
Changing Concepts Of Human Resource Management

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"The concept of human resource as distinct from personnel, emphasises not only on individual persons but also on groups of people functioning in an organization Human resource management is primarily concerned with increasing enabling capability of an organization."

The personnel function is currently undergoing some drastic change. New interest has been aroused in various dimensions of personnel management resulting in some changes in the concept itself, and realisation of the importance of changing dimensions.

In the first place, the concept of human resource as distinct from personnel, emphasises not only on individual persons but also on groups of people like various teams functioning in an organisation, formal human systems like departments, inter-departmental groups and temporary systems like task groups and committees appointed for specific purposes. According to the changed concepts, human resources are available in the form of individual persons as well as in the form of collectivities of such individuals. While individuals are important resources, the various groups and teams functioning in an organisation are qualitatively different from the individual persons and deserve attention in their own right. An organisation may have excellent individuals well trained and competent in their own fields and capable of handling all kinds of problems, and yet, if the groups and teams do not function effectively the organisational effectiveness will be low. The human resources in poor teams get wasted. The focus on human resources is on both individual persons as well as groups of various sizes functioning in the organisation.

Human resource management is a proactive concept. While personnel management is primarily concerned with maintenance

functions of administering the various matters relating to the personnel in an organisation, human resource management is primarily concerned with increasing enabling capability of an organisation. The difference between the concept of personnel function and human resource system have been discussed in detail elsewhere (Pareek and Rao, 1981). Human resource management attempts to increase capability of individual persons, systems and groups, and the total organisation, to anticipate issues and problems, diagnose current problems, develop alternative ways of dealing with such problems, implement changes, prepare feedback devices to know how far action has achieved the results, and replan to increase the effectiveness further. This is mainly done through use of action research and organisation development (OD) interventions. Human resource management proceeds with and develops the basic philosophy and assumption that people are primarily motivated by changes, opportunity for development and creativity. It helps the total organisation and various groups to evolve such challenges and opportunities for individual persons as well as for various groups.

One basic change slowly coming through human resource management is the increasing concern for values. Unlike personnel management, human resource management is not "value free". In fact, no system can be value free. According to the changing concept, people, groups and the organisation should take steps to understand what values they follow and practice. Human resource management makes conscious effort to promote certain values in the organisation. One set of values relate to the development of people. The other set of values relate to the process of humanisation. Human resource management emphasises values which will slowly humanise the organisation. Such values are emphasised through OD work and action research which promote openness, exploration, collaboration and proaction. Human resource management is also concerned with humanisation of work by examining the present work processes and encouraging experiments in redesigning work so that people enjoy their work, take pride in such work, learn continuously and maximise their contribution to the organisation. According to the concept of human resource management, continuous emphasis on the process of humanisation is necessary, both, for the growth and

development of the employees as well as for the development and strengthening of the organisation.

Several aspects of human resource management focus attention on development of people (Pareek and Rao, 1981) which becomes the focal point for various personnel practices to converge. For example, the role is analysed in terms of key performance areas or critical attributes or levels of responsibility in order to help people use such data, both to improve their performance and prepare plans of their development. The process of selection and placement is primarily undertaken to match the role and the person so that there is minimum wastage of human resource and the process of dehumanisation can be reduced. An integration of the person with his role is attempted in order to maximise the development of the person and his contribution. This is done through performance appraisal, potential appraisal, career development and career planning, performance feedback and counselling and training. All these devices are again focused on the development of individuals and groups. Various practices relating to the job and the role also take a new shape. Attempts are made to develop the role for the employees working in the organisation. These are reflected in practices like job rotation (to help employees to gain new experience and develop competences to undertake new responsibilities), job enrichment (to make jobs more challenging, worthwhile, and giving a sense of pride to the employees), job design and redesign (to achieve job enrichment through helping persons to develop their own systems of achieving the results and making arrangements which will maximise achievement of organisational goals and individual satisfaction and role effectiveness (through exercises which help people to cope with demands and role stresses and convert them into positive forces). Salary administration and management of Incentives and rewards are guided by the goal of developing equitability, so that employees feel that their contributions are being properly recognised and rewarded. Standardisation of various personnel practices and roles are administered with this point in view.

The traditional function of industrial relations is undergoing change and needs to be drastically redesigned. Such a function will both recognise and harness the collective power of individuals and groups in organisations. Coping with such

power should not necessarily be through conflicts and their resolution, although conflicts are a part of this sub-system and in many ways play a positive role.

There is one more trend which appears to be an important indicator of the change occurring in human resource management. Besides the emphasis on groups and teams, human resource system gives importance to the basic unit of all teams in the organisation, viz., the dyadic unit of the employee and his supervisor. All activities of human resource management should help to strengthen this two-person relationship and increase the trust and mutual understanding between the superior and the subordinate. The design of performance appraisal system, the use of performance review and feedback, and devices of self-appraisal should promote such a trust worthy and mutually reinforcing relationship. This is reflected in several new practices in these fields. To give one example, in some organisations the basic performance appraisal data are regarded as the property of the employee and his supervisor or reporting officer and these are not filed or made accessible to other levels, and, in fact, these are destroyed after three years.

In order to achieve this goal, movement in two opposite directions in human resource manage-

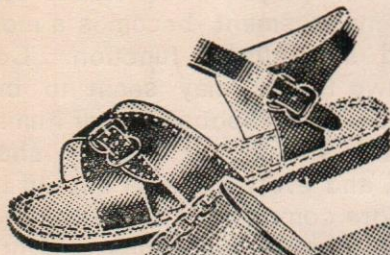
ment is visible. On the one hand, human resource management gets diffused in the organisation, and every manager is supposed to undertake this work for his employees, and on the other, human resource management becomes a more sophisticated and specialised function. Contradictory as these two trends may seem to be, both are necessary. The responsibility of human resource development should be largely shared by all managers, and every manager should increasingly become more competent and skillful in developing his people, making his teams and groups more effective and diagnose problems in order to take appropriate action with the help of his colleagues. However, this is possible only when a more sophisticated and specialised human resource management function is developed to monitor this work, devise various ways of achieving such a goal, and continually experiment and innovate in this area. Various experiments have been made in some organisations, and it is very encouraging to see that some Indian organisations are the forerunners and Pace-setters of new practices in this area. Perhaps development of our own systems in this significant area is on the way.

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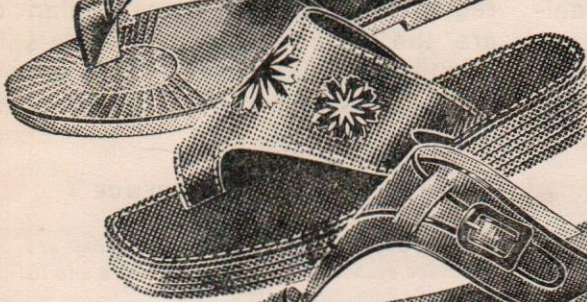
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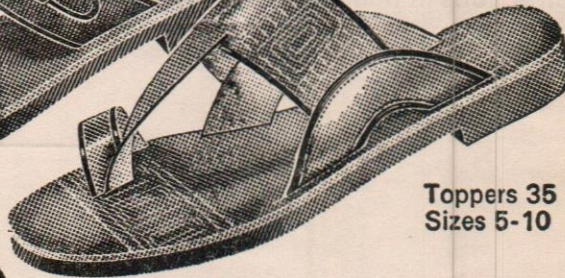
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Marketing Synergy : A Key To Increased Productivity

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"Marketing Synergy can be thought of as joint preparation of programmes and plans based upon combined resources of two or more independent organisations to achieve increased individual productivity, enhanced sales and greater customer satisfaction in all spheres of activity."

Any organisation, irrespective of its size, nature of business or the style of management, when attempts an exercise on corporate planning, the availability of facilities and resources at their disposal becomes a critical factor. On account of such limiting factors, allocation of resources in some other areas cannot be carried out at the same optimal level, resulting in under-utilisation of disposable resources. This is a serious problem calling for the attention of all concerned not only at the company and industry level but also at the macro level.

As one of the aids to improve utilisation of resources and increase productivity, *Marketing Synergy* - a framework whereby two or more organisations collaborate to market a product or a service effectively is a viable alternative. This is different from the conventional sense of large scale long range mergers and from the pattern of financial or technical collaboration and emphasises only a joint marketing relationship, to enhance productivity of the participating companies. The concept assumes importance in a situation where the firms are unable to amass the required capital or know-how or the marketing expertise to venture alone in a fluid economic environment. In such situations, the consumer is left in a lurch with his needs not adequately met and, from the macro point of view, it leads to under-utilisation of scarce resources.

CONCEPT

The concept of *Marketing Synergy* can be best introduced by borrowing the analogy of symbiotic relationship from natural sciences

agents for air conditioners, refrigerators and televisions, and are showing impressive financial results.

(iii) *Franchising* : A classic example of franchising is that of Coca-Cola's erstwhile Indian operations where territorial rights were granted to bottlers in various regions. The main benefit is the franchiser's knowledge of local customers and the market. Further, since operations are carried out at a lower level of capital outlay, the level of risk is reduced for the parent company. Simultaneously, this practice helps to establish the brand image as can be borne out by the financial performance of Coca-Cola all over the world.

(iv) *Package Tours* : Jointly organised by the hotel, airline and travel agent. This could include all arrangements in respect of travel, local transport, accommodation, sight seeing, etc., the specific aspects taken care of by the respective partners of this consortium. This kind of tour offers benefits and convenience to the tourists as well as the marketing partners.

(v) *Engineering Package Services* : Herein, an enterprise undertakes to supply the complete system of, say, materials handling, for a project. The products need not necessarily belong to the range of one manufacturer but an understanding between producers of related products (conveyors, cranes, forklifts, etc.) can provide the services to the mutual benefit of all concerned. The detailed engineering design is carried out by the group and the products best suited to the functions are provided, thus serving as another form of turnkey eliminating avoidable competition.

(vi) *Order Booking Agents* : A classic case in point is the recent tie-up between ITC and Sheraton Hotels for reservations etc. This eliminated duplicating booking counters for ITC all over the world. For Sheraton, this arrangement enlarged their chain of world-wide hotels, and facilitated accommodation arrange-

ments for their tourists travelling to India.

(vii) *Joint Product Development* : Offers benefits to the producers of related components in the sense that the R&D expenditure is shared. Also, the knowledge and features of the products developed concurrently aids in better marketing planning.

Quadrant III

This mode provides for two or more enterprises creating an entity which would function as a separate organisation owned by the parent companies. This is different from a merger between two companies whereby identity of one of them is lost. Licensing, formation of joint companies and associations may be classified in this quadrant.

(i) *Licensing* : A company can authorise another company to produce the goods by extending help in the form of necessary technology, product specifications and the brand name. This is resorted to in cases where there are major bottlenecks for expansion. Recent cases of formation of new enterprises such as Gujarat State Machinery Corporation to manufacture HMT Lathes, West Bengal Industrial Development Corporation to assemble HMT watches and Karnataka Blades under license from Wilkinson Blades of UK amply illustrate such an arrangement.

(ii) *Formation of Companies* : Two organisations with expertise in their respective fields, may join together to evolve a new entity. The formation of Diamines and Chemical Ltd—a creative combined project of Cellulose Products of India Ltd. Ahmedabad and The Bharat Vijay Mills Ltd. Kalol, and the case of Karnataka Explosives Ltd—a joint project of Chowgule Group and Karnataka Government are two such examples.

Similarly, individuals or diverse streams joining together to create an entity with a purpose can also be bracketed in this category. "Symbiosis", a consultancy set-up in Madras with a

highly skilled multi-disciplinary group of specialists in Engineering, Management and Computer Science, is a distinct case to illustrate this point. However, the financial or growth viability of such a system can be best illustrated by the case of Lijjat Papad, which has grown from being a Rs. 3.3 million company in 1955 to a Rs. 40 million set-up today mainly on account of co-operative marketing ventures. Khadi & Village Industries Commission (KVIC) and the recently formulated 'Good Value Marketing Company' to promote small producers of consumables are other examples.

(iii) Marketing Efforts through 'Associations' :

Any marketing plan requires accurate data on the needs and wants of the consumers. Market Research studies are a possible source but have not been popular among small scale industrialists due to their prohibitive costs. However, a consortium approach can reduce these costs to a large extent as can be seen from the results of a recent study by Bombay Textile Research Association. This has shown an estimated cost-benefit ratio of 1 : 8.5 on account of joint research (*Economic Times Research Bureau*, Nov. 2, 1979).

Quadrant IV

This mode requires creation of a distinct entity for a short span of time. In actual practice, this mode does not exist. The relationship always begins as a short range temporary relationship and either extends to long-range temporary quadrant or to the long range permanent quadrant.

PROCEDURAL DETAILS

A relevant question which crops up is : How does the executive in the Indian industry go about operationalising this concept ? No single answer can be suited to all the situations but a general outline of procedure can serve as a starter.

Step 1 : Carry out a situation audit of the company using the principles of SWOT (Strengths-Weaknesses-Opportunities-Threats) analysis.

Step 2 : Evolve a long-range plan on the

basis of the results of **Step 1** to identify the situation five and ten years hence.

Step 3 : Identify the weak areas needing reinforcement to effectively exploit the opportunities and tackle the threats which were predicted in Step 2.

Step 4 : The basic areas in which a 'synergistic relationship' can be thought of can be identified at this stage, based mainly on the weak areas (typical areas for relationships are : sales organisations, physical distribution systems, product development, advertising efforts, entry into a new market, diversification and marketing expertise in research, etc.).

Step 5 : This stage consists of choosing the partner. The choice is made, keeping in mind the company's strengths and weaknesses, the exact type of relationship envisaged, the style of management and the organisational culture. Primarily, it should be construed as a marriage between two organisations with the weaknesses in one case compensated by the strengths of the other. In practice, it might not be possible to find a partner fulfilling all the requirements and a compromise may have to be made, keeping in mind an informal order of priority for the strengths envisaged.

BENEFITS

Although the advantages have been enumerated throughout the text at different points, the major benefits to the participants are summed below :

*Cost reduction through optimum utilisation of resources in

—distribution system by achieving economies of scale,

—product modification and new product development,

—advertising

*Enlarging the existing market network and exploring new areas. Consumer satisfaction

through price advantage and a reduced market search for related products.

Although difficult it may seem, it is easier to operationalise a synergic relationship than conventional mergers or an acquisition-in our context where mergers are generally disapproved because of political and social reasons.

CONCLUSION

A framework for achieving higher productivity through collaborative arrangements in realising marketing objectives of more than one

company has been highlighted through examples from Indian business scene. The concept is not new, but more attention needs to be paid than hitherto has been the case, especially in the light of increased costs, competition and uncertain economic conditions. It is hoped that this will serve to initiate further thinking along these lines and eliminate avoidable duplication. □

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Structural Changes Of Rate Of Profits In Indian Manufacturing Industries¹

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"The newly established industries, through the government policies, got enough encouragement which enabled them to raise the profitability till and after 1963-64, while old industries, not only lost their earning position, but deteriorated further till 1974-75."

Economists, by and large have supported the proposition that, under perfect competition, the rate of return on investment tends towards equality in all industries. Entrepreneurs, under perfect competition, would seek to leave relatively unprofitable industries and enter profitable ones. This movement of capital is crucial to the efficiency and growth of the economy and is explained with factors like the free entry and exit of firms in industry, price-profit mechanism, the principle of factor substitution, etc. It is assumed, however, that in the beginning some differences exist in rates of profits earned by different industries (assuming further that the supply of entrepreneurs is perfectly elastic).

In view of the above, it becomes necessary to test the validity of the proposition that there is a tendency of rates of profits to converge towards a central value over time with respect to Indian Manufacturing industries. For this, the inter-industry variations in the rates of profits earned by 21 Indian Manufacturing Industries over the period 1950-51 to 1974-75, i.e., 25 years, is analysed.

Sources of Data

The study is based on the series of combined accounts (Balance Sheets, Income Statements etc.,) of different industries published by the Reserve Bank of India in its publication

¹ The author is indebted to Dr. M.M. Dadi, Dept. of Economics, M.S. University, Baroda for his valuable suggestions and comments.

'*Financial Statistics of Joint Stock Companies in India*'. Only large and medium public limited companies are covered. Companies with paid-up capital of Rs. 0.5 million or more are classified as medium or large companies. Notwithstanding the differences in the numbers of public limited companies covered, the coverage has been kept around 80% in terms of paid-up capital of all the non-governmental, non-financial public limited companies. Only those 21 manufacturing industries are examined for which the data for the whole period 1950-51 to 1974-75 were available.

Total number of companies covered by these 21 industries increased from 419 in 1950-51 to 1068 in 1974-75. Moreover, these industries controlled around 68.5% and 34.7% of productive capital employed in the whole manufacturing sector in the years 1950-51 and 1970-71 respectively. i.e. productive capital worth Rs. 4209.9 million out of 6145.3 million in 1950-51 and Rs. 38501.2 million out of Rs. 11105.8 million in 1970-71. A considerable decline in the share of total productive capital of these industries in 1970-71 is due to considerable expansion of the manufacturing sector in addition to the industries covered in the survey industries. This is obvious from the fact that the total productive capital in the manufacturing sector as a whole has increased from Rs. 6140 million in 1950-51 to Rs. 11101 million in 1970-71. However, even in 1970-71, the share of these twenty-one industries in total productive capital still is one-third of the whole sector. Similarly, the contribution of these industries to net value added of the manufacturing sector was 61.3% in 1950-51 and 49% in 1970-71. If the share of these industries in National Income is considered, it was 3.4% in 1950-51 and 6.7% in 1970-71.

Concept

The concept of rate of profit adopted for this study is an accountant's concept. It was observed that a concept of "pure profit" as defined in Economics (Profit as reward for taking unpredictable risks) carries with it a number of problems when the question of quantification arises. This is because the net profits shown in the accounts of joint stock companies consist of interest of shareholders' funds and the reward for uncertainty bearing. This would be true provided one assumes that all other factors of production receive income from the perfectly competitive system. If this

assumption is impaired in reality, which often is the case, then net profit may contain an element of monopoly revenue, gains, rent of fortuitous business ability etc. There is no tool in statistical armoury which can measure and demarcate these elements from "profit" to arrive at the abstract concept of "pure profit".

However, if interest charges on equity capital were imputed and then deducted from the 'net profits' given in the accounts, a better concept of "pure profit" could be derived. This procedure, also involves a number of practical difficulties. The first is with regard to the choice of rate of interest for imputation purposes. What rate of interest should be used to impute interest charges on equity capital? If market rate of interest is chosen for the purpose, the problem arises of practicability of its uniform application to the equity capital of different industries. Further, a decision regarding the time period involved in borrowing (i.e. equity capital is treated as borrowed funds) funds is to be made, because, interest charges differ according to time. Lastly, opportunity cost of capital also needs to be calculated. Considering the above mentioned problems and the non-availability of adequate data, it was thought desirable to take up the accountants' concept of profit rate i.e. gross rate of profit, for the study.

It is observed that two concepts of rate of profit are highly used in business for practical purposes, viz., Gross Profits as percentage of Total Capital Employed and net Profits as Percentage of Net Worth. The former represents the returns on total capital employed and thus takes into consideration the returns on both the equity and the borrowed capital, while the latter deals with the returns on the equity capital alone, thereby leaving the characteristics of borrowed capital unexplained.

The concept of gross profits includes interest charges on borrowed capital implying thereby that interest charges are not treated as cost item. This is done on the premise that if interest charges on borrowed funds are treated as cost item and therefore deducted from profits, it becomes necessary to impute the possible interest charges on equity capital and deduct these from the profits. Since imputation of interest charges on equity capital was difficult, it was felt appropriate to include the interest

charges on borrowed funds in profits assessed for the purpose.

In short, inclusion of interest charges on borrowed funds implies that one does not want to make any adjustment in total capital on account of interest as cost item. Hence, profits are taken gross of interest charges. Similarly, profits are taken gross of taxes also. The taxes are included in profits to avoid the distorting influences of differences in taxes on different industries. Moreover, profits are shown as returns on total capital employed, which means that whatever returns accrue to equity and borrowed capital are treated as profits. Hence, profits are taken gross of taxes also.

In short, profits comprise interest charges, taxes, dividends and retained earnings and are termed as gross profits. These profits are then expressed as percentage of total capital employed, where total capital is defined as net fixed assets plus current assets and is therefore equal to total net assets or total liabilities of the industry. However, both the 'profits' and 'capital' are taken as net of "depreciation charges".

Need for the Study

Having chosen the concept of gross profit rate for the study, it is intended to explore the structure of profit rates in Indian manufacturing industries. Do the profit rates have a tendency to widen or narrow down over time as far as Indian Industries are concerned?

Ideal conditions of perfect competition have never been observed in reality. Hence, perfect competition has always remained, more or less, a theoretical norm. However, it was felt that an attempt to translate this deductive reasoning into an inductive evidence can be undertaken. Postulating inter-industry differences in profit rates in the beginning of the study, it can empirically be tested, whether, over a period of time, these differences in rates of profits are wiped out or not? If the industries earning very high profit rates in the beginning are incapable of maintaining it to the same level over time, while those with low profit rates in the beginning rise high in earning power over the same period, then a sort of equalising tendency can be inferred.

A number of studies (Bowman, 1934;

Epstein, 1934; Hart, 1965 & 1968; Singh, 1968) have been undertaken to test validity of the proposition of equalising tendency of profit rates in different industries, applying statistical techniques to available empirical data.

Since independence, India has been interesting industrial transformation. Consequently, Indian industries underwent significant structural changes. With the adoption of a policy of mixed economy, the Government gave recognition to the continuation and existence of the private sector along with the public sector. Hence, economic activities left to the private sector were expected to work under more or less competitive forces, though some regulatory forces would still be in existence. The Government actively participates in core sectors and exclusively controls those sectors of the economy where individual and social interests diverge widely. The remaining sectors are left to the free forces of price-profit mechanism where the private sector can contribute relatively better in furtherance of social welfare. It is with respect to this kind of mixed environment that the study of different aspects of profitability of different Indian industries is warranted.²

Tables and Discussion

Table 1 below reveals the highest, lowest and mean rates of profits earned by each of the twentyone manufacturing industries over 25 years. It also gives information on the dispersion in the profit rates earned by each of these industries over the period.

It can be observed that medicines and pharmaceutical industry earned the highest rate of profit (25.2%) in 1969-70, while matches earned slightly less (23.1%) in the same year. However, the variations in profit rates on matches are relatively lesser than those for the medicines and pharmaceutical industry. Amongst the industries earning lowest profit rate, other chemical products

² It was observed that even the exclusion of two industries viz., Iron and Steel and Cement, as the ones being exclusively under government price control, or the exclusion of seven industries, i.e. these two along with Grains and Pulses Edible Vegetable and Hydrogenated Oils Sugar Cotton Textiles and Paper and Paper Products (as these industries also experienced some price control over some years), cause no variations in the trends, observed as far as inter-industry variations in profit rates are concerned.

Table 1

Industry Inter-Variations in Rates of Profit : Highest, Lowest and Mean Profit Rates, Coefficient of Variation and Number of Years of Losses

Industry	Rate of Profit			C.V.	No. of Years of Losses
	Highest	Lowest	Mean		
1. Grains and Pulses	21.7 (1964-65)	4.0 (1972-73)	12.6	.437	Nil
2. Edible Vegetables and Hydrogenated Oils	16.2 (1973-74)	-1.8 (1954-55)	7.5	.667	1 (1954-55)
3. Sugar	15.7 (1972-73)	4.9 (1970-71)	8.9	.258	Nil
4. Tobacco	18.4 (1965-66)	7.9 (1953-54)	13.1	.198	Nil
5. Cotton Textile	15.1 (1973-74)	2.9 (1957-58)	7.9	.367	Nil
6. Silk-Rayon and Woollen Textiles	21.5 (1974-75)	1.7 (1952-53)	12.1	.496	Nil
7. Medicines and Pharmaceutical Preparations	25.2 (1969-70)	4.7 (1953-54)	14.4	.472	Nil
8. Matches*	23.1 (1969-70)	8.0 (1957-58)	14.4	.236	Nil
9. Pottery, China Earthenware and Structural Clay Products	16.5 (1972-73)	6.5 (1968-69)	9.5	.268	Nil
10. Paper and Paper Products	22.4 (1974-75)	5.8 (1967-68)	10.0	.340	Nil
CONSUMERS' GOODS SECTOR	14.7 (1973-74)	5.1 (1952-53)	9.7	.263	Nil
11. Iron and Steel	15.7 (1955-56)	1.9 (1972-73)	9.0	.411	Nil
12. Aluminium	16.9 (1964-65)	1.6 (1953-54)	9.3	.433	Nil
13. Basic Industrial Chemicals	18.4 (1974-75)	2.5 (1953-54)	9.3	.433	Nil
14. Cement	14.1 (1966-67)	2.8 (1973-74)	9.4	.298	Nil
BASIC GOODS SECTOR	13.5 (1955-56)	6.2 (1958-59)	10.0	.200	Nil
15. Transport Equipment	11.4 (1965-66)	1.4 (1953-54)	7.7	.390	Nil
16. Electrical Machinery Apparatus and Appliances	15.9 (1963-64)	6.1 (1953-54)	11.3	.381	Nil
17. Machinery (Other than Transport Equipment)	12.2 (1963-64)	5.7 (1953-54)	8.9	.213	Nil
18. Ferrous/Non-Ferrous Metal Products	16.8 (1958-59)	-3.2 (1952-53)	9.3	.559	1 (1952-53)
CAPITAL GOODS SECTOR	12.8 (1964-65)	4.8 (1953-54)	9.4	.223	Nil
19. Jute Textiles	16.5 (1962-63)	-0.6 (1956-57)	6.1	.656	1 (1956-57)
20. Other Chemical Products	17.9 (1974-75)	-6.2 (1952-53)	10.0	.590	2 (1952-53 & 1954-55)
21. Rubber and Rubber Products	17.2 (1968-69)	10.0 (1962-63)	12.6	.159	Nil
INTERMEDIATE GOODS SECTOR	14.8 (1962-63)	1.5 (1956-57)	8.9	.315	Nil
WHOLE MANUFACTURING SECTOR	14.2 (1974-75)	6.3 (1957-58)	9.5	.200	Nil

Source : Financial Statistics of Joint Stock Companies in India in 3 Vols, 1967, 1975, 1977, Reserve Bank of India.

Note : *Data on Match Industry are available upto 1969-70 only.

incurred the maximum losses (-6.2%) and relatively highly fluctuating profit rates over the period of twenty five year (coefficient of variation=590). Another important feature which is noticeable is that majority of the modern industries that earned lowest rates of profit during the early fifties, earned highest profit rates in early seventies, viz., edible vegetable and hydrogenated oils, silk-rayon and woollen textiles, medicines and pharmaceutical preparations (consumer goods sector); aluminium, basic industrial chemicals (basic goods sector), transport equipment, electrical machinery, apparatus and appliances, machinery (other than transport equipment), ferrous/nonferrous metal products (capital goods sector), other chemical products (intermediary goods sector). This implies that these modern industries, majority of which belong to basic and capital goods sector, though suffered from low profitability in their initial stages, were capable of earning high rates of profit toward the end of the study period.

Industries like grains and pulses, sugar, pottery, china, earthenware and structural clay products, paper and paper products (consumers sector), iron and steel and cement (basic goods sector), and rubber and rubber products on the other hand earned lowest rates of profit in late sixties early seventies. These are mainly the traditional industries which enjoyed better profitability in the early fifties.

The rubber and rubber products industry, had the lowest fluctuations in profitability ratios (C. V. =.159) and also earned, on an average, relatively high rate of profit i.e, mean profit rate, over the study period. Similarly, edible vegetable hydrogenated oils industry had the largest fluctuations in profit rate (C.V. =.667) and also earned, on an average, a very low rate of profit (7.5% mean profit rate).

From Table 2, it is observed that industries like matches and grains and pulses enjoyed the most superior earning positions till early sixties, while medicines and pharmaceutical preparations dominated the period from mid-sixties onwards till the end of the study period. Similarly, industries like edible vegetable and hydrogenated oils, cotton textiles, pottery china earthenware and structural clay products, cement, transport equipment and jute textiles suffered from low rates of profits till mid-sixties while it was mainly the jute textiles

industry which earned lowest rate of profit during the more number of year after mid sixties.

Have the inter-industry profit rates a tendency to narrow down or have they widened over the study period? An answer to this question is sought through working out the coefficient of variation of profit rates at inter-industry level for each of the twenty-five years, and are presented in column four of Table 2. In order to further strengthen the conclusions, rank correlation coefficient between profit rates of different industries in 1950-51 and each of the following years, are worked out presented in last column.

Trend in the value of coefficient of variation examined along the rank correlation coefficient between rates of profits, enables to explore the existence or absence of equalising tendency. A fall in the value of coefficient of variation over time is indicative of narrowing down of inter-industry dispersion of profit rates while a rising value of coefficient of variation implies widening of dispersion of inter-industry profit rates. Briefly speaking, a declining trend in coefficient of variation implies a tendency of profit rates to converge towards a central value through narrowing the profitability gap between different industries and *vice-versa*.

It is obvious from Table 2 that dispersion in profit rates in manufacturing industries widened during 1950-51 to 1952-53 because the value of coefficient of variation increased over these three years. However, there is clearly a tendency for profit rates to narrow down the period 1952-53 to 1963-64, which is obvious from a continuously declining value of coefficient of variation over these eleven years (C.V. declined from .871 in 1952-53 to .179 in 1963-64). After 1963-64 the dispersion in profit rates has remained more or less fluctuating. Even then, it is obvious from the values of coefficient of variation that there is a tendency towards widening of profitability gap of different industries over the period 1963-64 onwards till 1974-75. This is obvious from the fact that the coefficient of variation having once reached its minimum value (.179) in 1963-64 has not only risen in value in the years following 1963-64, but has remained above its minimum value over the remaining years. Hence, even though there are fluctuations in the C.V. value

Table 2
Inter-Industry Variations in Rates of Profits Highest, Lowest Profit Rates, Rank Correlation Coefficient and Number of Industries having Losses.

Years	Rate of Profit			C.V.	No. of Inds. with Losses	Rank Corr. Coeff. in relation to 1950-51 profit rates
	Highest	Lowest	Range			
1	2	3	4	5	6	7
1950-51	14.8 Matches	1.8 Transport Equipment	13.0	.466	Nil	—
1951-52	15.0 Rubber and Rubber Products	0.6 Edible Vegetable and Hydrogenated Oils	14.4	.524	Nil	.910
1952-53	13.9 Matches	-6.2 Other Chemical Products	20.1	.871	Two 1. Cement 2. Other Chemical Products	.897
1953-54	13.8 Grains and Pulses	0.5 Cement	13.3	.642	Nil	.903
1954-55	16.9 Grains and Pulses	-1.8 Edible Vegetable and Hydrogenated Oils	18.7	.613	Two 1. Edible Vegetable and Hydrogenated Oils 2. Other Chemical Products	.909
1955-56	18.6 Grains and Pulses	2.4 Jute Textiles	16.2	.489	Nil	.406
1956-57	19.2 Grains and Pulses	-0.6 Jute Textiles	19.8	.488	1 Jute Textiles	.620
1957-58	17.8 Grains and Pulses	2.3 Edible Vegetable and Hydrogenated Oils	15.5	.481	Nil	.489
1958-59	17.4 Grains and Pulses	4.2 Cotton Textiles	13.2	.354	Nil	.368
1959-60	19.8 Grains and Pulses	7.3 Cement	12.5	.296	Nil	.132
1960-61	19.6 Grains and Pulses	7.21 Pottery China Earthenware and Structural Clay 2. Iron and Steel	12.4	.293	Nil	-.094
1961-62	16.6 Matches	3.4 Jute Textiles	13.3	.259	Nil	.069
1962-63	19.6 Matches	7.1 1. Edible Veg. and Hydrogenated Oils 2. Sugar	2.5	.287	Nil	.132

RATE OF PROFITS

19

1	2	3	4	5	6	7
1963-64	16.9 Matches	6.5 Edible Veg. and Hydrogenated Oils	10.4	.179	Nil	.048
1964-65	21.7 Grains and Pulses	5.4 Jute Textiles	16.3	.328	Nil	-.012
1965-66	23.3 Medicines and Pharmaceutical Preparations	5.4 Cotton Textiles	17.9	.347	Nil	-.153
1966-67	23.3 Medicines and Pharmaceutical Preparations	2.3 Jute Textiles	21.0	.658	Nil	-.094
1967-68	20.6 Medicines and Pharmaceutical Preparations	1.3 Jute Textiles	19.3	.475	Nil	-.076
1968-69	22.0 Medicines and Pharmaceutical Preparations	3.6 Jute Textiles	18.4	.471	Nil	-.123
1969-70	25.2 Medicines and Pharmaceutical Preparations	3.0 Jute Textiles	22.2	.487	Nil	-.077
1970-71*	21.1 Medicines and Pharmaceutical Preparations	4.9 Sugar	16.2	.374	Nil	-.140
1971-72*	20.5 Medicines Pharmaceutical and Preparations	3.4 Edible Vegetable and Hydrogenated Oils	17.1	.350	Nil	-.100
1972-73*	20.0 Medicines and Pharmaceutical Preparations	1.9 Transport Equipment	18.1	.434	Nil	-.348
1973-74*	18.9 Medicines and Pharmaceutical Preparations	0.8 Jute Textiles	18.1	.464	Nil	-.507
1974-75*	22.4 Paper and Paper Products	2.4 Aluminium	20.0	.424	Nil	-.329

Source : Financial Statistics of Joint Stock Companies in India, 3 Vols., 1967, 1975, 1977, Reserve Bank of India.

Note : *The number of Industries covered is 20 as data on "Matches" are not available for these years.

in latter period, its higher values are indicative of widening of the profitability gap.

Further analysis of the C.V. data indicates that it has a parabolic trend, rising over the years 1952-53 to 1963-64, reaching its minimum value in 1963-64, and rising and remaining above its minimum value (though fluctuating) till 1974-75. It implies that there was a widening of profitability gap till 1952-53 followed by a narrowing down of the profitability gap over the period 1952-53 to 1963-64, thereby indicating a tendency of profit rates to converge towards a central value or indicating the levelling effects in profit rates earned by different industries over this period of eleven years, and widening of profitability gap again from 1963-64 onwards till the end of the period.

From the above analysis, one can infer that for the period 1952-53 to 1963-64, there are some levelling effects as there is a definite declining trend in the value of coefficient of variation. However, the unchanged values of coefficient of variation at the beginning and at the end of the period indicate that the dispersion in the profit rates has remained almost same at the two ends.

As far as structural changes are concerned, it would not be enough to examine the trends in the value of coefficient of variation alone and it will have to be supplemented with the rank correlation data. This will show whether the industries were capable of maintaining their earning positions over time or not. The equalising tendency or the levelling effect in profit rates may be the result of wiping out or decline in the abnormal profits earned by some industries and rise in profitability of industries earning low profit rates in 1950-51. Competition among firms and entry of new firms within the industry creates such a situation.

The Rank Correlation Coefficient between the profit rates when worked out, indicates whether industries ranking top in profitability in 1950-51, could continue to top in following years or not, or, industries ranked in the lowest ladder of profitability in 1950-51 remained at the same position during the following period.

The rank correlation coefficients were estimated by arraying the industries in descending

order of their profit rates and by ranking them in ascending order. These ranks of 1950-51 were then correlated to the ranks of each of the following years.

A changing value of rank correlation coefficient indicates changing earning positions and negative values of this coefficient imply reversing of the ranks and the earnings positions of industries. Keeping in mind these implications following conclusions are drawn from the values of rank correlation coefficient presented in the last column of Table 2.

It reveals that the majority of the Indian manufacturing industries maintained their earning superiority in the initial period of study, i.e., till 1954-55 (value of Rank Correlation Coefficient is very high). However, from 1955-56 onwards, not only has there been a decline in the value of this coefficient, but it reached very low level in 1963-64 (.048) and become negative from 1964-65 onwards. This is an indication of changing profitability ranks of these industries and implies that industries experienced great changes in their earning position.

Further, the rank correlation coefficient is observed to have assumed negative values from 1964-65 onwards (though quite low in the beginning, but, relatively high from 1972-73 onwards), indicating thereby, that, not only the highly profitable industries of 1950-51 e.g. grains and pulses, sugar, paper and paper products, iron and steel, cement, etc. have lost their earning superiority over this period, but the industries earning low profitability in 1950-51 e.g. chemical and engineering industries have raised their earnings very high and acquired superiority in earnings in latter period.

If the trends in rank correlation coefficient are examined alongwith the trends in the coefficient of variation, a very interesting conclusion can be drawn. It has already been observed earlier that the coefficient of variation denotes a parabolic trend in variations in inter-industry profit rates. It is further observed that till 1952-53, the C. V. has increased indicating

3 Industries like silk-rayon and woollen textiles medicines and pharmaceutical preparations aluminium basic industrial chemicals, transport equipment electrical machinery apparatus and appliances ferrous/non-ferrous metal products other chemical products etc.

widening of dispersion of profit rates while rank correlation coefficient has remained quite high till 1951-55, indicating thereby that earning positions were maintained by different industries over this period and that there was a wide gap in profit rates earned by different industries. However, from 1953-54 onwards not only has C. V. fallen continuously in value till 1963-64, but even the rank correlation coefficient has also declined in value and reached its lowest positive value (.048) in 1963-64. These trends imply that the profitability gap started narrowing down and at the same time the earnings positions (ranks by profit rates) of different industries also underwent big changes, i.e., industries earning low profits in the beginning started earning high profits while those earning high profits in the beginning became low profitability industries over this period. This is a clear indication of narrowing down of the gap between profit rates earned by different industries over this period. Hence, it implies that Indian manufacturing industries experienced an equalising tendency in profit rates over the period 1953-54 to 1963-64 i.e. 11 years.

However, after 1963-64 not only has there been a rise in the value of C.V., indicating widening of the profitability gap between those industries, but, the rank correlation coefficient has assumed negative values, which are quite high towards the end of the period under study. Moreover, in 1974-75, the C.V. assumes, though slightly less, almost its equivalent value of 1950-51, indicating thereby that the dispersion in profit rates has widened and has come back to its original state. However, a negative and high value of the rank correlation coefficient emphasises the fact that though dispersion is almost similar to that of 1950-51, there have been drastic changes in the earnings positions of these industries in these two periods. Industries earning high profits in 1950-51 e.g. grains and pulses iron and steel cement etc. have become low earning industries in 1974-75 while those earning low profits in 1950-51 e.g. chemical and engineering industries have become highly profitable ones in 1974-75. This is highly indicative of a change in structure of profit rates of these industries over the 25 years though dispersion at the two ends of the period has remained same.

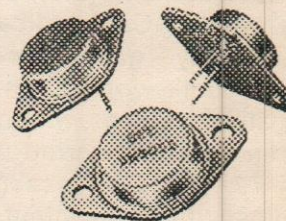
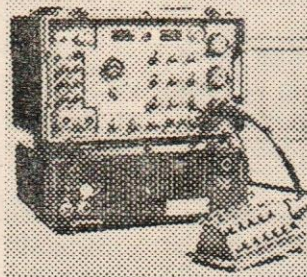
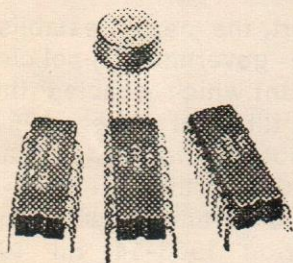
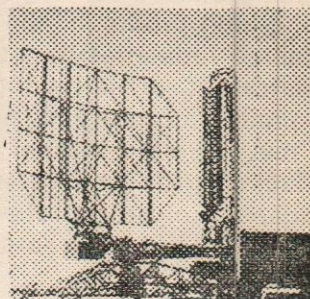
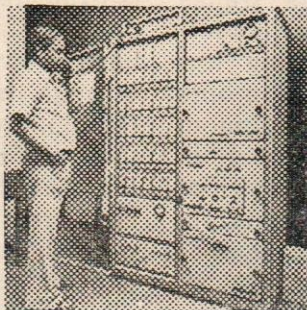
Having concluded thus, it becomes necessary to pinpoint those industries in the study which have been responsible for this tendency. As far as the equalising tendency observed over the period 1953-54 to 1963-64 is concerned, it has been the result of the combined effect of decline in the profitability of old industries like jute textiles, iron & steel and cement etc., and a rise in the profitability of industries like medicines & pharmaceutical preparations, silk-rayon & woolen textiles, chemical & engineering industries etc. When this levelling effect is examined in the light of government policy, we observe that the basic and heavy industries which have been strongly encouraged by the government through its five year plans and Industrial Policy Resolution of 1956 have been capable of raising their profit rates quite high over the period. On the other hand, the old and traditional industries like grains & pulses, cotton textiles, jute textiles, iron & steel, cement, etc., either had decline in profitability over the period or negligible rise, due to considerable government control on their prices, production or distribution.

In short, the newly established industries, through the government policies, got enough encouragement which enabled them to raise their profitability till and after 1963-64, while old industries, not only lost their earning positions, but deteriorated further till 1974-75. Hence, the profitability differences which narrowed down over the period 1953-54, till 1963-64, widened thereafter. This implies that modern industries (particularly the chemical & engineering industries) experienced rise in their earnings at a rate faster than the old industries.

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Unused Inventories In Central Government Heavy Engineering Enterprises

RAM PRAKASH
Planning Commission, New Delhi

Ten enterprises of the Central Government as on 31st March 1978 were engaged in the manufacture of capital goods required by major industries and power generation complexes. The names of these ten enterprises and the year of incorporation are indicated below :

Experience has shown that a reduction of about 20-25 percent of stock is within easy reach of management through modern inventory control techniques. About 157 to 196 crores of capital can be realised for active use apart from saving 10-15 percent of annual carrying cost of stocks in the public sector heavy engineering undertakings alone.

Sl. No.	Name of the Enterprise	Year of Incorporation (Registration)
1.	Jessop & Co. Ltd. (became a Govt. Co. w.e.f. 1.4.1973)	1788
2.	Bridge & Roof Co. (India) Ltd. (became a Govt. Co. w.e.f. 29.7.72; subsidiary of Balmer Lawrie & Co. Ltd.)	1920
3.	Heavy Engineering Corporation Ltd.	1958
4.	Tungabhadra Steel Products Ltd., (became a Govt. Co. since 1967)	1960
5.	Bharat Heavy Electricals Ltd.,	1964
6.	Mining & Allied Machinery Corpn. Ltd.	1965
7.	Triveni Structural Ltd.,	1965
8.	Bharat Heavy Plate & Vessels Ltd.,	1966
9.	Braithwate & Co. (India) Ltd.,	1976*
10.	Burn Standard Co. Ltd.,	1976*

* Year of becoming Government Company.

These heavy engineering undertakings have grown in number as well as in size both through merger and expansion during 1966-78. In 1966-67 there were only four enterprises under production nos. 3, 4 & 5 and Heavy Electricals (India) Ltd., which was later merged with BHEL. These had capital employed of Rs. 170.52 crores and sales turnover of Rs. 15.06 crores in 1966-67. In 1977-78, the capital employed increased by 354.6 percent to Rs. 775.26 crores and turnover increased to Rs. 719.40 crores, i.e., by about 48 times. The total equity and loan investment in these 10 enterprises was of the order of Rs. 827.01 crores on 31st March 1978. Thus, currently out of every 11.9 rupees invested in all the goods producing enterprises one is in those belonging to heavy engineering. These enterprises contributed 11 percent of the total gross profit earned during 1977-78 and were responsible for 47 percent of net loss of Rs. 92.55 crores incurred by all the goods producing enterprises.

Level of Inventories

The inventories as a percentage of total value of produce fell from 225 (1966-67) to 116 (1977-78). The average inventories in absolute terms

increased from Rs. 62 crores to Rs. 714 crores over the period under study. The cost of sales during the period increased from Rs. 28 crores to Rs. 460 crores as shown in Table 1. These figures are graphically presented in Fig. 1 for identifying the changing pattern of inventories and cost of sales.

It is one of the few cases when holding of inventories in all the twelve years have been more than the cost of sales. That is why the cost of sales curve passes through the bars representing average inventories in all the years under study in Fig. 1. In the initial years this group of enterprises carried excess inventories as revealed by some of the case studies mainly due to the facts that (i) the plants had planned for a high production level which could not be achieved; (ii) the production was job-based that necessitated stocking of different items; and (iii) procurement of material against work order had been usually made in one lot. In subsequent years some improvement is seen in management of inventories if judged from the stock turnover rate. Inventory-turnover ratio is the ratio of annual usage or cost of sales to average inventory during the period. It gives a quick appraisal of inventory condition

Table 1

Year	Rs. in crores		Inventories as % of cost of sales	Inventories in terms of months of cost of sales (nos.)	Inventories turnover rate 2÷3
	Cost of sales	Value of average inventories			
1	2	3	4	5	6
1966-67	27.77	62.41	224.74	27.0	.44
1967-68	38.82	89.87	231.56	27.8	.43
1968-69	71.85	124.55	173.35	20.8	.58
1969-70	91.89	151.71	165.10	19.8	.61
1970-71	99.64	177.77	178.41	21.4	.56
1971-72	110.16	215.53	195.65	23.5	.51
1972-73	193.20	286.89	148.49	17.8	.67
1973-74	210.44	372.71	177.11	21.3	.56
1974-75	319.88	529.32	165.47	19.9	.60
1975-76	459.22	715.25	155.72	18.6	.64
1976-77	601.29	775.29	128.93	15.5	.78
1977-78	676.30	784.80	116.04	13.9	.86

and reflects not only proportional investment but how well the stocks are moving. It is a quick guide to the 'mileage' obtained from the money tied up in stocks. During the period under study

the inventory turnover rate had gradually increased from 0.44 in 1966-67 to 0.86 in 1977-78. The inventory holdings in terms of months of produce has been reduced from 27.8 in 1967-68 to 13.9 in 1977-78.

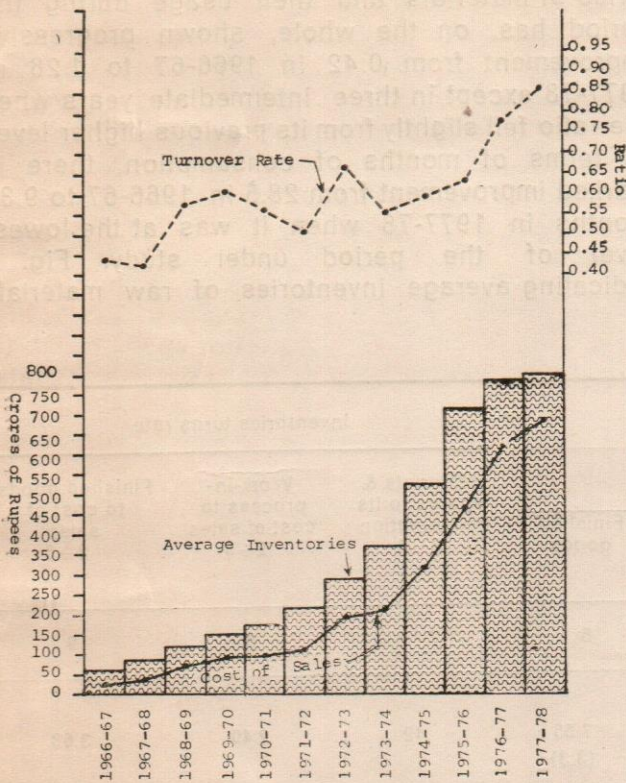


Fig. 1. Inventory Chartwatch—Heavy Engineering

The facts collected by the Committee on Inventories Control of Bureau of Public Enterprises, Government of India (Reference made to Report No. 2 on Heavy Engineering Corporation-Heavy Machine Building Unit) show that the inventory-turnover ratio in foreign countries in heavy engineering is about 2.75 whereas in this group of enterprises the corresponding ratio during the period had never been more than one. In USA, the ratio of net sales to inventory for 327 corporations in the group of industrial machinery shows a range of 7.8 to 3.4 upper and lower quartile, the median being 4.9 (Hayel, pp. 228-29.) The comparison of turns ratios with American or other foreign companies may not be helpful in determining the quantum of under-utilisation of capital invested in inventories due to working and environmental differences, but it does indicate that all is not well with the management of inventories in this group.

A further comparison of heavy engineering inventory of public sector undertakings with that of private sector companies in India also does not indicate encouraging position. The comparable data of 29 private sector joint stock companies with paid-up capital of Rs. 1 crore and above and engaged in the manufacture of all electrical, machinery and apparatus and appliances are reproduced in Table 2. It may be seen that against the private sector inventory holding of

Table 2

Year	Rs. in crores		In months	Turns Rate 2÷3
	Cost of sales	Value of average Inventories	Inventories in terms of months of sales	
1	2	3	4	5
1971-72	325.73	113.51	4.18	2.87
1972-73	368.23	122.11	3.98	3.02
1973-74	416.31	137.33	3.96	3.03
1974-75	599.58	167.81	3.36	3.57
1975-76	566.93	190.40	4.03	2.98

about 4 months, public sector enterprises had an inventory level which varied between 17.8 to 23.5 months of cost of sales during the above five years. The turns rate of the 10 undertakings of public sector in 1971-72 to 1975-76 ranging between 0.51 to 0.67 was very low as compared to that of those in private sector being between 2.87 to 3.57. This shows that inventories in private sector, if judged from turns ratio, are on the whole better managed than in the public sector in industrial group of heavy engineering.

Inventory Components

The data on heavy engineering inventories according to different components, viz., crude

material and spares, work-in-process and finished goods; consumption of materials and cost of sales; and their appropriate ratios are summarised in Table 3.

Raw Materials : The turnover ratio of inventories of materials and their usage during the period has, on the whole, shown progressive improvement from 0.42 in 1966-67 to 1.28 in 1977-78 except in three intermediate years when the ratio fell slightly from its previous higher level. In terms of months of consumption, there is marked improvement from 28.5 in 1966-67 to 9.34 months in 1977-78 when it was at the lowest level of the period under study. Fig. 2 indicating average inventories of raw materials

Table 3

Year	Rs. in crores					Inventories turns rate		
	Cost of Sales	Value of materials & spares consumed	Av. Inventories			Materials & spares to its consumption 3÷4	Work-in-process to cost of sales 2÷5	Finished goods to cost of sales 2÷6
			Raw materials & spares	Work-in-process	Finished goods			
1	2	3	4	5	6	7	8	9
1966-67	27.77	18.08	42.99 (28.5)	11.87 (5.13)	7.55 (3.3)	.42	2.40	3.68
1967-68	38.82	25.27	52.84 (25.1)	21.63 (6.7)	15.40 (4.8)	.48	1.79	2.52
1968-69	71.85	38.21	66.41 (20.9)	37.59 (6.3)	20.47 (3.4)	.57	1.91	3.51
1969-70	91.89	55.43	75.21 (16.3)	51.50 (6.7)	25.00 (3.3)	.74	1.78	3.67
1970-71	99.64	80.32	84.72 (12.6)	48.45 (5.8)	44.60 (5.4)	.95	2.06	2.23
1971-72	110.16	83.25	96.88 (14.0)	59.49 (6.5)	59.16 (6.4)	.86	1.85	1.86
1972-73	193.20	117.77	127.51 (13.0)	100.34 (6.2)	59.04 (3.7)	.92	1.92	3.27
1973-74	210.44	188.20	163.59 (10.4)	162.25 (8.1)	66.87 (3.8)	1.15	1.48	3.15
1974-75	319.88	235.27	234.75 (12.0)	157.85 (5.9)	136.72 (5.1)	1.00	2.03	2.34
1975-76	459.22	361.48	307.03 (10.2)	176.88 (4.6)	231.34 (6.0)	1.18	2.60	1.99
1976-77	601.29	386.17	313.38 (9.74)	201.86 (4.03)	260.05 (5.19)	1.23	2.98	2.31
1977-78	676.30	405.45	315.55 (9.34)	216.96 (3.83)	253.29 (4.49)	1.28	3.13	2.67

NOTE : Figures in parentheses relate to inventories in terms of months of consumption of materials and spares for crude materials; and of cost of sales for work-in-process and finished goods.

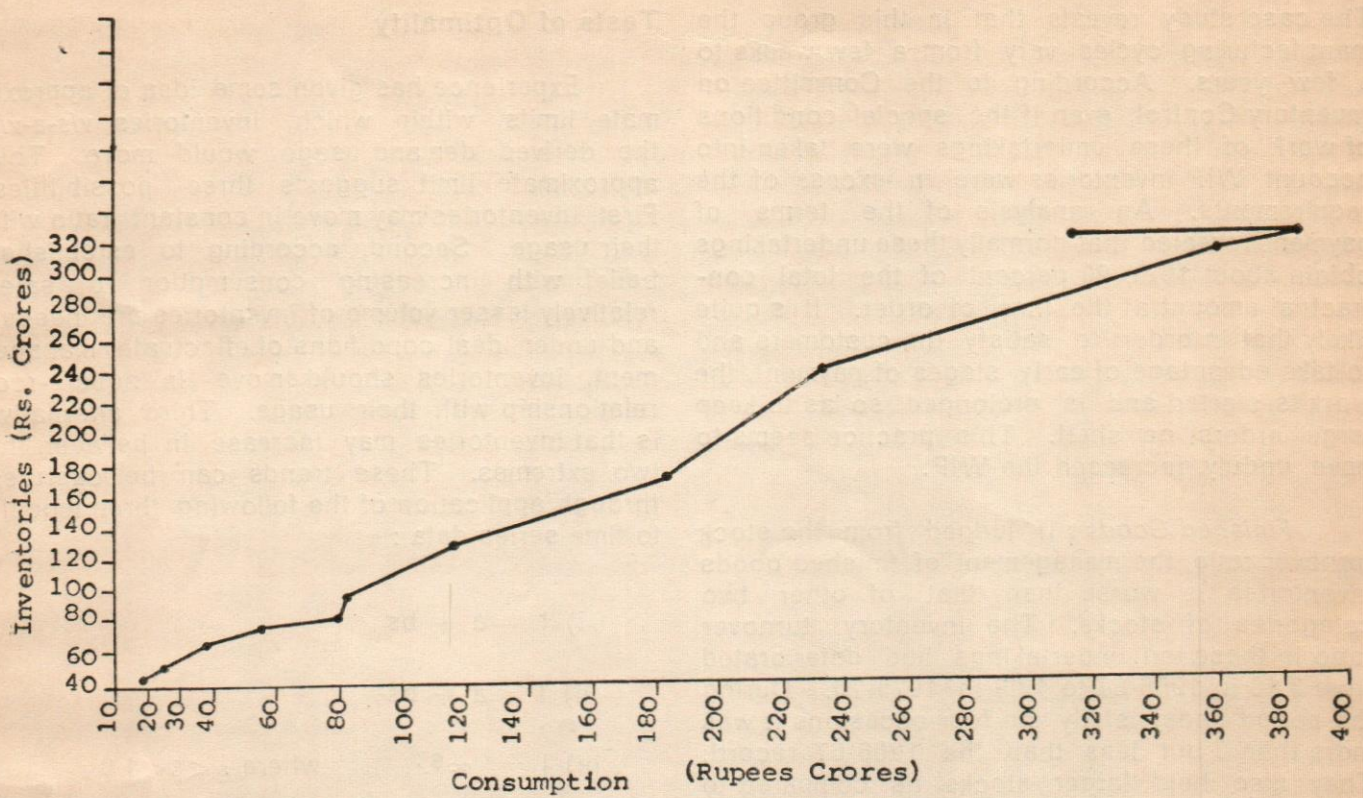


Fig. 2 Inventories of Raw Materials and Their Consumption Relationship—Heavy Engineering

and spares and their consumption, shows somewhat concave formation. This gives further evidence of economies of scale. In 29 large sized joint stock companies of private sector during 1971-72 to 1975-76 the material consumption and their average inventories ratio varied between 4.02 to 4.2, whereas in public sector enterprises the said ratio fell in the range of 0.86 to 1.18. This indicates the extent of under-utilisation of the investment in crude material.

Work-in-Process : In this category, the turns ratio over the period has not shown any notable improvement in the first nine years. In 1966-67 it was 2.48 and this figure did not exceed in any of the nine years. Subsequently, it increased gradually from 2.6 to 2.98 and then to 3.13 in the last year of the study. In the said 29 companies of private sector, the ratio of cost of sales and average value of work-in-process inventories ranged between 16.22 to 21.52 over the period 1971-72 to 1975-76. The corresponding ratio in public sector enterprises during the period varied between 1.48 to 2.03. This shows how relatively inactive the capital is in public

sector enterprises. Fig. 3 shows the rising trend in inventories of WIP over the period under study.

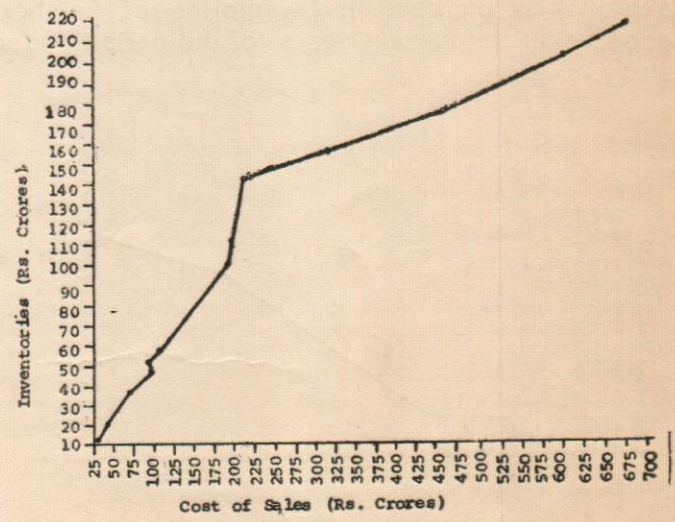


Fig. 3 Inventories of Work-in-Process and Cost of Sales Relationship—Heavy Engineering

The case study reveals that in this group the manufacturing cycles vary from a few weeks to a few years. According to the Committee on Inventory Control, even if the special conditions of work of these undertakings were taken into account, WIP inventories were in excess of the requirements. An analysis of the terms of payment revealed that normally these undertakings obtain about 10 to 20 percent of the total contractual amount at the time of order. It is quite likely that in order to satisfy the customers and to take advantage of early stages of payment, the work is started and is prolonged so as to keep large orders on shelf. This practice seems to have, unduly, increased the WIP.

Finished Goods : If judged from the stock turnover ratio, the management of finished goods inventories is worse than that of other two categories of stocks. The inventory turnover ratio in these ten undertakings had deteriorated from 3.68 in 1966-67 to 1.99 in 1975-76. During the period under study, on four occasions it was more than 3 but less than the 1966-67 record. They also held larger stocks as compared to their counterparts in private sector. The said large sized 29 private sector joint stock companies carried during 1971-72 to 1975-76 inventories of finished goods equal to 1.23 to 1.36 months of cost of sales. The ten enterprises in similar industrial groups of public sector had stocks of finished goods equal to 3.7 to 6.4 months of the cost of sales in the said period. Fig. 4 shows a very sharp increase in inventories of finished goods over the eleven years of the period under study.

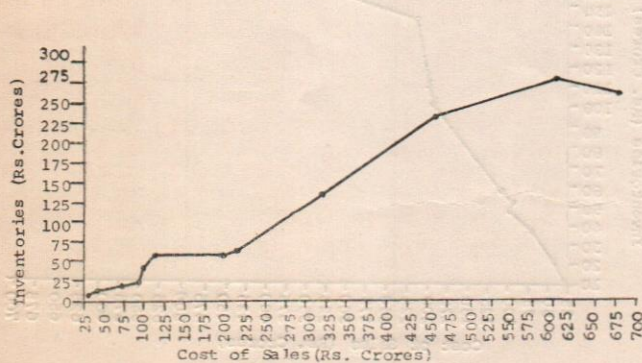


Fig. 4 Inventories of Finished Goods & Cost of Sales Relationship—Heavy Engineering

Tests of Optimality

Experience has given some idea of approximate limits, within which, inventories *vis-a-vis* the derived demand/usage would move. This approximate limit suggests three possibilities. First, inventories may move in constant ratio with their usage. Second, according to established belief with increasing consumption or sales relatively lesser volume of inventories are needed and under ideal conditions of effectuate management, inventories should move in square-root relationship with their usage. Third alternative is that inventories may increase in between the two extremes. These trends can be captured through application of the following three models to time series data :

$$i) I = a + bs$$

$$ii) I = a + bs^{\frac{1}{2}}$$

$$iii) I = \infty s^{\beta} \quad \text{where } \frac{1}{2} < \beta < 1.0$$

Here I stands for inventories, a -safety stocks, b/α -policy variable and S for sales/usage. The value of the exponent will indicate the degree of economies of scale in the holding of inventories. A general form equation $I = a + bs^{\beta}$ could give better idea about the extent of economies of scale, but unfortunately, there are statistical difficulties in establishing by linear regressions an equation of the general form and as such this model cannot be applied. The applications of three models will give insight in the inventory behaviour, and assess the extent to which there had been economies of scale in inventory holding. In model (i), inventories form a constant ratio with usage. In model (ii), stocks are in square-root relationship to derived demand. The model (iii), holds the assumption that economies of scale exist, but are not as great as those indicated by the square-root relationship.

Application of Models

Model I : The inventories of raw materials and spares in heavy engineering group were correlated with their usage and those of work-in-process and finished goods with cost of sales according to the linear model $I = a + bs$ through regression analysis in six combination of years

1 to 7, 1 to 8, 1 to 9, 1 to 10, 1 to 11 and 1 to 12. The important results of these regressions are summarised in Table 4.

intercept a is negative, but is not significantly different for zero in years 1 to 7, 1 to 8 and 1 to 9 and in the remaining three groups of years

Table 4
Simple Regression of Inventories to Usage : $I = a + bs$.

Parameters for Analysis	1966-67 to 1977-78			1966-67 to 1974-75		
	Raw Materials & spares	Work-in-process	Finished Goods	Raw Materials & spares	Work-in-process	Finished Goods
1	2	3	4	5	6	7
No. of observations	12	12	12	9	9	9
a—coefficient	35.64	26.55	-4.23	29.10	0.93	-3.33
standard error	5.18	10.12	8.46	5.54	7.36	7.28
t—value	6.88	2.62	-0.50	5.25	0.13	-0.46
b—coefficient	0.7285	0.3127	0.4242	0.8114	0.5350	0.3994
standard error	0.0238	0.0313	0.0262	0.0473	0.0469	0.0464
t—value	30.582	9.98	16.20	17.15	11.42	8.62
R ²	0.995	0.953	0.981	0.977	0.949	0.914
F—variance ratio	934.94	99.55	262.41	294.02	130.41	74.25

The regression of crude materials show positive intercept 'a' significantly different from zero at 95 percent confidence in all the six combinations of years. The reaction factor b is also positive. The R² value is more than 0.97. All these give strong evidence of economies of scale. In inventories of work-in-process and finished goods intercept 'a' is not significantly different from zero at 95 percent confidence. The R² is more than 0.9 in all the six groups of years for work-in-process stocks. For finished goods R² is more than 0.9 in the last four years of combination. These facts show that the inventories of WIP and of finished goods on the whole, had not taken advantage of economies of scale, and moved in constant ratio with the sales because here intercept 'a' is approaching zero.

Model II : The alternative theory to model I is that inventories are a square root function of sales/usage (i.e. $I = a + bs^{\frac{1}{2}}$). Regressions were run again for each of the three kinds of inventories in the same correlation as in the model I and important results are set out in Table 5.

For inventories of Raw materials in all the six groups of years R² is more than 0.93 and

it is significantly different from zero. For the last three groups of years it is further seen that the mean value of s is greater than the model value of $4a^2/b^2$. The coefficient 'b' is positive and is significantly different from zero at 95 percent confidence in all the five groups of years. These facts show that in this category of inventory the time series data have responded favourably to the square-root relationship upto first nine years, but when 1 to 10, 1 to 11 and 1 to 12 years were taken the model failed to catch reality. In the WIP the intercept 'a' is negative and significantly different from zero at 95 percent confidence, R² is more than 0.9, 'b' is positive significantly different from zero but the mean value of $s > 4a^2/b^2$ of the model. All these facts prove that in this component of inventories the square root relationship model does not capture reality. As such no conclusion can be drawn from this model for WIP. In finished goods inventories, the R² is very low in all groups of years except the last two groups of years and hence no conclusion. During the last two groups of years R² is reasonably high 'a' is negative, and 's' is less than $4a^2/b^2$. These facts show positive response of this model to the data. But R² of the model I is higher than that of the model II. Under these circumstances greater reliance

Table 5

Regression of Inventories to Usage : $I = a + bs^5$

Parameters for Analysis	1966-67 to 1977-78			1966-67 to 1974-75		
	Raw Materials & Spares	Work-In-process	Finished Goods	Raw Materials & Spares	Work-in-process	Finished Goods
1	2	3	4	5	6	7
No. of observations	12	12	12	9	9	9
a—coefficient	-56.27	-42.33	-89.37	-35.97	-62.75	-48.34
standard error	24.37	9.26	16.50	15.31	12.49	15.22
t—Value	-2.73	-4.57	-5.42	-2.35	-5.02	-3.18
b—coefficient	18.30	10.3015	13.3813	15.6823	12.4129	9.0296
standard error	0.9371	0.5958	1.0611	1.5828	1.0984	1.3384
t—Value	19.53	17.29	12.61	9.91	11.30	6.75
R ²	0.987	0.984	0.970	0.933	0.948	0.867
F—Variance Ratio	381.26	298.91	159.03	48.17	127.71	45.52

is to be placed on model I. The preceding analysis indicates that in all these categories of inventories for the period as a whole, the exponent of 's' is likely to be more 0.5.

Model III : The model $I = \alpha S^\beta$ with β lying somewhere between 0.5 and 1 indicates economies of scale but these economies are not as great as those indicated by the square root formula. Linear regressions on this model equation were calculated in the logarithmic form $\log I = \log \alpha + \beta \log S$. The results of regression for each of the three components of inventories in the same correlation as in the previous two models are indicated in Table 6.

As far as inventory holding of materials is concerned there is strong evidence of economies of scale. The value of β for the period as a whole is more than 0.5 and less than one being nearly 0.66 and when judged from the 't' value it is significantly different from zero. The R² value is very high. In the stocks of WIP, the economies of scale are very mild over the period as a whole as β is 0.88. The analysis of results of first three groups of years 1 to 7, 1 to 8, and 1 to 9, show that β is not significantly different from one at 95 percent confidence.

The R² is more than 0.97. All these show that WIP had been moving in constant ratio with value of produce. It is only with the additions of 10, 11 and 12th years that extremely mild economies of scale are observed. In the 10th year two new undertakings were added to this group. These contributed Rs. 33.57 crores and Rs. 37.12 crores to cost of sales and work-in-process respectively. But for the addition of these two enterprises the economies of scale would have been slightly more than those now seen. These facts fortify the conclusions drawn from the results of application of model I, and do not conflict with those of model II.

It is seen that in inventories of raw materials the management had taken advantage of substantial economies of scale which were in the neighbourhood of square root relationship during the group of year 1 to 7 and 1 to 8, and subsequently the gains of economies of scale did remain but were not to the extent observed in earlier years. In the category of semi-finished goods, the stocks, on the whole, moved in constant ratio with sales except for the mild economies of scale achieved in the 10th and subsequent years of study. The results of regression analysis according to model III for finished

Table 6
Regression of Inventories to Usage : $\log I = \log \alpha + \beta \log S$

Parameters for Analysis	1966-67 to 1977-78			1966-67 to 1974-75		
	Raw Materials & Spares	Work-in-process	Finished Goods	Raw Materials & Spares	Work-in-process	Finished Goods
1	2	3	4	5	6	7
No. of observations	12	12	12	9	9	9
β	0.6642	0.8839	1.0978	0.6127	1.0629	1.0811
standard error	0.0302	0.0569	0.0663	0.0445	0.0546	0.1150
t-Value	21.97	15.54	16.55	13.77	19.45	9.40
$\log \alpha$	1.73	-0.16	-1.48	1.93	-0.93	-1.42
standard error	4.63	7.97	5.88	5.60	4.56	4.10
t-Value	0.37	-0.02	-0.25	0.34	-0.20	-0.34
R ²	0.990	0.980	0.982	0.964	0.982	0.926
F-Variance ratio	482.86	241.47	273.94	189.75	378.27	88.30

goods inventories, gave β slightly more than one in all the six combinations of years. R² was more than 0.92 in the groups of years of 1 to 9, 1 to 10, 1 to 11, and 1 to 12. These indicate symptoms of diseconomies of scale. On application of further tests it was found that the differences between β value and one was not significantly different from zero at 95 percent confidence. So it will be safe to conclude that in finished goods inventories there had been no economies of scale and growth had been in constant ratio with cost of sales. This conclusion is further strengthened by the results of application of model II.

Impact on All Inventories : The results of regression of all inventories against cost of sales showed strong evidence of existence of economies of scale on the whole but not to the extent given by square-root relationship. The results of model II showed negative intercept and in most of the years $S > \frac{4a^2}{b^2}$, thus indicating that the exponent S value is more than 0.5. The model I gave positive intercept value significantly different from zero at 95 percent confidence level for 1 to 7, and 1 to 10, 1 to 11 and 1 to 12 years. The R² was more than 0.96. These facts give evidence of existence of economies of scale. It is further corroborated from the Fig. 5 which depicts relationship of cost of sales and average inventories over the period under study.

Among the six groups of years the application of model III gives minimum value of β coefficient at 0.784 for first seven years and maximum at 0.865 for decade. The multiple coefficient of correlation R² was very high being more than 0.97. These facts together with the results of application of models to the three components of inventories show that there had been economies of scale in the holding of stocks as a whole and, secondly, the economies of scale achieved through management of raw materials were large enough to offset the impact of increase in inventories of WIP and finished goods in constant ratio with value of produce.

Excess Holdings

The applications of models give evidence of some rationalisation in the management of inventories at aggregate level and of raw materials, but no such evidence could be gathered through application of models to WIP and finished goods inventories separately. The models also did not assist in assessing the excess inventories on any date. An approximate idea of the excess holding can be formed through analysis of growth rates on the assumption safety stocks and policy variables have not changed over the last eleven years. [The mechanics of working out excess holdings were explained in paras on pages 323-325 of the article published in *Productivity*, October-December, 1978].

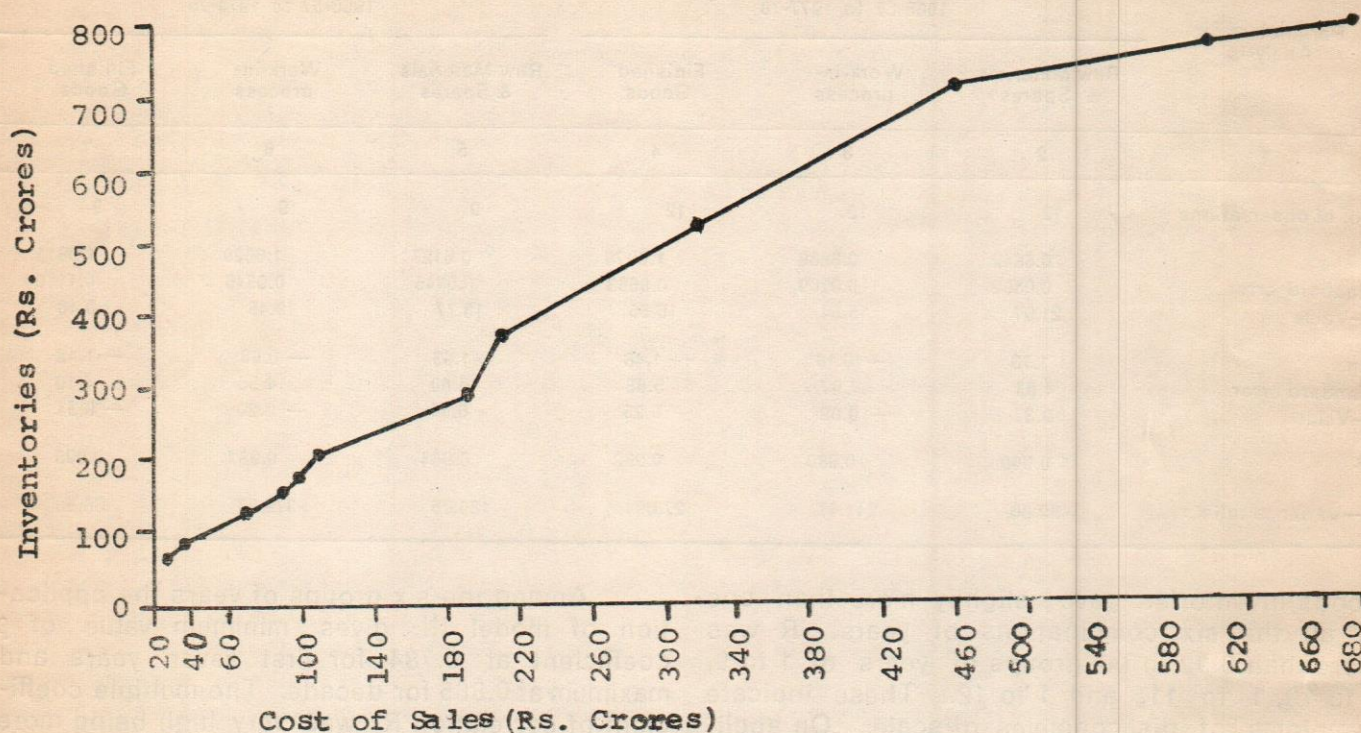


Fig. 5 All Inventories & Cost of Sales Relationship—Heavy Engineering

Analysis of Growth Rates : During the period under study the value of produce and total inventories respectively grew at 33.11 and 26.94 percent. If inventories had moved in the square-root relationship of the cost of sales the growth rate would have been $(\sqrt{1.3311}-1) \times 100$, i. e., 15.37 as against the actual rate of 26.94 percent. On the basis of the methodology referred to in the preceding para the excess stocks of all the inventories in the last year of the study as compared to those required under ideal conditions of square-root relationship are worked out at 55.78 percent i. e., Rs. 437.70 crores out of total holding of about Rs. 784.8 crores in 1977-78.

Experience has shown that a reduction of about 20-25 percent of stocks is within easy reach of management through modern inventory techniques. Even with this standard about Rs. 157-196 crores of capital can be released for active use apart from saving 10 to 15 percent of annual carrying cost of stocks.

Case Studies

In this group of 10 enterprises, four indepth studies have been made by the Committee on Inventory Control. These relate to (i) Heavy Engineering Corporation—Heavy Machine Building Plant (HMBP) Ranchi; (ii) Heavy Electricals India Ltd., Bhopal, (iii) Bharat Heavy Electricals Ltd. High Pressure Boiler Plant Unit, Tiruchirapali; and (iv) Bharat Heavy Plate and Vessels Ltd., Vishakapatnam. The Committee on Public Undertakings studied the management of inventories (as part of general working) in Mining and Allied Machinery Corporation Ltd. In addition, BPE in its Annual Reports for Central Government Enterprises reviews every year the position of inventories.

On the basis of certain norms laid down by the Committee on Inventory Control, these studies revealed existence of excess inventories between 28-50 percent of the total stocks in different

years of study in some cases. The main reasons of heavy accumulation of inventories in raw materials were : (i) the production was job based and that necessitated stocking of different types of items, (ii) procurement of material against work order had been usually made in one lot despite the fact that the execution of work was spread over 2 to 3 years, (iii) there was gap between planned and actual production and procurement of inventories was based on budgeted production in advance of about 2 years, and (iv) heavy dependence on imported materials which took generally 18 months. Some times purchases were made on barter basis in wider interest of country in some case on the advice of foreign collaborator and in both the cases these added to stock piling. The quantum of work-in-process was high due to the reason that these undertakings were manufacturing a wide variety of heavy equipments whose manufacturing cycles varied from a few weeks to a few years. The heavy inventories could also be the result of job works as these are clarified so that a large part of the contract value is received in initial years and thereafter urgency of early completion of work is reduced. In some cases the main reason of heavy stocks of finished goods was that customers who happened to be public undertakings wanted to withhold despatches for shortages of funds. Despite repeated disposal of surplus stocks as revealed by the Annual Reports of Bureau of Public Enterprises, these undertakings carried huge stocks of more than 2 years non-moving items. The Committee also identified the need to reduce the number of financial checks, prepare catalogue for variety reduction and standardisation and have scientific reporting system for enabling the top management to watch inventory performance. Emphasis was laid on the need to streamline the system of locating surpluses and arranging for their disposal.

Conclusions

The behaviour of different components of inventories in enterprises engaged in manufacture of heavy engineering equipment was analysed through trends in turnover rates, comparison of inventory investments over the period, regression analysis according to the three pre-conceived models, analysis of growth rates and findings of indepth case studies. The results obtained are consistent in respect of the following conclusions :

- (i) This group of enterprises carried stocks more than the cost of sales in all the years of the period under study.
- (ii) The level of holdings and inventory turnover ratios over the period show that during the last few years lesser volume of stocks supported larger sales as compared to stocks in initial years. The economies of scale made, were, however, not so high as those indicated by the square-root relationship. In the terminal year of the study this group of enterprises held nearly 56 percent of excess stocks as compared to the inventories required under ideal conditions. If the redundant stocks of initial year are also taken into account the excess inventories in the last year will be still higher.
- (iii) Indepth case studies conducted by the Committees on inventories control of BPE, show that inventories of all the categories are ill managed. Redundant holdings were discovered in a large number of items and at aggregate level the excess holdings vary between 28 to 50 percent as compared to certain norms fixed by the Committees.
- (iv) Experience has shown that a reduction of about 20 to 25 percent of stock is within easy reach of management through modern inventories techniques. With this standard about Rs. 157 to 196 crores of capital can be released for active use, apart from saving 10 to 15 percent of annual carrying cost of stocks.
- (v) Comparison of sales to inventories ratio in this group of enterprises with american and the large-sized private sector joint stock companies of India show that the performance of inventories in Central Government Public Sector enterprises in heavy engineering group needs to be significantly improved.
- (vi) The applications of models reveal different behaviour by the three components of inventories. The inventories of crude materials have, on the whole, shown economies of scale but

these are not equal to what is given by square-root relationship. The inventories of **WIP** and finished goods do not give any evidence of operation of the law of economies of scale.

- (vii) The **WIP** and finished goods inventories on the whole have moved in constant ratio with cost of sales except in case of **WIP** during the period of last three years when mild economies of scale are seen.
- (viii) The main reasons of excessive **WIP** stocks are long production cycles, and the practice of designing the term of payment in such a manner that a large part of contract value is received in initial years and thereafter urgency of early completion of work is reduced. The heavy stocks of finished goods in many cases were mainly due to the reason that customers who happened to be public

undertakings wanted to withhold dispatches for shortages of funds. The efforts for reduction in these two categories of inventories are to be made by the management of the organisation and through intervention of the Government.

- (ix) The evidence here supports the hypothesis, that the level of inventories is higher than what is required for efficient production. The evidence also shows that during the period under study, particularly in the last four years some rationalization in the inventory policies has taken place, but still there is scope of further reduction in stocks. Thus, wide publicity given during the last decade to the application of inventory models had positive impact on reduction in inventories level particularly those of raw material and spares.

Activity Sequence Analysis A Technique To Increase Production

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Activity Sequence Analysis and Method study cut down the distances traversed by 40% and released 18% crane hours for loading and unloading components of the production machines. They obviated the purchase of a new crane and enhanced production.

"The overhead cranes are my bottle-necks. The two that are there aren't sufficient at all. They are heavily occupied in transporting material. I am losing at least 15% of my machine hours waiting for a crane to be free for loading or unloading my machines" rattled off the foreman of our Heavy Machine Shop when asked by his manager to explain the shortfall in production.

"What solution do you suggest?" countered the manager.

"Give me one more crane and there will be no problems" replied the foreman.

"May be. But do you appreciate that it would cost a tidy Rs. 200 thousand in addition to an annual burden of Rs. 30,000 by way of new cranedrivers' salaries?" asked the manager.

"How about asking our industrial engineer to look into this?" suggested the foreman.

"That's a good idea" said the manager reaching for the telephone.

"I would like you to study the workload of our cranes. Would you mind seeing me?"

This was the background when the author undertook the study.

Objective

The aim of the study was to make the existing cranes adequately available to load and unload

components off the machines thereby avoiding the purchase of a new machine.

Activity Sequence Analysis

It was during this study that the technique of "Activity Sequence Analysis" was evolved and employed profitably together with the traditional method study.

The steps in using the Activity Sequence Analysis technique are :

1. List down components to be processed.
2. Denote by numbers the various activity centres i.e., locations of machines used for processing the components, locations of inspection benches, locations of material pools.
3. Against each component, mention the activity centre numbers in the sequence of occurrence of the activities. The numbers thus form a sort of numeric code for each component and represent

the process route of the component. So long as components have similar activity sequence code, Activity Sequence Analysis regards them as similar, irrespective of their physical features.

4. Compare the numeric codes of all components with one another.
5. Group together components having similar activity sequence codes.
6. Compute operational load (machine-hours) on the machines for the targeted output using operation timings for the components.
7. Based on the code grouping and machine-hour loads, rearrange the activity centres to minimise the distances traversed by components while ensuring balanced machine loads.

Use of ASA

(Table 1 lists for illustrative purpose

Table 1

Illustrative List of Components

Location and Sequence of Activities (Present)

Description	Door-Way	Pool	Grind	Mill	Drill	Inspection	Weld	Inspection
Component a	1	2	9	10	12	17	16	17
Component b	1	2	9	10	12	17	16	17
Component c		2	9	11	7	17	16	17
Component d	1	2	9	11	7	17	16	17
Component e	1	2	8	14	12	17	16	17
Component f	1	2	8	15	13	17	16	17
Component g	1	2	8	14	13	17	16	17
Component h	1	2	8	15	12	17	16	17

Notes : See Layout Drawing No. 1 in conjunction with Table 1

Activities 10, 11 are considered equivalent to each other.

Activities 12, 7, 13 are considered equivalent to each other

Activities 14, 15 are considered equivalent to each other.

only few of the forty components processed in the machine shop. Layout Drawing Fig. 1 shows the respective activity centres.

A close examination of the activity sequence codes and the movements of components on the shop floor revealed that

- a) the shop layout involved excessive movement between work zones X and Y,
- b) an additional crane would cause a physical interference with other cranes because the cranes ran on common overhead girders. Buying a new crane was, therefore, not at all advisable.

This meant that the inter zonal movement of the cranes had necessarily to be reduced. This was achieved by methods improvement (compare Layout Figs 1 and 2).

- a) Machines 8 and 7 were relocated (Fig 2). Since all production machines were heavy, only two were shifted to minimise the cost of shifting and interruption to production, though this admittedly was not the ideal solution.

This enabled one group of machines to process a certain 'family' of components having similar activity sequence codes (see Table 2) within one work zone X independent of another group of machines working in the other zone Y. Each zone could be serviced by a separate crane without interference.

- b) Certain long components that could not be transported by a forklift through the narrow doorway B (Fig. 1) used to be brought through the wider doorway A, unloaded at location 1 and transported by one of the overhead cranes to location 2. This put an undue load on the cranes. It was avoided by widening the doorway B (Fig.2). Long components could then be unloaded directly at location 2, thus eliminating the corresponding load of transportation from the cranes.
- c) Inspection and welding activities were decentralised. (Fig. 2). An electrical point was provided near each inspection bench to eliminate the to and fro move-

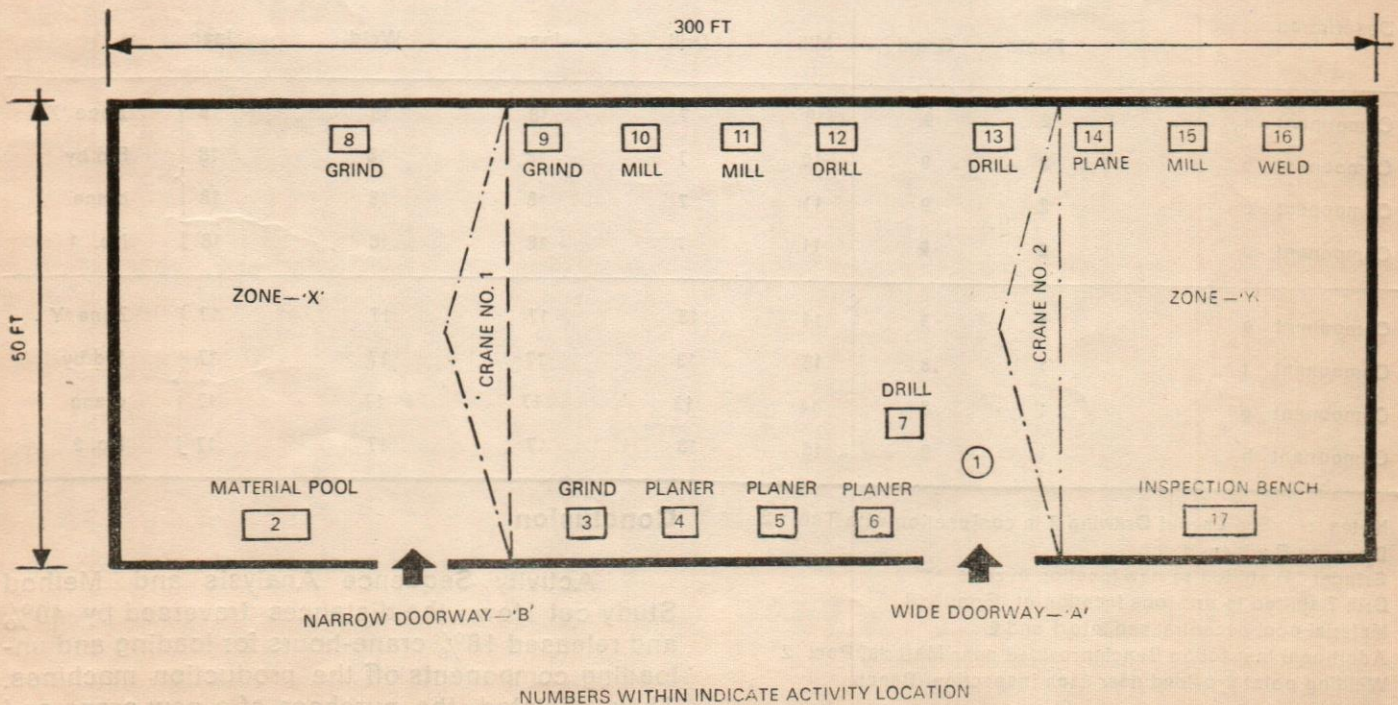
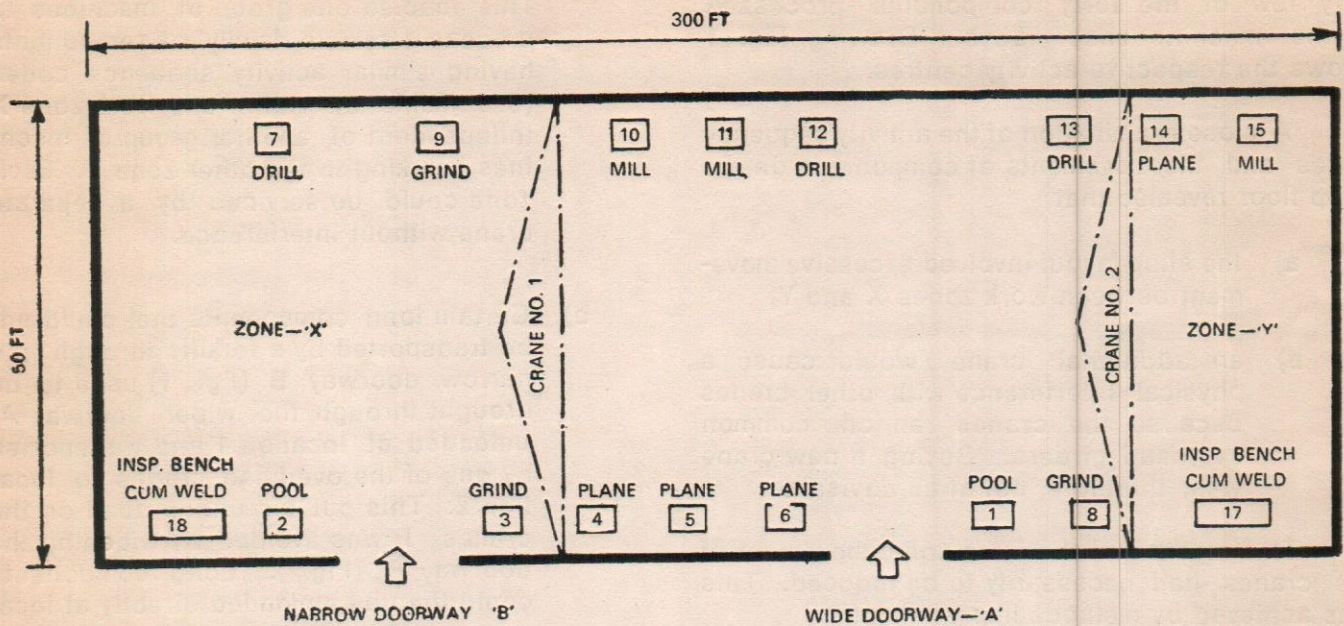


Fig. 1 Schematic Layout Drawing No. 1 (Not to Scale)



NUMBERS WITHIN INDICATE ACTIVITY LOCATION

Fig. 2 Schematic Layout Drawing No. 2 (Not to Scale)

Table 2
Relisted Components

Location and Sequence of Activities (Proposed)

Description	Pool	Grind	Mill	Drill	Insp.	Weld	Insp.	
Component a	2	9	10	7	18	18	18	Zone 'X' fed by crane No. 1
Component b	2	9	10	7	18	18	18	
Component c	2	9	11	7	18	18	18	
Component d	2	9	11	7	18	18	18	
Component e	1	8	14	13	17	17	17	Zone 'Y' fed by crane No. 2
Component f	1	8	15	13	17	17	17	
Component g	1	8	14	13	17	17	17	
Component h	1	8	15	13	17	17	17	

Notes : See Layout Drawing 2 in conjunction with Table 2
Doorway B widened
Grinder B shifted to new location in zone 'Y'
Drill 7 shifted to previous location of Grinder 8
Material pool decentralised into 1 and 2
Additional Inspection Bench provided near Material Pool 2
Welding point provided near each Inspection Bench

ments of cranes between inspection and welding activity centres.

Conclusion

Activity Sequence Analysis and Method Study cut down the distances traversed by 40% and released 18% crane-hours for loading and unloading components off the production machines. They obviated the purchase of a new crane and enhanced the production. Both the manager and the foreman were a happier lot. □

Technological Forecasting In India

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Technological Forecasting (TF) was evolved as a planning tool in the sixties and seventies in the defence, Long Range and R&D planning sectors. In India this tool has not become a widely prevalent technique because of many a misconception. It is, therefore, necessary to clarify the misconception and identify its utility in various enterprises and how best TF can be applied in Indian conditions.

Technological forecasting is not the prediction of the dreams of the 21st century, but is a useful concept to consider possible, probable & feasible product/process options of the future. These are objective inputs to reduce the long-term risks involved in long-range decisions. The major success of TF lies in generating newer alternatives from which selection can be made based on rational criteria.

PREVALENT MISCONCEPTIONS

1. TF is useful only to large Companies

Many practicing managers consider TF as a crystal-ball gazing technique useful to large corporations. Whereas, it is an area which uses a number of techniques for creating new ideas, solving problems, design optimisation, value engineering and for identifying newer alternatives, Design Engineers, Marketing Managers, Materials Managers, Purchase Managers, etc., have also benefited from TF techniques. It is often said that Technology Forecasting is an attempt to predict utopian technologies that are likely to be developed in the 21st century and beyond. This is not true because technology is used in general, encompassing product development, process development, improvements in design, packaging improvements, research methods, and cost reduction and it is in these areas that TF can be used for a wide variety of purposes at different levels, from the board room to the design engineers room effectively.

2. TF techniques are all sophisticated and small companies cannot afford the use of these.

TF techniques are objective methods which are taught and learnt easily, amenable to use effectively at all levels, subject to review and verifiable by the superiors, TF techniques can also be practiced easily, provided there is adequate data to proceed. Engineers, economists and statisticians can pick up TF techniques, without much difficulty.

3. Predicting technology is not reliable, since breakthroughs cannot be anticipated.

TF is only a way to reduce uncertainty and is not a guarantee against risk. Anticipating technological threats, product competitions, obsolescence and performance risk and the like can help in improving decision-making under competitive environments. TF is an early warning system or a technological environment scanning radar. Japanese have a well developed technological intelligence system, which is capable of providing data on new products, processes, patents, developments and licences. Developing a good technological base is a pre-requisite for development and a technology intelligence system is a pre-requisite for a technological plan. For a fast moving fighter aircraft, forward looking, side looking radars are a must and for a fast moving company an environmental scanning system is a must and TF is the basis. In other words, one reduces the risks by using these techniques if not altogether eliminate them.

4. TF is not a cent percent successful method.

Information for decision making cannot be evaluated easily for success and failure. TF is an input for corporate decision making process and is not a substitute for a decision. The major success of TF lies in generating newer alternatives from which selection can be made based on rational criteria. Any forecast can be described as a vector of two properties, the precision and reliability. TF mainly helps in increasing the reliability or the credibility characteristics of forecasts as opposed to precision which deals mainly with the pointedness of forecasts. For long term forecasts one needs reliability more than precision whereas short term forecasts rely more on precision. Computerisation can only increase the

precision of forecasting but TF helps in improving the reliability component. In rapidly changing environments no technique can be 100 percent successful.

5. TF is useful only to technology oriented organisations and not to service organisations like Electricity Boards, Railways, Road Transport Corporations, Posts and Telegraphs etc.

This is yet another misconception. Railways, Post and Telegraphs, Electricity Boards etc., can achieve cost reduction using TF techniques. Further, rate of obsolescence can be reduced and modernisation can be accelerated. Exposing senior managers of service organisations involved in planning to TF techniques, can help them to mitigate their fears about change. Changes cannot be introduced unless the system managers understand the need for change. In fact, TF and long range planning are needed more in service organisations. Bureaucracy has an inherent property of resisting exogenous changes and only endogenous improvements would be acceptable.

6. TF is a one shot technique.

Some organisations consider that once they do TF it is enough for years to come. TF must be used as a continuous input into the corporate planning exercise. Every year the forecasts should be reviewed and updated. In short, TF exercises should be done at regular intervals for preparing the corporate plans. In every long range planning group, there must at least be one person who regularly looks ahead to identify, evaluate and assess new product or new process information.

7. Companies with foreign collaborations cannot utilise TF at all.

TF has been wrongly perceived as a technique for predicting fantasy technologies of no immediate consequence to the organisation. TF is a package of techniques and can be of use in predicting new product demand, technological substitution, market penetration, product obsolescence, etc. In fact, TF has been defined as a method of predicting future performance characteristics of useful machines, procedures and systems. Fantasy predictions are precluded from the pur-

view of TF and only down to earth practical methods of immediate use to practising managers are included. Companies with foreign collaborations, can also use TF in market share analysis, cost reduction, design improvements and diversification analysis. In fact, TF techniques can be of help in increasing the rates of import substitution.

8. TF can be done independently without linking with a corporate Plan.

This is the most dangerous misconception of all. Technological forecasting is not a futuristic exercise in futurity. On the contrary, it is an input into managerial information for long range planning. If TF is to be useful to an organisation the first prerequisite is a long range plan. TF is used iteratively to derive long range policy objectives, long range product plans, long range production plans, diversification plan, long term market plans and R&D plan. Unless there is a good corporate planning system, there is no use of having technological forecasts. The long range forecasts and plans are linked through strategic and operational plans. A useful and meaningful long range plan cannot be derived without a good TF input. Technological forecasting is not the prediction of the dreams of the 21st century, but is a useful concept to consider possible, probable and feasible product/process options of the future. These are objective inputs to reduce the long term risks involved in our long range decisions.

It can, thus, be observed that TF is a useful concept for planning. However, before considering the applications of TF, it would be useful to answer questions such as what makes it necessary to have this new technique, is it not possible to manage with the older methods, etc. In the recent years, technology is becoming a major factor to be considered in planning process. This aspect is considered in detail in the following paragraphs.

IS TECHNOLOGY A MAJOR FACTOR ?

Technology was not considered a major factor by multinational companies (for their Indian operations), companies with foreign collaborations, and small scale companies (their operations were mainly short term oriented), of course, with difference in bias towards various objectives.

The Indian companies, especially the private ones, did not attach much importance to corporate technology problems. The problem started looming large as soon as giants started competing with multinationals or transnationals. The main eye opener was the factor that some Indian companies with their own technology could grow comparably well with others even though they were small in size. This has been mainly due to the fact that technology has become a power-parameter.

1. Technology capabilities grow exponentially.

The technological capabilities or system characteristics grew exponentially with time; for example, our energy requirement, generation capabilities, electric motor production, fertiliser production, air transport capacity, etc. Exponential nature of growth has made it necessary to look into the complementary areas like marketing, production, material and manpower requirements, process techniques, finance, investment decisions and competitions.

2. Linearity of human perception.

Human planning is optimistic in the short run and pessimistic in the long run, This shortsightedness arises because systems demand grows exponential whereas human perception which is linear lags behind systems demand leaving a big performance gap in the long run. Many examples of this can be sighted in the Indian scene, e.g. power shortage, transportation over-crowding in cities, shortages, etc.

3. Corporate competition.

Between business organisations there is a severe competition, and to remain a leader in one's product area, one has to look farther than what one's competitor perceives. On the export front also, competition exists among various countries. If India has to remain a leader in leather exports, it has to look ahead anticipating technology changes in leather industry as well as in competing industries.

4. Shift to large scale systems.

The present tendency is to go in for large scale production systems. This implies commit-

ment of more resources from which one cannot go back easily. Damages in larger systems will be costlier. For instance, if one is going in 500 MW generating systems, the reliability of such a system should be much more than the conventional small sets; otherwise power shortages can be of very high magnitude.

5. Obsolescence means collapse.

The innovations that are taking place in each area are increasing rapidly. Firstly, the number of research personnel has increased manifold. Secondly, the innovative skill of each person has improved because of (a) quicker information dissemination techniques all over the world, and (b) new computation tools or better precision instruments. The synergistic combination of these makes way for newer, better and cheaper products. This effect is perceptible in marketing efforts of companies directed towards market segmentation. Introduction of new technology means complete collapse in some cases of investments. Cases of investment decisions without any concern for technology have been on the increase. The cost of stainless steel produced in the ASP, Durgapur, based on an old technology without looking ahead had made it a losing venture. Similar short horizon decision making has been made in a large number of organisations in India. Old abrasive units have become obsolete because silicon carbide technology has been initiated.

Another glaring example of this in India is seen in the textile industry. A number of textile units have become sick because of non-availability of funds for modernisation, i. e., mainly due to obsolescence. Even large units established earlier could not compete successfully with the modern units. This is because technology was never considered a major parameter by these units earlier. If such a state of affairs is not to repeat in other sectors, one has to consider possibilities of changes in technology in the corporate sector.

6. Emphasis on appropriate systems.

Today, there is a bias towards decentralised production or small scale production. Some sectors have been reserved only for small scale production. This makes it necessary to look into the economics of scale of various technologies. Further, this also forces every corporate planner

to anticipate change in technologies which may shift economics of scale. Appropriateness is a very subjective area and planners have to look ahead.

Transportation and communication systems are mutually substitutive and this is of significance to a country like India. Transportation is 100 times more energy intensive than communication and one should look systematically into these kinds of appropriate options.

7. Resources are becoming scarcer.

It is very essential to look into resource utilisation because, the world over, resources are becoming scarce. Processes likely to consume less resources are always more profitable. Resource productivity, energy efficiency, etc., become factors in corporate choices. Changes in casting technology, manufacture of non-machining products, etc., have been mainly technology changes initiated by process efficiency. Plastics are preferred to metals because the energy costs of recycling by remelting favour the former.

8. Multiplicity of generation of Technologies.

Under conditions of fast technological changes, in many organisations there are situations where multiple technological generations are maintained. For example in the Indian Railways there are routes in which steam, diesel and electric traction are operating side by side. Similar situation exists in the Indian Airlines and their fleet consists of different generation planes like HS-748, DC-3, Caravelle, Fokker Friendship, Boeing 737, Airbus-300 etc. Another example is the telephone system where different levels of equipments exist involving three generations (like vacuum tube equipments, transistor equipments and IC equipments). Maintaining this type of different generations alongside escalates the operating costs, inventory costs, labour costs and decreases the system efficiency. Detailed long range exercises are necessary for any organisation to have an effective system. Unless long range corporate planning involving technology options is initiated, large scale systems will be operating far below their optimum efficiency.

9. Environment is dynamic.

The governments and their policies change very often in the states as well as at the centre.

The policy making process in India is so individualistic that industrial policy, licensing policy, pricing policy, raw materials policy, etc., change very frequently, mainly in opposite directions. This has made it necessary for the planners to go in for technology systems which are more adaptable; for example, the fuel policy in India changes often and dual firing burners capable of using oil or coal are suited than one technology choice option. This, obviously, may clash with resource efficiency and the corporate planner has to be more sensitive to technology.

These are the necessary and sufficient conditions why technology choice interacts with corporate strategy so strongly. This has made it necessary to introduce technology planning into the corporate strategy.

APPLICATIONS OF TECHNOLOGY FORECASTING

Corporate strategy incorporating technological forecasting has been referred to as technological planning, i. e., considering technology as a decision variable. This approach has many advantages compared to purely economic or financial approaches assuming technologies to be static.

1. To initiate long range planning.

To initiate long range planning, we need better perception or field of vision, and technological forecasting can clarify our field of perception. Conceptually, long range planning involves bigger changes involving technology, products, attitudes, social systems, resource consumption patterns, government policies, etc. Most of the Indian corporate planning exercises have been aimed at vertical diversification than horizontal diversification or functional diversification. For example, an electronic data processing unit is planning its diversification. Functional diversification involving data processing, like library documentation, computerised health systems, educational technology, soil diagnosis systems, etc., may be more broad-based rather than moving in the data processing part alone.

2. To avoid surprises.

To be caught unawares by the changes can be avoided by anticipating changes in the

environment and specific technology areas. Conventional polyethylene manufacturers and metallic component manufacturers have to anticipate the effect of large scale production of polypropylene which is superior. TV industry has to be carefully watching the CD technology since introduction of TV based on LCD will make TV based on cathode tubes obsolete.

3. To leap across generations.

One of India's major problems is the existence of a technological gap in areas such as computers, generators, fertiliser plants, etc. Technology Forecasting will help in the identification of newer systems so that skipping of one intermediate generation is possible. For example, consider the aluminium industry; while improving the present system India should develop the third generation process (non-electrolytic, direct reduction process). These forward leapings will reduce technology gaps.

4. To extend the planning horizon.

The corporate planning horizon in our country is about five years and any efforts to have a longer range of plan will have to use technological planning. This is done by anticipating crises or threats and converting them into opportunities. For example, suppose there is a likelihood of a material crisis in the near future. In such a situation, detailed plan has to be made in the area of material recycling, material conservation and waste reduction. Such deliberate exercises will have to be done so that planning horizon is extended.

5. To provide non-obsolete training.

One of the major problems of our country is training the professionals. Because of the rapid changes in the technologies and support systems training becomes obsolete quickly. TF tries to correct this lacuna by assisting to identify future technologies and support systems. Engineers, technologists and managers who are likely to be the top level decision-makers in the year 2000 may be the people who are undergoing learning in the current systems. Introduction of newer technologies will help in providing non-obsolete training which is conceptually difficult to provide. For example, instructions in solar technology,

computerised information dissemination, etc., have to be provided today in the current training.

6. To be a leader.

One who does not look ahead will find himself far behind sooner or later. Companies all round the world involved in systematic long range planning continue to be the leaders as compared to the bigger and conservative systems or even multinational companies. The Indian company which developed the production of rayon grade pulp from bamboo and Eucalyptus is still the leader in its sector. It is transferring technology to countries like Malaysia. In India itself, the process has been improved to utilise other varieties of wood since bamboo is in short supply because of its use in paper industry. In another case, one Indian company has foreign collaboration and its foreign collaborators abroad were absorbed by another company in England. This company which absorbed the foreign collaborator was the competitor of the Indian company. The Indian company managed to go alone because of its looking ahead in technology.

In the area of fertilisers, algae additives are found to increase the fertiliser effectiveness. There is likely to be a threat to the fertiliser industry since nitrogen is the basic input in cereal crops. The strategy should be to develop algae, P mixtures and nitrogen fixing bacteria packages. Addition of nitrogen fixing bacteria can impart nitrogen fixing capabilities in certain cereal strains. So, to be a leader, one has to look ahead in technology.

7. To be an eternal exporter.

Exporting to markets abroad requires extending the field of vision in two dimensions, i.e., offensive planning as well as defensive planning. Anticipating the performance of competitors' products will help in providing entirely different range of products, i.e., offensive planning. Defensive planning involves improving one's own products so that they are better than that provided by the competitor. To remain as an exporter, it thus requires (a) development of entirely new products, mainly functional diversification or horizontal expansion, and (b) development of improved products in the vertical path, i.e., in the same product line. The markets abroad may change faster, hence resilience is another character-

istic which is needed. Resilience may mean easy change of production pattern, product pattern, and distribution pattern in the wake of fluctuations in export market. HMT and BHEL are major Indian organisations which undertook detailed technological forecasting studies so as to remain as pace setters. This awareness among the corporations proves the significance of technology inputs.

APPLICATIONS FOR CORPORATE PLANNING

Technological forecasting can be used in corporate planning at the policy, strategy and operational levels. The various steps involved and the examples are given in Table 1. Technological forecasting will be of use in all the three levels. TF can be used for the following specific actions :

- * Identifying potential markets/new products
- * Identifying new opportunities/aiding investment decisions
- * Identifying threats to existing products
- * Estimating markets
- * Identifying feasible projects for new investment/project selection
- * Identifying newer R & D
- * Identifying areas for diversification and expansion.

In the following section, a discussion is provided on some specific cases involving applications of TF to corporate planning.

SPECIFIC CASES

Cotton Textile Industry

Cotton is being substituted by man made fibres but still man made fibre/cotton blends are preferred by consumers, mainly because of some specific characteristics of cotton. The only disadvantage of cotton being its poor crease resistance, cotton industry can still remain the leader, if, it can impart crease resistance to cotton fibres. Technological forecasting exercises indicate that the various possible solutions as (a) cotton fibre impregnation; (b) cotton fibres/other

Table 1

Corporate Planning and T. F.

Policy Planning	Strategic Planning	Operational Planning
1. Select the objectives	1. Select the strategy	1. Select the tactics
2. Identify alternatives	2. Visualize the corporate boundaries	2. Identify the sub-systems
3. Determine goal feasibility	3. Evaluate the alternatives	3. Integrate with the corporate and R&D plan
4. Anticipate threats	4. Find the road blocks	4. Initiate market tests and initiate marketing activities
	5. Plan the system	
Examples		
Better automobiles	Development of a newer engine - electric car	Improvement of battery to change its charge discharge cycle
Diversification of an electronic industry	Horizontal and concentric diversification into application systems	Develop microprocessor based systems
Cement industry expansion	Production process improvements Diversification into consumer items	Newer catalytic processes Production of modular house units, bathrooms etc.
Fertilizer Industry	Improved NPK mixtures Algae + P + K mixtures	Development of Algae application

fibre combinations instead of yarn; (c) cotton fibre reinforced plastics; (d) cotton fibre improvement by genetic changes, and (e) cotton fibre improvement by physical/chemical/irradiation treatment or fibre implantation-exist and detailed assessment of various options has to be undertaken.

While looking at the potential threats to cotton textile technology, monitoring exercises show that some other countries are trying to manufacture non-woven cotton fabrics, i.e., directly from cotton fibres. Many other countries are trying to enter into textile markets and they plan to make Indian textile obsolete. Japan owes its technological skill to the special emphasis on production process technologies rather than product related technologies. This has given

them an edge over nations which stress innovations in product related technologies. It is time that India also looks ahead for technology from a longer perspective. In case non-woven cotton textiles are being commercially manufactured abroad there will be a cost shift in their favour and our textile industry will become obsolete. This is, thus, an area where offensive planning is highly imperative.

Electronics

IBM has withdrawn from India. This gives a very ideal opportunity for the Indian Electronics Industry to diversify. Instead of vertical diversification some of those units can go in for horizontal diversification. Proper long range planning backed up by efficient market strategy based on

technological forecasting may be essential to maintain the market control. The possible alternatives are :

- * To make specific application systems (documentation systems, traffic control systems, health care systems, process control systems, education systems, automated transportation systems, etc.) A long term demand assessment is very desirable.
- * To go in for collaboration with specific application organisations (ISRO, NRSA, IIM, GSI, ICAR, HMT, Fertilizer Corporation of India, HSL, Road Transport Undertakings, Indian Airlines, IIT, etc.) to develop micro-processor based application systems.
- * To have better systems for computation like multi-programming, multi-language systems.
- * To develop software packages in advance for clients.
- * To integrate functions into chips and go in for micro miniaturization and also to go in for newer electronic instruments for energy meters, auto-fare meters, etc.
- * To consider changes in printing technology so that newer printing equipments can be designed and manufactured, like laser printing inkjet printing, thermal printing etc.
- * To make functional systems specifically for forecasting, inventory control, job allocation, project management, design of structures, analysis of structures, piping design, pressure vessel design, turbine design, market distribution, etc. and
- * To initiate a central scientific and technological information dissemination centre on a commercial basis with a view to export orientation. Effort can be made to capture African and South Asian markets.

Detailed technological forecasting and long range planning studies are necessary for this.

Leather Industry

Leather industry in India is facing severe competition from plastics and allied products. Except for shoes and other things, leather is not an exclusive material. If leather industry has to survive the onslaught from plastics sector it has to initiate strategies for cost reduction. An analysis of cost structure in leather industry will reveal that labour charges are the major component of a leather industry. The reduction in labour charges can be made possible in all areas and most critical area being stitching. If there can be an alternative process for leather joining instead of the time consuming sewing, leather industry may fare better. Similarly, leather will deteriorate in the presence of moisture. A coating which can make leather water-proof can revolutionise the demand and competition pattern. Only such functional improvements such as these will help the leather industry to survive in the long run but not the ones based purely on fashions or shapes.

Cement and Asbestos Industry

This group of industries in India has not gone for any horizontal diversification. In the long run, this group of industries has to go in for polymer reinforced concrete products ferrocement products and prefabricated housing products. Though technology is available, design procedures with polymer reinforced products have not been standardised. Similarly, construction of modular units for houses (like bath etc.) is another venture where technology is available and product is desirable. Apart from these product innovations, a detailed look into the production technology will help in cost reduction. Energy being a major input to cement and asbestos industry, energy saving innovations, design improvements, development of low temperature cement production processes, development of calcination catalysis etc., may be considered as possible options.

Railways

Though Indian Railway has prepared a corporate plan, it has not been made after detailed and dynamic computer simulation exercises. Changes in fuel prices, other competitive transportation modes, technologies, costs of transportation options, maintenance options,

replacement options, operating options, investment modes, industrial demand patterns, interstate freight movements etc., can change rail traffic considerably and only simulation models will be of help in such situations. Technology forecasting based long range planning of operations will certainly be more effective for a sector like Railways. This is more so because many technology breakthroughs are occurring in the area of transportation.

Service Sector

Services has been another major sector in India where an integrated corporate planning is virtually absent. Activities like banking, insurance, water supplies, electricity generation and distribution, posts and telegraphs, general administration, public distribution and civil supplies, urban administration, etc., are continuously on the increase. No systematic policy analysis and corporate planning efforts have been undertaken in this area. Even managerial inputs into these areas have been marginal. Proper integration of these services, planned design of the proper systems, training professionals for these services and allocating finances

for these sectors require detailed long range forecasting exercises.

Watch Industry

Recently, a number of manufacturers have migrated to this product line, the major one being HMT. Some of these organisations have gone into this area without perspective planning. Electronic watches have entered the market in India mainly through foreign collaborators. Under these conditions, it would be appropriate if companies like HMT, could analyse the long term changes in horology which has been subjected to vast changes in a short time and the innovations in electronics industry are being horizontally transferred to this area. Never technologies and breakthroughs in horological area can make vast amounts of public investments non-productive. Even watch manufacturers should diversify into other measuring technique-areas with their precision. Japan's entering into many production areas is mainly due to its intense development work in production process related technologies or in functional technologies rather than in products.

Table 2

TF and its Applications

Industry Level	Technology fast changing (electronics)	A stable Technology industry (Steel)	A Service organisation (Defence, P&T)	Intense competition (Drugs)
Top Management Level	An early warning system. Long term R&D Plan.	Identify long term threats defensive plans.	Integrate long term options and short term plans.	Long term product options. Long range corporate plans.
Middle Management Level	New product options Offensive plans.	New process alternatives. Long term market plans.	Modernization planning obsolescence avoidance.	Corporate contingency plans. New Product threats.
Junior Management Level	Cost reduction value Engineering. Generation of new ideas. Product development	Short term product changes. Generation of new application areas. Process R&D project initiation.	Reducing obsolescence. Generating new procedure or process alternatives.	New drug formulations. Toxicological modifications.

Steel Industry

It is time that Steel Industry planners of India looked into the total industry sector. Though the industry is expanding in size the companies have not diversified into other functional sectors. Steel Industry has witnessed minimum structural changes. This is perceptible from the increasing iron ore exports from India. Though a number of small scale sector steel plants have mushroomed, an integrated look is absent. Some major long-range options for the survival of the industry are :

- * Diversifying the large HSL units—horizontal
- * Initiating newer product units
- * Increasing R&D in production process related technologies
- * Going into construction related areas and prefab products
- * Decreasing raw material exports to finished product export
- * Development of hydrogen based iron ore reduction etc.

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Executive Leadership

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Be an Example to your men. An executive can be a power for good or a power for evil.....He must endeavour to make light of his troubles, belittle his trials & help build up an ESPIRIT DE CORPS within his organization whose value in time of stress is immense.

From the standpoint of society, the world may be divided into leaders and followers. Every profession has its leaders. It is therefore difficult, if not impossible, to separate the element of leadership and the element of personal gain or advantage to the individual, without which any leadership would lose its value.

It is in military system only, that men sacrifice their lives for a call, since they are willing to suffer and die for the right or the prevention of a wrong. In this form it could be stated that we realize leadership in its most exalted sense.

In the military system men have to follow because the driving power behind them is not enthusiasm but discipline. They go with doubt and trembling that prompts the unspoken question, "What will he do next?" Such men obey the letter of their orders but no more of devotion to their commander, of exalted enthusiasm which scorns personal risk, of self-sacrifice to ensure personal safety. Their legs carry them forward because their brain and their training tells them they must go. Their spirit does not go with them and so they are not creative. They are only doers. It therefore cannot become the basic operative in other systems including the industrial leadership.

Great results are not achieved by cold, passive, unresponsive actions. They don't go very far and they stop as soon as they can. Leadership not only demands but receives the willing, unhesitating, unfaltering obedience and loyalty of other men; and a devotion that will cause them when the time comes to follow.

A question can still be asked unhesitatingly : of what, then, does leadership consist of ? What must we do to become a leader ? What are the attributes of leadership, and how can we cultivate them?"

Leadership consists of a number of qualities. Among these most important may be listed Self-Confidence, Moral Ascendency, Self-Sacrifice, Paternalism, Fairness, Initiative, Decision, Dignity and Courage.

Self-Confidence results, first from exact knowledge; secondly the ability to impart that knowledge; and thirdly the feeling of superiority over others that naturally follows. To lead, one must know that one can bluff his men only for some time, and not for all the time. Men will not have confidence in the superior unless he knows his business, and he must know it from the ground up.

There is no substitute for accurate knowledge; one should be so well informed that men will hunt him up to ask questions; even his colleague may say to one another, "Ask him he knows".

Not only should an executive know thoroughly the duties of his own job, but he should study those of the two grades next above him. From this a two-fold benefit may accrue. He prepares himself for duties which may fall to his lot; he further gains broader view point which enables him to appreciate the necessity for the issuance of orders and join more intelligently in their execution.

Another element in gaining moral ascendancy lies in the possession of enough physical vitality and endurance to withstand the hardships to which a person in leadership position and his men are subjected, and it is the dauntless spirit that enables them not only to accept the hardships cheerfully but to minimize their magnitude.

One must endeavour to make light of his troubles, belittle his trials and help vitally to build up within his organisation an esprit whose value in time of stress cannot be measured.

Moral Force is the third element in gaining moral ascendancy. To exert moral force one must

live clear; one must have sufficient brain power to see the right and the will to do 'right'.

Be an example to your men.

An executive can be a power for good or a power for evil. Don't preach to them—things that will be worse than useless. Live the kind of life you would have them lead, and you will be surprised to see the numbers that will follow you.

When I say that paternalism is essential to leadership I use the term in its broader sense. I do not refer to that form of paternalism which robs men of initiative, self-reliance and self-respect. I refer to the paternalism that manifests itself in a watchful manner for the comfort and welfare of those working with you.

And by doing all these things you are breathing life into what would be otherwise a mere machine. You are creating a soul in your organization that will make the mass respond to you as though it were one man. And that is esprit.

Study your men as carefully as a surgeon studies a difficult case. And when you are sure of your diagnosis apply the remedy. And remember that you apply the remedy to effect a cure, not merely to see the victim squirm. It may be necessary to cut deep, but when you are satisfied as to your diagnosis don't be diverted from your purpose by any false sympathy for the patient.

Consideration, courtesy and respect towards man are not incompatible with discipline. They are part of our discipline. Without initiative and decision no man can expect to lead.

Any responsible order in an emergency is better than no order. The situation is there. Note it. It is better to do something and do the wrong thing than to hesitate, hunt around for the right to do and wind up by doing nothing at all. And, having decided on a line of action, stick to it. Don't vacillate. Men have no confidence in a person who doesn't know his own mind. Every time you change your orders without obvious reason you weaken your authority and impair the confidence of your men. Have the moral courage to stand by your order and see it through.

Moral courage further demands that you assume the responsibility for your own acts. If your subordinates have loyally carried out your orders and the movement you directed is a failure the failure is yours not theirs. Yours

would have been the honour had it been successful. Take the blame if it results in disaster. Don't try to shift it to a subordinate and make him the scape-goat. That is a cowardly act. Furthermore you will need moral courage to determine the fate of those under you. You will frequently be called upon for recommendations for promotion of officers and you have to be candid and honest.

It is taken for granted that you have physical courage. I must emphasize how necessary that is. Courage is more than bravery. Bravery is fearlessness—the absence of fear.

And, lastly, if you aspire to leadership, I would urge you to study men.

Get under their skins and find out what is inside. Some men are quite different from what

they appear to be on the surface. Determine the working of their mind.

In the aviation industry with the introduction of jet mechanism as against propelling system, technology has brought about astounding achievements both in terms of performance and speed. The Jet mechanism is based on 'Trust' and this technology has brought about fantastic achievements. The same mechanism when applied to human systems and leadership qualities can bring about better results. Finally I would like to summarise the leadership qualities can be briefly defined in one word IKADRA which calls for six instrumentalities—Imagination, Knowledge, Ability, Determination, Resourcefulness and Authority.

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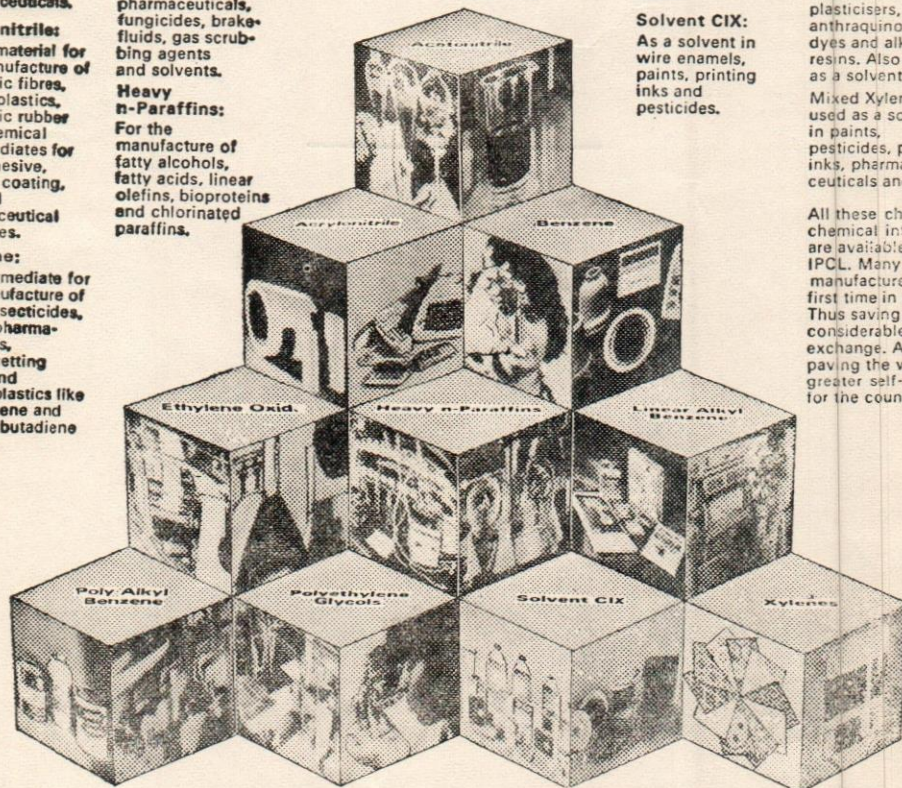
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EXECUTIVE READINGS

Management by Objectives : A Japanese Experience

By Takanobu Hongo

Published by Asian Productivity
Organization, Tokyo

Reviewed by Dr. M. Yoga
National Productivity Council,
New Delhi

It is stated that the book is based on the practical application of the concept of management by objectives for over ten years in Toshiba Electric Company. MBO being the creation of Western Industrial culture needed to be changed to make it appropriate and effective in a Japanese setting. Essentially, these changes meant greater flexibility of the system and comprehensive coverage of activities. Special features of the work environment which demanded these changes have been identified. A presentation describing how a foreign concept/system was integrated into an Eastern work culture, is of great interest to managers in India. Though the book is based on long experience in one company, the style of writing is simple without too many technical details. This publication

is meant for practising managers rather than specialist staff.

MBO is viewed in relation to other systems such as OD and QC programmes as well as profit control and personnel evaluation systems. The basic conclusion highlighted is that MBO represents a total system which integrates all others such as the ones mentioned above, as sub-systems. Such a conceptual clarification and marking of jurisdiction of different systems goes a long way in making MBO more effective. Further four structures—structure of organisation, structure of work, structure of manpower development and structure of communication, constitute the governing factors for any MBO system. All these need to be critically examined to identify aspects which require to be modified to facilitate MBO process. Some of the basic preparations for MBO are identified. These are - conversion of flock organisation to team organization, small group formation through change in work process, reducing levels of

organization and reshaping one dimensional relationship into two dimensional relationships.

A couple of chapters focus on designing an MBO system that takes into consideration special features of work environment such as the composition of work groups, nature of objectives of various groups, criteria for evaluation of progress achieved, whether the implementation unit is an individual or a group and the performance schedule. Such a dovetailing exercise leads to easy acceptance of the system and its effective implementation. It would have been very useful if more detailed information had been incorporated, as to how these modifications were identified and about the process of introducing MBO system to various groups in the organization.

Detailed material is provided regarding setting up of appropriate goals and the procedures for implementing MBO are stated in sequence. However, there is not enough information regarding the prob-

lems encountered, how these problems were overcome and whether some features of the MBO system had to be toned down in order to overcome resistance. More detailed description and discussion, particularly regarding the initial problems during implementation would have been of great interest and value to managers.

A document which is of interest in the context of monitoring results and evaluation is 'goal administration card'. It is a simple card, on the basis of which monitoring is done and the people concerned are kept in touch with the progress achieved. Chapter seven details the steps involved for effective implementation of the three stages of the MBO process goal setting, goal accomplishment and performance evaluation.

The style of writing is simple and clear. The presentation of the tables could be better. Addition of suitable bibliography would be a welcome feature. Reference material at the end of the book is useful. On the whole, a well written book and a valuable addition to management literature. □

Decision Styles and Organisational Effectiveness

By B. L. Maheswari

Vikas Publishing Home (Pvt) Ltd.
New Delhi

Reviewed by B. L. Lalvani
New Delhi.

The author has undertaken a sample study of Indian

business with a view to finding out the relationship between decision styles and organisational effectiveness. The sample represents a diversity of business organisations in India varying in size, strategies, technology, ownership structures and in terms of historical traditions, experiences and specific external environment. The sample embraces a wide spectrum of large scale business organisations in both the private and public sectors.

It is found that organisations in both the above sectors have been slow in adopting diversification strategies and divisional structures. There are, however, differences between the two with respect to age, technology, size and environment. The private sector companies have achieved higher output and profit in proportion to resources employed. Because of less efficient use of resources, public companies have more inputs in terms of human and financial resources. Public sector companies operate in a more favourable environment and are less bureaucratic than those in the private sector, contrary to prevailing belief. Their accent is on commercial functions in private companies, while there is more emphasis on production functions in the public sector judging from the larger number of managers employed in performing these functions. In general, Indian organisations are essentially production-oriented. Three-fourth of the managers are middle aged.

Indian organisations are not characterised by an extreme degree of either bureaucratic

or entrepreneurial management style but tend to be more bureaucratic than entrepreneurial. This results in management by crisis and muddling through in emergencies. This applies to both private and public organisations contrary to the belief that private sector displays more entrepreneurial drive.

Indian organisations like their counterparts in Europe and America do not practice joint or participative decision making on important matters. Public sector managers have a higher preference for this type of decision. This could be due to trade off between opportunities for participation and material gains. Managers below 36 and above 46 have lower preference for participation and managers in commercial functions have preference for higher participation than in other sectors of activity. On the whole, public sector top management is not perceived to be consistent, resulting in lowering of respect for its integrity and acceptance of its decisions.

Communication barriers between different hierarchical levels are overcome by the practice of oral communication of decisions at meetings between subordinates and superiors. The private sector commands better acceptance of their organisational goals from their members than organisations in the public sector.

The conclusions of the study are that firms characterized as "giant under fire" "lucky innovator" "dominant firms" have prospered on account of favourable environment (government protection, etc)

including marketing environment despite the fact that they were weak in systems capability and employee morale. Unsuccessful organisations however classified as "headless giant" or "swimming up stream" in the absence of favourable environment, owed their failure to lack of systems capability and low morale. Depending on a favourable environment is like building on quicksand. In the long run the systems and people variables are critical for continued organisational effectiveness since the external environment can be controlled only to a limited extent. Hence the importance of building internal strengths represented by strong systems, competent and enthusiastic workers and a high degree of adaptability to change in environment and product technology. But organisation effectiveness is not enough for ensuring growth. For growth, a favourable environment is a must coupled with authoritative and entrepreneurial decision making which is characterised by a readiness to take risks, innovation, non-conformity to rules and adaptation to changing environment, as distinguished from bureaucratic decision-making marked by rigid adherence to rules, lack of anticipation and aversion to taking risks.

According to the author there is ample literature on the connection between participative culture and organisation effectiveness (OE). The relationship between organisations effectiveness and entrepreneurial style of decision making which the writer has tried to establish, has how-

ever, received scant attention from other writers. But, says the author, big business still swears by entrepreneurial style of decision-making and participative culture is not widely prevalent as is generally believed. However, participative styles and entrepreneurial styles are mutually supportive in contrast to bureaucratic style. Further research into the relationship between the two is recommended for evolving better decision styles for making organisations more effective in satisfying the needs of society and stock holders. □

Development of Industrially Backward Areas—The Indian Style

Dr. S. N. Bhattacharya

Published by Metropolitan Book Company Pvt. Ltd., New Delhi 1981.

Reviewed by Navin Chandra Joshi, Moti Lal Nehru College, University of Delhi, Delhi

After revision of the Industrial Policy Resolution in 1956, the Government of India and the Planning Commission began to consider ways and means to attract industries to relatively backward areas. It was realised that in order to reduce regional disparities and ensure decentralisation of small-scale industries in backward areas, it was necessary to identify the criteria for selecting backward areas, for development programmes. At the same time it was felt that there can be no single strategy for development of all backward areas of the country.

One significant strategy

could be the setting up of local resource-based industries. It is well-known that the most important problem of backward areas is their overpopulation as also unemployment of the people living there. To overcome this problem and to stop the migration from rural to urban and semi-urban areas, projects using labour-intensive techniques, local resource-based and appropriate demand-based industries need to be encouraged. Necessary and adequate infrastructure facilities should also be provided for the development of such industries.

In this book of nine chapters and ten appendices the author takes us through the several ramifications of backward area development. The introductory chapter is however, presented haphazardly containing as it does disjointed themes wherein the author too quickly shifts between thoughts, topics, policies and prescriptions. On the issue of rural industrialisation it is observed that maximum productive employment of local resources, revival and development of traditional industries and skills, establishment of new units and integration of agricultural and industrial development should be the primary aim.

While the subject of integrated rural development has been adequately discussed with the help of a case study, the author gives a somewhat perfunctory treatment to the growth centre approach. His handling of the subject leaves much to be desired. The growth centres need to be selected on the basis of their linkage bet-

ween rural and urban economies through an appropriate infrastructural and institutional network. In such growth centres, appropriate projects could be taken up depending on the availability of local resources. Besides, in each backward area sites should be selected for industrial estates wherein all facilities are provided to entrepreneurs at concessional rates. If possible, the estates should be located in the proximity of district headquarters where workers' housing, medical, educational and other facilities are available.

The development of infrastructure is the key to the success of such programmes. It will ensure the proper provision for railway, road and communication facilities in all backward areas. Besides, there should also be an adequate number of warehouses and marketing centres for the produce of agriculture and industry. Lack of these will defeat the very process of giving a boost to development in backward areas. It would be desirable to develop the main focal points which possess minimum infrastructure facilities and extend them to other backward areas on a priority basis.

The role of financial institutions and entrepreneurship has also been discussed in the book. The author believes that the existing incentives and subsidies have a tendency to encourage capital-intensive industries in some cases and as such, they do not have a beneficial impact on the development of backward areas. He suggests that

multi-dimensional programmes should be taken up in backward areas. "Our efforts for developing entrepreneurship in backward areas are likely to bear quick results if care is taken to identify inputs and put them into action in an integrated manner and at the proper time." It is true that financial incentives alone are not adequate to take the industries to backward areas. Some kind of a package programme for self-employment of qualified young engineers and technicians should be undertaken. For this, programmes of training for motivation, information, consultancy and supporting services are essential. Indeed, with a clear perception of what needs to be done to encourage entrepreneurship in backward areas, half the battle may already have been won. □

Management of Absenteeism

By S. K. Bhatia

Published by Asian Publication Services, New Delhi-24.

Reviewed by C. D. Nandwani
Bharat Heavy Electricals Limited,
Bhopal

With the development of a vast industrial network in the country, certain ancillary problems have come to the fore. Absenteeism is one of the major human problems in industry which results in loss of production, increased labour cost and reduced efficiency of operations. This problem is multifaceted and needs to be split in smaller parts to allow thread-bare analysis of the

factors involved before suggesting any remedies.

In his recent book "Management of Absenteeism" Shri Bhatia has made an attempt to delineate the problem of absenteeism in industry. The tools used to analyse the problem, the empiricals suggested as remedies, make the book a worthwhile addition to the literature on Management studies.

The book covers several facets of the problem from concept and causes to methodology for analysis and remedial measures. It is a practical guide to managing absenteeism at the micro and macro levels using an integrated approach.

The author has analysed the problem of absenteeism using three empirical studies, using three different methodologies, namely (i) "condition-centred," (ii) "person centred", and (iii) identification of other factors responsible for high absenteeism. Through these studies he answers five basic questions: What is the quantum of absenteeism? What is its pattern? Where is absence occurring? How many individuals are involved? and, What conditions or factors cause absenteeism? He further diagnoses the nature of inplant, personal and external factors associated with absenteeism and highlights their impact.

A separate section reviews the research findings on absenteeism in India and abroad. It is obvious that much more research needs to be

done before effective techniques to control absenteeism can be developed.

Four chapters deal with the aspect of remedial measures. One chapter is exclusively devoted to tackling absence due to indiscipline. "Specific cures" and "alleviative cures" are discussed with their merits and demerits. In tackling absenteeism in an organisation, the author emphasizes an action oriented approach in four steps—(a) devising strategy for control and prevention of absenteeism, (b) creating awareness and involvement of supervisory and executive personnel, (c) spelling out unit target for reduction of absenteeism on yearly basis, (d) formulation of an action plan for implementation.

Basic research studies, have indicated that a small number of 5 to 10% of habitual absentees normally inflate the rate of absence. By tackling habitual absentees alone, the rate of absence can be brought down by about 4 to 5%. The habitual absenteeism is primarily due to 'personal factors' and as such a 'person centred approach' is called for to rehabilitate the chronic absentees. The stress is on the constructive approach through counselling in tackling the habitual absentees. To bring home this point, the author includes a study relating to effectiveness of counselling on habitual absentees. However it seems likely that a judicious mixture of counselling and disciplinary action may prove more effective than counselling alone.

Bhatia's book is a significant

contribution to the field of management education and personnel research. He has dealt with the problem comprehensively with a practical and positive approach. The style of the book is simple, readable and result oriented. Managers, executives, supervisors and students in the line will find this book interesting. The ideas elaborated in the book can be put to good use for improving productivity through better management of absenteeism. □

Preparing an Organisation Manual

J.C. Morrell, British Institute of Management Foundation, Management House, Parker Street, London

Reviewed by Kewal Soeny.

It is not a common practice in India to produce organisational manuals in spite of the great need for them. The more usual procedure is to apply the rule of thumb, follow practice or use managerial discretion when the need to refer to a manual arises. The government is probably the largest producer of manuals of its own kind with rules and regulations to be followed strictly, though people spend much time trying to find loopholes in them. Then there are those who appreciate the need but do not have the resources or knowledge to produce a comprehensive manual which would be relevant for at least some time. Both industrial and non-industrial organisations fall in one of these categories.

But it is interesting and

heartening (?) to note the author's observation that in Britain too, although so many organisations do produce manuals, there is little formal instruction on the subject and a reluctance between organisations to share skills and experience, perhaps because so few of their manuals are effective.

A manual is a collection of notes issues to employees or members, containing information and instruction pertinent to the work of the organisation. It may be used for training or reference, and may either consist of a fully comprehensive set of notes covering every facet of the organisation or be limited to a particular topic—perhaps as one of a series. Generally, manuals are loose-leaf binders, and the text is referenced and indexed to enable the contents to be kept up to date by the issue of replacement sheets.

This is a very well-written book, clear, precise and methodical in its approach. The author has listed several situations where a manual would serve as a valuable and reliable guide to "doing the right thing." Thus, a manual is helpful in communicating accurate information about procedures and standards in defining policies and specifying responsibilities, and in improving the effectiveness of organisational systems. Reliance upon an existing manual can be dangerous, though, if systems have not been enforced, as people have a habit of devising their own ways of doing things and developing unnecessary sub-systems.

The book opens with a chapter of the use of the manuals followed by its purpose, scope and responsibility, types of manuals, production, presentation, reference and indexing, updating and making a start. The reading list at the end which forms the last chapter, however, does not give many references which also indicates the paucity of material on the subject.

While each organisation will have to have a manual which answers the kind of questions its employees are going to face in their day-to-day work, the author has listed hundreds of possible areas which need to be included in different kinds of manuals like organisation manual, personnel, office administration, financial and accounting, sales, purchasing and so on. Another notable point is the influence of O & M on the author which indeed should be a part of the training of an adviser in this area.

An excellent job done of advice on manual writing. Even Bharat Heavy Electricals which did an admirable job of producing a very worth-while manual and won great applause would be able to learn a few things from this book. □

The Creation of Wealth

By R.M Lala

IBH Publishing Company, 1981,

Reviewed by V.S. Mahajan

The book under review

relates to the success story of Tatas. Over a hundred years ago Jamsetji Tata ventured into areas of modern industry against heavy odds of capital, technology, severe competition from imported goods and, above all, un-cooperative attitude of the then Indian government. It was owing to the shrewdness, tenacity and hard efforts of Jamsetji that the industrial map of the country gradually underwent a structural transformation. His earlier interest was in textiles and he had in 1877 established successfully a textile mill in Nagpur and in 1886 had bought a sick textile mill in Bombay and turned it into a healthy unit within a few years. Jamsetji enjoyed such a high reputation among the people that he could have raised any amount of capital for starting more textile units. But his aim was not profit-making alone. He was even more interested in laying the strong foundations of the Indian economy and here he realised that without the growth of basic industry, cheap electric power, scientific research and trained technicians this dream could not be realised. Thus in the later years of his life he struggled incessantly to fulfil this dream.

Starting from 1882 Jamsetji had begun his ambitious struggle to give India the latest steel plant—not many of the present developed countries had modern steel plants at that time. To fulfil this ambition Jamsetji struggled hard against many odds for over 25 years. Initially he had to find a suitable site for the location of the steel plant where there were plentiful supplies of raw materials as well as of

water. However, finding of such a site was an arduous job in those days of poor geological surveys and extremely trying travel conditions. But Jamsetji was undaunted. He travelled extensively across the vast area of this country in the company of experts looking for an appropriate site. He also travelled frequently to Western countries to study steel technology and minerals to hire the services of the best experts available. Obviously under these conditions it was years before the present site, Jamshedpur, was finally selected.

Unable to raise capital for the steel plant from the British money market as was originally planned, Tatas ultimately decided to try the Indian market. It was heartening to find that within three weeks the needed capital was raised from 8000 investors. This was the first time that Indian hidden wealth came to the surface for such a giant venture. A total capital of Rs. 2.32 crores was raised. It shows that raising of industrial capital was never a problem in this country, provided it was raised by a sound business house in whom the investors had full confidence and faith. And Tatas did enjoy such faith in abundance. However, Jamsetji did not live to see the plant. He died in 1904 in Germany. In his last days he urged his son, Dorab, and close members of his family to carry forward the work he had started. "If you cannot make it great, at least preserve it. Do not let things slide. Go on doing my work and increasing it, but, if you cannot, do not lose faith in what we have done." In fact, subsequent

experience showed that the steel plant for which Jamsetji had worked so hard and which he had brought to the final stage was not only maintained but was considerably expanded.

Similarly Jamsetji's dream for cheap power, produced with the aid of modern big-sized plants, was realised after his death. The giant Tata Hydro-Electric Power Supply Co. was established in 1910, followed by the Andhra Valley Power Co. in 1916 and the Tata Power Co. in 1919. It is interesting to find that today the entire distribution of electricity for greater Bombay and Bombay city is done by the Tata Electric System from its load despatch centre at Trombay.

Jamsetji, was also keen that India have a science university, where students could get the highest education in different fields of science and research could be carried out to benefit the Indian economy. To fulfil this dream he "in 1898 set aside 14 of his buildings and four landed properties in Bombay for an endowment to establish a university of science". It was not until 1911, however, that the Institute of Science was opened and this institute was subsequently to occupy a place of high pride in learning and research in various sciences.

Jamsetji was thus a veritable character. Not only was he interested in building up material capital, he was equally interested in building up human capital. He was keenly interested in labour welfare, training and education. Long before

labour was protected by law he had introduced a package of labour welfare programmes in factories controlled by him. While today we deplore the lack of good hotel facilities for foreign tourists in particular, it was Jamsetji who had 80 years ago measured this, problem and had created Taj Hotel which for years was considered the best hotel in the Middle-East, South and South-East Asian countries. The hotel was opened in 1903 during Jamsetji's life time.

Subsequently, industrial complexes managed by Tatas have multiplied in number and are to be found in areas which demand a high degree of investment and technology as well as skilful management. Thus Tatas have succeeded in creating a large industrial wealth for the country, which runs into several crores of rupees. They have also created both direct and indirect employment avenues for a very large section of the Indian population. Their continuing interest in social welfare, educational programmes, medical facilities, management education, sports, various research programmes and the like makes impressive reading. And much of this is owing to the pioneering efforts of Jamsetji and the spirit of dedication of those on whom the burden of managing this vast industrial empire has fallen.

The book is very well produced, written in an elegant style and reasonably priced. It should be a source of great inspiration to budding entrepreneurs, and students of industrial economics would read it with interest. It should

also be an eye opener to our administrators in making them realise that given the appropriate direction and encouragement the private sector in India is capable of producing a large wealth for the country and could also create large employment opportunities. □

Agricultural Growth in Japan, Taiwan, Korea and the Philippines

Edited by Yujiro Hayami, Vernon W. Ruttan and Herman M. Southworth.

Asian Productivity Organisation (1979) East West Center Book.

Reviewed by N. K. Jain
New Delhi

Eleven papers contained in this volume were initially presented in a conference at the East West Center, Honolulu February 5—9, 1973. The conference was sponsored by the Food Institute of the East West Center, the Economic Development Center of the University of Minnesota and the Agricultural Development Council.

The book consolidates in one volume the available quantitative evidence on long term growth of agricultural output, inputs and productivity for the three East Asia countries, Japan, Korea and Taiwan and for the Philippines. The organizers of the conference and the Asian Productivity Organisation can legitimately claim that, for the first time, comparative data on agricultural inputs, outputs and productivity have been brought together for a group of recently developed and developing countries. The information in the

volume contains is indispensable for both analysis of the quantitative changes associated with modernisation of the agricultural sector and formulation of national development policies and plans. The discussions on the methods used to construct the output, input and productivity series in each country would be useful to economists and other professionals in other developing countries who seek to extend social accounting systems to include productivity accounting for the agricultural sector.

The book has four parts. Part I, contributed by Y. Hayami and V. W. Ruttan provides a well written summary of the experiences of the four countries in agricultural growth. The authors first identify the contribution of growth accounting to development theory and practice and indicate the significance of the East Asian experience. They then compare the growth patterns revealed by the four country studies and suggest implications regarding future agricultural development in South Asia.

Part II contains four detailed country-wise studies on agricultural growth; Japan by S. Yamada and Y. Hayami, Taiwan by T. Lee and Y. Chen, Korea by S. H. Ban and Philippines by C. C. David and R. Barker. In addition to the detailed analysis of agricultural growth in these countries, the papers are rich in discussions on the methods, sources and data used for each country. Part II, in fact, constitutes the core of this book. The primary aim in each country study has been to measure changes in agricultural output, input and

productivity over as long a period as that for which usable data on the country's agriculture could be obtained. As a basis for this, annual data on outputs and inputs was first compiled and index numbers were constructed for them. Indexes of productivity were then calculated as ratios of input and output indexes.

Part III has been devoted to critical reviews of the methods of measurements used in the four country studies of Part II. The reviewers are: A.M. Tang on "Output Measurement: Data and Methods"; H. Kaneda, on "Measurement of Labour Inputs : Data and Methods"; Tara Shukla, on "Land and Capital Inputs : Data and Measurement"; and D. D. Durost, on "Current Inputs : Data and Measurement". As the titles of these reviews suggest, the authors have dealt with a wide range of empirical and conceptual issues relating to growth accounting of agriculture. Indeed, it is difficult to provide even a synopsis of these critiques in this brief review.

In part IV, two authors present their treatment of the perspectives on productivity measurement and agricultural development. J. W. Kendrick's "A Perspective on Partial and Total Productivity Measurement" offers a brief, but excellent treatise on the conceptual issues and methodological problems in productivity measurement. K. Ohkawa's "Implications for Agricultural Development" concentrates on the implications of measures of total as well as partial productivity growth.

The book is certainly a unique contribution to growth accounting and productivity analysis. Its relevance need hardly be emphasised in the context of the emerging agricultural sector in South Asia. As a sequel to this conference and the book, it may be considered whether similar work could be undertaken in the case of South Asian economics like India, Pakistan, Bangladesh, Nepal, Sri Lanka and Bhutan. □

Human Relations & Organizational Behaviour

By R. S. Dwivedi

Oxford & IBH Publishing Company,
New Delhi (1979).

Review based on the reviews by Vijaya Rao, National Productivity Council, Madras, and Rahul Bhatnagar, Institute of Productivity & Management, Ghaziabad.

The major problems facing modern organizations are primarily human, not technical in nature. In India, especially, it is the human resource which ultimately determines the productivity and profitability of an organization. However, traditional human relations management has focused on somewhat simplistic assumptions and solutions which have been found to be inadequate. Consequently there has been a shift in emphasis to an understanding, rather than an evaluating, approach to human behaviour in organisations. The human being is assumed to be extremely complex and there are no simple solutions.

The book under review

attempts to provide a conceptual framework for the study and understanding of human relations and organizational behaviour. Essentially, it is a synthesized anthology of the eminent theoretical literature in the field. The influence of writers like Kolasa, Blum and Bitchell is quite apparent. The author has presented his material in nine chapters and has used the tenth to discuss a few case problems illustrative of the principles detailed earlier.

The two major variables of organizational behaviour examined in the book are the formal organization and the human being. The formal organization system consists of structure, processes and technology. The author has

devoted a chapter to classical, non-classical and modern organisation structures using the Atomic Energy Commission of India as an illustration. This is followed by a discussion of the informal organization and the interaction of technology with human factors. The major organizational process elaborated by the author is communication with specific reference to communication problems in the Indian context.

The treatment given to "human system" by the author is rather perfunctory in view of the stated scope of the book. Preceding the discussion of the organization and the human being are two chapters dealing with the historical develop-

ment of the behavioural approach, and a review of the various theoretical approaches to organizational behaviour. The author has made a notable attempt to include comparatively recent research to provide the reader with a sound theoretical perspective. The penultimate chapter deals with organizational change and development.

The book seems to be intended primarily for students of management. A noteworthy feature has been the relevance of case material and illustration to the Indian context. One would have wished that more care had been taken with the layout and with the rectification of typographical errors. □

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Economic Performance of Small Scale and Ancillary Units

K. R. SHALIG RAM
MADRAS

It would have been socially preferable if the expansion of Indian industry had been attained by the coordinated growth of small scale and large scale industry This philosophy is at the heart of the concept of ancillary relationship. The study found that the mean economic performance of ancillary units was no different from that of small units indicating that there was no net advantage from ancillary relationship as prevailing in India.

Resource-constrained developing nations, have often resorted to promoting small scale industry. There is a belief, that a capital scarce economy would substantially benefit from small scale industry, which could be a device for effectively mobilising scattered resources of capital and labour (likely to be otherwise unutilised) to generate immediate large-scale employment per unit of capital, and consequently ensuring geographic dispersal of industry, with an equitable distribution of national income and wealth.

The origin of the small industry movement in India is traced to the Industrial Policy Resolution of the Government. The following Industrial Policy objectives are relevant :

1. To encourage and protect small industry;
2. To prevent undue concentration of economic power.

There was an obvious departure from these norms, with the initial emphasis in Indian economic planning being on developing heavy industry. The declared rationale was that this was necessary to create the infrastructure for national self-sufficiency. Development of small industry was undertaken at a slower pace. This is indicated by the quantum of funds allocated for promoting small industry over the various Plan periods (Table 1). Possibly, this was a consequence of independent interpretation of the first of the two objectives.

The two objectives taken together, imply something different, namely, that it would have

Table 1

Government Outlays for Small Scale Industry

	(Rs. Millions)				
	I Plan	II Plan	III Plan	IV Plan (Reappraised)	V Plan Draft Plan
Outlay on Small Industry	51.6*	560*	886.5*	1219.8**	2872.3**

Source : P.M. Bhandari, *A Handbook of Small Scale Industries* (Calcutta : The Peerless Publishers, 1975), p. 49

Symbols : * Actual expenditure

** Outlays

been socially preferable, if the expansion of Indian industry had been attained by the *coordinated growth* of small scale industry and large scale industry, rather than by the disproportionate growth of large industry alone. This philosophy is at the heart of the concept of *ancillary relationship*, which is essentially the forward linkage of small firms (*ancillary units*) typically with a large firm (*master unit*). The former "collaborate" by supplying *intermediate goods* (components, sub-assemblies, etc.) to the latter. In contrast, *small scale units* typically manufacture *end-products* and "compete" with large firms. If ancillary relationship were sustained during the growth of large industry, this would ensure simultaneous growth and modernisation of small industry.

This had indeed been the experience of some industrially-advanced economies, notably Japan. In Japan, most of the small firms functioned as ancillaries to large firms and the share of ancillaries in the total industrial output was about 30 per cent. According to Verma (Vakil, 1973), Japan had achieved a 30 to 40 per cent reduction in the overall cost due to the practice of sub-contracting.

The general state of small industry in India has always been somewhat obscure, partly because no law requires that it should publish its facts and figures. The Census of Small-scale Industries (1976), revealed that the number of small scale units in the country had risen from 140,000 in 1971-72 to 550,000 in 1975-76. The official definitions for registration of an ancillary unit and small scale unit, imply that both could produce a mix of intermediate goods and end-products [guidelines for Industries 1975-76, p. 17]. As this mix varies, from firm to firm and

over time, reliable data on the aggregate output of the ancillary industry are not available. One estimate is that the ancillary industry produces barely 1/2 percent of the total industrial output, as against 30 percent in Japan [*The Economic Times*, Bombay, Oct. 19, 1976]. Thus, it is apparent that the buyer-seller inter-relationship between large firms and small firms has been deficient, despite the growth of small industry. Another aspect of Indian small industry is the high mortality rate, ranging from 30 to 50 per cent. Mazumdar, *et al*, studying the mortality of small-scale industries in South India, observed that financial constraints, raw material scarcities and inadequate demand were major causes.

POLICY DELIBERATIONS

The erstwhile policies of the Government, were directed towards promoting small industry in general, without any special emphasis on developing ancillary industry. Ancillary development was entirely left to the initiative of large industries. The indifferent attitude of large industry [Basu, *et al*, p. 95] and inadequate public policy, apparently retarded the growth of the ancillary industry in India.

Based on such assessment, the Government was contemplating on policy measures to stimulate the growth of the ancillary industry, and raise its output from the 1975 level of about 0.5% of the output of the large houses, to the level of 15%, within 10 years [*The Economic Times*, Bombay, Aug. 29, 1977]. Some of the proposed policy measures were:

1. Limiting the expansion of large industrial firms, to ensure that further growth

takes place in the small industry sector [*The Financial Express*, Bombay, Aug. 14, 1976];

2. Licensing of new projects, subject to the condition that the promoters sponsor ancillary units [*The Economic Times*, Bombay, Sep. 24, 1976];
3. Promoting the long-term contract mode of purchase, to replace the current tender-purchase system followed by the Master Units [*The Economic Times*, Bombay, Oct. 21, 1976];
4. Legislation to ensure payments within 30 days against goods supplied by the ancillary units [*The Times of India*, Ahmedabad, Sep. 29, 1976].

OBJECTIVES OF THE STUDY

The proposed policy of accelerated development of the ancillary industry rests on the belief that ancillary relationship is beneficial for the small firm. Ancillary relationship is conceivably associated with both advantages and disadvantages for the ancillary unit. The advantages are, probably :

1. Ancillary units, due to sales to master units, are less exposed to marketing problems than small scale units;
2. The master units supply some crucial inputs required by the ancillary units to ensure uninterrupted operations;
3. The ancillary unit may also have the benefit of locational proximity to the master unit, which reduces transportation cost and facilitates transfer of technology from the Master Unit.

The disadvantages of the ancillary unit are, perhaps :

1. The larger master unit tends to dictate price and payment terms to the ancillary units;
2. The fluctuations in demand for the products of the master unit affect the

demand for intermediate goods supplied by the ancillary unit;

3. The diversification possibility of the ancillary unit are restricted, if special-purpose machinery and equipment have been installed.

The objective of this paper is to examine the following issues: *Have ancillary units fared better than small scale units in India? In what functional aspects did ancillary units differ from small scale units?* It is assumed that if ancillary units experience a net advantage from ancillary relationship this would be reflected in their superior performance relative to small scale units.

Framework for Analysis

To carry out this study, the official definitions of ancillary unit and small scale unit were inadequate, because both might produce a mix of intermediate goods and end-products. This study was, therefore, based, on the following sharper definitions :

Small Scale Unit : A small firm with investment in fixed assets less than Rs. 1.5 million that manufactures and markets only end products. (As these firms do not manufacture intermediate goods, they are, by definition, devoid of ancillary relationship).

Ancillary Unit : A small firm with investment in fixed assets less than Rs. 1.5 million that manufactures and supplies only intermediate goods. (By definition, these firms are associated with ancillary relationship).

The economic performance (or overall performance) of a firm was conceptualised as being determined by functional performance. The functions of a small firm include :

- * Financial management
- * Marketing management
- * Production management
- * Personnel management

The economic performance of a small firm would depend on how well the entrepreneur managed these functions. If ancillary units

performed better than small scale units, the root of the superior performance would be superior performance in one or more functions.

The enquiry was conducted in two stages. To examine *whether ancillary units performed better than small scale units*, their relative efficiency was assessed. The measure of relative efficiency employed, was $(\mu_1 - \mu_2)$ where μ_1, μ_2 were the mean economic performance of the populations of ancillary units and small scale units respectively. The following is a statement of the single-tailed test of hypotheses about the population means, μ_1, μ_2 :

$$H_0 : \mu_1 = \mu_2 \quad (\text{null hypothesis})$$

$$H_1 : \mu_1 > \mu_2 \quad (\text{alternate hypothesis}).$$

These hypotheses were alternately tested by the parametric t-test [Walker, 1965] and the non-parametric Mann-Whitney "U" test [Siegel, 1956]. The alternate measures of economic performance employed included,

1. gross profits/total assets,
2. gross profits/total fixed assets, and
3. gross profits/sales. As these are all ratios, the effect of size of the small firm on profits would be neutralised.

To examine *the functional differences between ancillary units and small scale units*, two applications of multiple discriminant analysis were employed [Kerlinger, 1973] :

1. Finding a representative *linear* combination of the predictor variables that maximised among-group relative to within-group separation and analysing which variable accounted most for inter-group differences. (The assumption was that within-group covariance and dispersion were equal across groups. No assumptions regarding the probability distributions of the groups need be made).
2. Testing whether significant differences existed among the mean values (taking all predictor variables simultaneously) of the groups, (The assumptions were that within-group covariance and dis-

persion were equal across groups and that the groups were distributed as multivariate normal).

The predictor variables chosen to represent the performance of the various functions were as follows :

1. Total Fixed Assets to Total Assets ratio (TFA/TA): This represents the composition of fixed and working assets, and a high value of this ratio indicate reduced liquidity.
2. Sales as a ratio of Total Current Assets (S/TCA): This represents working capital turnover.
3. Accounts Receivable to Sales ratio (AR/S): A measure of cash collection effort.
4. Delay in Payment (DP) : The average time in days for an invoice raised by the small firm to be paid, as a ratio of 90 days.
5. Marketing Effort (MC/TC) : The ratio of expenditure on advertising and sales promotion to total cost was treated as a surrogate measure of marketing effort.
6. Sales as a ratio of Total Fixed Assets (S/TFA): This represents marketing management.
7. Capacity utilisation (CUS): Measured as a ratio of the output of the firm to the entrepreneur's estimate of the firm's capacity. This represented capacity management.
8. Percentage Defects (PD): The ratio-variable sales returns to sales-net-of-returns was used as a proxy for percentage defects. This represents quality management.
9. Labour Turnover (LT): This variable was measured as the ratio of the sum total of exiting and entering personnel to the total personnel in employment at the beginning of the year. It represented personnel management.

Variables 1 to 4 represented the performance of the finance function, 5 and 6 marketing, 7 and 8 production, and the last variable, the performance of the personnel function. To select the representative function, the criterion of lowest probability of misclassification was employed. Once the representative function was identified, the following measure was computed :

$$\frac{|l_i d_i|}{\sum |l_i d_i|}$$

where l_i = discriminant coefficient

$$d_i = X_{ij} - X_{ij}$$

X_{ij} = i^{th} predictor variable

$j = 1, 2$ the two groups, namely, Ancillary Units and Small Scale Units.

This measure indicated the contribution of the predictor variables (X_i) to the discrimination between the two groups. The F-test was employed to examine whether ancillary units and small scale units were statistically different from each other on the basis of the performance of the various management functions considered simultaneously. The F-test is simply a multi-dimensional analogue of the t-test described earlier.

SAMPLING AND DATA COLLECTION

There is a dearth of published accounting data on small firms in India. This necessitated

the collection of primary data for this study. The questionnaire-cum-interview method was adopted.

Due to lack of information of adequate numbers of firms conforming to the researcher's definitions of small scale unit and ancillary unit, statistically representative sampling was precluded. A sample of 35 small scale units manufacturing *industrial machinery* whose accounts were maintained by one commercial bank was selected. Of these, 10 agreed to cooperate in this study. A sample of 51 ancillary units manufacturing *components for industrial machinery*, and located in one industrial estate sponsored by a Master Unit was drawn. Only 7 firms extended cooperation. Qualitative and quantitative data pertaining to 1975 were collected from both samples.

It is pertinent to note, that business fluctuations would equally affect the demand for *industrial machinery*, and *components for industrial machinery*. This is because the demand for components is derived from the demand for machinery. Firms making machinery and those manufacturing components were, therefore, considered as falling in the same broadly-defined industry. Thus, the statistical tests would not be vitiated by industry influence on performance.

FINDINGS

A profile of characteristics of the sample firms was constructed (Table 2) to serve as an

Table 2

*Profile of Characteristics of the Sample Firms**

Characteristics	Small Scale Units	Ancillary Units
1. Sample Size	10	7
2. Location	City A	City B
3. Mean age (years)	15	11
4. Mean fixed assets (Book value Rs. million)	0.735	0.22
5. Mean sales (Rs. million)	2.782	1.08
6. Mean no. of personnel	96	32
7. Percentage of firms employing high technology**	36	80
8. Percentage of firms which receive payments within 3 months	90	40
9. Principal problem area	Finance	Finance
10. Sales contract with master unit	No	Yes
11. Mean no. of master units	Nil	4

Symbols : * Based on firm-level primary data for 1975

** These were the perceptions of the entrepreneurs.

aid in interpreting the results of the statistical tests. The sample small scale units were slightly older but definitely larger in size (on the basis of mean fixed assets, mean sales and mean number of personnel) than the sample ancillary units. The difference in size is partly because manufacture of end-products requires more resources than the manufacture of components. The small scale units employed high technology less often than the ancillary units which had access to transfer of modern technology from the Master Units. All the ancillary units relied on a few (average 4) master units for sales and this was attributed as a cause for delays in payment (only 40% of the firms received payments within 3 months of delivery of goods). Finance was the principal problem area in both cases.

The results of the t-tests and the Mann-Whitney "U" test of the hypotheses regarding the equality of the two populations' mean economic performances are presented in Table 3. The mean performance of ancillary units was not significantly different from that of the small scale units by the t-test (computed t less than critical value) and the Mann-Whitney "U" Test (Computed "U" higher than critical value) on the three performance measures. *The conclusion was that ancillary relationship as prevalent in India conferred no net advantage on the small firm.*

The results of the multiple discriminant analysis are contained in Table 4. Only a selected few of the computed multiple discriminant functions are presented in this table. The representative function (selected by the procedure described earlier) has been marked with a triple asterisk against the serial number. Ancillary units were significantly different from small scale units on the basis of a linear combination of the following predictor variables (functional performance characteristics):

$$\text{Accounts Receivable/Sales (AR/S)} = 37.7\%$$

$$\text{Sales/Total Fixed Assets (S/TFA)} = 5.9\%$$

$$\text{Percentage of Defects (PD)} = 52.1\%$$

$$\text{Labour Turnover (LT)} = 4.3\%$$

The extent to which each variable accounted for the inter group differences is indicated above. Accounts Receivable/Sales, and Percentage of Defects together accounted for 90% of the differences. *The conclusion was that management of accounts receivable and output quality constituted the crucial functional differences between ancillary units and small scale units.* The interpretation is that the entrepreneur of the ancillary

Table 3
Test for Equality of Mean Economic Performance
of Ancillary Units ($n_1=7$) and Small Scale Units ($n_2=10$)*

Type of Test		Performance Measure		
		Gross Profit Total Assets	Gross Profits Total Fixed Assets	Gross Profits Sales
Parametric t-test (assuming normal distributions and unequal variances)	t (Computed)	0.704	.645	1.131
	degrees of freedom	10	9	11
	t (critical)	1.81	1.83	1.8
Non-parametric	U (Computed)	27	30	24
Mann-Whitney "U" Test	U (Critical)	17	17	17

Symbols . *Based on primary data for 1975.

Note: The computed t, U values are not significant at 95% level of confidence.

Table 4
Multiple Discriminant Functions of Ancillary Units ($n_1=7$) and Small Scale Units ($n_2=10$)

No.	AR S	DP	MC TC	S TFA	CUS	PD	LT	F (df)	Pr
1	-11.58				-6.02	-34.5		7.2 (3,13) *	1.23
2		-9.25			-2.49	-26.8		7.6 (3,13) *	1.27
3	-10.9			-.29		-32.1		7.1 (3,13) *	1.22
4		-8.86		-.037		-26.9		7.4 (3,13) *	1.25
5		-9.25		-.016	-2.443	-26.57		5.3 (4,12) *	1.27
6			86.4	-.425		-42.4	-21.2	6.2 (4,12) *	1.37
7	*** -13.6 (37.7)			-.349 (5.9)		-51.2 (52.1)	-15.6 (4,3)	7.2 (4,12) **	1.48
8		-8.13		-.037		-31.2	-3.89	5.3 (4,12)	1.27

Symbols : For symbols $\frac{AR}{S}$ LT, refer the text.

F (df) = Computed F statistic (with degrees of freedom)

Pr = The probability of misclassification is twice the probability that a standard normal variate takes a value greater than Pr. The higher the Pr value, the lower the probability.

* Indicates significant at 99% level of confidence

** Indicates significant at 95% level of confidence

*** Indicates the representative discriminant function, with figures in parentheses indicating the percentage contribution by the variables towards discrimination between the two groups.

unit has to pay greater attention to managing problems of product quality and accounts receivables.

CONCLUSION

The finding that the mean economic performance of ancillary units was no different from that of small scale units indicates that there was no net advantage for ancillary units, from ancillary relationship as prevailing in India. There are two interpretations for the equal mean economic performance. The first question that could be raised, is whether small scale units that bear the *additional risk of marketing* should be earning the same average returns as ancillary units. The second viewpoint could be, that ancillary units are an *efficient form of small enterprise*, considering the fact that they have mastered modern technology to produce sophisticated quality components at *prices administered* by the Master Units, and yet their performance was not inferior to small scale units. The moot question is whether reward for small industry should be in compensation for *market risk bearing* or *efficiency*.

Multiple Discriminant Analysis confirmed that there were functional differences between ancillary units and small scale units, management of product quality and accounts receivable being important. While quality management is an exclusive measure of the entrepreneur's capability, receivables management is dependent on the entrepreneur's efforts and the payment policy of the Master Unit. Only 40% of the sample ancillary units received payments within 3 months, against 90% of the sample small scale units. The sample small scale units often received payments as they manufactured machinery to order. If payments had been made on time, perhaps the mean economic performance of ancillary units would have been higher than that of small scale units.

Under the prevailing conditions, entrepreneurs would be indifferent between establishing ancillary units and small scale units, provided they are aware of the situation. The Government's proposals for accelerated development of the ancillary industry would prove futile, If ancillary development is preferred, a reorientation

is necessary with legislation to protect ancillary units and incentives to Master Units to encourage purchases from ancillary units.

Excise duty relief may be one such incentive.

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Performance of Contract System of Execution of Construction Projects

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Introduction

In any project, the construction activities are inevitable. In the wake of unprecedented development, large scale construction activities have come up, which are being executed through contract system. Such construction activities involve both Government departments and Public and Private sector undertakings. Due to their inability to execute the works departmentally, or due to the multifarious problem faced in the same, these organisations resort to contract system. Even some construction undertakings such as National Building Construction Corporation, Bridge Construction Corporation etc., who act as contractors for other organisations, execute the works through other contractors establishing thereby that the contract system is inevitable.

Whether the contract system is all too efficient is a debatable point, more so the way in which it is practised. A study by the Central Building Research Institute, Roorkee, has established that none of the various contract systems is very satisfactory, although performance of the Lumpsum Contract system is comparatively better.

The basic parameters reflecting performance of contract systems are *Time over-run* and *Cost over-run*. A single performance Index can reflect the combined effect of both these

Most of the organisations because of their inability to execute the construction projects themselves departmentally and due the multifarious problems faced in the same, resort to contract system. The basic parameters reflecting the performance execution through contract systems are Time over run and Cost over run. To improve the performance, these two parameters should be reduced to minimum. This paper deals with the causes of Time over run and Cost over run and suggests methods to reduce the same.

parameters and can be defined as follows.

Performance Index =

$$\frac{\text{Estimated cost of the project}}{\text{Actual cost of the project}} \times 100$$

$$= \frac{\text{Estimated cost}}{\text{Estimated cost} + \text{cost over run} + \text{opportunity loss due to time over-run}} \times 100$$

Thus the performance can be improved by reducing the cost over-run and time over-run.

Causes of Time Over Run and Cost Over Run

1) Causes related to the management

- a) Delay due to lack of clarity and incomplete specifications and drawings.
- b) Delay in handling over of site
- c) Delay due to a lot of formalities
- d) Delay due to non-availability of fund on time.
- e) Delay due to non-availability/non-issue of materials on time.
- f) Delay due to lack of coordination among concerned departments.
- g) Cost over run due to items added during execution.
- h) Cost over run due to increase in prices of inputs during execution.

2) Causes related to the contractors

- a) Bad Planning
- b) Professional incapability
- c) Lack of finance
- d) Lack of motivation.

Methods to Improve Performance

On the examination of above causes of Cost over-run and Time over-run the following conclusions are drawn.

- a) Time over-run results in opportunity loss, and some times increase in cost of materials because of market fluctuations.

- b) Increase in additional work during execution due to vague specifications, frequent changes in design, drawing and planning results in cost over run. Some times increase in prices of items during the course of execution also results in cost over-run.

Thus for improving the performance the following guide-lines are suggested.

- 1) Establish the work logic and activity relationship through a network diagram for the project and plan the execution work accordingly. Net work analysis should be adopted as far as possible in all major projects and the completion time should be arrived at based on critical path analysis. The standard deviation for the various activities and the critical path should be arrived at. The scheduled time given for the completion of the project should normally be the time taken for the critical path + three times the standard deviation of the total critical path, so that the probability of completion of project is practically 100%.
- 2) Spell out the specifications, drawings and work content in clear terms.
- 3) Simplify and stream line decision making procedures.
- 4) Select proper contractors. The method of selecting the contractors, for different works, taking into account their past experience, financial soundness and capacity to undertake the desired magnitude of works, will help in many a way. It will help in weeding out incompetent parties quoting for high value of work. It will also help in quickening the process of entering into agreement.
- 5) Fix obligations and accountability of contracting parties in the event of delay on either side.
- 6) Motivate contractors to complete work in estimated time.

The first four come under the direct perview of the management. The last can be achieved by

introducing a rational compensation for delay clause in the contract which should be fair to both contracting parties. A rational compensation for delay clause suggested by the author is given below :

Project Delay and the Cost of Capital

The delay caused in a project may be either due to the contractor or due to the employer. The delay caused by the employer can be classified into two types, one the direct delay like delay in the issue of materials, issue of drawings, delay in handing over the site etc; and the other, the indirect delay caused by the non-payment of bills in time, non-releasing of security in time etc. Non-payment of bills in time by the employer amounts to the blocking of funds of the contractor which forces the contractor to arrange for more funds at a particular period of time, than the normal requirement, thus increasing the cost of capital. If the contractor could not arrange for more funds the project is delayed. This indirect delay can be compensated by paying the contractor the increase in the cost of capital. The direct delay caused by the employer which can be quantified is deducted in the total recorded completion time.

After accounting for all the above, the balance period of delay, which is mainly due to the contractor, should be compensated by the contractor by way of penalty. Here the important point is, that as the increase in cost of capital is being paid to the contractor, the contractor will have no reason to delay in arranging for more funds whenever it is required, and so the indirect delay will be fully eliminated.

So, the net penalty for delay will be the gross penalty calculated minus the increase in the cost of capital.

Formula for Calculation of Compensation for Delay

The net penalty to be levied on the contractor should be a function of the probability of completion of the project (P_c), the percentage of delay of the project (D), the cost of capital (C), a constant substituted to control the total percentage of delay within which the full penalty is to be recorded (K_3) and the total percentage

of the value of the work (K). That is, the net penalty = $f(P_c, D, C, K_3, K)$, considering the inter-relationships between the various factors, the formula for net penalty can be formulated as

$$\text{Net penalty} = (K_1 + tK_2) P_c K_3 D - C \quad (1)$$

In this formula to suit the departmental procedures the total percentage of the value of work K , has been split up into $(K_1 + tK_2)$ which is equal to the total security deposit.

As per the departmental procedure, the EMD is received during the tendering of the work and it is converted into security deposit. The balance security deposit is recovered in 4 equal instalments in the running bills. So, in the formulas,

K_1 = Earnest money deposit

K_2 = Equal instalment amount of balance security deposit deducted from the running on Account bills.

t = 1, 2, 3, 4, which represents the number of bills paid at the time of consideration.

P_c = Probability of completion of the project in the scheduled time calculated from Network.

D = Percentage of delay.

C = The increase in the cost of capital.

K_3 = A constant which can be assigned any value depending upon the total percentage of delay within which the full penalty is to be recovered, $K_3=1$, indicates that at 100% of delay of the project the penalty will be recovered in full and for the percentage of delay less than 100%, the penalty will be proportionate. $K_3=2$ indicates that at 50% of delay of the project the penalty will be recovered in full and for the percentage of delay less than 50% the penalty will be proportionate. That is for 30% of delay the penalty will be 60% of the total penalty. $K_3=3$ indicates that at 33 1/3% of delay of the project

the penalty will be recovered in full and so on.

As per the prevalent practice and as recommended by Bureau of Public Enterprises, the total security deposit will be 10% of the first one lakh of the contract value plus $7\frac{1}{2}\%$ of the next one lakh of the contract value plus 5% of the balance contract value and the total amount thus calculated will be limited to one lakh.

As per normal practice the total percentage of the value of work used for calculation of the penalty should be less than 50% in which the maximum penalty will become less than 5% of the contract value. Considering this, the formula (1) will not hold good for contract values beyond 20 lakhs, as $(K_1 + t K_2)$ is limited to 1 lakh which is less than 5% of the contract value.

For contract value of beyond 20 lakhs, the formula can be slightly modified so that the maximum penalty is not less than 5% of the contract value. The modified formula for penalty for delay for contract value beyond 20 lakhs will be (2) $[K_1 + t K_2 + 0.05 (A - 20,00,000)] P_C D K_3 - C$

Where $A =$ Total contract value, if the contract value is less than 20 lakhs. The term in the above equation will be zero for all values less than Rs. 20 lakhs.

In the formulas suggested, if the contractor fails to take up one work, penalty will be equal to EMD. That is the EMD will be forfeited. After doing some work, if the contractor abandons the work, the penalty will be the EMD plus the

instalments of the security deposit so far deducted from the running bills. That is the security deposit on hand will be forfeited. In such cases the probability of completion of the project does not come into picture as the project has not been either taken up or completed. The percentage of delay will also be taken as full delay as it is uncertain to say when the project will be taken up further, after fixing up another agency.

The sixth can be achieved by introducing an incentive scheme for the contractors which will motivate them to complete the work early if not at least in estimated time. A model incentive scheme suggested by the author is given below.

Incentive

The author in his earlier work has advocated that the standard time for any project can be calculated from the PERT Network of the project as critical path time (TE) plus three times standard deviation of the critical path (σ). The total time saved due to early completion of the project is equal to (Standard time - Actual time) and if the average cost incurred per day by the management in terms of supervision and opportunity cost over the total span of project execution then the total saving by early completion of the project can be calculated as follows.

Total saving = (Standard time - Actual time) x (Average cost per day).

If the incentive to be paid is 50% of the total saving then Incentive to be paid will be $= \frac{1}{2}$ (Standard time - Actual time) x (Average cost per day).

Comparative Cost Analysis Of Some Rice Polishers

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Unit cost of operation for four different polishers were studied. The results indicated that the cost of operation of parboiled paddy is consistently higher than that of raw paddy. Further, the unit cost of polishing is lowest with a vertical cone type polisher and highest for a horizontal disc type polisher.

Rice polishing is an important and a critical operation in the rice milling process. It is also the most energy consuming operation and is responsible for the final quality and quantity of the rice obtained from a mill. A faulty design or adjustment of a rice polisher may completely disfigure the economy of a rice mill. A good polisher may produce rice with *broken* (pieces smaller than half a rice) as little as 5 per cent whereas a faulty polisher may result in *brokens* as high as 50 per cent. Moreover, energy consumption of the polishers have been found to vary considerably. Therefore, proper selection of a polisher for a rice mill is a factor of great importance.

At present, polishing machines of different type and make are available in the country with variation in design and construction materials. However, there is no independent or impartially obtained data on comparative performance of various machines. Such an information is necessary for guiding a purchaser to choose a particular machine for meeting his operational requirements. The result of such tests can be useful to the manufacturers also, in bringing about improvements in their existing machines. With these ends in view, a comparative study of some polishers has been made.

Methods and Materials

Four different polishers, each representing a class of polishers, were selected to study their cost in relation to output. These were:

1. Vertical Abrasive Cone polisher (Dandekar polisher).
2. Horizontal Abrasive Disc polisher (Kisan polisher).
3. Horizontal Abrasive and Friction polisher (Satake polisher).
4. Huller polisher (Barthakur polisher)

type of machine, based upon assumed annual use, current rate of interest, labour charges and machine capacity. The unit costs were expressed in terms of rupees/tonne of brown rice to the standard polish of 4 to 5 per cent.

RESULTS

A summary of the costs data of the four rice polishers, under test is given in Table 1. The final results are shown in the form of a histogram (Fig. 1). These results indicate that unit cost of operation of parboiled paddy is consistently higher than that of raw paddy. This is because energy requirements for polishing parboiled rice are higher than those for raw rice. The increased energy costs of parboiled rice are contributed to the hardening of the grain during parboiling process.

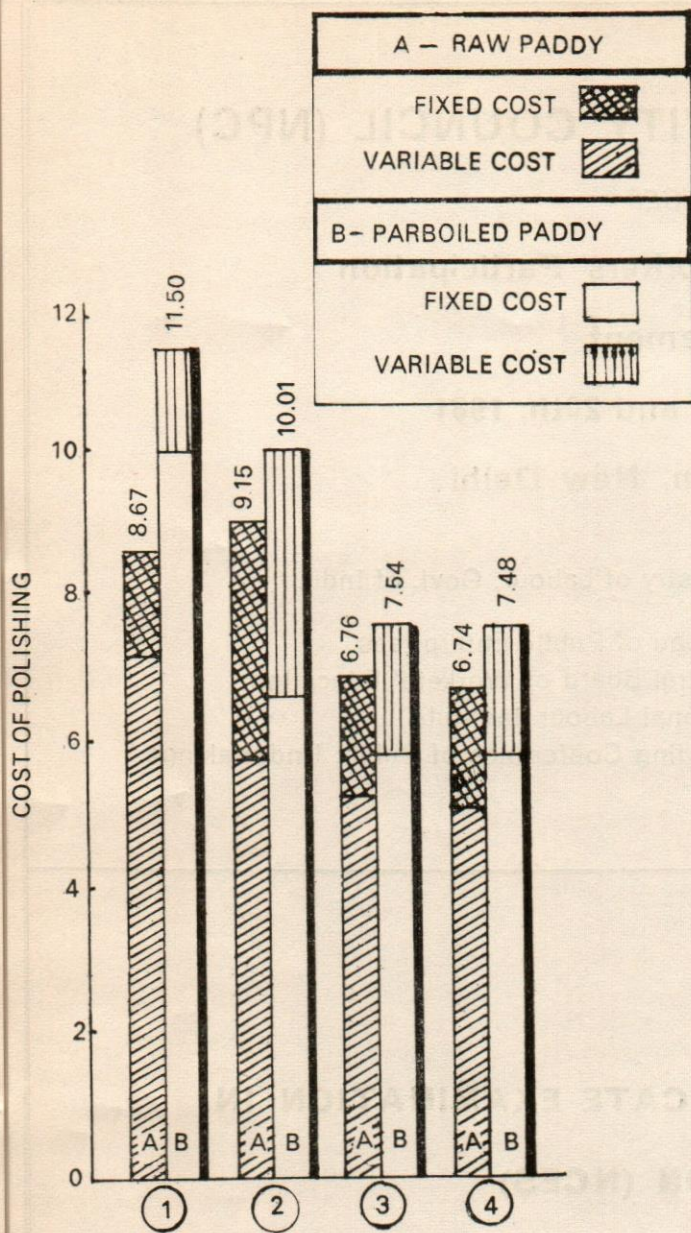
Before the actual trials were conducted, the polishers were adjusted for their best possible operation. It was done by carrying out pilot trials and plotting calibration curves for the standard 4-5 per cent polish of Jaya variety. The curves were later used to adjust the machines. All the machines were, thus, adjusted to get a polish range of 4 to 5 per cent. After the proper adjustments were made, well graded brown head rice sample of 5 kg was polished by each machine. Trials were conducted both for raw and parboiled paddy (Jaya variety). Polish percentage, capacity, broken percentage and energy consumption for whitening the rice in machine were measured. The unit cost of operation of each machine was then calculated. The cost of operation included the fixed costs such as depreciation, interest on investment and other charges, and variable costs such as repair and maintenance, energy costs, labour charges, etc. For comparing capital cost, the prices of the machines were ascertained. The operational costs were estimated for each

The results also show that unit cost of polishing both raw and parboiled rice is the lowest with the vertical cone type polisher whereas it is highest for a horizontal disc type polisher. The unit costs for a huller type polisher compares well with a vertical cone type polisher. The higher costs in case of disc type polisher is indicated due to the higher repair and maintenance cost of the machine. The high unit cost of polishing for satake polisher is mainly due to higher initial investment; the variable costs compare well with any other type of polisher. The low unit costs for vertical cone polisher and

Table : 1

Cost of data of rice polishers

Polishers	Fixed costs (Rs. per tonne)						Variable costs (Rs. per tonne)						Total cost (Rs. per tonne)	
	Raw			Parboiled			Raw			Parboiled			Raw	Par-boiled
	Dep.	Int	Oper.	Dep.	Int.	Oper.	Repair & Main	Energy costs	Labour	Repair & Main	Energy costs	Labour		
Verticle Abrasive Cone	0.79	0.40	0.45	0.79	0.40	0.45	2.60	1.60	0.90	2.60	2.34	0.90	6.74	7.48
Horizontal Abra-sive Disc.	0.53	0.26	0.70	0.53	0.26	0.70	1.55	2.31	1.41	1.55	3.09	1.41	6.76	7.54
Horizontal Abra-sive & Friction	0.41	0.20	0.85	0.41	0.20	0.83	5.55	0.02	1.66	5.55	2.85	1.66	8.67	11.50
Huller	1.90	0.95	0.51	1.90	0.95	0.51	2.90	1.87	1.02	2.90	2.73	1.02	9.15	10.01



huller type of polisher are attributed to the low repair and maintenance costs, energy costs and labour charges per tonne of material handled.

CONCLUSION

From the results, it can be concluded that both the fixed costs and variable costs are the controlling factors for unit operational cost of a machine. A higher investment on the machine may increase the fixed cost whereas higher repair costs, energy costs and labour costs will increase the variable cost of machines operation. The conclusion that can be derived from the study is that a cone type polisher is more favourable than any other type of polisher. Although the costs of a huller type polisher compare well with the cone type polisher, yet, its performance index being very low, it does not stand in comparison with the cone type of polisher. □

- 1 HORIZONTAL ABRASIVE DISC POLISHER
- 2 HORIZONTAL ABRASIVE AND FRICTION POLISHER
- 3 TRADITIONAL HULLER POLISHER
- 4 VERTICAL ABRASIVE CONE POLISHER

Fig. 1 Comparative Cost of Polishing in rupees, per tonne of Brown Rice.

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Productivity Trends In A Cement Plant

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Sectoral economic performance depends upon the efficiency with which resources are employed to achieve the given targets. Thus, productivity of the factors of production determines the growth path of an industrial enterprise. In the unit under study, although, the number of workers has increased, labour requirement per tonne has decreased, as a result of increased production and capital intensity.

Developmental strategy of a country is a function of relative economic performance of all sectors. And, the sectoral performance depends upon the efficiency with which the resources are employed to achieve the given targets. Thus, productivity of the factors of production determines the growth path of an industrial enterprise. An attempt has been made in this paper to analyse and explain trends in productivity in a cement plant from 1955 to 1975. (The name of the plant has been kept as secret).

Sources of Data

The data for purposes of analysis have been obtained from the Annual Reports of the company for various years. Data relating to physical production, installed capacity etc., have been acquired from the publications *Cement Production and Despatches* and *Cement* published by the Office of the Cement Controller, Delhi, and Cement Manufacturers Association Bombay, respectively. Supplementary details have been obtained from the *Weekly Replacement Service*, Stock Exchange, Bombay.

Variables Used :

The main analytical variables used are

V = Net Value Added

L = No. of Workers

K = Net adjusted Capital for Capacity Utilisation

W = Wage Rate per Worker (in rupees)

r = Rate of Return per unit of Adjusted Capital

I_t = Kendrick's Index of Total Productivity which measures productivity if the factors are rewarded at base year prices.

Data Processing and Price Deflation

Net value added has been obtained as the difference between total output and inputs in value terms at current prices. The figures so obtained have been deflated by the index of average ex-works prices fixed by the Government from time to time at the recommendations of the Tariff Commission, appointed for this purpose, for this company. Similarly, total net capital has been obtained from various reports after making adjustments for additions and deductions. The figures have been deflated by the combined average index constructed from the indices of logs and timber, construction, metal products, machinery and transport equipments and cost of living indices. The deflated figure so obtained has been multiplied by the capacity utilisation factor obtained by dividing the total physical production (tonnes) by the total installed capacity during different years. The adjusted capital has been divided by the total number of workers including skilled, semi-skilled, un-skilled, clerical and supervisory persons during respective years to obtain net adjusted capital per worker.

Wages and Salaries have been obtained from profit and loss accounts for the relevant years and deflated by the cost of living indices on the all-India basis. As at regional level, separate indices are not available, hence, it is assumed that increase in money wage rate takes place in response to rise in prices. The total wages and salaries so deflated have been divided by total workers to get wage rate per worker. Similarly, out of the total value added, the total real wages have been subtracted to arrive at share attributable to capital. The share so obtained has been divided by the net adjusted capital to arrive at rate of return (r) per unit of adjusted capital. The total wage payment per worker (W) has been divided by r to get wage-rental ratio. All variables have been deflated at 1951-52 prices.

Productivity : Some Measurement Problems

The accurate measurement of productivity is very difficult. Since it is a by product of the joint efforts of all factors of production combined in a certain proportion, it is difficult to isolate the contribution of each of them. The factors themselves are heterogeneous. The technological changes are so fast embodied in capital goods, that it is difficult to get an accurate value of capital employed. Moreover, method of production or quality of inputs also change. All these affect quantity of each. Therefore, the contribution of each factor to Productivity is a difficult task.

The concepts here used are labour, capital and total productivity

Labour Productivity:

It is the net value added or output per worker.

Capital Productivity:

It is the net value added per rupee of net capital adjusted for capacity utilisation.

In this context rate of return ' r ' has also been calculated as a measure of Capital Productivity. Rate of return has been calculated as under :

Net Value Added-Total Wages and Salaries

Total Net Adjusted Capital

Total Factor Productivity:

It is the output per unit of input. Moreover, we have calculated Kendrick's Index (I_t) of Total Factor Productivity when the factors (labour and capital) are rewarded at base year prices.

Interpretation of Results

Productivity Ratios and Indices at constant prices (1951-52) are presented in Table 1. It can be seen that Labour Productivity ($\frac{V}{L}$) has shown an abrupt increase in 1957. Except for 1958, it has almost doubled in 1959. It has

Table : 1
Productivity Ratios and Indices (at 1951-52 Prices)

Period	Labour Productivity	Indices of Labour Productivity	Capital Productivity	Indices of capital Productivity	Rate of Return of per unit of Adjusted Capital
	$\frac{V}{L}$	V/L	$\frac{V}{K}$	V/K	r
1955	596.56	100.00	0.3998	100.00	0.2671
1956	537.20	90.03	0.0389	9.72	-0.0392
1957	4344.36	728.11	0.2285	57.15	0.1517
1958	2722.01	456.20	0.3503	87.66	0.2252
1959	7018.94	1176.37	0.2998	74.98	0.2015
1960	7618.10	1276.79	0.2411	60.30	0.1492
1961	7121.97	1193.64	0.2648	66.23	0.1735
1962	4470.58	749.26	0.2312	57.82	0.1200
1963	7943.47	1331.32	0.3575	89.44	0.2585
1964	6453.41	1081.59	0.4103	102.62	0.2793
1965	7008.24	1174.58	0.4002	100.10	0.2821
1966	7160.53	1200.10	0.4675	116.93	0.3342
1967	7356.37	1232.92	0.4581	114.58	0.3237
1968	7412.57	1242.34	0.4387	109.72	0.3013
1-4-69 to 31-3 70	10955.41	1836.21	0.6398	160.02	0.4396
31-3-71	11361.02	1904.10	0.3152	78.83	0.2106
1972	8056.49	1350.26	0.3737	93.47	0.1848
1973	7199.16	1206.58	0.2633	65.85	0.0720
1974	7724.24	1294.58	1.2585	314.78	0.6019
1975	13840.46	2319.65	1.2785	569.90	1.5388

maintained a fluctuating trend throughout the decade 1958-68 with a sudden rise in 1970. Except for a decline during 1972-1974, it has reached the highest figure in 1975. Thus, on the whole, it has shown an increasing trend.

With regard to Capital Productivity $\left(\frac{V}{K}\right)$, though the trend is increasing but there are minor fluctuations. But it has shown abrupt increases in 1974 and 1975.

Another measure of capital productivity, i.e., rate of return (r) per rupee of adjusted capital

has been abnormally low (negative) during 1956 and 1973. This is because of low level of net value added. The rate of return was the highest in 1975. When it was 1.5388.

Real Wages per Worker:

Real wages per worker (W) was very low in 1955, (Rs. 198.04 at 1951-52 prices) but it has increased in subsequent years and has shown rising trend throughout the period so much so, it reached Rs. 5228.57 in 1973 and then decreased abruptly to Rs. 449.85 in 1975 (Table 2), possible reason could be the rise in the cost of living indices.

Table 2
Productivity Ratios (at 1951-52 prices)

Period	Annual Real wage payment per worker	Wage Rental Ratio	Total workers	Fixed Capital
	W	$\frac{W}{r}$	Total Tonnes produce	per worker
	Rs.		Rs.	$\frac{K}{L}$ Rs.
1955	198.04	741.46	0.0605	1491.95
1956	1078.55	-27514.03	0.0066	13801.21
1957	1459.88	9623.51	0.0047	19009.63
1958	973.10	4321.08	0.0085	7764.52
1959	2301.45	11421.63	0.0032	23411.49
1960	2903.44	19460.07	0.0023	31587.99
1961	2455.23	14151.22	0.0026	26890.96
1962	2150.07	17917.27	0.0034	19329.93
1963	2199.66	8506.03	0.0029	22298.86
1964	2060.32	7376.75	0.0040	15724.83
1965	2066.83	7326.59	0.0035	17510.90
1966	2042.38	6111.26	0.0038	15314.40
1967	2158.50	6668.23	0.0034	16055.45
1968	2320.87	7702.86	0.0034	16895.12
1-4-69 to 31-3-70	3427.45	7796.76	0.0028	17123.11
1971	3771.12	17906.56	0.0023	36034.68
1972	4071.84	22033.78	0.0023	21557.51
1973	5228.57	72619.08	0.0016	27336.31
1974	4029.93	6695.34	0.0022	6137.26
1975	449.85	2919.06	0.0018	6072.75

Wage Rental Ratio $\left(\frac{W}{r}\right)$

Generally wages are not equal to the value of the marginal product of worker. It is possible only in case of perfect competition. Similarly, rate of return is the reward of capital that should also be equal to the marginal product of capital. Thus, the wage rental ratio indicates the ratio of marginal product per worker to marginal product

per rupee of adjusted capital. If wage rate is equal to marginal product, then the ratio indicates the amount of capital required to be invested in order to get the product produced by one worker associated with capital provided capital and labour can be perfectly substituted for each other. From Table 2, it can be seen that the ratio

$\left(\frac{W}{r}\right)$ is negative in 1956 (-27514.03) because of

negative value of rate of return. It has also shown rising trend but is subjected to many fluctuations. Because of rising real wage rates, the ratio indicates that relatively greater capital is required for purposes of investment, in order to get marginal product equal to that produced by one worker.

Labour Requirements per Tonne:

If we visualise whether labour efficiency has increased or otherwise or whether labour requirements per tonne has increased we should calculate the ratio $\frac{\text{Total workers}}{\text{Total Tonnes produced}}$

The ratio indicates that there are many fluctuations but the trend is declining. The declining ratio shows that labour required per tonne has decreased over the period. This might have happened to change in capital-labour ratio. Increased capital per worker may be due to technological changes in the industry.

Capital Intensity:

The above reduced labour requirements per tonne can be reconciled by the fact that capital-labour ratio $\left(\frac{K'}{L}\right)$ has increased over the period, though it has shown fluctuations throughout the period (Table 2, col. 5). The ratio has declined during 1974 (6137.26) and 1975. (6072.75) but that might have been affected by some changes in employment policy and replacement of assets.

Indicators of total Productivity

Output Input :

The $\frac{\text{Output}}{\text{input}}$ ratio (Table 3), shows fluctuating trends over the entire twenty-one year period, except in 1970 (2.1523) and 1975 (2.1472) when it increased abnormally. No steady increase or decrease is recorded. The trend indicated by index of $\frac{\text{Output}}{\text{input}}$ is declining, since the indices show increase or decrease as compared to 1955.

I_t Index :

Kendrick's measure of total productivity (I_t Index) taking 1955 as base year shows an in-

creasing trend in total productivity except for the years 1956, 1957, 1960, 1961, 1962 and 1973. Thus, as compared to the base year, the total productivity of labour and capital has increased.

Value Added as percentage of Output:

If absolute value added by factors is compared with the value of output, then it would indicate increase in productivity. If the net value added (the difference between output and inputs) increases, it implies that contribution of factors increase, since the output, input and value added are calculated at base year prices. Hence, the value added as percentage of output has been calculated to measure total productivity. The percentage has been fluctuating from year to year. Only in 1956, it was 56 per cent of the output.

Inputs as Percentage of Value Added:

Inputs as percentage of value added has been calculated in order to know the trends in the value of inputs required to generate value added, throughout the period. The percentage should be as low as possible in order to increase productivity. It was lowest during 1970 which indicates that total productivity was highest during 1970. This is also supported by labour productivity $\left(\frac{V}{L}\right)$ and capital productivity $\left(\frac{V}{K'}\right)$.

However, on the whole, the trend is fluctuating.

Inputs requirements per Tonne.

Inputs required per tonne of output also indicates level of productivity. The lower the value of inputs per tonne, the higher would be the productivity. Once again, 1970 shows the lowest value of inputs, hence, total productivity was the highest during this year (Table 4).

Inputs plus Wages and Salaries cost per Tonne:

Total cost per tonne is also an indicator of total productivity. Total cost has been calculated as the cost of inputs including depreciation and total payments made for wages and salaries. Rising costs per tonne-indicates that productivity is decreasing and *vice-versa*. The data reveal fluctuating performance but the trend is declining. It was at a fairly low level in 1970 (35.74), but

Table 3
Productivity Ratios (at 1951-52 prices)

Period	Output/Input	Indices of Output/Input	It Index	Value Added as percentage of Gross Output
1955	1.9034	100.00	100.00	50.90
1956	1.1206	58.87	13.83	6.38
1957	1.7997	94.53	82.34	37.10
1958	1.8337	96.33	119.80	41.76
1959	1.6479	86.57	108.79	40.82
1960	1.4113	74.14	88.22	32.60
1961	1.4466	76.00	96.49	33.94
1962	1.2541	65.88	83.38	27.85
1963	1.5624	82.08	129.58	42.41
1964	1.8077	94.97	146.73	46.98
1965	1.8405	96.69	143.75	44.11
1966	1.8200	95.61	166.96	49.57
1967	1.8221	96.04	163.96	45.88
1968	1.9026	99.95	157.35	45.97
1-4-69 to 31-3-70	2.1523	113.07	229.60	55.53
1971	1.8261	95.93	115.65	47.66
1972	1.5471	81.28	155.26	33.32
1973	1.4976	78.68	95.99	21.42
1974	1.9494	102.41	420.21	31.39
1975	2.1472	112.80	760.23	43.84

was lowest in 1975 (34.70). Thus, total productivity over the period has witnessed a rising trend.

Conclusion

On the basis of the above analysis, the following conclusions emerge :

- (1) Labour productivity has shown an abrupt increase in 1957 followed by a fluctuating trend during 1958-68. It was highest during 1970.
- (2) Capital productivity $\left(\frac{V}{K'}\right)$ and rate of return (r) on capital have exhibited rising trends, though, they were subject to many fluctuations.
- (3) Real wages per worker taking 1951 as base year has increased over the period.
- (4) Although, the number of workers has increased, labour requirements per

Table 4
Productivity Ratios (at 1951-52 prices)

Period	Inputs as percentage of value Added	<u>Total Inputs</u>	<u>Input+Wages and salaries</u>
		<u>Total Tonnes Produced</u>	<u>Total Tonnes produced</u>
		Rs.	Rs.
1955	103.21	37.30	49.29
1956	1397.04	49.97	57.15
1957	149.74	31.11	38.10
1958	130.56	30.53	38.90
1959	148.64	33.78	41.47
1960	217.32	39.67	46.64
1961	203.63	38.71	45.26
1962	286.22	44.65	52.15
1963	150.88	35.83	42.41
1964	117.74	30.97	39.37
1965	123.17	30.42	37.70
1966	110.84	30.76	38.68
1967	119.20	30.63	38.17
1968	114.31	29.43	37.49
1-4-69 to 31-3-1970	83.66	26.01	35.74
31-3-71	114.88	30.66	39.52
31-3-72	193.97	36.19	45.62
31-3-73	311.59	37.39	46.10
31-3-74	163.39	28.72	37.89
31-3-75	106.22	26.58	34.70

tonne has decreased. This may be due to the increased production and increased capital intensity.

- (5) Fixed net adjusted capital per worker has increased during the period. This shows that technological progress is capital absorbing.
- (6) Total cost per tonne measured in terms

of costs of inputs and wages and salaries has witnessed a declining trend.

- (7) When we analyse all ratios, total productivity has increased over the period though it has shown many fluctuations. The performance of the unit was the best during 1970. The overall trend in productivity is increasing. □

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LETTER FROM THE EDITOR-IN-CHIEF

Every enterprise has to contend against forces both external and internal and utilise the resources for effective enterprise operations consistent with enterprise objectives. In this it has to rely on the knowledge and experience of its operating members which often come in conflict with the desired expectations generated in the enterprises. As such there is a lack of compatibility between expectations and the potentialities of the system to meet these expectations.

The art of management consists of overcoming the dilemmas without sacrificing the organisational needs. Obviously it is not confined merely to the art of using the resources but also of optimising this use, and overcoming the stresses and strains which are a necessary part of a dynamic system. In fact stresses and strains are symptomatic of lack of planning and pragmatic policy execution. Effective management not only plans for the present or the expected but also for the future and the unexpected thereby causing the unexpected to become expected. In this process some of the dilemmas which a manager must overcome may be characterised as follows :

(i) **That given the opportunity and the resources a Manager can achieve the expected.**

In practice this does not happen because the resources are never enough. Even when there are plentiful resources in the absence of a proper "Strategy", results cannot be achieved. In fact, it is not resources which limit decisions—it is decisions which limit the resources.

(ii) **That activities in an enterprise develop momentum according to the pressures built.**

This leads to psychology of counter-acting pressures while allowing things to move. Any activity under pressure is indicative of a lack of foresight and a poor appreciation of the perspective of enterprise and its goals.

(iii) **That Managers are highly intelligent people.**

It is a strange paradox that high intelligence among Managers leads to complacency and at times even destroys the process of "collective thinking" and "team work". It also becomes a road block in solving problems which are an essential part of a Manager's task. It has also to be recognised that while dealing with a large body of people average intelligence is always the rule. To make people work as a team and to solve common problems, additionally requires a sense of identification and compatibility. Too much reliance on intelligence alone may not be very conducive to the success of a Manager.

(iv) **That problems are a continuing feature of any system.**

Problems are of a never ending nature. A Manager who is obsessed with the problems has to overcome these by finding time for planning and organising and for giving new directions to the enterprise activities. In solving problems there are always alternatives available and if a Manager makes his choice only from these alternatives, he cannot be creative. A Manager has therefore to search for new alternatives and in the event two alternatives are available he should be ready to look for the third one.

(v) **A Manager's personal visibility is always high.**

While it is undoubtedly true that a Manager enjoys better visibility as compared to those down the line, it should not blur his vision. There is always a danger of a Manager becoming a victim of the limelight and getting dazed. This is not merely a matter of risk and danger to the Manager but also to the enterprise as a whole. The visibility of a Manager should not lead to distortion of either values or of understanding.

(vi) **A Manager must take decisions.**

In taking decisions a Manager must avoid falling into the 'intelligence trap' and getting into the vicious circle of overcoming problems. His primary task is to solve problems by concentrating on alternatives which would redefine the problem. This is necessary for obtaining results, for lowering unit cost and exercising judgement in doing the right things at the right time.

A. N. Saxena