maintenance of an appropriate level of quick assets (in the current assets portfolio) with reference to the current liabilities of a company for more effective management of working capital. It is interesting to note that none of the banks and financial institutions used this variable.

In contradistinction, most of them used (9 out of 14) receivables as number of days' sales ratio as one of the major tools

of working capital analysis. The present study confirms that there is very considerable validity to the generally held belief that ability to collect receivables is a substantial determinant of effective working capital management.

Since most working capital analyses are based on published annual reports or financial statements, it is important to assess the relative objectivity of external financial analysts in formulating their judgments based on such analysis. The study shows the degree of their objectivity to be extremely low, and that most external financial analysts seem to be considerably affected by their unconscious perception relating to the concerned organizations' public image. The study also shows that on an average the judgment of financial analysts when the identity of the organization is disclosed to him - is likely to be no better than a random decision. Also, judgments made by different financial analysts for the same organization are likely to be widely different, indicating that, in most situations, financial analysis is marked by a great degree of subjectivity.

One of the most interesting conclusions arising from the study is that the working capital management *processes and systems* of those companies who managed their working capital effectively were not significantly different from those which were not effective. This

would indicate that, in the final analysis, working capital management is not as much a function of the management process as of the dimensions or the variables on which such processes are focused, i.e. profitability of sales and the turnover of resources in generating sales, holding a part of the current assets into quickly convertible assets (in terms of current liabilities) and the ability to collect receivables expeditiously. However, there is evidence to show that certain managerial attributes help in achieving relative effectiveness in the management of working capital :

a ability to manage the levels of liquidity and financial mobility compared to other companies in the same industry ;

b ability to establish effective communication between marketing and finance functions ; and

c ability to determine the level of assets to be held in short-term securities compared to other companies in the same industry.

The only systemic consideration which seems to be of relevance and importance is the use of financial ratios for taking decisions relating to levels of trade credit to be granted. Structurally, the constitution of a separate group specializing in management of current assets also contributed to effective working capital management.

12 RECOMMENDATIONS FOR PRACTISING MANAGERS

We are basically concerned with two groups of practising managers in relation to the present study. The first group consists of financial managers and corporate level managers of companies who are concerned with the financial aspects of operations of their organizations. The second group of managers for whom this study would be relevant consists managers in banks and financial institutions who have to analyse working capital position of companies, make judgment on the basis of such analysis, grant credit and follow up such credit with a view to ensuring the safety of funds lent. In other words, the conclusions of the study would be of use and benefit to those who are concerned with the management of working capital and to those who grant credit for working capital purposes.

We recommend to corporate financial managers and corporate level managers that the following four important determinants identified by us be formally reflected in their financial management systems and processes to ensure that the desired achievement level is planned and monitored systematically and purposively :

a Profit after tax as percentage of sales
b Sales as number of times of total assets
c Quick assets as percentage of current liabilities
d Receivables as number of days' sales

Given the fact that these aspects of the working capital management account for 80 per cent effectiveness in the management process, these should be incorporated in the ongoing formal financial analysis process. In addition, at the time of annual budgeting, an indepth examination of the company's performance in regard to these four aspects should be undertaken and comparisons should be made with its major competitors in the same industry for determining the level of desired achievement. It would also be necessary to design reporting formats for financial and corporate level managers in such a manner that they are continuously kept informed about the company's performance measured in terms of these four determinants in relation to the budgeted or targeted level of performance. It would also be appropriate for industry and trade associations to continuously analyse and report to their member-companies the norms of performance to ensure that they are in line with the operating technology and marketplace characteristics of the industry. Individual companies could also use the cut off point shown in Appendix VIII and page 34 to test for themselves whether they are currently managing their working capital effectively and to locate areas of management in which they are ineffective compared to the "effective" group mean scores.

We would also recommend to the financial managers and corporate managers to pay conscious attention to determining a company's optimum level of liquidity and financial mobility compared to other companies

in the same industry. Furthermore, they should examine the effectiveness of their communication process between the marketing and finance functions, as there is evidence to show that such effectiveness contributes significantly to better working capital management. Also, the companies need to examine formally their trade credit policies by way of relevant financial ratios, to ensure that such credit practices are in line with the practices of effective companies. They should consider the provision of a separate cell for managing current assets since such a structural device contributes to effective management of working capital.

We would once again emphasize that the effective management of working capital is not so much a function of systems and processes as the significant operational variables on which such processes are focused. It would, therefore, appear that excessive sophistication in financial management systems and processes, beyond a threshold level, has very little payoff. The objectives are more likely to be realized by focusing on the relative aspects and variables rather than on sophisticated systems and processes.

To the second group comprising managers in commercial banks and financial institutions, we would urge that the four variables identified by us be given greater and formal attention. It would be worthwhile to

re-examine formal credit appraisal practices and policies in commercial banks and financial institutions to ensure that the performance of the credit seeking companies in relation to these four variables are thoroughly analysed. There would be considerable merit in using the cut off point identified in Appendix VIII to appraise the effectiveness of working capital management and to compare a company's performance in relation to the mean scores of effective companies included in the discriminant analysis.

The study group constituted by the Reserve Bank of India to frame guideliness for follow-up of bank credit, has already recommended that credit-seeking companies should furnish to commercial banks, at quarterly intervals, their projections relating to sales, cost and *profit*. The study group has also recommended that financial analysts in credit granting institutions should continuously monitor such projections in relation to actual performance to assess company's financial management capabilities. The RBI should ensure and oversee that the recommendations of the study group are followed methodically and purposively by commercial banks. The study group did not identify the ability of a credit seeking company to use its total assets in relation to sales generated as a critical determinant of effective working capital management. We recommend that this dimension be included in the procedures suggested by the study group and be made a part of the formal analysis of credit appraisal

by commercial banks and financial institutions. Wherever substantial amounts are granted as credit towards working capital by commercial banks and financial institutions, such decisions must be made on the basis of the company's ability to collect its receivables. Our study has identified that the level of current assets held as quick assets in relation to current liabilities is a significant determinant of effective working capital management. Since variations in these two dimensions could significantly affect the working capital management of a company, the maintenance of norms relating to these two aspects, on the basis of which the credit was granted, should be made a formal part of the loan agreement. The companies should be required to report at periodic intervals their performance in regard to these two variables and any significant departure from the stipulated level. This would ensure that the assumptions made in granting credit remain valid during the tenure of the credit and a "thermostat" mechanism for signalling problems be operative.

The perception of most external financial analysts seem to be highly subjective and appear to be significantly influenced by factors other than purely financial variables. It should be considered whether commercial banks and financial institutions, while making the *initial* analysis of the financial position of credit seeking companies should

disclose identity of companies before forming conclusions and judgments which would serve as inputs for the decisions regarding granting of credit. It is however realized that, ultimately, such decisions must be related to the company but an analysis at the *initial* stage made without personal subjectivity alone can provide objective insights, which could then be supplemented by judgmental considerations.

13 AREAS OF FURTHER RESEARCH

The present study establishes that while profit after tax as percentage of sales is a critical determinant of effectiveness of working capital management, the ratio of contribution to sales was not so. This would indicate that effective management of overheads in relation to sales, particularly in periods of working capital stresses and strains, would be of great importance in improving the level of working capital. Research done in this field seems to be somewhat limited. It will be worthwhile to explore this aspect of working capital management in greater detail to obtain the required insight and understanding on the part of both accountants and practitioners.

The current study also indicates that the level of current assets held as quick assets in relation to current liabilities was an important determinant of effective working capital management.

Research will have to be done to provide a methodology for determining the optimum level of quick assets consistent with the operating characteristics of the concerned companies and the opportunity loss involved in holding excess current assets as quick assets. A method will have to be developed to measure the relative gain of effectiveness of working capital management accruing from holding of quick assets in relation to the opportunity cost of holding larger-than-necessary quick assets in the portfolio of current assets.

Finally, research should also be conducted to provide a framework for determining the levels of financial mobility, i.e. the availability of short-term financial and economic resources for meeting unexpected changes in cash flow compared to other companies in the same industry.

APPENDIX-I

SUGGESTED NORMS FOR INVENTORY AND RECEIVABLES

Industry	Raw materials (including stores and other items used in the process of manufacture)	Stocks-in-Process	Finished goods	Receivables and bills purchased and discounted
(1)	(2)	(3)	(4)	(5)
(i) Cotton and synthetic Textiles	2 Cotton (Bombay and Ahmedabad areas)	¾ (Composite textile mills)	——— 2½ ———	
	3 (Eastern areas — Bihar, Orissa West Bengal and Assam)	½ (other mills)		
	2½ (Other than the above areas)			
	2 Other raw materials			
(ii) Man-made Fibre	1½	½	——— 1¾ ———	
(iii) Jute Textiles	2½	¼	1 (For domestic sales) and 1½ (For exports)	1½
(iv) Rubber Products	2	¼	——— 1¾ ———	
(v) Fertilisers (a) For nitrogenous plants	¾ (Units near refinery)	Negligible	1 (Where stocks are in plant site)	1¼
	1½ (Units away from refinery)		1½ (Where stocks are also in upcountry centres)	

Contd....

APPENDIX-I
(contd ..

(1)	(2)		(3)	(4)		(5)
(b) For phosphatic plants	2	(Units in port areas)	Negligible	1	(Where stocks are in plant site)	1¼
	3	(Units away from port areas)		1½	(Where stocks are also in upcountry centres)	
(vi) Pharmaceuticals	2¾		½	2		1¼
(vii) Dyes and Dyestuffs	2¼		1	¾		2¼
(viii) Basic Industrial Chemicals	2¾		¼	1		1¾
(ix) Vegetable and Hydrogenated Oils	1		Negligible	¾		
(x) Paper	2-6	Bamboo and Wood (To be built up in stages from November to May and thereafter to be brought down)	"	1	(For controlled sales) and	¾
				¼	(For free sales)	
	2¼	Chemicals				
(xi) Cement	2¼	Gypsum	½	1		
	1¼	Limestone				
	¾	Coal				
	1½	Packing materials				
(xii) Engineering-Automobiles and Ancillaries	2½		¾	2½		

Contd....

APPENDIX-I
(contd..)

(1)	(2)	(3)	(4)	(5)
(xiii) Engineering— Consumer Durables	2	¾		2½
(xiv) Engineering— Ancillaries (other than Automobile Ancillaries) and Component Suppliers	2	¾		2½
(xv) Engineering— Machinery Manufacturers and other Capital Equipment Suppliers (other than Heavy Engineering)**	2¾	1¼		3½

NOTES: (i) Raw materials are expressed as so many months' consumption. They include stores and other items used in the process of manufacture.

(ii) (a) Stocks-in-process are expressed as so many months' cost of production.

(b) In individual cases, the bank may deviate from the norm for stocks-in-process if it is satisfied that the actual process time involved in any particular unit, say, in view of the nature of production, past experience and technology employed, is more than the norm suggested.

(iii)(a) Finished goods and receivables are expressed as so many months' cost of sales and sales respectively. These figures represent only the average levels. Individual items of finished goods and receivables could be for different periods which could exceed the indicated norms so long as the overall average level of finished goods and receivables does not exceed the amounts as determined in terms of the norm.

*(b) The norm prescribed for receivables relates only to inland sales on short term basis (i.e. excluding receivables arising out of deferred payment sales and exports).

(iv) Stocks of spares are not included for norms, since in financial terms they are not significant in many industries. Banks will ascertain requirements of spares for individual units. They should, however, keep a watchful eye if spares exceed 5% of total inventories.

**(v) Heavy Engineering will include supply of whole or substantial plants involving long manufacturing period, i.e. sugar, cement, steel and textile plants.

Reproduced from 'Report of the Study Group To Frame Guidelines - For Follow-up Of Bank Credit' Reserve Bank of India, Bombay 1975' pages 20-22'.

APPENDIX-II

ASSUMPTIONS MADE IN COMPUTING THE FINANCIAL RATIOS

CURRENT ASSETS – Inventories (Raw Materials, Stores, Spare Parts and components, Work-in-Process & Finished Goods),
Loans & Advances (net of tax paid in advance),
Sundry Debtors (Receivables),
Market Value of Quoted Investments (Free Securities) &
Cash and Bank Balances

QUICK ASSETS – Debtors,
Loans & Advances (net of tax paid in advance),
Market Value of Quoted Investments &
Cash and Bank Balances

CURRENT LIABILITIES – Tax Provision (Net of Advances),
Bank Borrowings (excluding :
Borrowings against mortgage
Borrowings against debenture
Deferred Payment Liabilities
Deposits from Public &
Other Deposits),
Sundry Creditors,
Other Current Liabilities &
Other Current Provisions

DEBT – Borrowings from Government and Semi-Government, Statutory Financial Corporations and other institutional agencies,

Borrowings from banks against own debentures and other mortgages, &

"Other Borrowings" against own debentures, other mortgages, deferred payment liabilities and Public and other deposits.

EQUITY – Paid-up capital (ordinary and preference shares), forfeited shares and all reserves.

Note : Averages have been computed on the basis of current and previous year's figures.

APPENDIX-III

CHARACTERISTICS OF PARTICIPATING COMPANIES

		Number	Percentage to total
A.	**Sectoral Classification:**		
a	Public Sector	17	23.62
b	Private Sector	55	76.38
		72	100.00
B.	**Management Style:**		
a	Government associated companies	17	23.62
b	Widely held companies managed by professional directors	7	9.73
c	Foreign Subsidiaries	15	20.83
d	Members of groups of companies (Previously managed by managing agencies)	22	30.55
e	Family managed companies	11	15.27
		72	100.00
C.	**Nature of Industry/Business**		
a	Manufacturing-high technology	12	16.66
b	Manufacturing-low technology	24	33.33
c	Processing	18	25.00
d	Mining	2	2.78
e	Construction	2	2.78
f	Marketing/Trading	8	11.12
g	Agro-based industry	1	1.38
h	Transportation, Communication, Public Utilities, etc.	3	4.17
i	Others	2	2.78
		72	100.00

Contd.....

APPENDIX-III

(contd ..)

	Number	Percentage to total
D. Sales Volume:		
Over Rs. 2,000 million	7	9.73
Rs. 2,000 million - Rs. 749 million	13	18.04
Rs. 750 million - Rs. 249 million	17	23.62
Rs. 250 million - Rs. 100 million	22	30.55
Below Rs. 100 million	13	18.06
	72	100.00
E. Total Assets:		
Over Rs. 2,000 million	8	11.12
Rs. 2,000 million - Rs. 749 million	12	16.66
Rs. 750 million - Rs. 249 million	16	22.22
Rs. 250 million - Rs. 100 million	16	22.22
Below Rs. 100 million	20	27.78
	72	100.00

APPENDIX-IV

DISTRIBUTION RANGE OF 11 RATIOS FOR 72 COMPANIES

	Current Assets as Percentage of Current Liabilities	Quick Assets as Percentage of Current Liabilities	Average Finished Goods inventory as number of days' Sales	Average Raw Materials Inventory as number of days' consumption	Average Receivables as number of days' Sales	Cash Throw off (PAT + Depreciation) as percentage of Sales	Sundry Creditors as percentage of Raw materials consumption + operating exponses other than wages	Profit after taxes (PAT) as percentage of Sales	Sales as number of times of Total Assets	Profit after taxes (PAT) as percentage of Total Assets (ROI)	Debt as percentage of Equity
Arithmetic Mean	158.59	70.21	27.53	120.84	45.32	6.91	22.48	3.03	1.55	4.21	102.12
Standard Deviation	53.28	47.65	26.51	140.16	38.50	9.46	14.45	9.11	1.39	5.54	370.48

DISCRIMINANT ANALYSIS FOR EFFECTIVE (30 COMPANIES) AND NOT-EFFECTIVE (16 COMPANIES) COMPANIES USING ORIGINAL 11 VARIABLES

Variables (Ratios) (x) (1)	(a) Means of variables of Group I (30 companies) (2)	(b) Means of variables of Group II (16 companies) (3)	(c) Difference in Group Means (a–b) (4)	(d) Discriminant Coefficient of Variables (5)	(e) Importance value of of Variables (d x c) (6)	(f) Percentage relative importance of variables $\left(\frac{e}{\Sigma e}\right)$ x 100 (7)	(g) Ranking of variables in terms of relative importance (8)
1. Current Assets as Percentage of current liabilities (x_1)	166.04	136.60	29.44	0.02770	0.815	7.75	VI
2. Quick Assets as Percentage of current liabilities (x_2)	72.82	57.48	15.34	-0.01620	0.248	2.36	XI
3. Average Finished Goods as number of days' sales (x_3)	20.21	38.20	-17.99	-0.01406	0.253	2.41	X
4. Average Raw Materials inventory as number of days' raw material consumption (x_4)	89.13	230.03	-140.90	-0.00845	1.177	11.19	V
5. Average receivables as number of days' sales (x_5)	30.03	67.47	- 37.44	-0.04232	1.584	15.07	III
6. PAT + Depreciation as percentage of sales (x_6)	6.18	4.20	1.98	0.61472	1.222	11.62	IV
7. Sundry Creditors as percentage of raw material consumption + operating expenses excluding wages (x_7)	18.18	26.26	- 8.08	0.05429	0.439	4.17	VIII
8. PAT as percentage of sales (x_8)	3.29	0.14	3.15	-0.63388	1.998	19.00	I

contd...

APPENDIX-V (contd)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
9. Sales as number of times of total assets (x_9)	1.76	1.09	0.67	1.12281	0.743	7.07	VII
10. PAT as percentage of total assets (ROI) (x_{10})	5.39	1.11	4.28	0.37876	1.621	15.42	II
11. Debt as percentage of equity (x_{11})	36.42	323.88	-287.36	-0.00144	0.415	3.94	IX

F = 3.77 with D.F. = 11 and 34 -- Significant at 1 percent level.

Correct Classification = 89% Probability of misclassification = 0.26

DISCRIMINANT ANALYSIS FOR EFFECTIVE (23) AND NOT-EFFECTIVE (8) COMPANIES (REMOVING OUTLIERS AND COMPOSITE VARIABLES)- INCLUDING CURRENT ASSETS/CURRENT LIABILITIES

Variables (Ratios)	(a) Means of variables of Group I (23 Companies)	(b) Means of variables of Group II (8 Companies)	(c) Difference in Group Means (a-b)	(d) Discriminant Coefficient of variables	(e) Importance value of variables (d x c)	(f) Percentage relative importance of variables $(\frac{e}{\Sigma e} \times 100)$	(g) Ranking of variables in terms of relative importance
1. Current Assets as percentage of current liabilities	155.13	145.57	9.56	-0.01635	0.156	3.09	VI
2. Average finished goods as number of days' sales	21.55	30.38	-8.83	0.00540	0.048	0.94	VIII
3. Average raw materials inventory as number of days' raw materials consumption	85.76	112.11	-26.35	-0.00498	0.131	2.59	VII
4. Average receivables as number of days' sales	30.77	52.64	-21.87	-0.01500	0.328	6.48	IV
5. Sundry creditors as percentage of raw materials consumption + operating expenses excluding wages	18.61	23.66	- 5.05	0.04643	0.234	4.63	V
6. PAT as percentage of sales	4.45	2.29	2.16	0.95071	2.054	40.57	I
7. Sales as number of times of total assets	1.66	1.17	0.49	3.31212	1.632	32.23	II
8. Debt as percentage of equity	36.18	66.25	-30.07	-0.01594	0.479	9.47	III

F = 2.21 with D.F. = 8 and 22 . . . Not significant at 5 percent level

Correct classification = 84% Probability of misclassification = 0.32

APPENDIX-VII

DISCRIMINANT ANALYSIS FOR EFFECTIVE (23) AND NOT-EFFECTIVE (8) COMPANIES (REMOVING OUTLIERS AND COMPOSITE VARIABLES) QUICK ASSETS AS PERCENTAGE OF CURRENT LIABILITIES INCLUDED

Variables (Ratios)	(a) Means of variables of Group I (23 companies)	(b) Means of variables of Group II (8 companies)	(c) Difference in Group means (a-b)	(d) Discriminant Co-efficient of variables	(e) Importance value of variables (d x c)	(f) Percentage relative importance of variables ($\frac{e \times 100}{\Sigma e}$)	(g) Ranking of variables in terms of relative importance
1. Quick Assets as percentage of current liabilities	57.65	68.94	-11.29	-0.10654	1.202	13.99	III
2. Average finished goods as number of days' sales	21.55	30.38	- 8.83	-0.01971	0.174	2.02	VIII
3. Average raw materials inventory as number of days' consumption	85.76	112.11	-26.35	-0.01369	0.361	4.19	VII
4. Average receivables as number of days' sales	30.77	52.64	-21.87	0.02259	0.494	5.75	VI
5. Sundry creditors as percentage of raw materials consumption + operating expenses excluding wages	18.61	23.66	- 5.05	0.10126	0.511	5.95	V
6. PAT as percentage of sales	4.45	2.29	2.16	1.42699	3.083	35.85	I
7. Sales as number of times of Total Assets	1.66	1.17	0.49	4.31673	2.126	24.74	II
8. Debt as percentage of equity	36.18	66.25	-30.07	-0.02146	0.645	7.51	IV

F = 3.71 with D.F. = 8 and 22 Significant at 1 percent level

Correct classification = 90.30%

Probability of [illegible] = 0.20

(23) AND NOT-EFFECTIVE (8) COMPANIES
NEW VARIABLES)

Variables (Ratios) (z)	(a) Means of variables of Group I (23 companies)	(b) Means of variables of Group II (8 companies)	(c) Difference in Group means (a-b)	(d) Discriminant Coefficient of variables	(e) Importance value of variables (d x c)	(f) Percentage relative importance of variables $\left(\frac{e}{\Sigma e} \times 100\right)$	(g) Ranking of variables in terms of relative importance
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1. Quick Assets as percentage of current liabilities (z_1)	57.65	68.94	-11.29	-0.30073	3.394	15.49	III
2. Average receivables as number of days' sales (z_2)	30.77	52.64	-21.87	0.15367	3.361	15.34	IV
3. Sundry creditors as percentage of raw materials consumption + operating expenses excluding wages (z_3)	18.61	23.66	- 5.05	-0.00979	0.049	0.23	X
4. PAT as percentage of sales (z_4)	4.45	2.29	2.16	2.55487	5.519	25.20	I
5. Sales as number of times of total assets (z_5)	1.66	1.17	0.49	11.19620	5.515	25.18	II
6. Debt as percentage of equity (z_6)	36.18	66.25	-30.07	-0.02220	0.668	3.05	VIII
7. Contribution as percentage of sales (z_7)	29.85	28.05	1.80	0.21092	0.380	1.74	IX
8. Quick Assets as percentage of current assets (z_8)	57.31	48.19	-10.88	0.00224	0.024	0.11	XI
9. Receivables + Inventories - Payables as number of times of Debt. (z_9)	9.13	3.21	5.92	-0.13036	0.772	3.52	VII
10. Incremental short term loans as percentage of PAT+depreciation (z_{10})	59.13	85.79	-26.66	-0.03472	0.926	4.22	VI

contd..

(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)
11	Interest paid as percentage of PBIT (z_{11})	20.63	50.92	-30.29	- 0.04279	1.296	5.92	V

$F = 4.80$ with D.F. = 11 and 19 Significant at 1 percent level

Correct Classification = 97%; Probability of misclassification = 0.065

$\bar{D}_1 = 18.604$ $\bar{D}_2 = 5.013$; Cut off Score $D^* = \frac{\bar{D}_1 + \bar{D}_2}{2} = 11.81$

If the value of the discriminant function is $>$ D*, the company belongs to Group I (i.e. group of effective companies)

If the value of the discriminant function is $\leq$ D*, the company belongs to Group II (i.e. group of not effective companies)

APPENDIX-IX

VARIMAX ROTATION OF FACTOR ANALYSIS OF THE SAMPLE OF 31 COMPANIES (23 EFFECTIVE AND 3 INEFFECTIVE COMPANIES)

Variables (z)	Factors I	II	III	IV
1. Quick Assets as percentage of Current Liabilities	0.637	0.286	0.248	-0.539
2. Average Receivables as number of days' Sales	0.935	-0.150	0.098	0.156
3. Sundry Creditors as percentage of RM Consumption + Operating expenses other than wages	0.845	-0.176	0.093	-0.036
4. PAT as percentage of Sales	-0.061	0.443	0.745	-0.130
5. Sales as number of times of Assets	-0.432	0.286	-0.740	-0.211
6. Debt as percentage of Equity	0.140	-0.771	0.521	0.054
7. Contribution as percentage of Sales	0.423	0.504	0.324	0.344
8. Quick Assets as percentage of Current Assets	0.757	0.032	0.175	-0.511
9. Receivables + Inventories - Creditors as number of times of Debt	-0.162	0.256	-0.745	0.094
10. Incremental shot term loans as percentage of PAT + Depreciation	-0.010	-0.009	0.006	0.883
11. Interest as percentage of PBIT	0.107	-0.874	-0.022	0.062
Variances	3.757	2.153	1.501	1.223
Percentage to Total Variance	34	19	14	11

APPENDIX-X

EXCERPTS FROM QUESTIONNAIRE AND RESULTS OF STATISTICAL TESTS *

A CROSS-CULTURAL STUDY OF
MANAGEMENT PERCEPTIONS OF THE WORKING
CAPITAL PROCESS IN LARGE INDUSTRIAL CORPORATIONS

1. How would you rate the edge your company has over your major competitors as a result of . . . .

a	Technology?	....	No significant difference
b	Product leadership?	....	No significant difference
c	Efficiency?	....	
d	Market share?	....	No significant difference

2. During the past year has your company experienced financial surprises that have affected your financing alternatives?

3. Currently, how would you rate the reliability of your company's predictions related to

   a Cash inflows?
   b Cash outflows?

4. Relative to other companies in your industry how would you rate your company's current ...

+ a Profitability? (net income/total tangible assets) ... Significant difference

+ b Liquidity? (cash or its equivalent) ... Significant difference

+ c Financial mobility? (the availability of short-term financial and economic resources for response to unexpected changes in cash flows) ... Significant difference

* Statistical results indicate whether the perceptions of managers of two groups of companies (30 effective and 16 not-effective) differ significantly or not at 5 percent level of significance.

+ Significant difference.

Contd....

5. The following is a list of long-term financial planning objectives. For your company, which one of these objectives would you consider the ...

a Most important?
b Second most important?
c Least important?

	Objectives	
1	Increasing the future level and/or growth of total profits	No significant difference
2	Increasing the future level and/or growth of sales	
3	Increasing the future level and/or growth of earnings per share	
4	Increasing the future level and/or growth of dividends per share	
5	Increasing the future level and/or growth of return on shareholders' capital	

6. The following is a list of working capital management objectives. For your company, which one of these objectives would you consider the ...

a Most important?
b Second most important?
c Least important?

	Objectives	
1	To provide the cash, debtors, inventories and short-term credit necessary to support the anticipated sales in a defined planning period	No significant difference
2	To provide a financial buffer in order to minimize the effect of surprises in sales of materials, production, labour, credit and transportation	
3	To minimize the balances in cash, debtors, inventories and short-term debt	
4	To evaluate changes in each current asset as an investment decision and to minimize the cost of short-term credit.	

7. The following is a list of problems encountered in the management of working capital. For your company, which of these problems would you consider the ...

a Most important?
b Second most important?
c Third most important?
d Least important?

Contd...

Problems

1	Forecasting sales	No significant difference
2	Forecasting the use and/or cost of materials and supplies	
3	Forecasting the supply of credit	
4	Forecasting the outflow of cash	
5	Forecasting cash inflow	
6	Extension of credit	
7	Collection of short-term credit	
8	Managing the production process	

8. In your company, how would you rate the importance of each of the following working capital policy decisions? Establishing policies related to ...

Policy Decisions

a	Prices of products	Not tested
b	Minimum and maximum level of cash and/or equivalent	
c	Credit terms and/or credit extension	
d	Credit collection	
e	Stretching the payment of creditors for goods and services	
f	Inventory valuation and/or inventory control systems	
g	Research and engineering commitments	

9. Which of the policy decision in Quesion 8 would you consider ...

a	Most important?	No Significant difference
b	Second most important?	
c	Least important?	

10. In your company, how would you rate the importance of the following working capital activities?

Working Capital Activities

a	Planning the cash budget	Not tested
b	Designing sales strategies and product promotion	
c	Receiving cash inflow; paying debts; investing cash balances	
d	Arranging for short-term borrowing at banks or with trade creditors	
e	Planning and scheduling production activities	
f	Purchasing of materials and goods	
g	Credit extension and collection	

11. Which of the working capital activities in Question 10 would you consider ...

a	Most important?	No significant difference
b	Second most important?	
c	Least important?	

Contd....

APPENDIX-X
(contd ..)

12. At the current time period how would you rate the permanent nature of each of the following accounts relative to the level of rupees involved?

Accounts	
a Debtors	Not tested
b Inventories	
c Creditors for goods and services	
d Other short term debt	

13. At the current time period how would you rate the concentration of the following accounts?

Accounts	
a Debtors	Not tested
b Creditors for goods and services	
c Other short-term debt	

14. Given your current volume of sales, how would you rate the following techniques with regard to changing the level of working capital?

Techniques	
a Technological developments in production and engineering	No significant difference
b Changing the organizational structure	
c Improved internal communications network for forecasting sales and production	
d Improved finance techniques in managing cash inflows and outflows	
e Improved sources of credit or permanent capital	

15. In your company how would you rate the internal communications network in the management of working capital between ...

a Production and Marketing	...	No significant difference
b Marketing and Finance	...	Significant difference
c Finance and Production	...	No significant difference

Contd...

16. Compared to other companies in your industry, how would you rate the system your company has for managing the ...

	a	Receipt of Cash?	.. No significant difference
+	b	Investment in short-term securities?	.. Significant difference
	c	Extension of trade credit?	No significant difference
	d	Collection of credit sales?	
	e	Raw materials balances?	
	f	Production process?	
	g	Distribution process?	
	h	Payment of short-term debt?	
	i	Acquisition of short-term debt?	
	j	Purchasing materials and services?	
	k	Process of forecasting sales?	

17. In your company how would you rate the importance of financial ratios as tools for making decisions concerning the upper and/or lower limits of the ...

	a	Cash balances?	... No significant difference
	b	Investment on short-term securities?	.. No significant difference
+	c	Extension of trade credit?	.. Significant difference
	d	Collection of credit sales?	No significant difference
	e	Investment in inventories?	
	f	Trade credit payables?	
	g	Short-term bank credit?	

+ 18. In your company do you have a group that specializes in managing current assets as investment decisions? ... Significant difference

APPENDIX-XI

FINANCIAL RATIOS USED BY BANKS AND FINANCIAL INSTITUTIONS IN APPRAISING EFFECTIVENESS OF WORKING CAPITAL MANAGEMENT

(* shows the ratio being used)

	Current Assets/ Current Liabilities	Finished Goods Inventory/ Sales	Total Inventory/ Sales	Receivables/ Sales	Raw Material Inventory/ RM Consumption	Raw Material Inventory/ Sales	Retained Profit/ Profit after tax	Profit after tax/ Net Worth	Borrowings/ Total Liabilities	Sales/ Total Assets	Debt/ Equity	Debt / Sales	Profit after tax/ Sales	Sundry Credits/ Purchases
BANKS														
A	*	*		*	*						*			
B	*		*	*	*	*		*			*			
C	*	*		*	*			*			*		*	*
D	*	*	*		*		*		*	*	*			
E	*		*		*		*		*		*			
F	*	*			*						*			
G	*		*	*	*		*		*	*	*			
H	*		*	*							*		*	*
I	*	*		*				*			*			*
J	*	*		*	*		*		*	*	*			*
K	*	*	*			*					*	*	*	
L	*	*		*	*			*			*			
FINANCIAL INSTITUTIONS														
M	*	*		*			*		*		*			*
N	*									*	*		*	
TOTAL	14	9	6	9	9	2	5	4	5	4	14	1	4	5