Research and Development Activity in India

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Introduction

Research and Development (R&D) is a subject of growing importance all over the world. This is because of a number of factors. First, one finds that R&D activity is related to economic development. Many rich countries of today are those where R&D activity has been accorded an important place and *vice versa*. There are, however, instances where expenditure on R&D is high and yet the growth rate of the economy is low. This suggests that there are other factors necessary for the growth which are lacking there. We would accept the premise that there is a positive relationship between R&D activity and economic growth. There is a good deal of evidence to support this. Second, in the case of depleting natural resources such as coal and other minerals, properly directed R&D activity would help in providing substitutes. Finally, developing countries like India are striving to expand their export trade which could only be possible if they are not behind their competitors in technical knowledge. All these factors signify the importance of R&D activity.

Since this subject is vast, it is not possible to cover it in its entirety within a short compass of this paper. It first sets out to define research, development and other related terms. It then analyses the main trends in R&D activity in India on the basis of statistics brought out by the Department of Science and Technology, Government of India, raises a number of pertinent issues and finally offers suggestions for the improvement of R&D statistics in India.

Concepts of Research and Development

The term 'research' signifies the process which leads to the advancement of knowledge. According to the National Science Foundation of

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the United States,[1] scientific research is systematic and intensive study directed towards fuller scientific knowledge of the subject studied. It could be of two types, viz., basic or pure research and applied research. As Keith Norris and John Vaizey point out, the former is undertaken with no specific commercial objective, while the latter tackles problems with immediate commercial potential.[2] Though one may be able to distinguish basic research from applied research, in most of the cases, the distinction between the two, at times gets blurred. Several firms may be engaged in basic research which does not have any immediate commercial use. However, it may be commercially potential as otherwise firms would not undertake it at all.

The National Science Foundation defines 'development' as "the systematic use of the scientific knowledge directed towards production of useful materials, devices, systems, or methods,, including design and development of prototypes and processes".[3] It is the process of selecting the most promising research results and using them to create new products or processes. A comparison of the definitions of 'research' and 'development' as given by the National Science Foundation shows that the latter lays emphasis on the application of scientific knowledge. Since all processes or products are not likely to be profitable in given market conditions, development involves the identification of commercially most promising processes and discarding others. It will be seen that commercial objectives become overwhelmingly important in the development stage of a new product. An integral part of development activity is design which involves a comprehensive examination of commercial and production possibilities. Finally, when a new production process is introduced or a production line is set up to produce a new product, one may regard it as the final outcome of development. In this context, one may also like the meaning of a related term 'innovation' which takes place towards the end of development phase. Innovation is the embodiment of new knowledge into actual productive processes. However, there are certain improvements which take place subsequently. This is because certain limitations or deficiencies become apparent only when production takes place on a fairly large scale. In other words, some development takes place subsequently to innovation which goes on to signify that there is overlapping of research, development and production.[4]

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1. National Science Foundation : *Methodological Aspects of Statistics on Research and Development, Costs and Manpower*, Washington, 1959, p. 74.

2. Keith Norris and John Vaizey : *The Economics of Research and Technology*, London, George Allen & Unwin Ltd., 1973, p. 21.

3. National Science Foundation : *Op. cit.*

4. Keith Norris and John Vaizey : *Op. cit.*, p. 22.

R&D Organisation Set-up in India

Before undertaking the analysis of R&D statistics, it may be worthwhile to know the organisation of R&D in India. There are various types of agencies that are engaged in R&D activity. A number of departments/ organisations in the ministries of the Government of India are involved in R&D activity in their respective fields. These are Department of Atomic Energy, Council of Scientific and Industrial Research, Defence Research and Development Organisation, Indian Council of Medical Research, Indian Council of Agricultural Research, Department of Space, Department of Science and Technology and Department of Electronics. Some of these organisations like the Council of Scientific and Industrial Research have a number of affiliated institutes/laboratories, each devoted to a specialised field. At the State level, there are organisations/departments where research and development activity is carried out. Besides, many public sector undertakings have also started their own research and development. There are many research associations in different industries where R&D activity is carried out. There are institutions engaged in co-operative R&D activity. These are devoted to problems of common interest within an industry. To mention some of these—Automative Research Association, South India Textile Research Association, Bombay Textile Research Association, Wool Research Association, Cement Research Institute, Indian Plywood Industries Research Association, Indan Rubber Manufacturers' Research Association, Silk and Art Silk Mills' Research Association and the Tea Research Association. These associations are representative bodies of the concerned industries and are interested in such problems that may be of interest to a large number of units in the same industry. There are a host of industrial firms in the private sector which have their own R&D cells/departments where research and development activity is undertaken on the basis of priorities and relevance of the problem faced by them. To complete the list, there are universities too where a limited amount of research and development activity is carried out. By and large, universities are engaged in basic or fundamental research which has its own importance.

During the Fifth Five-Year Plan,[5] the Government of India has taken a number of steps to streamline the R&D activity in the country. At the State level, State Committees for Science & Technology were constituted in some States at the instance of the National Council for Science & Technology. State Research, Development & Design Committees were set up under the joint auspices of the Ministry of Industrial Development and the Department of Science and Technology. The main task of these State level committees is to scrutinise problems pertaining to research, development and design referred to them by industries from the small-

5. For details, see G. O. I. Planning Commission: *Draft Five-Year Plan 1978-83*, New Delhi, 1978, pp. 256-269.

scale sector. The problems thus identified are then referred to appropriate national laboratories and other institutions for solution.

The foregoing points establish that India has a vast network of institutions of various types where R&D activity is carried out. This list, no doubt, is impressive. However, as will be evident at a later stage, R&D activity is not commensurately developed in India on account of a number of factors.

Growth of R&D Activity in India

R&D Expenditure : R&D activity in India received a great push during the past three decades as is evident from the figures pertaining to expenditure on R&D.

Table 1 : R&D Expenditure, 1958-59 to 1976-77

	1958-59	*1965-66*	*1970-71*	*1975-76*	*1976-77*
1. GNP at current prices (Rs. crores)	12600*	21866	36654	64996	69047**
2. Expenditure on R&D (Rs. crores)	22.93	68.39	139.64	356.69	402.25
3. 2 as % of 1	0.18	0.31	0.38	0.55	0.55
4. Expenditure on R&D & related S&T activity (Rs. crores)	28.81	85.06	173.37	397.99	448.19
5. 4 as % of 1	0.23	0.39	0.47	0.61	0.65

* Net National Product

** Quick Estimate

(Source : Department of Science & Technology, Government of India : Research & Development Statistics 1976-77, New Delhi, 1978).

Expenditure on R&D increased much faster than the GNP during the period 1958-59 to 1976-77. Consequently, the proportion of R&D expenditure to GNP increased from about 0.25 percent in 1958-59 to 0.65 percent in 1976-77. However, this is much smaller than the corresponding percentage in advanced countries, as will be seen later.

Table 2 : Expenditure on R&D in Public Sector Undertakings and Private Sector Enterprises

(in Rs. crores)

Year	*Public Sector Undertakings*	*Private Sector Enterprises*
1974-75	19.00	36.46
1975-76	26.15	42.35
1976-77	34.41	49.50
Percent increase in 1976-77 over 1974-75	81.10	35.77
Expenditure on R&D as percentage of sales turnover	0.38	0.78

(Source : Same as in Table 1).

DST gives separately statistics on R&D by Central Government, State Government, Public Sector Undertakings and the Private Sector Enterprises. A comparison of data for the public sector undertakings with those of the private sector enterprises shows that for the three year period, 1974-75 to 1976-77, the growth was higher in the former (Table 2). However, in absolute terms expenditure on R&D was more in the private sector than in the public sector undertakings. Furthermore, expenditure on R&D constituted a higher proportion to sales turnover, 0.78%, in the private sector as compared to mere 0.38% in the public sector undertakings. This shows that private sector units are not averse to R&D activity contrary to the general impression in this regard. This also shows that the public sector undertakings have not given enough attention to R&D activity. This may be partly on account of the absence of competitive market in their case. However, this needs detailed investigation.

Table 3 presents data on R&D expenditure in selected countries. As the figures do not relate to a common year, these are not strictly comparable. However, these data would give a broad idea of the relative R&D effort in different countries. It will be seen that in terms of per capita R&D expenditure, India occupied the lowest position in 1976 with a meagre sum of US $ 0.43 in contrast to US $ 158.5 in the United States. In terms of GNP, R&D expenditure in India was a shade higher than in Argentina and twice that in Iran. Barring these two countries, India occupied the lowest position in this respect. Thus one finds that measured by itself, R&D expenditure in India has increased substantially over the past decade though in relation to other countries, its performance is poor.

Table 3 : R&D Expenditure in Selected Countries

Name of the country	*Year*	*R&D expenditure as %of GNP*	*Per Capita R&D expenditure in US $*
India	1976-77	0.6	0.43
Argentina	1974	0.5	7.36
Australia	1973	1.6	71.28
Belgium	1969	1.2	30.20
Canada	1973	1.2	63.09
France	1974	1.7	91.14
Germany (FRG)	1973	2.1	117.24
Iran	1972	0.3	1.68
Italy	1974	0.9	25.34
Japan	1975	2.1	83.46
Sweden	1973	1.6	101.08
Switzerland	1971	2.0	58.79
U. K.	1972	2.0	58.79
U. S. A.	1974	2.3	158.50

(Source : UNESCO Statistical Year Book, 1976)

Patent Statistics : One of the measures used to determine the output gained from the R&D expenditure is the patent statistics. This is not, however, the only measure of output available—one alternative measure could be the number of articles published in scientific and technical journals, but this measures the scale of inventive activity. Generally, patent statistics are used to measure the output of R&D activity. But, as certain results are not patentable, patent statistics do not fully show the output of scientific and technological activity. These can be regarded, in part, the Measure of R&D activity. In the absence of any better indicator of research activity, patent statistics could be used for analysis. However, before we analyse patent statistics, we should be aware of two underlying assumptions in the use of such statistics. First, that the ratio of patent to inventions remains constant over time. This may or may not be true. For example, some industrial firms may like to keep their invention as a secret and as such, may not get it patented. Another factor that may affect the ratio of patents to inventions is the change in the standards of patentability applied by the Patent Office. The second assumption is that the 'average' invention in any year is of equal importance to the 'average' invention in all other years. In other words, the distribution of patents by importance remains unchanged over the years. Since there is no evidence available to support these assumptions, one has to be very careful in analysing patent statistics.

Table 4 : Growth of Patents, 1968 to 1976-77

Year	Number of Applications		
	Total	Made by Indians	Col. (3) as% of Col. (2)
(1)	(2)	(3)	(4)
1968	5,358	1,110	20.7
1969	5,446	1,120	20.6
1970	5,142	1,116	21.7
1971	4,345	1,231	28.3
1972	3,695	1,180	31.9
1972-73	3,639	1,143	31.4
1973-74	3,491	976	28.0
1974-75	3,406	1,148	33.7
1975-76	2,996	1,129	33.7
1976-77	3,104	1,342	43.2

(Source : Same as in Table 1).

It will be seen from these statistics that the number of applications filed for patents has declined from 5358 in 1968 to 3104 in 1976-77. This is mainly on account of the decline in the number of applications from foreigners. In order to have a better idea of R&D activity in India, corresponding statistics for Indians would be more relevant. These statistics are shown in Column (3). It will be seen that the number of applications made by Indians showed only a modest increase from 1110 to 1342 during a period of about ten years. For a vast country like India, the figure of about 1340 is very small. A heartening feature, however, is that the proportion of patent applications made by Indians to the total patent applications has been, on the whole, rising. The proportion of applications filed for patents by Indians increased from 21 percent in 1968 to 43 percent in 1976-77.

R&D Manpower: Another indicator used to measure the R&D effort is the proportion of scientists and engineers employed in research and development. Table 5 gives these satistics for selected countries.

While the absolute number of scientists and engineers may be large in India, yet, in relation to population it forms a small proportion. India (1976) had only 4 scientists and engineers per thousand of its population whereas it was as high as 185 in Japan (1975). Further, the proportion of scientists and engineers employed in R&D activity per thousand population was mere 0.09. Only 2.37 percent of scientists and engineers were engaged in R&D activity in India which was higher than in

Argentina and Mexico. As R&D activity is not yet well developed, it is not surprising to know that it absorbs only a small proportion of scientists and engineering personnel.

Table 5: Scientists and Engineers employed in R&D

Country	*Year*	*Scientists & Engineers Per 1000 population*	*Scientists & Engineers & Technicians in R&D per 1000 Population*	*Scientific & Technical personnel in R&D (%)*
Argentina	1974	97.41	0.76	0.76
Australia	1973	46.64	3.27	7.01
Canada	1972	32.29	1.90	5.88
Germany (FRG)	1973	18.61	2.97	15.95
Iran	1972	5.25	0.19	3.63
India	1976-77	3.80	0.09	2.37
Japan	1975	185.08	4.40	2.40
Mexico	1971	20.94	0.22	1.05
Netherlands	1974	56.25	3.92	6.97
U.S.A.	1974	11.90	2.68	22.52
U.S.S.R.	1973	81.54	3.72	4.56

(Source : UNESCO Statistical Year Book, 1976).

Strengthening of R&D Activity

Having analysed statistics on R&D activity, let us consider another important aspect, viz., limitation of R&D activity in India and the measures required not only to promote it but to make it more purposive to the requirements of the Indian economy.

A factor which has not been sufficiently recognised in the discussion on R&D activity in India is that the industrial concerns have been, by and large, enjoying a sheltered market. This is more true in the cases of large scale public enterprises. Consequently, these concerns do not seem to have any interest in R&D activity; more often than not they are indifferent in R&D activity. It is suggested that the policies should be formulated so as to ensure greater competition among the industrial concerns which, in turn, would help promote R&D activity.

R&D activity in developing countries like India should be relevant to the stage of economic growth as also to their social objectives. In view of the scarcity of resources, it is impossible for developing countries to pursue science and technology in the multitude of areas as is being

done in the developed countries. As such, research and development activity has to be extremely selective, keeping due regard to the natural endowment of the country and their main requirement. An imitation of western pattern of R&D activity disregarding our immediate requirements and limitations will not help the country besides draining away our scarce financial resources. In this context, one should not forget that agriculture is the most important economic activity of the country. But, R&D expenditure in agriculture, forestry, fishery, etc., constitutes only 20 percent of the total R&D expenditure in the country. This needs to be pushed up. Similarly, in the sphere of industries too, there should be greater emphasis on the development of small scale industries. A judicious selection of the projects for the R&D activity both by governmental institutions, public and private sector enterprises is an imperative need of the present times. Further, one should not overlook social aspects too. R&D activity should be in conformity with the social goals set by the society. There should be increasing realisation on the part of authorities in R&D institutions and organisations that there should be conformity between R&D policy and social objectives, thereby strengthening the link between the two.

Apart from our own effort towards the orientation of R&D activity to our requirement, it is desirable that developed countries too should provide some orientation in their R&D expenditure to the specific problems of the developing countries. In this context, it is worthwile to recall the observations made by Prof. Hans W. Singer : "At the present time, the scientific and technological power of mankind, the greatest force for good or evil in the outlook for the human race, is not used for developing the technology which is right for the great majority of mankind living in the poorer countries. Military, space and atomic research absorb half of it". In fact, one of the many recommendations made by the Sussex Group (of which Prof. Hans Singer was the Chairman) in its famous manifesto on Science and Technology to Developing Countries during the Second Development Decade[6] was to pursuade the developed countries to give some orientation to their R&D activity to the needs of the developing countries. This, however, is extremely difficult to implement.

Management of research and development is yet another area on which greater attention needs to be given. Even developed countries have realised that despite rich resources at their disposal, they have not been able to obtain the best results from their R&D activity on account of limitations in management. Since R&D activity needs huge investment the outcome of which is uncertain in the initial stages of the project, it will be only proper if greater care is exercised right from the beginning.

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6. H.W. Singer : "The Development Outlook for Poor Countries : Technology is the Key". *Challenge*, New York, May/June 1973.

As Carter and Williams have rightly observed "the task of R&D Department of a firm is not simply to solve scientific and technological problems, but to solve those problems, which are most relevant to the changing position of the firm. That is to say, the successful research manager relates his actual programme to the market position, its selling policy, the size of the project which the firm can competently undertake, its raw material problems and capital programmes. Unless this is done research projects that cannot or will not be used by the firm will be carried through, while others that could have been used will be ignored".[7] In this context, one would like to know as to what are the major aspects that are relevant in the evolution of a sound management system of R&D activity. Economic, organisational and behavioural aspects of the management of research and development and their impact on technological innovation in industrial firms must be probed into. Case studies of good management of R&D activity may be taken up with a view to identifying the factors that have promoted R&D activity in such enterprises.

In the private sector, R&D activity is mostly confined to a few industries such as electronics, chemicals (including drugs and pharmaceuticals, dyestuff and fertilisers), industrial machinery and metallurgical industries. These industries are based on advanced technology, which, in turn, lead to frequent obsolescence of processes. Further, market competitions have also contributed to the spurt in the R&D activity of these industries. Such a concentration of R&D activity in a couple of industries should be further investigated in order to understand the growth process of R&D activity.

There are over 400 establishments in the private sector registered with the Department of Science and Technology and reported to be engaged in research and development. The Government offers certain incentives to these establishments to promote indigenous technology. It may be worthwhile to examine as to how far such incentives have been useful. A comprehensive appraisal of various incentives for promoting R&D activity may be undertaken for making these more effective.

Improvement in R&D Statistics

Collection and dissemination of data on R&D have not yet received the attention they deserve. While the Department of Science and Technology made a good beginning in this direction a few years ago, a lot needs to be done. A few suggestions for the improvement of R&D statistics are made here.

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7. Carter, C. & B. R. Williams: *Industry & Technical Progress*, London, Oxford University Press, 1957.

Of the tables contained in the annual publication of the Department of Science & Technology, only two give State-wise break-up of the data on R&D and related activities. No break-up of R&D expenditure by the nature of activity for different States is available. Such data, being important, may also be given. Besides, a few tables with State-wise break-up may be given to enable the users to form some comparative idea on R&D effort of various States.

Statistics of R&D in the private sector should also indicate the type of industry group. There are certain industries where R&D activity is more prominent than others. It may be useful to bring out statistics industry-wise as well. Further, the statistics may also indicate the number of new units registered with the Department of Science and Technology each year. A table showing the number of new units by industry registered with the Department each year, the number of R&D personnel employed and the expenditure of R&D by such units would enhance the utility of the publication. The Department of Science & Technology should explore the possibility of compiling statistics of R&D on the basis of size of the firms especially in the industrial sector. In the absence of such statistics, we do not have any idea of the relationship between size of firm and its R&D activity.

Finally, a few more tables relating to R&D expenditure in other countries, both developed and developing, may also be given. At present, one or two tables with skeleton data are given; one needs to know much more about R&D activity elsewhere. This would make international comparisons possible. □

Job Enrichment : Prospects and Problems

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Introduction

Management of human resource is increasingly being recognised as the limiting factor in organisational effectiveness. In recent years questions like why do people behave the way they do in their work, what do they want from their work, etc., have become pressing concerns of managers. Last two decades have seen extensive growth in the research on motivation and several behavioural scientists have been able to develop some of the most fascinating theories of human motivation. McGregor, Maslow, and Herzberg have become familiar names not only in academic circles but in industrial organisations as well.

Maslow's (1954)[1] theory of need hierarchy postulates that as man's basic needs (psysiological and security) are satisfied, the secondary needs (social, ego and self actualisation) begin to assume importance. Much of his attitude and behaviour gets modified according to the degree of satisfaction of these needs. Maslow emphasises, that the efforts to motivate workers have to be consistent with the theory that a satisfied need does not offer opportunity for motivation. He stresses that as lower order needs are satisfied, higher order needs have to be acknowledged as motivators.

McGregor's (1966)[2] two-facet theory proposes that the average worker is lazy, does not like his work, is not ambitious and would rather like to be led (Theory X). On the other hand, theory Y postulates that work is an essential part of man's make up. That the average worker can be taught to seek and accept responsibility and make meaningful contribution in decision-making and problem-solving if given the opportunity.

The most recent of the three and probably much more acceptable is Herzberg's (1959)[3] two-factor theory of motivation. Using critical

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1. Abraham H. Maslow. *Motivation and Personality*. New York : Harper and Row, 1954.
2. Douglas McGregor, *The Human Side of Enterprise*. New York : McGraw Hill, 1966.
3. F. Herzberg, B. Mausner, & B. Snyderman. The *Motivation to Work*, New York, John Wiley, 1959.

incidents technique Herzberg found two sets of factors known as motivators (achievement, recognition, growth etc) and hygiene factors (eg. salary, working conditions, inter-personnel relations etc.) These two sets of factors are discrete aspects of work and are neither different points on the same continuum, nor different levels in a motivational hierarchy—the presence of one does not mean the absence of the other. If one wishes to minimise dissatisfaction one must focus on hygiene factors. But to achieve satisfaction the shift has to be in favour of motivators.

All three researches, despite differences in approach have one thing in common. None sees the contradiction in maintaining that to achieve satisfaction and motivation focus should be on the work itself. As a sequence of these theories of work motivation, several new concepts have been evolved and tested out in a variety of situations. One such concept is job enrichment.

Job enrichment, as a process of restructuring jobs so as to make them more challenging, motivating and satisfying to the individual was implemented in a systematic way as early as 1944 in IBM (Richardson & Walker 1948)[4]. Contrary to the popular view, job enrichment, both, theoretically and in its application, is different from such intrachangeably used terms as simplification and enlargement etc. Let us first look at what the concept of job enrichment does or does not entail.

1. Job enrichment does not mean to enlarge a job, or simplify it or vary it, or set targets for achievement. These generally have been the concern of industrial engineering.

2. Job enrichment also does not mean to be nice to people to improve the environment in which people work, to have participative style etc., which might be the concern of personnel department.

3. Job enrichment is not a bargaining process in which one side specifies what it wants or is prepared to give up.

4. Job enrichment is also different from job enlargement. The latter is far more comprehensive in its scope and takes into account decision making over a wide field of managerial interests.

5. It is also different from job expansion which consists of merely adding similar elements to the job without altering job contents.

6. It differs from job simplification which results in job that requires less skill, is more repetitive and offers less autonomy.

4. F.L.W. Richardson & C. R. Walker. *Human Relations in An Expanding Company*. New York : Yale University Press, 1948.

Job enrichment refers to the process of making a job more interesting and satisfying, adding to it a sense of achievement, increasing responsibility and providing opportunities for advancement and growth. It refers to the change in the contents of job. Basic to job enrichment is the content/discretion hypothesis. In this hypothesis content refers to the additions in job contents. These additions should not be of 'more of the same' kind as otherwise the exercise will become an exercise in job extension (Kilbridge, 1960)[5]. Rather, the additions should be in terms of "new contents" to the existing jobs. Discretion refers to increasing responsibility and providing opportunity. The addition and discretion are not the sheer sum but an interaction of the two. The addition in interaction with discretion can be responsible for increasing performance and satisfaction. However, this apparently simple relationship is mediated through a third variable, variety. Increase in contents/discretion leads to variety. making repetitive jobs less monotonous and more satisfying. In this context participation and delegation etc., became *means* to introduce additional contents and accountability, authority and proprietorship etc., as just by-products of this addition (Maher, 1971)[6].

The effectiveness of job enrichment programme is enhanced manifold if changes in jobs are made to be perceived as opportunities rather than demands. The logic is simple. People are likely to ignore and/or resist new demands and continue to do the job as they have always done before. If changes are perceived as opportunities, the programmes are likely to be accepted with much enthusisam. For example, in a series of studies in Imperial Chemical Industries, Paul and Robertson (1970)[7] initiated job enrichment programme by making boundaries of the job more flexible. These changes were enabling changes allowing for differential response from individuals. Their results showed a dramatic increase in sales turnover and job satisfaction.

Published studies on job enrichment are not scarce. Two articles on job enrichment are of special interest : *Newsweek* (March 26, 1973) and *Span* (February 1974) have published some very interesting implementations of the concept of job enrichment in a variety of organisations and its influence on satisfaction and productivity.

Relevance of Job Enrichment in India

It is often pointed out that Indian traditions and systems being what they are, for an Indian worker job enrichment may be a far cry. That if

5. M. D. Kilbridge, Reduce Cost Through Job Enlargement : A Case, *Journal of Business*, 1960, 33, 357-362.
6. John. R. Maher, Job Enrichment, Performance and Morale in a Simulated Factory. In J. R. Maher (Ed.) New Perspectives in Job Enrichment. New York : Van Nostrand Reinhold, 1971.
7. W. I. Paul & K. B. Robertson. *Job Enrichment and Employee Motivation.* London : Gower Press, 1970.

employees are paid little more than before, all problems will be solved. There will be greater satisfaction and higher productivity. In order to appreciate the desirability of job enrichment programme in India a survey was carried out on 320 persons who have opted for professional education. The purpose was to understand their needs, aspirations, work values and other factors which would have greater influence on their choice of a career.

The results of the survey indicate the following. A majority of them (72.8%) consider challenge inherent in the job as the major variable in their choice of the career. Freedom to make their own decision (78.8%), maintaining good relations with others in the organisation (62.5%), and willingness to finish jobs before deadline (60.6%) seem to be the major concerns after they have accepted a career. Unlike the general belief, the percentage of people whose major interest will be money that the job offers, is quite less (55%) than those who would be inclined to have a challenging job, discretion in the performance of their duties and meeting deadlines. Their definition of success means having personal sense of satisfaction in whatever they do (88.7%) and they subscribe to the idea that hardwork always pays (75.9%).

Conversely, such things as status, prestige and control etc., seem not to influence them so such. For example there is a very high percentage of those who do not seem to be too cencerned with how their office would look (95%), having control over a large number of people (85.9%), level at which they might join an organisation (71.2%), a continuous increase in their salary (64.4%) and prestige of the organisation (61%).

Though the results of the survey, by and large, indicate non-economic motives as major concerns of the sample, people may insist that the replies are indicative of socially desirable responses. They may also question that since these people have no experience of a job how could they know what the reality is like. In order to overcome the above issues and also to understand what could be some of the additions to the job contents, 47 engineers of one of the State Electricity Boards were interviewed. These engineers have been working on the project site for the last 6-7 years and are involved in the generation and distribution of electricity in a 2-unit thermal plant.

They were asked to suggest ways and means to make their jobs more meaningful to them without necessarily bringing about larger organisational changes. The interviews were open-ended. A content analysis of these interviews provided a set of themes which are listed in Table 1 along with the percentages of people suggesting them. The individual percentages do not add up to 100 because each respondent suggested quite a few contents.

Table 1 : Job Enrichment Themes with Percentages

Contents	*Percentage*
Supportive services	80
Organisational constraints	66
Job contents	47
Training	33
Salary	23
Security	23

As is suggested in Table 1, 80% of the respondents felt their jobs could be enriched if they are provided such facilities as more efficient staff, quality tools and spare parts, and some library facilities. Given the nature of technology (i.e., power generation) these might seem quite important. This thermal plant, because of being old, experiences frequent breakdowns which hamper not only the progress of the on-going activity but also blocks achievement of the targets set by these engineers. Since replacement of plant calls for decision-making at the top level, the respondents felt that if they are provided quality auxiliary equipment much of these breakdowns could either be prevented or taken care of with ease and efficiency.

About 66% felt that if organisational constraints are suitably modified it will provide them greater flexibility and more satisfaction. The constraints referred to rules and regulations, freedom to reward and punish the subordinates, increase in the ceiling of the money they can spend, some control on the pace of activity on the project and little relaxation in the organisational expectations.

As far as job contents are concerned (here job contents are referred to in the Herzberg's framework), 40% are of the opinion that job enrichment is possible if they have more discretion, remote supervision, greater responsibility, frequent opportunities to participate in decisions concerning target setting and power distribution, greater acceptance of their ideas by the supervisors, and no pressure from extra organisational sources.

Training has been classified as a separate content. It is not included in job content because training may not be a job content variable though it can lead to greater confidence. About 33% of the sample felt that training, both job related as well as human relation, will greatly facilitate their functioning in the organisation.

Next important content was found to be the financial incentive. According to 23% of the sample, money has become an important element in their job satisfaction only recently. With increasing prices of essential commodities they felt that the present salary is just not adequate and

hence they would very much like to have more than what they have been receiving. It is important to point out here that because of various administrative constraints, this organisation has not been able to keep up with the payment of Dearness Allowance in as efficient a manner as other organisations.

Security in Table 1 refers to the protection from physical assault or blackmailing by either the *goondas* who live in the villages around the project site or from men hired by the 'enemies'. The fact is that during the last few years the incidents of physical attacks have increased manifold, with serious repurcussions on the performance of workers. It is, therefore, not surprising to find one-fourth of the sample being concerned with security of themselves and their family and feeling a carry over effect into their job. One such example which was quoted by a number of respondents had to do with their inability to strictly adhere to rules and regulations because of unfavourable consequences from the operative staff. This, they feel had contributed substantially to the indifference towards jobs shown by the operative staff.

The results of the survey seem to be consistent with the job enrichment experiments carried out in Texas Instruments, USA, (Weed, 1971)[8] on cleaning service companies employees. Three key variables were manipulated. They were increase in wages to industry average, improve cleaning technology and equipment and improve the selection and training of employees. Their results showed that cleanliness improved from 65% to 85%. The number of people required to do cleaning dropped from 120 to 71 and quarterly turnover dropped from 100% to 9.8%. The similarity of the variables used in Texas Instruments Inc. and the one suggested by the Engineers of the State Electricity Board is remarkable. Of the six contents suggested by the latter, three are more or less same as Texas Instruments study. Supportive services (80%), training (33%) and money (23%) seem like the common parameters of the two cross cultural studies.

The survey results suggest that as far as this particular organisation is concerned, job enrichment can be brought by making suitable changes in their job contents and supportive services. It is difficult to draw a clear cut line between job content and supportive services in this kind of technology, wherein restructuring jobs so as to make them challenging, motivating and satisfying may be frustrated as the back up services are not supportive enough to take care of the challenge inherent in the redesigned job. These results do not seem to be too discrepant from those suggested by 320 students.

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8. E. D. Weed. Job Enrichment "Cleans Up" at Texas Instruments. In J. R. Maher (Ed.) *New Perspective in Job Enrichment*. New York : Van Nostrand Reinhold, 1971.

Feasibility of Job Enrichment Programme

Joh enrichment as a process of making a job more meaningful seems to have caught the attention of a large number of industrial organisations. However, the concept itself has not yet been refined to a point where it can be *easily* adopted or implemented by most managers. It is not yet very clear what should be the parameters of the job (the individual, the nature of technology, and the organisation) that should be altered to gain effective achievement in peroformance and satisfaction. Few precautions are suggested in the following paras that should be taken into consideration before implementing job enrichment programme in an organisation :

1. The process of job enrichment assumes that as the jobs become increasingly specialised they become repetitive. Repetition leads to monotony, which, in turn, generates boredom and job dissatisfaciion, both of which have been found to be associated with undesirable (from the point of view of management) behaviour (Mulin & Blood, 1968)[9]. The purpose of job enrichment is to reverse the effect while keeping the same sequence. However, individual reaction to job enrichment is as difficult to forecast in terms of attitude as in terms of performance. Not all people may welcome the changes in their job. Studies show substantial individual differences in susceptibility to monotony among workers on the same job (Smith, 1955)[10] and perference to routine rather than variety in their jobs (Vroom, 1960)[11]. Not only this, Mulin (1968)[12] found that under certain circumstances job satisfaction was significantly related to individual decision to quit. Therefore, the organisations have to pay attention to the presonality of the employees before bringing about changes.

2. Job enrichment assumes that jobs can be redesigned to permit discretion and responsibility. However, if job is so engineered that it yields itself to repetitive tasks only or if redesign is prohibited by technical and cost consideration, providing for individual growth may be impossible. Hence job enrichment would very much depend on the nature of technology. Some jobs would be easy to redesign while others might be difficult. One would imagine easier ways to enrich assembly line or craft jobs as compared to process industry.

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9. C. L. Mulin & M. R. Blood, Job Enlargement, Individual Differences and Worker Responses. *Psychological Bulletin*, 1968, 49, 41-55.

10. P. C. Smith, Individual Differences in Susceptibility to Industrial Monotony. *Journal of Applied Psychology*, 1955, 39, 322-29.

11. V. C. Vroom, Some Personality Determinants of the Effects of Participation. Englewood Chiffs : Prentice Hall, 1960.

12. C. L. Mulin, Job Satisfaction and Return Over in Female Clerical Population. *Journal of Applied Psychology*, 1966, 50, 280-285.

3. Jobs are much more repetitive and monotonous at the lower levels of the hierarchy because their contents are more clearly identifiable ,and hence rationalisable. As one moves upward in the organisational hierarchy, jobs become complex and lack clear identification. A programme of job enrichment would thus be easy to implement at lower levels than at higher levels.

4. Restructuring of job means more responsibility for the employee and lesser supervision. This in some cases might result in the resentment that supervisory staff might feel because of loss of status and power and possible redundancy. This suggets that job enrichment programme should thus be not just for one level in the organisation but for several so that the feeling of redundancy is not generated.

5. Another precaution has to do with salary structure. When there are additions of 'new contents' there would also be expectations for more money. Where the workers, among other things, are not economically compensated, the job enrichment programme may become an expensive exercise (Sleesmith, 1973)[13]. This does not mean that economic support should be the sole aim of job enrichment. But as suggested by the experiments in Texas Instrument Inc. and as seen in the survey of the Engineers of one of the State Electricity Boards, financial gain along with other things seems to give a push to the success of job enrichment programme. However, it should be kept in mind that higher pay may buy more work temporarily, but it does not buy commitment. Hence exclusive reliance on more payment in job enrichment programme may lead to undesirable behaviour and defeat the very purpose of job enrichment.

This list of variables is by no means exhaustive. Organisational climate, attitude of the management, cost and administrative constraints are some of the other factors that have to be taken into account quite rigorously before a job enrichment programme is implemented. The benefits of a meaningfully carried out job enrichment programme are not immediately apparent either in terms of satisfaction of employees or company profits. In the long run, however, the improvements are likely to be reflected in greater interest in job, leading to greater output. □

13. P.I Sleesmith, Job Involvement and Communication. London : Business Books Limited, 1973.

Corporate Planning : A Model for Banks

S. R. Subba Rao*

INTRODUCTION

The last decade has seen a phenomenal growth of commercial banks in India in terms of branch network and functional areas. This period has witnessed on the part of the banks:

(a) an urge to grow geographically from regional to state level, state to national level and national to international level for better image and strength;

(b) an attitude to multiply in operational activities in spite of growing complexities;

(c) an obligation to lend funds to priority and weaker sectors at concessional rates of interest;

(d) acceptance of increased competition;

(e) an increase in resource costs and operational expenses on the one hand and ceiling on lending rates on the other; and

(f) acceptance of the social responsibility of providing banking services to rural areas (though they—the banks—find the rural branches economically non-viable in most of the cases).

In the light of these, it is a challenging, nonetheless, an onerous task for the managements of the banks to act as development agent to translate the government policies into reality, to retain the commercial character of the banks, to generate profits to keep the shareholders in their fold (which is, of course, applicable to private sector banks also) and more importantly, to build up reserves for the future growth of the institution itself. In order to achieve all these objectives simultaneously, a planned approach is essential. This paper shows how Corporate Planning, an

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of the management. Ackoff[8] has aptly stated that "planning is the design of a desired future and of effective ways of bringing it about".

There are instances of banks growing from regional to national level within a span of five years. In the process, they have multiplied their branch network and operational activities. The forecasts made for them based on past performance will turn out to be wrong.

On the other hand, there are also cases where banks have grown in consonance with the past trends. For some, it was a slow movement upwards. For some others, it was a painful process of retaining their existing hold in their area of operation in the wake of intense competition from others.

Thus, the dynamism of management is the pivotal factor in giving a shape and direction to corporate planning. Without looking into the past performance it may well fix up goals to be attained by the bank. However, a prerequisite for the achievement of these goals is a realistic assessment made by the management, regarding the Strengths (S) and Weakness (W) of the organisation, Opportunities (O) open to it and Threats (T) to be faced by it.

Every bank has certain strong points which are responsible for its existence. These should be identified and every possible step taken by the management to retain them. These may be the image of good customer service the bank has in certain regions, or the special deposit schemes it has got, or the quickness in sanctioning of loans, or profitable services, or motivated employees, etc.

Similarly, some of the weaknesses a bank may have are operations/services on which it is incurring losses, or the traditional methods of its operations (for e.g., carrying out the remittance facilities through demand drafts only and not having, in addition, mail transfer and telegraphic transfer services), or lack of desire to expand the geographical area of operation for fear that the hold of the management of the bank may get reduced, or demotivated staff and so on. In such circumstances, the Corporate plan should have necessary measures to eliminate these weaknesses/drawbacks, or reduce them to a bare minimum.

The opportunities refer to the new geographical areas in which the bank may open branch offices, or undertake new activities or introduce novel deposit schemes depending upon the areas of location of the particular branches, etc.

Threats, aspects such as the growing competition the bank is required to face, or increasing cost of operations, a narrow spread

8. Ackoff R. C., *A Concept of Corporate Planning*, Wiley, Interscience, 1970.

between the rate of interest earned on advances and that payable on deposits, or lack of preparedness on the part of the staff to work in rural areas (due to inadequate civic amenities and facilities therein and the tendency on the part of some employees to follow unhealthy practices in their anxiety to procure business for the bank), should be viewed in totality while preparing a Corporate plan.

An assessment of the above aspects gives a direction to the implementation process in the fullfilment of objectives and enables the management to take supportive/corrective steps to interpret the corporate plan in a meaningful way.

Management Information System

Corporate plan has a rational approach. The analysis, projection and conclusion relating to it are based on "observed data, statistical measurement, mathematical treatment, and the best available methods of non-numerical evaluation and deduction."[9] For this the management should have a ready flow of information all the time. The Management Information System comprises collection and storing of data, its processing and analysis and preparation of concise statements/reports for ready use of the management.

The banking trends have to be forecast by the MIS cell using relevant modern techniques.[10] There may be some areas of corporate plan for which actual or complete information may not be available, thereby entering the plan as an element of uncertainty. This is inevitable. However, with the help of forecasting techniques one can always reduce the degree of uncertainty, to minimum.

The corporate planning process encompasses, among others, the development of alternative courses of action to achieve the objectives set and the selection of one or more course(s) of action from among these alternatives.[11] The MIS will be helpful in preparing these alternative courses of action-plans.

Implementation

Once the corporate plan is ready, it is the responsibility of the Chairman of the Bank to get prepared an operational plan (normally covering a period of two years). An operational plan envisages the performance areas of the bank (viz., deposits, borrowings, remittances, cash

9. Melville C. Branch, *Op. cit.*, p. 37.
10. For a detailed account of these techniques, see Olaf Kleine and Rakesh Kumar, *Corporate Planning—A Management Tool*, National Productivity Council, New Delhi, 1978, pp. 213-215.
11. Scott B. W. *Long Range Planning in American Industry*, American Management Association, 1965.

management, investment and advances), the input requirements (i.e., manpower need, furniture and equipment, stationery etc.) and results (reflected in profits)

Table 1 : A Corporate Planning Model (1980-84)

Item	*Existing position 1979*	*By the end of 1984*
I. Number of Branches		
(a) In India		
1. Andhra Pradesh		
2. Assam		
3. Arunachal Pradesh		
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(b) Abroad		
1. USA		
2. UK		
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II. Key Resources (Rs. crores)		
1. Capital		
2. Reserves		
3. Deposits		
4. Borrowings		
5. Bills Payable		
III. Major use of Funds		
1. Cash		
2. Investments		
3. Advances		
IV. New Schemes/Activities to be introduced		
(eg.: New deposit schemes, Merchant banking, Income tax consultancy cell, Economic research, Traveller's cheques, etc.)		
V. Manpower (Number)		
1. Executives/Senior Officers at Head Office		
2. Junior Officers at H. O.		
3. Zonal Managers		
4. Regional Managers		
5. Branch Managers		
6. Accountants/Junior Officers		
7. Clerical staff		
8. Sub-staff		
VI. Market Strategies		
VII. Profit		
VIII. Welfare Measures for Staff		

Project Financing and Financial Statements

Rama Sinha*

The importance of finance for any entrepreneurial venture cannot be over-emphasised. Without money, or without adequate money supply, very few efforts are likely to succeed. Money is necessary for setting up a shed or a workshop; it is essential for the purchase of machinery, tools and equipment and it is required for borrowing money from financial institutions to fund the project. Finance is often the key to successful entrepreneurship.

But finance is rarely available in abundance and still rarely free of cost. It costs money to invest, to borrow, and to spend, even as it costs money in delaying and deferring such activities. Time being an important factor, delayed supply of money may as much add to the cost as premature borrowings. This may not only disturb the money situation, but may also eventually affect the profitability of the venture. Optimisation of the financial resource, which envisages the most effective and timely utilisation of funds, thus becomes an implied objective.

Towards this end, the entrepreneur has to ensure, or at least has to attempt that the requirement, availability, mobilisation and disposition of money is worked out and arranged in a scientific manner to help him plan the optimal utilisation of this scarce and costly resource. Financial statements are the instruments of such an attempt.

The financial statements that may be required for a successful venture can be broadly grouped into two parts : first, those that are required to initiate, complete and run a project, and second, those that are required to act as management tools for controls and supervision. This paper deals only with the first aspect and examines the financial statements of simpler types for normal use. Thus, the statements concerning internal rate of return, discounted cash flow, break-even point and shadow prices are not intended to be dealt with.

There are primarily, five statements in this group :

1. Project Cost Statement

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2. Financing Pattern Statement
3. Working Capital Statement
4. Profitability Statement
5. Cash flow Statement,

It would be worthwhile to understand what each one of these stands for, and what important points should be kept in mind while preparing them.

Project Cost Statement

Cost is the main criterion for the selection of a project. An entrepreneur has to select from out of a range of cost-estimates, not only the type of the project, but its nature and size as well. For he has to assess his capacity and capability to muster enough finance, some part of it from his own resources, and then take a decision to take up a project worth, say Rs. 500,000 or Rs. 1 million. The choice for him is also limited on account of the available technology and certain other factors like market potential, raw material availability, management possibilities, etc., but it is primarily the scale of finance required that clinches his choice.

It is essential, therefore, that he be rightly advised on the project cost and he is convinced that the cost worked out has been rationally done. He also must know, beforehand, the financing pattern that will have to be adopted, especially, the money he has to provide from his own resources. Hence, the need for the statement on project cost.

By way of illustration, let us consider the project cost of an Electronics Carbon/Film Resistors Manufacturing Project. This assumption is purely hypothetical and may vary from situation to situation, as the factors that are likely to affect the cost are numerous, such as nearness of raw materials, labour and wages, public policy, taxes and duties, cost of materials, credit policies etc.

With these limitations, the project cost can be arrived at as follows :

Table 1 : Project Cost

Sl. No.	*Items of Expenditure*	*in lakhs*
1.	Land & Building	1.25
2.	Machinery, tools and equipment	3.00
3.	Other Fixed Assets	0.50
4.	Preliminary & Preoperative Expenses	0.25
5.	Margin Money	4.26
6.	Contingencies	0.30
	Total	9.56

It is seen from Table 1 that there are six items of expenditure that normally make the broad heads to arrive at the total project cost. These individual items of expenditure involve numerous variables and thus provide opportunities for choice. The cost of each will presumably be dependent on the choice so exercised.

Thus, while estimating the cost of land, the options may be as under :

a) To purchase land
   (i) in cash down payment, or
   (ii) in instalments.

b) To rent out land
   (i) on annual lease, or
   (ii) on monthly rent.

c) To purchase/rent land
   (i) near the town, or
   (ii) in the industrial area, or
   (iii) in the interior rural area.

d) To purchase/rent land
   (i) of a size required immediately, or
   (ii) of a size that provides for future expansion

The selection of the land and its purchase/rent will rightly depend on various considerations. The cost of such land, to be charged to the project cost would depend on this selection.

Similarly in the case of building, the choice will have to be made from the following alternatives :

a) To purchase buildings
   (i) on outright cash payment, or
   (ii) on instalments.

(b) To rent out buildings
   (i) on annual lease, or
   (ii) on monthly rent.

(c) To construct buildings

(i) in one go, or

(ii) in phases.

d) To construct

(i) Working sheds, or

(ii) first class buildings.

The selection of the type of building/construction will directly affect the cost structure and thereby the project cost estimates.

In machinery and equipment, the problem of selection becomes more acute, for it is not only the level and the nature of technology in question but also the source and the cost which become relevant. Thus, the process know-how may be manual, mechanical or electronic; the technology may be indigenous, imported or mixed; the consultants may be Indian or foreign; the machines may be indigenous or imported (or even in the former, they may be top or medium quality machines); and the equipment and tools may be standard or non-standard. All these would obviously increase or decrease the cost of machinery and equipment and thus have a direct impact on the project cost estimates.

Comparatively, the costs on minor fixed assets, preliminary and pre-operative expenses and the requirement of contingencies pose lesser problem since the amount involved is generally low and it is not worthwhile to go into the intricate details of each and every item. In contingencies, for example, by their very nature it is an unpredicatable charge to the project and, therefore, it is often taken as a reasonable percentage of the capital investment.

It must be mentioned that while other items precede other financial statements, the margin money charged to the cost can only be determined after a working capital statement is prepared on the basis of product identification, assessment of market potential, and determination of level of production and hence the requirement of working capital for production. As a result, the margin money is added to the project cost subsequently.

It will thus be noted that the project cost would depend on the selection of the various items of expenditure out of available variables and the process of elimination and final selection leads to assumptions of project cost estimates. In the instant case, the price of land has been assumed on the basis of an outright purchase in an industrial area sponsored by the State and at price fixed by the State. The cost of building has been taken as for duly constructed in one go of industrial sheds and other allied structure at current cost of construction. The cost of equipment and machinery has been worked out at a mixed mechanical-cum-electro-

nic process based on the assumed advice of the Consultant of a reputed organisation. The other items have been based on probable estimate based on the author's personal experience. The Margin Money is based on the Working Capital Statement which we will examine shortly.

Financing Pattern Statement

Once the Project Cost is ready, the next important thing to determine is the financing pattern. The financing pattern has two components, namely equity and debt. The equity or share capital is the money that the entrepreneur is prepared or has to invest through his own sources. The debt reflects the borrowings that have to be made to fill up the requirement of funds not otherwise covered up. Thus, while equity is his own money, notionally free of interest, debt is the borrowing from institutional or other sources for which interest is chargeable to the project cost.

The equity-debt ratio is dependent on the preparedness of the bankers/financing institutions to lend, on the nature of the project and on the status of the entrepreneur. While a conservative industrial financing institution may entertain only 1:1.5 equity-debt ratio, an aggressive commercial bank may agree to a 1:2 ratio. Similarly, the extremely-high potential of the project, or a high degree of profitability may encourage a financing institution to fund the debt component in an enhanced ratio. The backing that a project may receive, which is reflected in the underwriting of shares or other infra-structural support, from the State or a reputed business concern may again help obtain a still favourable equity-debt ratio.

The equity-debt ratio may be depicted solely in total financial terms or in phased manner over a particular period of the project. On the assumed basis of a ratio, the financing pattern of the Resistors' project proposed above has been taken to be as under :

Table 2 : Financing Pattern

(in Rs. '000)

Items	*I Qr*		*II Qr*		*III Qr*		*IV Qr.*		*Total*	
	Equity	*Debt*	*Equity*	*Debt*	*Equity*	*Debt*	*Equity*	*Debt*	*Equity*	*Debt*
1. Land & Building	25	—	—	100	—	—	—	—	25	100
2. Machinery, Tools & Equipment	—	—	—	—	20	80	40	160	60	240
3. Other Fixed assets	5	20	5	20	—	—	—	—	10	40
4. Preliminary & pre-operative expenses	5	—	5	—	5	—	10	—	25	—
5. Margin Money	—	—	—	—	—	—	426	—	426	—
6. Contingencies	—	—	—	—	—	—	6	24	6	24
Total	35	20	10	120	25	180	482	184	552	404

It is seen that the total of Table 2 tallies with the total project cost in Table 1 and thus the financing pattern is well determined. It will also be observed that as against a total project cost of Rs. 956,000, the equity required is Rs. 552,000, being the money necessary to raise loans against items 1, 2, 3 and 6 of Table I calculated at 20% margin. In the instant case the equity-debt ratio of the Project works out to 1:1.4.

The period-wise phasing indicates the emergence of the financing pattern over four quarters in the construction period. The requirement of equity and borrowings each quarter for each item has been worked out depending on the schedule of the implementation of the project.

Thus, while in the first quarter the total equity required is Rs. 35,000 as against the debt. of Rs. 20,000, in the last quarter, the pressure on equity goes up to Rs. 482,000 as against only Rs. 184,000 as debt. In other words, the equity-debt ratio fluctuates in the four quarters, depending on the need for each item.

It is noteworthy that although the equity may be available with the entrepreneur right from the beginning, the requirement of raising the loan cannot be dispensed with, since it is linked up with different items. It is also important to note that since margin money for working capital at Rs. 4.26 lakhs is fully equity, it is distinguished from other items except item 4 in as much as no long-term borrowings can be effected against these, nor can it be adjusted against long term borrowings.

Working Capital Statement

With equity-debt ratio having been established and long-term borrowings taken care of, the next step is to make assessment of the working capital requirements. Let us see how this is done. The working capital statement reflects the requirement of capital for the day-to-day working of the project. It does not include capital investments on land, buildings, machinery, etc., nor does it include pre-operative expenses and contingencies required to complete the project. The necessity of such a statement is obvious from the fact that the requirement of margin money, that is an essential ingredient of the project cost, can only be worked out if the requirements of working capital and the percentage of margin money required for obtaining it are known.

It will be seen from Table 3 that there are eight items in the working capital statement which encompass the routine administrative expenses and salaries and wages to the cost of stocking raw-materials and finished products and the expenses involved on the sales and servicing of the products so manufactured. The list may include some more items depending on the nature of the project, but by and large these eight items cover all the requirements of working capital. The Table indicates the requirement of working capital or the cash requirement for

continuous production in the factory for an assumed minimum period of one month. It also shows the amount of cash available as short-term loan from the financial institutions and also the margin money required to be put in by the entrepreneur. Necessary ingredients of the statement are the direct cost (i.e., cost of raw materials (imported as well as indigenous), packing material, consumable material (or working material), direct salaries, power and fuel, etc., repair and maintenance, rent, taxes and insurance cost of goods in process, finished goods, stacks at cost (cost for the time they are kept in stocks), sundry debtors at cost and also part of the indirect cost necessary for continuation of the production (i.e., administrative expenses, sales and servicing and also indirect wages and salaries).

There are certain items that, though relevant, are not included. Thus, treatment for income tax is not necessary since the payment will relate to the current year. The depreciation and interest on the working capital is also not included as it also relates to the same year. Goods in process will be the cash expenditure during that period, i.e., wages plus manufacturing expenses plus material.

The most important column for the entrepreneur happens to be that which concerns the period of reserves or stocking, for this will determine ultimately the question of the working capital. If, let us say, the stocking period is reduced from 2 months to 1 month in the working material, immediately the requirement of working capital would be halved from Rs. 0.6 million to Rs. 0.3 million, thus affecting the entire statement. On the other hand, if the period is increased to four months, the requirement will automatically double to Rs. 1.2 million, again disturbing the whole statement.

Table 3 : Working Capital Statement

Sl. No.	*Items*	*Stocking Period*	*Bank Margin*	*Working Capital Required (Rs. million)*	*Margin Money*	*Bank Finance*
1.	Working material	2M	20%	0.60	1.20	0.48
2.	Wages	1M	—	0.06	0.06	—
3.	Manufacturing expenses	1M	—	0.06	0.06	—
4.	Work in progress	½M	25%	0.21	0.05	0.16
5.	Finished Goods	1M	20%	0.42	0.08	0.34
6.	Sundry Debtors	2M	—	0.84	—	0.84
7.	Admn. Expenses		—	0.03	0.03	—
8.	Sales & Servicing		—	0.03	0.03	—
	Total			2.24	0.43	1.81

This is not to say, however, that this is dependent on individual entrepreneur's wish to change this as it suits him. There is, indeed, an almost established pattern in estimating the period of stocking for different items and there is little option or arbitrariness involved in such stocking-period estimations. There are often reasonably clear guidelines available for preparing such a stocking plan or the time-schedule of resources or reserves for such items as raw materials, work in progress and finished goods.

In a nutshell, the basic guideline for such a plan or schedule is the desire for maintaining an optimal supply line and an optimal inventory. For a raw material plan planning there are two methods that are generally used, namely (a) ABC and (b) Economic Order Quantity (EOQ),

In the ABC method, the entire raw material is categorised in three parts; Material A, involving high cost, Material B of medium cost and Material C of low cost. In case of material C, large quantities can be ordered since this involves low investments and saves the expenditure on repeated orders. In case of B, the orders may be placed after periodic reviewing of the existing position, but in case of C, strict control is required as the money involved is high.

The EOQ method is used for determining the quantity to be ordered at one time after taking into account the comparative cost of placing the order and receiving the goods and keeping the items in stock. The quantity to be ordered at one time in a period, say one year, is determined by the formula :

$$EOQ = \sqrt{\frac{2 \times \text{Annual consumption} \times \text{cost of placing the order once}}{\text{Interest and storage charges of one unit for one year}}}$$

As for work-in-progress, it is a necessary condition that whenever the process of manufacture is longer than a day at any point, there will be some units which will require some work to be done. On some units, work may have merely begun and, on some others, work may have been near finish. The one effective way to reduce the quantum of work-in-progress is to have proper production planning and control and to ensure that work is not held up at any point longer than is necessary. In some cases, companies may deliberately keep a large quantity of work-in-progress so that when a customer orders goods with special features, the goods may be manufactured accordingly and delivered promptly.

The function of finished goods inventory is two-fold, namely, to avoid lost sales and to enable long production runs. Lost sales mean those sales which would have been made but for ready delivery. The amount by which

the company suffers because of lost sales is the contribution on such sales i.e., sales minus the variable expenses.

As regards production runs, it is obvious that if sales are fluctuating and if finished goods stock is kept at a fixed level only, production levels must be changed. This may become costly since it may mean idleness of machinery and labour or frequent retooling.

However, there is another aspect of the finished goods inventory, i.e., interest which is involved in maintaining inventories. A company must balance the advantage from avoiding lost sales and having long production run against the cost of keeping inventories. This may be ensured through the formula, which may be expressed as :

$$\sqrt{\frac{2 \times \text{Annual consumption} \times \text{cost of retooling}}{\text{Cost of maintaining the item in stock for one year}}}$$

So far as the working out of the actual requirement of raw materials, wages and salaries, manufacturing and administrative and sales and service expenses are concerned, they have to be decided upon the level of production envisaged, the promotion, publicity and sales network planned and the changes considered reasonable for wages and salaries. This is how it has been worked out in Table 3.

The total requirement of working capital at Rs. 2.24 million has been worked out on the basis of the Company's assumed policy to give two months' credit to its customers, to maintain one months' inventory of finished goods, to keep two months' stock of raw materials and the assumed needs and expenses for various items as mentioned in the Table. While the total working capital requirement is estimated at Rs. 2.24 million the requirement of margin money, as per certain estimated rates in each item, has been worked out at Rs. 0.43 million, leaving a gap of Rs. 1.81 million, which becomes the Bank finance needed for the project.

Profitability Statement

The statement of profitability is the most important financial statement for a project. This is so because the aim of an entrepreneurial venture is basically to earn profit. The financial return that a project may generate is the reason for its starting and continuance and a project that does not fulfil the profitability criteria, does not normally deserve attention. It is a different matter that many projects may still be taken up on the social rather than economic basis, but even there the returns, though in unquantifiable social terms, have to exceed the costs and thus create some semblance of profit. The profitability Statement thus forms an essential part of any project.

This statement is normally an anticipated financial account of about ten years or so, indicating therein the items of cost and the items of return, all in terms of totals during the particular years. The level of production is assumed, as also the level of cost, at constant or current prices (although both may highly fluctuate) and all the direct and indirect expenses on the manufacture of the product are changed including the interest on capital, depreciation on machinery and expenses on sale. The total of fixed and variable cost is indicated as total manufacturing expenses.

An estimate is then made of the total sale value of production, which generally is shown at constant level often due to assumed constant level of production and prices. Allowance is thereafter made for investments, preliminary and pre-operative expenses and taxation liabilities. The total sale value minus the total manufacturing expenses and these allowances gives the net profit, after defraying all expenses, after changing all reserves and after paying all taxes.

It will be seen in Table 4 that the level of production has been kept at 60% constant capacity for the entire period, although in the initial stages the capacity utilisation may be lower and for the later years it may be more than 60%. While the expenses on working capital, wages and salaries and other direct manufacturing expenses have been worked out from Table 3 spread over the years, partly on constant prices and partly on current prices to explain the two types, the interest on long term and short term borrowings has been charged @ 12.5% and 15% respectively at constant rate of interest.

The difference in interest rates is assumed, and it will differ on actual rates being charged by financing institutions and banks, which in many cases, especially for backward or rural areas, provide for a low and preferential rate of interest for borrowings. It will be seen that wages and salaries and manufacturing expenses have been progressively increasing since some measure of increase in wages is invariably associated with future. On the contrary, the quantum of interest on long term borrowings has been shown as decreasing progressively since it is assumed that some principal will also keep on being returned to the financing institution. The same principle would normally apply to working material where escalations are bound to take place, but where a constant level of expenditure at Rs. 30 lakhs per year has been charged for purposes of illustration.

The costs then include depreciation on building and machinery @ 5% and 10% respectively. This has been based on the progressively reduced value of machinery at constant level of percentage, thus reducing progressively the actual incidence. The percentages have obviously been taken on the assumption that the building will have run its life in twenty

Table 4 : Profitability Statement

(Rs. Million)

Sl. No.	Capacity Utilisation	1st Yr. 60%	2nd Yr. 60%	3rd Yr. 60%	4th Yr. 60%	5th Yr. 60%	6th Yr. 60%	7th Yr. 60%	8th Yr. 60%	9th Yr. 60%	10th Yr. 60%
1.	Working Material	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60
2.	Wages & Salaries	0.27	0.75	0.79	0.83	0.87	0.92	0.96	1.01	1.06	1.12
3.	Direct Manufacturing Expenses	0.72	0.76	0.79	0.83		0.92	0.97	1.01	1.07	1.12
4.	Interest on long-term borrowings @ 12½% p. a.	0.05	0.05	0.04	0.04	0.03	0.03	0.02	0.01	0.01	—
5.	Interest term on short-term bank borrowings @ 15% p.a.	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27
6.	Depreciation on building @ 5% p.a.	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
7.	Depreciation on machinery @ 10% p.a.	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01
8.	Other administrative expenses	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
9.	Selling expenses @12½% of Sales	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10.	Total manufacturing expenses.	6.69	6.76	6.83	6.91	6.98	7.06	7.14	7.23	7.33	7.42
	Total Sale Value	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
	Less investment allowance	0.05	0.03	—	—	—	—	—	—	—	—
	Preliminary and preoperative	0.01	0.01	0.01	0 01	0.01	—	—	—	—	—
	Total operating profit	1.25	1.20	1.16	1.09	1.02	0.94	0.86	0.77	0.68	0.57
	Less Taxation	0.72	0.69	0 67	0.63	0.59	0.54	0.49	0.44	0.39	0.33
	Net Profit	0.52	0.50	0.49	0.46	0 43	0.40	0.36	0.33	0.29	0.24

years and machinery would need complete replacement in ten years. The period taken as life may differ from types of construction as well as on account of different types of machinery, depending on their wear and tear. It may, however, so happen that with all the care so taken, these may last much longer or may require replacement earlier, depending on the quality of construction and the standard of machinery. It should be noted that this has nothing to to do with annual repair and maintenance expenses, which should be as a course provided for in the working expenses.

To the costs then are added other administrative and selling expenses, the latter normally being charged as a percentage of the total assumed sales depending on the policy of the company. Some companies believe in low margins to distributors and feel less the need for publicity on account of their products being well established or well in demand, whereas others may have to undertake an aggressive salesmanship and to provide for larger margins for distributors and dealers, keeping in view their own costs, competitive character of the product and the market prices.

The deductions to be made on account of taxes are based on assumptions of certain public policies and the level and the rate of taxation at particular points of time. Assessing the same policy and the same rate over the entire period, which may be too much of an assumption, the cost is worked out. In view of lessening operating profits, the tax share may go down year after year, with the same rate (Table 4).

The net profit, that finally emerges year after year, indicates whether the project is worth taking up and also the number of years in which the investment is likely to pay off, again on assumed returns and often at constant prices. In the instant case, it will be seen that on a total investment of Rs. 9.56 lakhs, the profits in ten years have been worked out at Rs. 40.27 lakhs and in fact in the very first two years the project gives a net profit of Rs. 10.34 lakhs, ensuring thereby a more than full return on investment in two years.

Cash Flow Statement

Having established the level of production and the debt-equity ratio and having worked out the profitability statement and the annual profits that are likely to be generated, the next step is to assess the requirements and then finalise the arrangements for supply and regulation of cash. This is done through the cash flow statement which, as the name suggests, indicates the likely periodic inflow and outflow of cash over the projected years.

The Cash flow statement is an index of the sources as well as the dis-

Table 5 : Cash Flow Statement *(in Rs. Million)*

	Construction period	1st Yr.	2nd Yr.	3rd Yr.	4th Yr.	5th Yr	6th Yr.	7th Yr.	8th Yr.	9th Yr.	10th Yr.
A. Sources of Funds											
1. Net profit before taxes with interest added back, but after depreciation and development allowance	—	1.57	1.93	1.48	1·40	1.32	1.24	1.15	1.05	0.95	0.85
2. Equity	0.55	—	—	—	—	—	—	—	—	—	—
3. Depreciation & pre-operation expenses written off	—	0.04	0.04	0.04	0.03	0.03	0.02	0.02	0.02	0.02	0.02
4. Investment allowance	—	0.05	0.03	—	—	—	—	—	—	—	—
5. Increase in long-term loans	0.04	—	—	—	—	—	—	—	—	—	—
6. Increase in bank borrowing	—	1.81	—	—	—	—	—	—	—	—	—
	0.95	**3.47**	**1.59**	**1.51**	**1.43**	**1.35**	**1.26**	**1.17**	**1.07**	**0.97**	**0.86**
B. Disposition of Funds											
1 Preliminary & pre-operative Expenses	0.03	—	—	—	—	—	—	—	—	—	—
2. Capital expenditure	0.46	—	—	—	—	—	—	—	—	—	—
3. Increase in inventories	—	2.24	—	—	—	—	—	—	—	—	—
4. Miscellaneous Assets	0.05	—	—	—	—	—	—	—	—	—	—
5. Decrease in long-term loans	—	—	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	—
6. Interest Charges	—	0.32	0.32	0.31	0.31	0.30	0.30	0.29	0.29	0.28	0.27
7. Taxation	—	0.72	0.69	0.67	0.62	0.59	0.54	0.49	0.44	0.39	0.33
8. Dividend @ 10%	—	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
	0.53	**33.38**	**11.23**	**10.92**	**10.45**	**9.95**	**9.45**	**8.90**	**8.34**	**7.73**	**6.60**
Opening Balance	—	0.43	0.56	1.03	1.45	1.83	2.19	2.50	2.78	3.02	3.22
Net surplus (A—B)	0.43	0.14	0.47	0.42	0.39	0.35	0.32	0.28	0.24	0.20	0.20
Closing Balance	0.43	0.56	1.03	1.45	1.83	2.19	2.50	2.78	3.02	3.22	3.42

position of funds, indicating clearly the resultant annual opening and closing balance, after having taken into account the taxes, the dividends and the net surpluses. In Table 5 this has been made clear by dividing the statement in three parts.

In the first part, concerning sources of funds, six items have been charged including equity, borrowings, depreciation, allowances and profits, and in the second part, concerning disposition of funds, eight items have been charged including capital expenditure, inventories and assets, payment of principal, interest and taxes and release of dividends. The total resource mobilisation of Rs. 9.56 lakhs has been indicated during the construction period whereas only Rs. 5.3 lakhs have been shown as expenditure during the same period, leaving mostly the margin money intact for use during the first year. The first year, which depicts the end-of-the-year situation mentions the four remaining items of resource mobilisation totalling Rs. 34.74 lakhs and four remaining items of resource allocation totalling Rs. 33.38 lakhs.

From the third year, the only two sources of resources remain profits earned and depreciation charged and the only four avenues of expenditure remain payments concerning principal, interests, taxes and dividends. The former indicates the full ploughing back of the profits and the latter a full clearance of all the dues aimed at reaching the net-surplus stage.

The profits have been shown as decreasing over the years and the taxes have, accordingly, shown a downward trend. On the other hand, the repayment of principal has been shown in almost equated instalments and the interest on capital has been shown as decreasing as the borrowings go down. The payment of dividend has been shown at the assumed constant level for convenience.

The third part presents the net picture of opening and closing balance, where although the net surplus has been shown as fluctuating, depending on annual charges in items, both the opening and the closing balances show a continuously upward trend since profits accumulate and debts decrease. Thus, on an investment of Rs. 9.56 lakhs with an opening balance of Rs. 4.26 lakhs in the first year, the project shows a closing balance of Rs. 34.19 lakhs at the end of the tenth year of its existence.

Limitations

An examination of the financial statements necessary for a project would be incomplete without a few words on their limitations. There are four such limitations that reduce the value of these statements as management tools.

First, they are based on certain assumptions of rates, prices, costs and

levels, thereby making their applicability conditioned to the existence of certain facts.

Secondly, they assume a particular set of public policies and entrepreneurial environment, whose non-existence may have serious impact on the calculations so made.

Thirdly, they only exhibit a financial exercise to understand the venture and do not indicate a physical picture or the merits and demerits of alternative financing or disposition.

And finally, the statements are often wishful estimates and on account of intricacies of project management may not necessarily turn out to be blue-prints of action.

With all these limitations, however, they remain an integral part of an entrepreneurial venture. It is on this account that it is essential for a present or prospective entrepreneur to understand the mechanics of these financial statements as also to appreciate the needs they fulfil. □

believe that when both are combined under one department head, both planning and operation suffer. They feel that a planner is an anticipator of problems and, therefore, should be separated from operations so that judgement will remain clear. "Planning requires meditative thought, imagination, creativeness and vision unperturbed by pressing operating problems which probably can be best solved by others. In addition, such things as consultations, keeping abreast of developments, reading literature on new techniques, and measuring results and performance in terms of objectives are important in turning out good planning work; and those activities frequently must be passed over if the planner's time is occupied with operating problems."[4]

There are basically two types of planning : strategic planning and operations planning. Strategic planning consists of dealing with the enterprise's internal developments and external forces that affect the enterprise's successful accomplishment of its stated objectives.[5] "Strategic planning is concerned with decisions that have enduring effects on the organisation, making it difficult to reverse them."[6] More functions of the organisation are affected by strategic planning. "Strategic planning is concernced with both formulation of the goals and selection of the means by which they are to be attained."[7]

Operations planning is concerned with the efficient allocation of resources available for the purpose of attaining the given and specific objectives. It is concerned with the factors which must be dealt with to achieve a goal. It is not concerned with determining what should be goals, for that is within the realm of strategic planning. "Operations planning is concerned with the short-term logistics of the company : the planning and scheduling of the day to day buying, manufacturing, distribution and selling operations of the company. It seeks to optimise the overall utilisation of the resources currently available. From its nature, it follows that operations planning is usually the responsibility of operating management whereas strategic planning is a top management function."[8]

Areas of Planning

Operations planning addresses itself to the following areas :

1. Planning for facilities;[9]

4. *Ibid.*, p. 282
5. *Ibid.*, p. 276
6. Russell L. Ackoff. *A Concept of Corporate Planning* (New York: John Wiley and Sons), 1970, p. 5.
7. *Ibid.*, p. 6.
8. M.H. Chappel, "Information for Operations Planning" *Management Accounting*, April 1967, p. 138.
9. Johnson, Hewell and Vergin, *op. cit.*, pp. 241—278.. F. Eugene L. Grant and Ireson W. Grant, *Principles of Engineering Economy*, (New York: The Ronald Press Company), 1970 and Paul T. McElliney and Robert I. CooK, (Editors), *The Logistics of Materials Management*, (Boston: Houghton Mifflin Company), 1969.

2. Planning for resources;[10]
3. Planning for processes;[11] and,
4. Planning for functional implementation.[12]

Planning for facilities is not a new theory in management science. It was one of the earliest principles of managerial planning discussed, and is now well developed. Planning for facilities includes inventory theory, maintenance and replacement theory, and the techniques of PERT, CPM, and mathematical programming. Questions that must be answered during facilities planning are :[13]

* How large should the plant be ?
* Where should the plant or plants be located ?
* When should construction start ?
* What production orders should be assigned to the new plant so as to minimise some of the relevant production and transportation costs over the entire production system ?
* Which of the alternative sources should be used to supply a new facility ?

Each of these questions must be answered in order to minimise costs. In addition, the location of the plant must consider where its market is located, where its supplies are located, where its employees and other, resources are located and the costs of locating in any particular area such as taxes and utilities. The size of the plant will depend upon taxes, demand for finished goods, and economic models for optional usage.

Planning for resources can be subdivided into three areas : materials and supplies, money, and personnel. While we can assume materials and supplies will always be available, we cannot make the same assumption as to the costs of these supplies. We cannot assume that costs will remain the same because we are within an inflationary economy which is also subject to such external forces as OPEC, etc. These external forces can raise prices and at the same time cause shortages. "Possible

10. Reed M. Powell and Paul L. Wilkens. "Design and Implementation of a Human Resource Information System," *MSU Business Topics*, Winter 1973, pp. 21—27, Hopeman, *op. cit.*, pp. 137—138.
11. Martin K. Starr, *Management—A Modern Approach* (New York: Harcourt Brace Jovanovich, Inc.), 1971, pp. 325—374; John J. Dinkel, *Management Sciences: Text and Applications*, (Home-wood, Illinois : Richard D. Irrwin, 1978.
12. Harold Koontz and Cyril O'Donnell, *Essentials of Management*, (New York; McGraw Hill Book Company), 1974, pp. 53—132,
13. Russell L. Ackoff, *op. cit.*, p. 67.

increases in cost may be sufficiently large to justify a search for alternative materials or consideration of producing one's own raw materials. Planners should always consider the desirability of vertical integration on the input side of the business.[14]

Management must be careful with financial planning because, while it is a part of the total planning process, it is important for the survival of the firm. Financial planning requires a lot of skill on the part of the managers. They must evaluate investment opportunities in the long-run and short-run, company cash requirements, and control over the company's most liquid asset, viz., its cash. "Successful execution of financial planning requires the ability to forecast the financial position of the company for each year in the planning period and to do so under a wide variety of assumptions about policies and environmental conditions."[15] Through the use of a financial model, managers are able to accomplish this task. A financial model is useful because it gives the manager an idea of the financial position the firm will be in future. It is also of value since it gives the manager an idea of what the cost will be of carrying out some plan which has either been already approved or is still being developed.

In personnel planning there are a number of considerations that the manager must evaluate. He must evaluate his own style of managing to see if it is the best possible to perform the required task. He must also look at the attitudes of employees towards the task and the superiors. Personnel planning is often directed at finding answers to the following questions :[16]

* What is the minimal number of men by type that are required to meet the goals set in the plan ?

* What number of men by type should be recruited in each year of the planning period ?

* How should newly acquired personnel be allocated to o ganisational units ?

* How should personnel be recruited and selected so as to get employees that are as good as possible ?

* What type of education and training and how much of it should each type of personnel receive in order (a) to maximise their ability to serve the organisation now and in the future, and (b) to satisfy

14. *Ibid.*, p. 68.
15. *Ibid.*, p. 66.
16. *Ibid.*, p. 69.

their own needs and desires ? More generally, how should careers in the organisation be designed and programmed ?

* How should tasks be designed so that both maximum productivity and satisfaction are yielded by them ?

* How can the work environment be developed so that each individual is motivated both to work as closely as possible to the limits of his capabilities and to extend his capabilities ?

Planning for processes involves designing the various procedures necessary to produce the finished product. It involves answering questions which relate to the product's production. Some questions that have to be asked are :

* What is the optimal amount to be produced at a given period ?

* How many labour hours and machine hours will be spent producing each product ?

* What is the optimum amount of inventory, beginning, work-in-process and finished ?

Answers to these have to be provided, if a company is to operate efficiently.

The fourth planning area is that which relates to *functional implementation*. The manager must plan for functional implementation. Any goal or objective, if it is to be accomplished, must start out on the right footing. Planning for implementation better insures this, even though at times the goal or objective may fail.

Development of Operations Planning

Companies, in their effort to maintain and increase their market share, organised planning units to serve different departments of the firm. The purpose of these planning units was to assist each department in achieving its objective as it related to the company's objectives. Some examples of the types of planning groups are : distribution planning, raw material control, production scheduling, sales forecasting and sales control, and finished goods stock planning and control. As time progressed and competition became more and more intense, operations became increasingly complex. This complexity of operations forced companies to coordinate

the planning units through profit maximisation and efficiency. This way the planning units used their skills to attain company objectives rather than departmental objectives.[17] "The second stage in the development of operations planning arrived as the coordination was improved by arranging for each planning unit to work from the same basic data or from the plans of the previous planning unit in the production marketing cycle."[18] Over time, high-level management began to demand greater coordination and a shorter response cycle and, therefore, introduced the Operations Planning Unit. This unit combines all the specialised planning units of various departments into a centralised planning unit so that efficiency is maximised and the response time to environmental changes is shorter. "Because all divisions of the company are now represented in the group responsible for operational planning, a broader, company-wide view is substituted for the narrow divisional view of operations planning in the earlier stages of development."[19] The resulting problems that operational planning units faced were more complex than those faced by planning units in individual departments. This may very well be the result of the fact that it is easier to optimise the performance of a department than it is to optimise the company's performance. The personnel of operational planning units are usually of higher calibre than their counterparts in individual departments.

Technological Variables

There are two technological variables involved in operations planning. Operations planning focuses on the following two technological variables because in the final analysis, the level of production technology in the firm is the best possible indication of the firm's overall planning, commitment, and sophistication.[20]

1 Organisational technology

Organisational technology is defined as the basic mechanism used by the company in turning out its products and services; and,

2 Operations technology

Operations technology is defined as the utilisation of appropriate techniques such as workflow, integration, cash flow, and capital intensity to carry out the required corporate mechanism.

17. M. H. Chappel, *op. cit.*, p. 138.
18. *Ibid.*, p. 138.
19. *Ibid.*, p. 139.
20. The late Joan Woodward found in her pioneering study of British industrial firms that the organisation structure was strongly related to the relative continuity of the firm's production process. See her, *Industrial Organisation: Theory and Practice*, (London: Oxford University Press), 1965, *Passim*.

Duties of Operations Planners

In any planning procedure there are various duties which must be performed if everything is to move smoothly. This also holds true in operations planning. Operations planners perform the following duties in completing their assignments :

* Data collection;
* Forecasting;
* Procedural formating;
* Planning integration;
* Coordination of planning effort;
* Budgeting development;
* Planning, testing, and implementation;
* Review and planning control.

Each of these duties provides the information necessary for a planner to evaluate present plans, formulate new plans, test these new plans, and re-evaluate them in a future period to understand their utility.

To evaluate any plan or formulate a new plan a manager first needs to collect data. This is the starting point and depending on his interpretation of the data his plan will develop. For operations planning a manager should start by looking through company records in the manufacturing department, purchasing department and account-receivable department since these are very often the departments that cause a plan to fail. Other departments and external sources should also be looked into since they also form sources of information. Finally, a source which must be contended with is ourselves. No matter how objective we are, our past experiences, opinions, and knowledge will affect the plan.

Forecasting is an attempt to predict the future. There are various methods of forecasting, none of which is 100% effective. Most forecasting is directed at trying to predict a market which includes consumers, government and business. We try to predict the actions of these groups when planning because a sharp change in the actions of one of these groups could nullify a plan or even wipe off the company.

Procedural formating is in most instances performed by the organisation. In other instances it is a task left to the planner. Organisations, when they set up the format, usually do it through policies and regulations. Planners, when they set up the format, are usually very

flexible. While their format may characterise their own personality it also considers the situation and other external and internal factors.

Putting the components of the plan together or implementing it is an important part of the planner's job which he should not delegate out. It is a tricky task, failure of which could mean collapse of the plan and perhaps the planner's job. It involves putting the components of the plan in the appropriate sequence which will best insure success of the plan.

Coordination of planning efforts is a personnel relations job. It involves getting each department head whose department is in some way involved with the plan to listen and take instructions from the planner. It should be carried out by someone whom department heads feel they are accountable to. If the planner is to do the coordination, high level management should make sure that each department head understands that the planner is operating under their expressed authority and that department heads will have to answer to higher management for their hindering the planner.

A plan being developed must operate within company constraints, one of which is the budget. A plan is of no value if it requires the company to spend money it does not have and cannot get. The budget for the plan should be determined at the beginning of planning, after much consultation between the planner and the company's financial officers (Controller, Treasurer, and Financial Analyst).

Before any plan is implemented it should be tested in order to determine whether it would accomplish its goal. If the test nullifes the plan as it stands, then the planner should re-evaluate it and change the necessary components. After the changes are completed the plan should be re-evaluated, and if found in order, it should be implemented. This process should have been formulated during the planning process in order to ensure success. To introduce a plan it is necessary for it to be able to operate under the given conditions. The environment cannot change and so the plan must be structured to accomplish its objectives in the given environment. Implementation means to start the plan off on the right foot so that you are most certain that it will succeed in its purpose.

Periodically, the plan should be reviewed after it has been implemented. This is because internal and external factors can change over time which could make the plan fall short of its goal. Finally, there should be planning control. This will assist in detecting deviations and rectifying them in time.

The responsibility for the success of operations planning lies both with

the planning team and the top management of the firm. There should not just be reliance on the older, outdated, and traditional line-staff relationship between them, but a feeling of mutuality and cooperative team spirit based on an identity of goals.

Functions of Operations Planning

In any planning process there are steps which must be followed to achieve success. This holds true for operations planning as well. The following are the major steps necessary in the overall operations planning responsibility[21] :

Step 1 - The development of the objectives and goals for the administrative functions of operations planning in the firm.

Step 2 - The isolation of both internal and external constraints affecting each identified objective of operations planning.

Step 3 - The collection of pertinent information and data-base for each aspect of operations planning.

Step 4 - The design of the operations planning with detailed instructions on procedures, budgets, forecasts, and activities on a fixed time-schedule.

Step 5 - The testing and implementation of operations planning in coordination with other major administrative functions of the firm and,

Step 6 - The periodic review of operations plans by control, feedback, and review within the operations system.

I. Development of Operations Planning Objectives :

Planning begins with a statement of goals or objectives and proceeds with the development of policies and procedures to accomplish the stated objectives.[22] These objectives are usually assigned to the planning team by the top management. In other instances, the team develops its own objectives in the light of prior corporate history and allied data. Some suggested operations planning objectives are :

21. Steps in Overall Operations Planning are not identical with the steps in overall corporate planning process. For the latter see, Robert J. Mockler, *Business Planning and Policy Formulation* (New York: Appleton-Century Crofts), 1972, pp. 6—7.
22. Arthus C. Taufer, *Operatives Management*, (Cincinnati: South West Publishing Company, 1975, pp. 171—180.

* Improvement in production scheduling;
* Betterment of inventory re-order policies;
* Cost reduction in distribution;
* Value engineering improvements in procurement cycle;
* Time saving in use of Management Information System; and
* Greater coordination in departmental planning efforts.

Operations planning objectives must always be realistic, deterministic, tactical and quantifiable in nature. It will not be effective to bring a lot of strategic and visionary goals into the operational level. Emphasis should be placed on the immediate or intermediate fulfilment of these goals.

The operations planning objectives should be classified on an organisational basis—commensurate with the structure of the firm. It could be departmental, divisional, functional, geographical, custom-related, sectoral, or any combination of these. Each objective-cluster must portray the capabilities and potentialities of that particular area of the corporate effort.

The operations planning team must make an attempt to minimise bias, prejudice, or administrative favouritism in the development (or acceptance) of the planning objectives. Effort, should be made to avoid endorsing the same slate of objectives evey year without any accommodation for possible executive change or environmental modifications.

II. Isolation of Constraints

The second task of the operations planning team is to isolate the major internal and external constraints affecting the operations of the firm.[23] This step requires the planning team to possess analytical and research orientation, familiarity with survey techniques, knowledge of interpretative mechanism and a receptive mind open to environmental factors. One principal reason for considering the systems constraints is the fact that the departmental as well as the total operations of the firm are always subject to the impact that these constraints have in the corporate action. Inherent in this is the premise that the company cannot always make unilateral decisions or act in an atmosphere of total isolation.

Some suggested internal constraints on the corporate operations are :

* Availability of money;
* Present skills of workers;

23. Levin, *op. cit.*, pp. 67—116.

* Level of managerial know-how;
* Inter-departmental conflict or cooperation degree;
* Personality problem in the firm;
* Philosophy of top management; and,
* Historical profit-data of the firm.

Some suggested external constraints on the corporate operations are ;

* Level of competition with other firms in the industry;
* Movements in the overall economy (inflationary or recessionary);
* Government pressures on prices;
* Taxation and tariff regulations;
* Population changes, clusters, and locations;
* Traffic and logistics in the distribution area; and,
* Climate and personal standard of living rationale.

The operations planning team should try to gather as much current information about both internal and external constraints as possible.

Not every corporate firm is influenced identically and uniformly by the above-listed operations constraints. The operations planning unit will have to use an adaptive reference in finding those which have the least effect.

III. Collection of Pertinent Information

The third task of the operations planning team is to collect relevant information to serve as the basis for planning from different sources both within and outside the firm.[24]

Some suggested internal sources of information are :

* Corporate accounts;
* Production Department Reports;
* Marketing Department's Sales Records;
* Personnel Reports;

24. Van Court Hare, Jr., *Systems Analysis—A Diagnostic Approach* (New York: Harcourt Brace and World, Inc.), 1967, pp. 272—281. A recent case study is John J. Omlor, "Management Information System for Planning, Forecasting and Budgeting," *Management Accounting*, March 1970, pp. 13—16.

* Research and Development Data; and
* Foreign Branch Reports.

Some suggested external sources of information are :

* Industry data;
* Governmental Trade Reports:
* Association Statistics;
* Competitor's Accounts (if available);
* Competitor's Sales Data (if available); and
* Foreign Trade Association's Reports.

There are various methods of data collection available to the operations planning team. These include :

* Primary and Secondary records analysis;
* Meetings with executives;
* Interview;
* Questionnaire techniques;
* Simulation;
* Field research; and,
* Computerised MIS.

The astute planner uses most of these tools of information collection and analysis. This accumulated information acts as the background of future planning dynamics. This data enables the planner to be realistic and flexible in preparing both short and long-term plans.

IV. Operations Planning Design :

The fourth task of the operations planning team is a comprehensive and elaborate one. It requires the following detailed set of activities:[25]

* Gross design of the plan;
* Detailed analytical input-output for each operation;
* Narrative systems of each operation;

25. This analysis is based upon Murdick and Ross, *op. cit.*, pp. 446—468.

* Preparation of budget for each division;
* Preparation of forecast—total and departmental;
* Submission of daily, weekly, monthly, quarterly, semi-annual, and annual plans for each division;
* Preparation of intermediate and long-term plans for each division and the total firm's organisation; and
* Integration of both short and long-term plans in one comprehensive planning mechanism.

These are highly analytical, sophisticated, and, to a certain degree, quantitative activities requiring intellectual precision and familiarity with several important systems-oriented skills including at least the following :[26]

* Systems analysis;
* Input-Output Theory;
* Linear Programming;
* Game Theory;
* PERT and CPM methods;
* Computer hardware and software know-how;
* Risk analysis;
* Model Building methods; and,
* Simulation.

These skills are to be applied by the operations planner in completing the list of eight major activities included in this step. It addresses itself to the actual development, preparation, and submission of the operations plan to the top management of the firm. From both the substance and the format perspective, this step requires utmost attention from the planners.

The gross design of the plan focuses on the methods of plan—narration and description, including considerations of format, data classification, tables, exhibits, notes and documentation. The design should be precise, functional and updated to include all salient points. A brief summary should precede all presentation chapters enabling the divisional managers and members of the top management to conceptualise the finds in a nutshell.

26. For a complete bibliography on these items see Hopeman, *op. cit.*, pp. 305—340.

* Updating current work because of obvious time-lag between plans and its eventual action phases;
* Repairing the system on the basis of dry runs to alleviate any existing reinforced top management's active support; and
* Ascertaining reinforced top management's active support.

Once these afore-listed testing tasks are accomplished, the operation plan can be implemented. It refers to the activation of the plan by following a time schedule. The following considerations are included in the implementation phase of the plan.

* To retain the older operations plan for a smooth transition period over a given length of time;
* To prepare proper phasing-out of the old plan so that corporation's commitments thereto can be fulfilled;
* To provide for proper plan-orientation in the various departments by holding conferences;
* To appoint spearheads in each department who will oversee the plan's initial performance;
* To have adequate back-up support and contingency plans in case of totally unanticipated occurences;
* To train employees in newer changes and techniques if called for by the new operations plan: and,
* To develop a congenial level of acceptance for the plan in the overall firm.

Testing and implementation steps are crucial for the actual putting into effect of the intellectual plan. It often happens that the plan appears perfectly rational and suitable until it is activated. It then develops several snags, difficulties and problems which were unexpected while the plan was being developed. The answer lies in the lack of adequate provision for proper testing and post-testing activation. Planning programme requires an action-oriented approach and it is this step of testing-implementation which fulfills this provision.

VI. Review and Control

The sixth task of the operations planning team is a continous function involving the setting of proper feedback, and review points while the plan is in active phase, and controlling them through periodic check-up

issues.[29] This is the final step requiring full information flow from each pre-determined time period.

Following are some suggested techniques for review and control:

* By monitoring the progress of plans with reference to a comparison of achievements with goals.
* By setting standars of achievement;
* By having proper feedback communication through suggestion schemes and open-door policies;
* By continually comparing corporate plans with industry data;
* By updating the plans whenever significant changes occur either in the firm or in the general economy; and,
* By requiring submitted reports from departments showing targets, progress and status of future moves.

Who Should the Planners Be ?

Planning can be done by either teams or department heads. Managers when they do planning are usually directed to the immediate future. Very often, it is done in a systematic or comprehensive manner as it is with planning teams. "In order to plan systematically and comprehensively, the planning process must itself be organised and efficiently managed and carried out. It has seemed natural, therefore, to many executives who recognise the need for an organised planning effort to create corporate and/or divisional or departmental planning units."[30]

Many arguments have arisen over who should be the planners. Managers believe they should be in control over the planning process because it is they who would carry out the plan. Others believe that managers should not be the only ones carrying out the plan. They lack in-depth knowledge of the various technical areas; therefore, they require technical support. "The skills required for support of effective planning must be drawn from a variety of professions, such as operations research, information systems, sciences,economics, statistics, behavioural sciences, and other management-related fields. Those professions used in planning are better drawn from management service groups in the organisation and are better organised as a task force."[31] Advantages of this area are (a) persons involved have no vested interest and (b) they bring the ideas of the units from which they come. □

29. Starr *op. cit.*, pp. 459—461, Also see, Robert L. Childress, "Optimal Planning—The Use of Sales Forecasts," *Decision Sciences*, April, 1973, pp. 164—172; Richard V. Levin, *Quantitative Approaches to Management*, (New York: McGraw-Hill), 1978.
30. Russell L. Ackoff, *op. cit.*, p. 129.
31. *Ibid.*, p. 132.

is often traced to the work of Rensis Likert, a Social Psychologist of

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The author is highly obliged to Dr. R. N. Singh, Professor of Business Administration, University of Himachal Pradesh, Simla, for his critical observations and valuable suggestions on the original draft of the paper.

Michigan University. In fact, it was Likert who first used the term 'Human Asset' in late 1950's, a term since replaced by 'Human Resource.'[1]

With the passage of time, this concept was later revised and more moderate human considerations emerged. The contention that human resource is as much important as any other resource is supported by economic literature, which specifies human and non-human resources alike as 'capital'[2].

Various definitions of Human Resource Accounting (HRA) have been given by scholars and experts. They have diverse opinions about HRA.

Eric Flamholtz of the University of California, Los Angeles, defines it,".... accounting for people as organisation resources. Human Resource Accounting is the measurement of the Cost and Value of people for the organisation."[3]

American Accounting Association (AAA) defines HRA as, "a process of identifying and measuring data about human resource and communicating this information to interested parties."[4]

According to R.L. Woodruff Jr., Vice-President of R.G. Barry Corporation of the U.S.A.," HRA is an attempt to indentify and report investment made in resources of an organisation that are not presently accounted for under conventional accounting practice. Basically, it is an information system that tells the management what changes over a time are occurring to the human resources of the business."[5]

Davidson & Roman L. Weil defines HRA as, "a term used to describe a variety of proposals that seek to report and emphasise the importance of human resources—knowledgable, trained and loyal employees—in a company earning process and total assets."[6]

The economic view point of HRA has been stressed by Sprouse and Moonitz in their Research study conducted in 1962 which shows that, "the value of assets, indeed their existence, depends upon the future

1. Qureshi, M.A. and Lavan, H., "Much More Research is Needed in Human Asset Accounting", *Management Accounting* (London), May, 1975, p. 161.
2. Lev and Schwartz, "On the Use of the Economic Concept of Human Capital in Financial Statements." *The Accounting Review*, Jan., 1971.
3. Flamholtz, E., "Human Resources Accounting." p. xv.
4. Qureshi, M.A. & Lavan, H.—*op. cit.* p. 161.
5. Foley, K., Accounting for Human Resource", *Management Accounting*. Sept , 1977, p. 345.
6. Davidson & Weil, Roman L., "Handbook of Modern Accounting," p. 37-2 IInd Ed., *Tata McGraw Hill*, New Delhi.

economic services that they are capable of rendering to the business enterprise."

Measuring Human Asset

According to the above definitions, human resource should be classified as an asset. Once human resource is accepted as 'Asset', there follows the need for measuring the value of this asset for the purpose of recording them in the books of account. Various methods have been suggested for measurement of cost and economic value of human resource. However, a few of the most important methods are summarised below :

(A) COST METHOD

Under the Cost method several valuation models have been suggested to value human resource. Here the emphasis is on the three basic approaches of cost measurement.

(1) Historical or Actual Cost Method : Historical cost method suggests that human resource may be valued at costs likely to be incurred in procuring and developing the same, It means that expenditure on recruitment, selection, hiring and training is capitalised and amortised. This method was also adopted by R.G. Barry Corporation in 1968. Rensis Likert in his R.G. Barry Corporation experiment in USA formulated the historical costs concept for 100 selected managers and this was later extended to other employees.[7] As the system was intially limited to managers, seven functional capital accounts were initiated and an account was opened for each manager. These seven accounts were : (i) Acquisition Costs; (ii) Recruiting Outlay Costs; (iii) Formal Training Costs; (iv) Informal Training Costs; (v) Investment Building Experience Costs; (vi) Development Costs; (vii) Familiarisation Costs.

The human asset account balances were amortised annually based on the expected length of service of an individual employee. But the training and development accounts were amortised over a shorter period of time and the termination of an employee resulted in complete write-off of the accounts. Though the data from the human resource system have not been incorporated in the company's audited financial statements the company's annul reports contain a supplementary balance-sheet and income statement that shows the human resource effects.[8]

7. Robert L., Woodruff, Jr. "Human Resource Accounting", *Canadian Chartered Accountant*, Sept., 1970, pp. 156-161.
8. See R. G. Barry Corporation and Subsidiaries Balance Sheet and Statement of Income for the Year 1972.

This method is simple and easy to comprehend and fulfills basic accounting principles. It simply involves an extension of the concept of proper matching of cost and revenue. However, the disadvantage of the method is that it does not reflect the true value of human asset which results in improper evaluation of human resource of the concern. Secondly, it is difficult to estimate the number of years over which the capitalised expenditure is to be amortised.

(2) Replacement Cost Method : Here, the costs the organisation has to incur were it to replace the present employee with a person of equal ability is estimated. This requires an estimate of the cost of replacing the existing personnel under the existing organisational conditions. Though this method is useful for managerial decision-making and to obtain affirmation of accountants and managers, yet, it has some deficiences. For instance, it is not possible to replace an outgoing employee with a new one with identical abilities and skill. One cannot assess the capablities of a new incumbent who might be a better one or otherwise.

(3) Opportunity Cost Method : In order to cope up with the deficiencies of replacement cost the concept of opportunity cost has been suggested. It is based on the principle that the assets, including human asset have value only when there is an alternative use for them. This concept implies that only scarce human resource would have value. If the employees can be hired easily, then there is no opportunity cost of them as this method values human resource on the basis of the economic concept of opportunity cost. The opportunity cost of employees in one department is calculated on the basis of offers made by other departments for the employees working in that department in the same organisation.[9]

(B) PRESENT VALUE METHOD

It is also known as capitalisation of salary method. The present value of future earnings which an employee would be getting up to his retirement is found out by discounting it at the rate of cost of capital. All employees are analysed according to age and skill. The present value of future benefits is important. The model was introduced by Lev and Schwartz on the basis of salary of individual employee assuming that employee will be with the company till his retirement.[10] This model is based on two assumptions, i. e., the future services of an employee can be determined and the time that an employee will be with an organisation is known. On the same basis, Bharat Heavy Electricals Ltd.. has made an attempt to evaluate human resource.

9. Qureshi, M.A. & Lavan, H.—*op. cit.* p. 162.
10. Lev and Schwartz—*op. cit.* pp. 103-112.

However, it is difficult to predict for how long a particular individual intends to stay with the firm or for how long he is likely to work at a particular position. But on a group basis, it becomes easy to ascertain the present age of employees of a particular group likely to leave the firm during each of the forthcoming periods or to be promoted to higher ranks.[11]

This method is criticised on the ground that there is no assurance of future benefit from human resource as we live in the world of uncertainty and at the same time one cannot be sure of future benefits from any asset. According to A.S. Raj, " . . . . . this is a world of uncertainty where perfect knowledge of future earnings streams and discount rate does not exist and even if there is some knowledge about these factors, it is bound to be incomplete.'[12]

Conclusion

There are several ways of measuring and accounting for human resource but no single method encompasses all the factors. Needless to say, human resource accounting is important for the management in measuring the value of human resource of the organisation. □

11. Jaggi and Lau, "Human Resource Valuation", *The Accounting Review*, April 1974, p. 324.
12. Raj, A.S., "Measurement of Human Capital (Assets) and Its Inclusion in Financial Statements", *The Singapore Accountant*, Vol. 9, 1974 p. 95.

Optimisation of Export-Production Cost

K. T. George* M. Achuthan and T. V. Sethuraman*****

Introduction

The importance of international marketing has increased considerably during the past few years due to rapidly growing world trade. Each company, irrespective of its size, has an opportunity to gain a share of the world market either directly or through intermediaries. The customers of the world market are the elite class of urban society. They are very sophisticated and technology conscious in their attitudes. Marketing is where the customer is. Consequently, it is the customer who decides the final success of a product. And the success of a product hinges on its price, quality and image. The price of a product depends on the cost incurred in its production and marketing. This paper discusses an algorithm developed for optimising the export-production cost.

For the success of international trade in a competitive situation, optimal choice of market inputs is necessary. Because of the need for high quality products in international markets and for the profitability of a product the best production and marketing techniques should be employed. Therefore, it is advantageous to treat product for export as a separate lot. This enables one to employ sophisticated manufacturing techniques to meet the international standards. The optimal rate of production in each lot can be obtained by the well known optimisation techniques such as Linear Programming. However, the stochastic variables of the model can more easily be incorporated in a dynamic programming model.[1] Since these models require the market demand, an LP model for selecting the optimum market segment is dealt with first and then the demand in the segment is determined.

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1. R. Bellman and S. Dreyfus, *Applied Dynamic Programming*, Princeton University Press (1962).

Market Segmentation

For determining the optimum export-production schedule the total world market is segmented and optimum potential market segment are selected. The selection of optimum potential market segment is a decision problem. Market segmentation has so far been based mainly on demographic characteristics, personality, life style, consumption or brand loyalty patterns and attitudes, perception and preferences. Haley[2] suggested the use of benefit sought from a product as a basis of segmentation. However, Multiple discrimination analysis, canonical analysis and factor analysis are also used for segmentation studies.

But, these techniques do not envisage the selecting of optimum market segments. The marketer is interested in selecting the optimum market segments in order to increase sales of his product and consequently profit. This is possible if the costs incurred at various stages of production and marketing are minimised. Such an optimum market segment can be selected by the model proposed below :

$$\text{Maximise} \quad \sum_{i=1}^{n} X_i R_i \qquad \ldots\ldots \quad (1)$$

$$\text{subject to} \quad \sum_{j=1}^{m} \sum_{i=1}^{n} Q_j X_i \leqslant B_j \qquad \ldots\ldots \quad (2)$$

$$X_i \leqslant T_i \qquad \ldots\ldots \quad (3)$$

$$R_i X_i \geqslant O \qquad \ldots\ldots \quad (4)$$

where B_j is the total supply capacity of the producer of product J, and T_i is the total target consumers in segment i, R_i is the per capita income of the target consumer, X_i is the number of target consumers in segment i, Q_j is the quantity of sales of product j in segment i. Thus the segment having the highest per capita income of the target consumers are selected first and then the next highest till the supply is exhausted.

Demand Determination

After selecting the optimum market segment, the demand potential of a product in the segments is considered. Demand depends on the disposable income of the consumers in the segments, and the production schedule is based on the demand for the product. Thus, the demand is a function of the segment potential, segment work effort, industry promotion characteristics, product image and other features.

2. Haley, R.I., 'Benefit Segmentation: A Decision-Oriented Research Tool', *Jl. of Marketing*, 32, No. 3, 30-35, July 1968.

Demand for a particular product has been estimated by multiplying the number of target consumers in the segments by product penetration and average usage rate of the product.

The product penetration is measured by

$$q_t = \bar{\theta}_r (1-r)^{t-1} \qquad \ldots\ldots (5)$$

where q_t is increase in cumulative penetration in time t, $\bar{\theta}$ is the market potential which is a fraction of total effective promotional effort of all industry producing the kind of goods, and r is rate of increase in penetration.

Then the aggregate potential demand for the product in a segment is represented as

$$DP_i = \sum_{j=1}^{m} \sum_{i=1}^{n} W_{js} L_{is} \qquad \ldots\ldots (6)$$

where W_{js} is the proportion of demand for the product j by consumer group s and L_{is} is the proportion of consumers s located in segment i.

The production schedule is prepared on the basis of the aggregate demand potential in the selected segment.

Production Cost

Production cost comprises material cost M_j, labour cost l_j and overhead f_j. Material costs comprise inventory and purchases, labour cost comprise labour hours multiplied by wage rates and factory overheads consist of fixed and variable overheads. Thus, the total production cost for a unit of product j is

$$M_j + l_j + f_j \qquad \ldots\ldots (7)$$

Thus the total cost consists of fixed and variable costs. A portion of the inventory cost is fixed. Similarly, a portion of the factory overhead is also fixed which are estimated separately.

Optimisation of production cost is obtained by formulating a non-linear programming model. However, this model involves considerable computation work. Hence a dynamic programming model is formulated where the computation cost is minimum and a fairly optimum result is also obtained.

Further, for optimisation, it is essential to determine the maximum export

production capacity. This information is normally available from the plant records.

Optimisation

The optimum market segment is selected and the potential demand for the product in the segment is forecast. The inventory cost, material, labour and factory costs have also been determined. The production capacity is known. Now the export-production schedule is prepared by the dynamic programming model.[3]

The cost of production is represented by

$$\begin{cases} q_j (F_j + V_j) & \text{if } 0 < q_j \leqslant y_i \\ 0 & \text{if } q_j = 0 \end{cases} \quad \ldots (8)$$

q_j is the production quantity for the product j and y is the capacity of the producer.

In addition, an inventory holding cost is incurred for the units that have not been used, and therefore production cost is linked by inventory balance. Thus the cost in any period is the sum of number of units j produced and inventory holding cost.

This is written as

$$f_j = C_j(q_j, I_j) = \left\{ \begin{array}{ll} (F_j + V_j)\, q_j & \text{if } q_j > 0 \\ 0 & \text{if } q_j = 0 \end{array} \right\} + I_j \quad \ldots (9)$$

At each period the optimal decision is to minimise the cost for that period plus subsequent period cost. Each stage involves finding an optimum value of q_j for each I_j which is written as

$$\text{minimise} \quad \sum_{j=1}^{m} q_j C_j \quad \ldots (10)$$

$$\text{subject to} \quad \sum_{j=1}^{m} q_j \leqslant y_i \quad (11)$$

$$\sum_{j=1}^{m} q_j \geqslant \sum_{j=1}^{m} D \quad \ldots (12)$$

3. K.T. George and T. V. Sethuraman, 'Credit Scheduling in Marketing', *Jl. of Ind. and Management*, July—Sept. 1977.

and then the total cost is

$$\sum_{j=1}^{m} C_j = \sum_{j=1}^{m} (F_j + V_j + I_j) \qquad \ldots (13)$$

The excess inventory in one period is carried to the next period at the average cost. The optimisation model is then written as

$$f_n(I_n) = \underset{\substack{0 \leqslant q_n \leqslant y_n \text{ and} \\ q_n + I_n \geqslant D_n}}{\text{minimum}} \left[C_n(q_n, I_n) + f_{n-1}(I_n + q_n - D_n) \right] \qquad \ldots (14)$$

$$q_i = \sum_{i=1}^{n} F_i + \sum_{i+1}^{n} V_i \qquad \ldots (15)$$

This is the general model for the whole period. Individual period schedule can be written similarly.

In this model we start from the last period and reach the first period. The last period schedule is written as

$$f_n(I_n) = \underset{\substack{0 \leqslant q_n y_n \\ \text{and} \\ q_n + I_n \leqslant D_n}}{\text{min.}} \left\{ C_n(q_n, I_n) \right\} \qquad \ldots (16)$$

Thus the export production schedule depends on the inventory, as well as the capacity constraints. Each period demand is met either from inventory or from production or jointly.

Example

A four month period demand forecast is given as 2000, 4000, 3000 and 4000 units respectively. The maximum capacity of the producer is estimated as 6000 units per period. The variable cost for material and labour is estimated as Rs. 2.5 per unit, and fixed cost as Re. 1 per unit which will be incurred irrespective of production. The fixed inventory holding cost is estimated as Re. 0.50 per unit. Table I shows the optimum cost computed and also the production schedule.

The problem is solved by backward recursion. The production is carried out in 1000 unit lots. The beginning inventory was assumed to be zero.

TABLE 1: Determination of Optimal Export-Production Cost

Period: 1

Demand: 2000 units

in thousands

Beginning Inventory	Possible Export Producton	Cost			Ending Inventory in	Subsequent cost	Total Cost $C_1(q_1,I_1)+$
	units	Production	Inventory	Total $C_1(q_1I_1)$	units	$f(I_2)$	$f_2(I_2)$
I_1	q_1				I_2		
		Rs.	Rs.			Rs.	Rs.
0	*2	6.0	0	6.0	0	30.5	36.5*
	3	8.5	0	8.5	1	28.5	37.0
	4	11.0	0	11.0	2	26.5	37.5
	5	13.5	0	13.5	3	24.5	37.0
	6	16.0	0	16.0	4	22.5	38.5

* optimum

□

Increasing Productivity for Railway Passenger Coach Manufacture : A Case

L. R. Gosain* S. Srinivasan**

Introduction

A leading railway coach manufacturing unit in India set up with foreign collaboration was manufacturing coaches to its full capacity. The design of coaches is integral, viz., embodying the concept of light-weight all-steel, all-welded stressed skin construction. The four major assemblies of the coach, viz., the underframe, side-walls, end walls and the roof are integrated by welding to form a hollow tube, capable of withstanding various specified design loads. In the construction work, extensive welding is required. Of the many welding processes adopted, the butt-seam welding, is the most suitable for joining thin sheets (thickness 1.6 mm to 4 mm). This process is also called "stitch welding" as the process is similar to that of joining two pieces of cloth by a sewing machine.

Identification of the Problem

The factory has three butt-welding machines working to full capacity for meeting the production requirements. The estimated load on the machine was 90%. The actual availability and utilisation was about 80%, mainly due to 20% breakdown as the machines were very old and imported spare parts were not readily available. As a result, these machines and the butt seam welding operations posed a production bottleneck. It was, therefore, decided to subject the entire process to a systematic value engineering and work study.

Details of Work Study

1. Specifications of Materials :

The factory uses thin imported steel sheets of thickness ranging from 1.6 mm to 4 mm. The annual consumption of these sheets is 6850

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tonnes involving a total expenditure of Rs. 34.25 million for the 1979-80 programme.

The design required the use of high tensile corrosion-resistant steel (commonly called Corten steel) to IRS M.41 of the following specifications :

Elements	*IRS M.41* %
Carbon	0.10
Manganese	0.25 to 0.45
Phosphorus	0.075 to 0.145
Sulphur	0.045
Silicon	0.28 to 0.72
Copper	0.30 to 0.50
Chromium	0.35 to 1.20
Nickel	0.28 to 0.62
Tensile strength	49 Kgs./mm^2 min

A check of the materials received during the last few years revealed that there were several instances of the material received containing 0.50% or less of chromium and nickel. The customs duty on steel sheets containing chromium and nickel above 0.50% was 75% and the customs duty on steel sheets containing upto 0.50% was only 40%. It was, therefore, decided to restrict the specification to a maximum of 0.50% of chromium and nickel retaining the ultimate tensile strength. This resulted in a saving of customs duty to Rs. 1085/- per tonne. Since the factory uses approximately 6850 tonnes per year, it brought about a saving of Rs. 740 thousand annually for 1979-80 programme.

2. Thickness of Steel Sheets :

The design consisted of Corten steel sheets of 2.2mm thickness. A re-check of the design calculations revealed that the thickness of the steel sheet was somewhat high, giving a safety factor 2.2. Since the design stipulated safety factor is only 1.6, it was possible to reduce the thickness from 2.2 mm to 1.6 mm. Allowing for some margin for corrosion and other operational considerations, it was considered practical and safe to reduce the thickness from 2.2 mm to 2 mm. This change brought about a reduction in weight of one tonne approximately per coach, and also an annual reduction in the requirement of this steel by 660 tonnes. This resulted in a saving of Rs. 20 lakhs per annum in foreign exchange for 1979-80.

3. Butt-Seam Welding :

The factory has planning and production organisation. For use of sheets, cutting diagrams are regularly used to determine the most economical size of sheets as also proper cutting diagrams to ensure minimum wastage of material with lowest number of joints. According to the existing methods, the sheets used were 2.2 mm x 1000 mm x 2800 mm. A standard product (BG II Class shell) required 30 butt-seam welding operations and 44 pillars required one weld each.

Enquiries were made from suppliers to determine and find out if any bigger and more economical size were available in the market. The existing suppliers themselves advised that they manufactured sheets of size 1250 mm x 2900 mm. On examination, it was found that if the bigger sheet was used one welding operation done on each of the 44 pillars could be completely eliminated. Furthermore, the number of butt-seam welding joints per sheet per side of a coach could be reduced from 15 to 11 (See diagram enclosed). In addition, the labour cost and the cost of the welding foil used came down, resulting in an annual saving of Rs. 15,000/-. It was, therefore, decided to replace the existing sheets of size 1000 mm x 2800 mm by larger sheets of size 1250 mm x 2900 mm.

4. Maintenance of Butt-Seam Welding Machine :

Cooling System : The availability of these machines was approximately 80%. A study of the breakdown data of the past three years revealed that breakdown was mainly due to the inefficient cooling system and non-availability of spares. The welding current carrying parts, secondaries of the welding transformers and the steel angles on the magnetic clamping plates are cooled by water. The inlet temperature of the cooling water should not exceed 25°C for satisfactory cooling, particularly in the roller heads and the secondary winding of the transformers. The water must be free from suspended particles in order to avoid contamination and clogging of the water cooling lines. In practice, it was found that the water lines or pipes got clogged up due to several bends and sediment formation, adversely affecting the free flow of water. This resulted in improper cooling and consequently high temperature of the bus bars and the roller electrodes leading to poor welding and consequent shutdown of the machine.

Although the layout and the maintenance of these pipes was improved, it was found that the efficiency of the machine and breakdowns remained the same. It was, therefore, concluded that the design of the cooling system was defective. It was decided to split the cooling system into two parts—one for transformer and roller electrodes and the other for bus bars. The revised system involved an additional cost of only

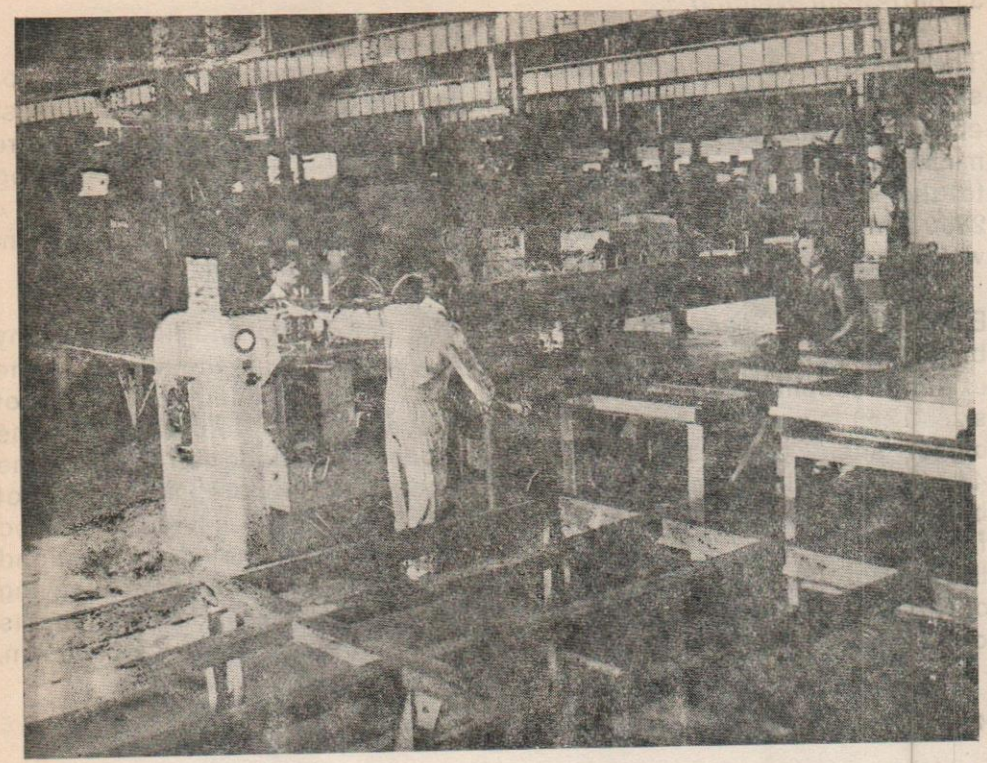

Fig. 1

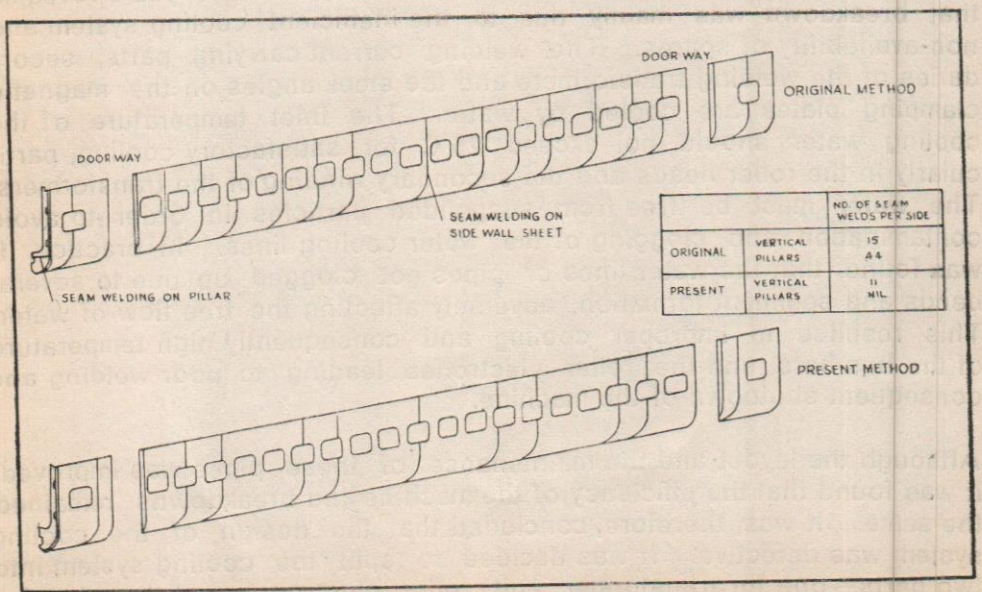

Fig. 2 : Diagram of Butt Seam Welds on a BG-Second Class Sleeper Side Wall

Rs. 100/- approximately, but resulted in a more efficient cooling and greater availability of the machine.

Preventive Maintenance

It was found that machines were imported and approximately 15 years old and in a run-down condition. There was little or no stock of the spare parts since almost all had to be imported. The indenting of the spare parts was done as and when the machine broke down, resulting in considerable delay or time-lag in the availability of materials. As a result, the downtime for availability of spare parts and replacing them was high. A study was made of the parts that had been used on the machines during the last three years. After the spares required were identified, it was decided to either import them or manufacture them and stock them in advance so that replacements could take place almost immediately.

After the steps indicated above were taken, the availability of the machines improved from 80% to 90% and is expected to improve further to 95%.

Conclusion

First of all the necessity for eliminating a production bottleneck in butt welding of thin sheets was felt and established. A systematic and detailed analysis of the problem by the application of value engineering and work-study principles was carried out. The study brought forth some new and important steps towards improvement in materials and methods. Implementation of the following steps brought about not only elimination of the existing production bottleneck but also resulted in considerable increase in productivity and economy as given below :

	Steps taken	*Total annual savings for 1979-80 (Rs. '000)*
1.	Improvement in specification of materials	740
2.	Reduction in thickness of material	330
3.	Change in dimensions of material	210
	Total	1280

Besides, improvement in preventive maintenance systems ensured increased availability of machines by 10%, enabling to meet production targets adequately. □

Productivity-Linked Bonus

B. P. Rao*

Introduction

The decision to introduce the concept of productivity-linked bonus scheme for railmen should now pave the way for resolving the question of payment of bonus to other sectors of the economy as well. This will not only help restore normalcy in the working of railways, but will also give a definite turn to the consideration of the vexed bonus issue and to the management of industrial relations in general.

The linkage of bonus to productivity should be welcomed as it is a sensible policy for the economic determination of the bonus quantum and indeed of all wages. This has set aside the earlier concept that bonus is deferred wage. The present agreement between the Government and the Federation representing the largest body of organised workers is important because there is every likelihood that the next logical extension of this concept is that it spreads to other areas like posts and telegraphs, ordinance factories and the like.

It is well known that because there was no settlement between the employers and the employees with regard to the bonus issue earlier, industrial disputes were on the increase and indiscipline was becoming the order of the day in many an undertaking. This cancerous disease had affected the railways too at large. The present agreement should promote industrial peace and harmony in the nation's largest state-owned commercial undertaking by way of infusing a new sense of dynamism in the economy and remove bottlenecks in transporting crucial raw materials like coal, steel, foodgrains etc., to the needy areas.

Whether the settlement of bonus issue for the railways is as rational as is made out needs a careful analysis. Also, the various implications will have to be analysed with a view to finding whether such a scheme is practicable. This is important because, in case of the failure of the present scheme it will not only have an adverse effect on the

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railmen and the performance of railways, but will also have a multiplier effect in the negative direction on other industries that are in the process of introducing a similar scheme to buy industrial peace and harmony.

Before the scheme is analysed, it would be worthwhile to delineate here the salient features of the scheme.

The Scheme

After dithering for over two years over the question of payment of bonus to railway employees, the Government announced the payment of 'Productivity-Linked Bonus' to over 1.7 million railmen in December 1979. The Scheme covers all those employees who were in service on 1st November 1979. After protracted discussions with the representatives of the railmen, a solution to the problem could be found. It was a difficult problem, as the payment of bonus under the Bonus Act did not cover departmental undertakings of the Government and as such, were excluded from the purview of payment under the Bonus Act. The important role of the railways as an infrastructural activity in accelerating the pace of economic growth, however, called for consideration of a scheme which could be acceptable to the employees and to the Government. It was, therefore, necessary for the Government to ensure that high productivity on the part of railwaymen should be a pre-condition to payment of bonus. Thus linking bonus with productivity in lieu of bonus on the lines of payment under the Bonus Act was conceived and a workable solution found.

A base year 1977-78 has been selected and the performance of this year has been taken as a standard on the basis of which the bonus would become payable in future. The productivity shall be determined solely on the basis of Revenue Traffic Tonne Kms. achieved each year as derived from the relevant audited statements.

The total Revenue Traffic Tonne Kms. for purposes of determining productivity comprises two components : (a) Revenue Net Tonne Kilometres of goods traffic, and (b) Revenue Net Tonne Kilometres of passenger traffic derived from the passenger kilometres for non-suburban traffic by applying the factor of 0.071. The performance in terms of Revenue Traffic Tonne Kms. corresponding to the base year (1977-78) would entitle the railwaymen to productivity linked bonus equal to 25 days' wages. For every increase of 3,250 million Revenue Traffic Tonne Kms. over and above the target of the base year, the railwaymen are entitled to an additional one day's wage. If, however, the productivity declines from that of the base year level, a deduction at the rate of one day's wage would be applicable for every shortfall of 2,250 million Revenue Traffic Tonne Kms. No bonus would be awarded if the Revenue

Traffic Tonne Kms. falls below the level of 90% to that of the base year.

In physical terms, the total Revenue Traffic Tonne Kms. was 159 billion traffic units in 1977-78. It can thus be seen that a floor level has been fixed whereas there is no ceiling. This scheme assumes more importance in the sense that any shortfall in output on account of natural calamities such as power crisis, floods, etc. would not be recognised as alibi. In order to claim bonus, any shortfall will have to be made up in other months by additional efforts.

Evaluation of the Scheme

At the outset, it is all the more important to ascertain whether the selection of the base year—1977-78—is correct. This is because, as is known, during that period there was an unprecedented surplus of Rs. 1260 million and the productivity attained was the highest. Therefore, this period cannot be regarded as the normal year. It would have been appropriate had an average of the plan period was accepted as the base for the determination of bonus on the basis of productivity.

Another fundamental question that crops up is whether the railways can afford to pay the bonus in proportion to the increase in output (Revenue Traffic Tonne Kms.), because, any increase in physical output need not necessarily give rise to increased revenue unless the freight rates are suitably revised.

It is also well known that the rate of obsolescene of wagons works out to be 12,500 a year. Owing to financial difficulties, instead of placing an order for 21,000 four-wheeled wagons (including the replaced ones), the order has been reduced to 10,050 wagons by December 1980. Since the emphasis is more on catering to the goods traffic in addition to the passenger traffic, one wonders whether the physical targets as agreed upon by the Federation and the Government are within achievable limits. The Chairman of the Association of Indian Engineering Industry (Eastern Region), reminded the Government that if the haulage capacity is not raised, the 5% annual growth rate as envisaged in the plans cannot be achieved.

The probable solution to this apparent contradiction is that, while there are enough wagons for essential and industrial items, there is shortage in other spheres. This can be solved by bringing about an improvement in wagon turn-round, in order to ensure better wagon availability to the consumers. Reduction in the terminal detention at loading and unloading points as well as at destination in all phases should be the aim of every railman. They have to ensure reasonable distribution of the available capacity to ensure maximum supply to users. A keen watch on movement of wagons

carrying raw coal to washeries, raw materials to steel plants and intensive, utilisation of special type of wagons like BOBS etc., will contribute to the successful implementation of the scheme for railmen to earn rich dividends by an increase in their bonus. Further, improvement in engine maintenance has to be paid a high priority to minimise their failure as well as to improve their running. The maintenance of wagons, which is now not satisfactory, has to be improved upon. Negotiations with the World Bank has yielded a loan for the Railway Workshop Modernisation Project. An independent agency called the Central Organisation for Modernisation of Workshop (COFMOW) has been constituted which will spend Rs. 1100 million by March 1982. This input will give the much-needed revival tonic to the Railway Workshops. The Railway Workshops will then be able to introduce modern technology to achieve a decisive and discernible impact in improving the efficiency of its rolling stock. The introduction of ultrasonic cleaning of roller bearings, use of mini-computors for data processing in production control organisations, modern material handling systems, modern machines and tools etc., are envisaged and will usher in a new era in the history of the old Workshops.

It is seen that the Scheme does not provide for natural calamities such as power shortage, floods etc., when the wagons do not move. The latest Assam blockade has also proved that events may go beyond the control of the workers. The impact of events like these will undoubtedly, have an adverse impact on the future earnings of bonus when it becomes due.

The productivity index is constructed on the basis of Revenue Traffic Tonne Kms. of goods and passenger traffic, with a higher weightage to the former. No doubt, more attention has to be devoted to increase the haulage capacity, but equally important is the passenger services. Moreover, about 10% of tonne Kms. which is non-revenue traffic should also be included in the calculation of the output, as only then would it give a realistic picture.

The Bonus Act was defective as Officers, Executives and some type of employees were put outside the purview of Bonus. The productivity linked bonus has also ignored the Officers and Executives who draw a basic salary of more than Rs. 1600. Though it seems that this is one of the ways in reducing the gap between the high-paid officials and the low-paid employees, when it comes to rewarding anyone with bonus, all of them should be treated at par. Moreover, it is the crucial decisions taken by Officers and Executives which contribute to improving the performance of railways. So if they are excluded from the present scheme, there can be very little of an incentive for them to accept challenges and take risks in the interest of their employees. It is desirable here that before it is too late, this aspect may be reviewed if the team of officials and workers is to work together. □

Contingency Theory : An Empirical Test of Some Postulates

V. Anand Ram*

A recurring problem faced by branch managers has been that of determining the managerial strategies necessary to improve the performance of their branches. The performance of a branch is influenced by a number of factors. The state of the economy of the region in which a branch is located is one factor. The motivation and behaviour of people working in the branch is another. The political forces operating at the branch is a third factor. It is, therefore, clear that a large number of internal and external factors influence the performance of a branch. The task of branch management is to manage these diverse forces and maintain a high level of performance. In the present paper an attempt has been made to identify organisational variables which are within the control of branch managements and to study their impact on performance.

Bank branches are units which are very widely dispersed geographically. Also, the demands that the external environment makes on these branches vary. Any prescriptions for improving the performance of a branch will have to take into account the specific context and the nature of the external environment that a branch faces. In the present paper the contingency theory framework has been utilised to study the performance of branches.

Description of the Contingency Model

The basic premise of what has come to be called as the contingency theory is that different external conditions require different organisational characteristics and behaviour patterns for effective performance. If we could investigate and compare organisations in several different environments we might provide a systematic understanding of what organisational variables are related to effective performance under different environmental conditions.

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This article is based on the author's dissertation for the title Fellow of Indian Institute of Management, Ahmedabad. The study, a part of which is reported here, was carried out under the guidance of Prof. P. N. Khandwalla.

In the framework of the contingency theory, the analysis generally begins with the environment or the context that an organisation has chosen as its domain of operation. Once this decision is made, the attributes of the chosen environment can be analysed. Internal attributes of the organisation in terms of managerial orientations can be tested for goodness of fit with the various environmental variables. The performance of the organisation is a function of the goodness of fit between environmental variables and internal attributes of the organisation.

The spurt in branch expansion in the post nationalisation period brings into sharp focus the limited understanding of the correlates of branch performance. The study of bank branches is of special analytical interest because of certain unique characteristics of these units. Bank branches are spatially separated work units which are far removed from the controlling office. Moreover, the relative absense of interdependence between the branches creates subsystems—organisations within the framework of a larger organisation. The branches operate in substantially differing environments and these differences influence the management strategies to be followed.

The principal agency which mediates an organisation's response to its external environment is management. It is the task of management to reconcile and manipulate the various pressures on the organisation and through its decisions and directives give the organisation a distinctive form.

In spatially separated work units, the Head Office is far removed from the location of the branches. Moreover, in a bank where decision-making is decentralised, there is a great deal of delegation of powers to the branch managements. In view of the fact that branch managements have a great deal of leeway in deciding the strategy by which they improve the functioning of their organisations, the way in which the managerial group relates with the environment acquires a great deal of importance. Child [1972] believes that within limits decision makers do have choices in shaping the responses of the organisation to its environment.

The fact that management is the principal agency which mediates the response of an organisation to its external environment gives rise to alternative approaches to deal with events in the external environment. Some managements use sharply defined and clear-cut functions for the roles. Others deliberately encourage broad and loosely defined functions. Some managements attempt to plan their activities well in advance to deal with contingencies while others prefer to respond to situations as and when they arise. The question that arises out of these alternative strategies is :

1. What are the reasons for managements using alternative approaches to coping with the external environment ?

2. Does it make any difference to organisational performance whether one kind of strategy is used over another ?

The four hypotheses tested in this paper attempt to provide answers to these questions.

Framework for Hypotheses Testing

The various hypotheses that will be tested can be conveniently looked at in the following framework. The three major classes of variables are environmental variables, strategic variables, and performance variables.

The external environment of an organisation can be analysed in a number of ways. Thompson [1967] proposed that the environment could be viewed as either stable or shifting and homogeneous. Lawrence and Lorsch [1967] have viewed the environment in terms of the certainty-uncertainty continuum. Khandwalla [1977] had identified five attributes,i. e., turbulence, hostility, technical complexity, diversity and restrictiveness of the external environment which have an impact on the managerial strategy of an organisation.

The two properties which have been taken into account for purposes of the present paper are environmental heterogeity, and environmental competitiveness.

The extent to which an organisation's environment is heterogeneous is determined by partitioning the environment into distinctive, internally consistent, homogeneous clusters. This gives us an idea of the diversity of the client group to which a branch caters to. The greater the dependence on one market segment the more homogeneous the external environment. If an organisation depends uniformly on all the market segments for its business volume, the more heterogeneous the external environment will be.

The external environment of an organisation is competitive when the opportunities for growth and development of business are limited because there are a number of organisations operating in the same area and competing for business. A non-competitive environment is one where an organisation is the only one operating in the area, with no competitors for business and hardly any scope for expansion of business volume.

The five aspects of managerial orientation are :

1. Planning
2. Bureaucratisation
3. Risk taking
4. Participation
5. Coercion.

These five elements have also been used by Khandwalla [1975] in identifying styles of management. These variables were measured on the basis of responses to a questionnaire administered to seniors officers at the branch level. In the present paper, the hypotheses do not pertain to all the five variables, individually. This is because, it has been found that combinations of these variables explain branch performance better than the variables taken individually [Ram 1978].

The three measures used for assessing the performance of the sample of organisations studied are :

* The ratio of actual to budgeted levels of business volume.

* Subjective ratings of performance in comparison with other banks in the area on the dimensions of growth and profitability.

* Subjective ratings on six critical aspects of a branch's performance by senior officers of the branch. The six aspects are :

1. Achieving trageted levels of business
2. Customer service
3. Staff relations
4. Efficiency i. e., cost control
5. Maintenance and upkeep of premises
6. Development of business.

These three measures of performance were aggregated into an overall performance index in the light of which a branch's performance was assessed. Throughout this paper any reference to high performance of a branch indicates its score on the overall performance index.

The various hypotheses that have been tested attempt to find a link between external environment, managerial orientation and performance.

Sample

Seventy branches of a leading bank in the country constituted the sample for the study. The branches are all located in Gujarat. The sample consists of branches varying from very small to large.

Measures

To gather information on the internal aspects of branch functioning, both questionnaires and interviews were used. The examination of audit reports

helped in identifying a number of internal managerial and administrative dimensions which might have a relationship to performance. A number of rating scales were developed on the basis of interviews held with senior officers of various branches. An initial draft of the questionnaire was pretested on a sample of thirty-five branches. After the questionnaires were received back, the respondents were interviewed on a personal basis. This procedure exposed ambiguities in the phrasing of questions and led to tightening of the language. The modified version of the questionnaire was used to collect data from a larger sample of seventy branches of a leading bank.

Method

To test the hypotheses, the sample of branches were trichotomised on the basis of their scores on the environmental variables. This helped in classifying the sample into branches which have highly heterogeneous/homogeneous or highly competitive/non-competitive environments. The success rate of branches with specific managerial orientations in each of the four types of environment is examined. This data provides an indication of whether the data supports or invalidates given hypotheses. The data presented in Table 1 is self explanatory and clarifies the methodology used for testing the hypotheses.

Results

In presenting the findings of the study, the various hypotheses tested are stated first. This is followed by presentation of data which indicates whether the stated hypotheses was found valid or invalid.

HYPOTHESIS 1

In a competitive environment, an organic orientation leads to high performance.

As can be seen from Table 1 out of the seventeen branches which face a highly competitive environment, six of them have organic managements and 50% of these are high performers.

In contrast, only three branches out of the total of seventeen have a mechanistic orientation and only one of them is a high performer. The success rate of branches with an organic orientation is higher than those with a mechanistic orientation. Hence, the data supports the hypotheses.

HYPOTHESIS 2

In a non-competitive environment, a mechanistic orientation leads to high performance.

Table 1 : Testing of Hypothesis

	Hypotheses	*Number*	*% High Performers*
H_1 :	In a competitive environment an organic orientation (i.e., low, bureaucratisation) leads to high performance.		
	a) Branches with competitive environments	17	24%
	b) In the above environment, branches which are low on bureaucratisation (i.e., having highly organic managements)	6	50%
	c) In the above environment, branches which are high on bureaucratisation (i.e., having highly mechanistic managements)	3	33%
H_2 :	In a non-competitive environment a mechanistic orientation (i.e., high bureaucratisation) leads to high performance.		
	a) Branches in a non-competitive environment	16	56%
	b) Branches in the above environment which are high on bureaucratisation	7	86%
	c) Branches in the above environment which are low on bureaucratisation	3	33%
H_3 :	In a heterogeneous environment, the professional style of management (high on planning and participation) leads to high performance		
	a) Branches in a heterogeneous environment	17	47%
	b) Branches in above environment practising a professional management style	3	100%
	c) Branches in above environment not practising a fully professional style or practising an anti-professional style (i.e. practising a style that is either high in planning but low on participation, or low on both planning and participation)	4	25%
H_4 :	In a homogeneous environment, the anti-professional style of management (low on planning end participation) leads to high performance		
	a) Branches in a homogeneous environment	14	64%
	b) Branches in above environment with an anti-professional management style	3	33%
	c) Branches in above environment with a professional or quasi-professional management style (i.e , a style that is either high on both planning and participation, or low on one of them and high on the other)	4	75%

Table 1 indicates that out of the sixteen branches which operate in a non-competitive environment, nine are high performers of which seven have a mechanistic orientation (high bureaucratisation) and 86% of these are high performers. In contrast, out of the three branches which have an organic orientation only one of them is a high performer.

The findings relating to hypotheses one and two generally corroborate the findings of earlier researchers. Burns and Stalker [1961] have found that a mechanistic style with highly structured channels of communication, formal hierarchy and rigid observance to rules and procedures is fairly prevalent in a static environment. Similarly, the organic style characterised by open channels of communication, emphasis on situational authority and a fairly loose and flexible organisation was found to flourish in firms which face a rapidly changing market and technology. Child [1972] has found that in a variable environment less formalised organisation structures are conducive to faster grow rates. Khandwalla [1975] has also found that an organic management style is required to cope with a competitive environment and a mechanistic style to cope with a non-competitive environment.

HYPOTHESIS 3

In a heterogeneous environment, the professional style of management (high on planning and participation) leads to high performance.

The data in Table 1 indicates that out of the seventeen branches operating in a heterogeneous environment, eight of them are high performers. The success rate of the professional management style is 100% whereas that of the non-professional style is only 25%. This clearly supports the above hypothesis.

HYPOTHESIS 4

In a homogeneous environment, the anti-professional style of management (low on planning and participation) leads to high performance.

As can be seen from the data in Table 1, the branches in a homogeneous environment seem to be more conducive to high performance than branches in a heterogeneous evironment. The success rate of the anti-professional style as compared to the non-anti-professional style indicates that the hypotheses is not validated by our data. A quasi professional style where a branch scores high on planning or participation seems to be associated with high performing branches in a homogeneous environment. This indicates that high planning or participation is critical for high performance of a branch operating in a homogeneous environment.

Limitations of the Data

The findings as reported in this paper provide emperical evidence in support of the contingency theory. However, the following are some special features of the data base which should be taken into account while interpreting the findings.

1) All branches which have been covered in the study are from one bank and are concentrated in one region.

2) The various hypotheses, tested, are based on studies carried out in Western countries. Also, the manner in which the variables have been operationalised are different.

The validation of three of the four hypotheses tested, in spite of the limitations of data pointed out above is an indication of the universality of contingency theory.

Implications of the Findings

The results reported earlier bring to the fore a major issue which has been of concern to theorists in the area of organisational behaviour. The issue is : what are the determinants of unit performance? The two major perspectives that have emerged have been labelled universalistic theory and contingency theory.

The proponents of universalistic theory [Likert, 1961, Beckhard, 1971] have tended to take an ideological stand on many issues relating to organisation and management. For example, morale, participation, etc., have been espoused as ends in themselves. The problem for the practitioner in accepting these exhortations is the very little evidence that exists which shows that these variables contribute to performance.

The hypotheses that we have tested in this paper provide some evidence that the managerial orientations which are associated with high performing branches vary with the properties of the environment that a branch faces. In other words, the starting point for formulating a strategy to improve branch performance has to begin with an analysis of the properties of the environment.

As we have seen, in a heterogeneous environment a management style which places heavy emphasis on planning and participation is associated with high organisational performance. Similarly, in a competitive environment, an organic orientation characterised by low bureaucratisation is conducive to high performance, whereas, in a non-competitive environment, a mechanistic orientation characterised by a high degree of bureaucratisation is conducive to high performance.

The task of developing managerial orientations which are in tune with the demands of environment is the task of training and management development departments. Most of the training programmes in the banking industry are leaning more and more towards the use of behavioural science techniques which emphasise motivation, communication, participative management etc. There is insufficient evidence in the Indian context that these aspects of management alone are related to organisational performance. The findings which we have reported in this paper emphasise the need for a differential approach to training and mangement development.

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APPENDIX

The scales used for measuring the variables are as follows :

Environmental Variables

Environmental Heterogeneity : This measures the diversity of the client group to which a branch caters to. The percentage of business volume from each segment is calculated. The difference between the highest and lowest is a measure of environmental heterogeneity. A high score indicates a homogeneous environment and low score a heterogeneous environment.

Environmental Competitiveness : The following scales measure environmental competitiveness :

1. How tough is competition for business in your local area from other banks, post offices, money lenders etc.

   Extremely intense; Tough Competition for business 1 2 3 4 5 6 7 Virtually none; we are the only source of finance in the local area.

2. Lack of potential for growth of business in the area coming under the jurisdiction of the branch.

   Very important as a constraint 1 2 3 4 5 6 7 Not important as a constraint

The score on environmental competitiveness varies from a minimum of two to a maximum of fourteen. A low score indicates intense competition and a high score, a non-competitive environment.

Strategic Variables

Planning : The following scales have been used to measure the planning and technocratic orientation :

1. The allocation of work in this branch involves :

   Matching availability of staff with requirements of work *only* on a day to day basis 1 2 3 4 5 6 7 Advance planning of the work allocation schedule

2. The work in this branch progresses from week to week according to work schedule drawn up in advance 1 2 3 4 5 6 7 We generally avoid working on the basis of plans and schedules and prefer to respond to difficulties as and when they arise

3. In our branch

   We normally prepare at the beginning of the month schedule of visits to be made to our depositors and borrowers 1 2 3 4 5 6 7 We do not normally prepare schedules at the beginning of the month and prefer to respond to difficulties as and when they arise

4. In evaluating proposals for financing small scale industry's long term finance and working capital requirements

We depend almost wholly on the technical soundness of the project breakeven point analysis, evaluation of the borrower's marketing strategy and generally the projects financial viability.	1 2 3 4 5 6 7	We depend almost wholly on the borrower's reputation in the community and the informal enquiries we make about his credit worthiness

The scores on items (2), (3) and (4) are reversed. The score on planning varies from a minimum of 4 to a maximum of 28 A high score indicates a high and a low score, low planning orientation.

Risk Taking : The following scales measure the risk taking orientation of the branch management.

1. While making advances to parties :

We prefer to rely on precedents and past practices to keep risks as low as possible	1 2 3 4 5 6 7	We prefer to disregard past practices in order to go after new business

2. With regard to competitors in our area of operations, such as branches of other banks, post offices, etc.

We strongly prefer to avoid competing with them for business	1 2 3 4 5 6 7	We strongly prefer to compete with them for business

3. It is far better to seek out potential customers and actively canvass new business—that way we get more growth | 1 2 3 4 5 6 7 | It is far better to let the customers take the first initiative in seeking out our Branch—that way our risks are lower

4. The publicity material for advertising the various schemes and services offered by the branch

Is generally distributed only to customers who visit us at the branch premises	1 2 3 4 5 6 7	Is generally distributed in schools, market places and other important community centres

5. In our branch we generally do not give credit for outstation cheques until we have received the payment advise from the paying branches. | 1 2 3 4 5 6 7 | We give credit for outstation cheques without waiting for the payment advise in the case of valued customers.

The score on item (3) is reversed. The score on risk taking varies from a minimum of 5 to a maximum of 35. A high score implies high risk taking and a low score, low risk taking.

Bureaucratisation : The following scales have been used to measure the bureaucratisation dimension.

1. In our branch there is a strong emphasis on strictly following the formally laid down rules and procedures. | 1 2 3 4 5 6 7 | Getting targets and tasks accomplished even if formal procedures need to be disregarded.

2. In our branch the clerical employees tend to resolve their work-related problems on their own | 1 2 3 4 5 6 7 | Go with their disputes to a common superior for resolving them

3. Large amount of paper work and time-consuming procedures prescribed by Head Office for use in the branch adversely affect our effectiveness

Very true 1 2 3 4 5 6 7 Not true at all

The score on item 2 is reserved. The score on bureaucratisation varies from a minimum of 3 to a maximum of 21. A high score on bureaucratisation implies a mechanistic style and a low score an organic style.

Coercion : The following scales measure the coercive orientation:

1. The Branch Manager's philosophy in dealing with the employees at our branch is "If you cannot make them think as you do, make them do as you think" i.e., use force when persuasion fails.

Not at all characteristic of the Branch Manager 1 2 3 4 5 6 7 Very characteristic of the Branch Manager

2. The Branch Manager believes very strongly in arriving at a mutually satisfactory agreement with the employees of the branch through persuasion and discussion. He never issues orders without due consultation with the employees. 1 2 3 4 5 6 7 Is a strict disciplinarian and uses fully his formal powers to ensure that his orders are obeyed. Does not ordinarily consult employees

3. In dealing with the representatives of employees' union at the branch :

The Branch Manager believes in making friendly accommodation with them. 1 2 3 4 5 6 7 The Branch Manager believes in being very tough and strict with them.

The scores on coercion varies from a minimum of 3 to a maximum of 21. A high score indicates a coercive orientation and a low score, non-coercive orientation.

Participation : The following scales measure the degree of participation :

1. Please indicate the extent to which each of the following is used or done at your branch :

a) The Branch Manager consults supervisory staff in framing annual budgets
Not done at all 1 2 3 4 5 6 7 Done as a matter of course

b) The participation at the committee meetings in the branch show :

Great deal of enthusiasm 1 2 3 4 5 6 7 No enthusiasm at all

The score on item 1 (a) is reversed. The score on participation varies from a minimum of 2 to a maximum of 14. A high score on participation implies a participative approach and a low score a non-participative approach to decision-making.

Performance Variables

Objective Index : The performance ratio is the objective measure of performance. It is the ratio of targets achieved to targets budgeted.

Relative Index : The scales used to measure relative index are :

1. In relation to branches of other banks in the local area, (A) how rapid is your growth of business ? (B) how profitable are your operations

a) Our growth rate is very much lower than that of other banks in the area 1 2 3 4 5 6 7 Our growth rate is very much higher than that of other banks in the area

b) Our profitability is very much higher than that of other banks in the area 1 2 3 4 5 6 7 Our profitability is very much lower than that of other banks in the area

The score of item (b) is reserved. The score on relative performance varies from 1 to 14. A high score implies high performance and a low score low performance on this dimension.

Subjective Index : The scales for a measuring subjective index are as follows :

1. On the basis of your experience and information, how well does your branch do in comparison with other branches of your bank of comparable size, location and potential of the area served on each of the following ;

a) Achieving targeted levels of business

Branch's performance relatively poor 1 2 3 4 5 6 7 High, well above average

b) Efficiency, i.e., control over costs

Branch's performance relatively poor 1 2 3 4 5 6 7 High, well above average

c) Customer satisfaction

Branch's performance relatively poor 1 2 3 4 5 6 7 High, well above average

d) Staff relations

Branch's performance relatively poor 1 2 3 4 5 6 7 High, well above average

e) Development of business

Branch's performance relatively poor 1 2 3 4 5 6 7 High, well above average

f) Maintenance and upkeep of premises

Branch's performance relatively poor 1 2 3 4 5 6 7 High, well above average

The score on subjective index ranges from 6 to 42. A high score implies high performance and a low score, low performance.

Overall Performance Index

The three measures of performance discussed earlier were aggregated into a performance index. The manner in which this is done is as follows :

All the scores on the three performance measures are converted into standardised scores. In each of the three measures the following thumb rule is applied to form the index since it was found that all the three measures of performance conform to a normal distribution :

1. Standard scores whose values were less than —.43 were given a score of one.

2. Branches with standardised scores in the range of —.43 to +.43 were given a score of 2.

3. Branches with standardised scores greater than +.43 were given a value of 3.

For each branch, the aggregate of these converted scores represent the index of performance. It was found that the index of performance conformed closely to a normal distribution curve. □

Relationship Between Internal *vs.* External Control and Need for Achievement

J. P. Singh* Neeru Singh**

Suggestions for a significant relationship between the personality variables of Internal *versus* External control (I—E) and Need for Achievement (n Ach) have been made from time to time. These suggestions have been based upon both theoretical arguments and some empirical research. Rotter [1966] observed, "Perhaps one of the major conceptions which bear some relationship to the belief in internal *versus* external control of reinforcement is that of need for achievement". Based on limited empirical evidence, he suggested that people who are high on n Ach, have, in all probability, some belief in their own ability or skill to determine the outcome of their efforts. He further speculated that the relationship was "probably not linear". Despite these strong suggestions, only scant attention has been paid to the relationship between these two variables [Heckhausen, 1968], and no clear-cut relationship has been established. The present study examines this alleged relationship between n Ach and I—E control variables.

The concept of internal *versus* external control of reinforcement was developed by Rotter [1966] as a part of his social learning theory. In social learning theory a reinforcer acts to strengthen an expectancy that a particular event or behaviour will be followed by that reinforcement in the future. These expectancies are assumed to generalise from a specific situation to a series of situations which are perceived as related or similar. Consequently, a generalised expectancy for a class of related events acquires functional properties and makes up one of the important classes of variables in personality description. Depending upon the individual's history of reinforcement, individuals seem to differ in the degree to which they attribute rewards to their own actions. Thus, a person with the belief that rewards follow from, or are contingent upon, his own behaviour, is said to have internal control. Conversely, external control represents a person with the belief that rewards are controlled by forces outside of himself and thus may occur independently of his own

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actions. Accordingly, the potential for any behaviour to occur in a given situation is a function of the person's expectancy that the given behaviour will secure the available reinforcement and the value of the available reinforcements for that person. Thus, the I—E control construct is also an instrumentality formulation of the "strength of contingency" between acts and their efforts. As Lefcorut [1966] notes, I—E control is an expectancy variable rather than a motivational one.

Rotter [1966] also noted that it would seem a logical extension of the notion of internal-external control that internals would show more overt striving for achievement than those who felt they had little control over their environment. Rotter cited F ranklin [1963], Efran [1963], and Rotter and Mulry [1956] as supportive of the above deduction. Both Gurin, Gurin, Lao and Beattie [1969] and Lao [1970] noted that students who had a high sense of personal control also had higher achievement l evel. Correspondingly, Coleman, Campbell, Hobson, McPartland, Mood, Weinfeld & York [1966] reported that children of minority groups who showed a high sense of control of the environment had higher achievement scores than those who did not.

There also seems to be some non-supportive research to the hypothesised relationship between n Ach and I—E. Crandall, Katkovasky and Crandall [1965] using the IAR scale found positive results for boys but not for girls. Lichtman and Julians [1964] study reported an insignificant relationship (r-.27) between a measure of n Ach and I—E scale. As Weiner and Kulka [1970] observed,..... "the intuitively reasonable hypothesis that high achievement motivation is associated with a faith in internal control, and low need for achievement with a belief in external causality, have received only suggestive support (p. 8)".

Most of the above studies were conducted on small group of *Ss* and the instability of results is, therefore, not unexpected. However, based on Rotter's [1966] theoretical analysis, it can be hypothesised that there should be some linear or non-linear, relationship between the two variables. The exact nature of this relationship can be specified only after further research. The present research provides an opportunity to test this hypothesis.

Methods and Procedures

Subject : The *Ss* were 174 male undergraduate students between the ages of 19 and 26 (Mean Age=22.07, S. D.=2.15). The *Ss* were volunteers who had responded to a request for participation in Psychological research.

Personality Measurement : Following the tradition of the Atkinson group,

an individual's *resultant achievement motivation* score was obtained by combining his score on motivation to achieve success (M_s) and his motivation to avoid failure (M_{af}). To assess M_s, *Ss* were administered four Thematic Apperception Test pictures under neutral conditions. The *Ss* were tested in small group sessions. Each picture was projected for 20 seconds, and the students were asked to write stories about the projected pictures by answering four standard questions. The students were allowed five minutes to write each story. The four pictures selected for the study were : Nos. 2, 48, 1 and 7 [Atkinson, 1959] and were administered in that order. The stories were scored by the present researcher for n Ach score. Prior to scoring these stories, the standard set of practice material [Atkinson, 1958] was scored by the first author and a correlation coefficient of .91 was obtained with the "expert" scoring. Thus TAT n Ach score converted into standard score yielded M Score.

M_{af} was assessed through Mandler and Sarason [1952] Test Anxiety Questionnaire (TAQ), electing self-ratings on items descriptive of anxiety reactions in Test situations. The M_{af} scores were also converted into Z scores. The resultant n Ach score for an individual was computed by taking his M_s Z-score minus his M_{af} Z-score. The mean of the resultant n Ach score distribution was—0.005 with a standard deviation of 1.38.

The *Internal—External* control was measured by means of Rotter's I—E scale [1966]. The I—E scale consists of 23 forced choice items with six filler items. The high scoring individuals are designated internals. The mean of the I—E score distribution was 9.25 with a standard deviation of 4.36.

Procedure : The *Ss* were tested in small groups of 15 to 20 and were told that they will be administered some psychological tests as a part of a research project. The participation was voluntary and no monetary benefit or courses credit was to accrue from it. The tests were administered in the order of TAT, TAQ and I—E Control. Standard instructions for each test were followed.

Results and Discussion

Correlation coefficients between personality scores were computed for the total pool of *Ss*. The correlation between Resultant n Ach and I—E control scores was —.27 (P. 01). Since a low score on the I—E scale indicated a belief in internal control, the present results supported the hypothesis that there is a relationship between high n Ach and internal control. However, the size of the correlation indicated a weak relationship. To further investigate Rotter's hypothesis of non-linear relationship. eta was computed for the two score distributions. Eta coefficient was found to be 0.40. However, when the hypothesis of deviation from Linearity

was tested, the data yielded an *F* ratio of 0.937. Thus, the hypothesis that n Ach and I—E are non-linearly related, was disconfirmed.

The correlation between TAT n Ach and anxiety was —.14 which was not significant. Since the Resultant n Ach score was based upon both of these scores, and they are uncorrelated, it is appropriate to consider the separate correlation of each with I—E control. The correlation between anxiety (TAQ) and I—E control was .26 (P .01) and between TAT, n Ach and I—E control was —.12 (P .05).

From the results it is clear that there is a small but significant relationship between Resultant n Ach and I-E control (r=.27, eta=.40). This correlation indicated that people who have some belief in their own ability or skill to determine the outcome of their effort (internal control) also tend to be high on need for achievement. These results are consistent with Rotter's theoretical prediction and with previous studies that investigated the relationship of the I—E control with achievement related activities [Franklin, 1963, Efran, 1963], [Rotter & Multry, 1956], [Coleman, *et al.*, 1966, Gurin, *et al.*, 1969 and Lao, 1970]. The reasons for the non-significant correlations obtained in some of the studies [Crandall *et al.*, 1962], [Lichtman & Julian, 1964] seem to be related to sampling variations. For example, Crandall, *et. al.*, found positive results for the above relationship for boys, but not for girls. Crandall and his associates employed the IAR scale for measurement of internal—external control, instead of the customary I-E scale. The Lichtman & Julian study was based on a very small sample (N=28) which might be a reason for their non-significant results.

Although not intended as a focus of the present research, the correlation between the TAQ and I-E scale scores was also computed and was found to be .23 (P.01). These results are parallel to the Ray & Kathan [1968] study with two college populations. They had obtained correlations of .22 and .21 between I-E scale and TAQ.

In conclusion, the present study agrees with Rotter's [1966] deduction that there is a significant relationship between high n Ach and internal control. However, the extent of this relationship is small. Further, there is no evidence of the relationship being non-linear. The study, however, supports Joe's [1971] inference based upon literature review"... that internals tend to manifest greater interest and effort in achievement related activities than do externals (p.628.)" □

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Book Reviews

Productivity Agreements and Wage Systems

D.T.B. North and G. L. Buckingham

Published by Grower Press Limited, UK, 1961, pp. 262, Price in India Rs. 50.00

Reviewed by V. K. Goel*

In a developing country like India, the institution of collective agreement for improving the wages and working conditions of workers has lost its relevance and effectiveness. Most often, the agreements are reached not by bilateral negotiations but by the intervention of the third party which is either the Court of Law or the State itself. What is even more disquitening is the fact that in most cases such agreements or awards are made either to the dissatisfaction of the union or to the resentment of the management because under a system of 'trial of strength' it is inherent that one party may always have the feeling of being a loser. Thus whether trade union wins or the management, in either case, industrial harmoney is under constant threat.

Further, the traditional collective agreements do not take into consideration the developmental needs of a fledgling economy since the reward under this system is related to such extraneous factors as the bargaining strength of either party, cost of living index, comparable wages in other industries, the efforts required to be made to enhance the efficiency of a productive system, nor the reality of a developing economy.

Moreover, in a welfare State, the philosophy of 'trial of strength' is a redundant concept though it might have played a protective role in times of *laissez faire*. It is time, therefore, for both trade unions and management in India, to rethink about the validity of collective agreements and to use their ingenuity in searching a viable institution that ensures better working and living conditions for the workers on the one hand, and higher productivity to a developing nation, on the other. In their search, both trade unions and management may take the help of some endeavours that are being made in this direction both within and outside the country. One outcome of such endeavours is the concept of productivity bargaining culminating into productivity agreements, wherein vagaries of 'trial of strength', are replaced by mutual cooperation towards higher productivity and higher standard of living.

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The book, under review, is a valuable document on the subject, though it has been written against the backstop of obtaining situation in UK. Needless to say, therefore, the concept and appoach which the authors have presented In this book, may have to be suitably 'Indianised' for practical considerations. However, the book is a useful reference document as it provides a conceptual framework within which comprehensive productivity bargaining can be understood and appreciated.

Not to leave matters to generalities, the authors have attempted to give a step-wise approach for taking appropriate measures for arriving at a productivity agreement. These measures, in brief, consist of the feasibility of a wage system based on productivity; installation of a productivity agreement highlighting the importance of productivity bargaining as a fore-runner to productivity agreement; prerequisites which an organisation must take note of before implementing a productivity agreement; and, post-agreement evaluation system pointing to the implications, for both management and trade unions, of implementing a factor reward system based exclusively on productivity needs.

One caution to the readers of this book: We have, somehow, developed a habit of ignoring Appendices, Annexures, Tables and Illustrations contained in a book. For this book, they have to make an exception if they really want to be benefited by it. In fact, it is the appendices which constitute the core of this book. It is they which provide the practical guidelines for taking a number of measures that precede a successful productivity agreement.

Lastly and most important, the authors do not view productivity agreement as simply a new form of collective agreement, with elements of productivity injected into it. Instead, they view the whole process of productivity bargaining as useful vehicle for restructuring the total gamut of industrial relations. This, in turn, demands a progressive outlook on the part of unions and management and, even more, their WILL to improve wages and working conditions not through the machanics of 'bargaining strength' but by the joint co-operative endeavour towards reducing conflicts and to make productivity more meaningful and more effective. Both, management and trade unions in India have to do a lot of heart-searching if they are serious about productivity-linked reward system. □

Studies on Development of Uttar Pradesh

T. S. Papola, V. N. Mishra, H. S. Verma, R. C. Sinha and A. Joshi

Published by Giri Institute of Development Studies, Lucknow, 1979

Reviewed by P. L. Narayana*

A feature of India's economic growth which is causing concern is the widening disparities in the levels of development of various regions. While a few pockets in the country maintained a high rate of growth, a comparative stagnation is noticed in the remaining parts. The disparate growth rates and the maldistribution of economic gains among various segments of the society retard the achievement of our national goal of building a 'socialistic pattern of society'. Hence planners in India started thinking in terms of arresting this tendency.

The earlier plans, though showed the awareness of the problem, did not initiate any specific measures to solve it. It was only during the Fourth Plan that a remedial action was started with the objective or industrialising backward regions by offering fiscal and financial incentives. But no specific programmes were formulated for the agricultural sector, which is one of the major sources of spatial inequalities. During the past two and half decades, agricultural sector advanced mainly in areas, which were favourably endowed. The 'new strategy of agricultural development' introduced in India during mid-60s has further accelarated the development of the districts, which are already prosperous. A majority of the districts, which could not adopt this new technology have lagged behind since they did not have the necessary infrastructure. The new strategy of agricultural development indirectly contributed to an accentuation of regional disparities. Therefore, researchers have started identifying factors that are responsible for the variations in the growth of different regions.

The book under review is one such study which aims at 'verifying some of the theoretical and historical propositions in the tradition of empirical research in social sciences and brings about conclusions with important implications for development strategy and policy.' It has six papers; two devoted to agriculture and four to Industry. It is of immense interest to the students of applied economics desirous of developing an understanding of the analytical tools. The policy makers can also draw some valuable conclusions in making regional development plans.

Of the two chapters which are devoted to agriculture, the first analyses the 'anatomy' of the past trends in the growth of agriculture and the second

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is an attempt to develop a proper framework for studying issues relating to rural employment. In the context of the Sixth Plan, with emphasis on rural development, both these aspects are likely to receive wide attention. Though our planning recognised the importance of agriculture as a supplier of foodgrains and fibres to meet the growing needs of India the efforts made in the past to achieve stable growth have remained unfulfilled. Further the agricultural sector has to absorb the unemployed manpower as the performance of non-agricultural sector has been below our expectations. Thus both the aspects studied are highly relevant from the point of rural development. The anatomy of the growth in U.P.'s agriculture revealed the following trends :

—During the last two and a half decades agricultural output showed an increasing trend, the period 1962-65 to 1968-71 recording the highest growth rate. In this period an acceleration in the rate of growth was also noticed.

– The tempo of growth observed during the above period could not be sustained in post-1971 period. In fact there has been a deceleration in the growth of agriculture after 1971, noticed in all the regions and most districts.

—There has been an accentuation in disparities among regions and districts as a consequence of higher growth rate experienced by relatively developed and high productivity regions and districts than those poorly endowed and underdeveloped.

—Area increase accounted for the most growth during 1950-53 to 1956-59. In the second and third periods yield increases contributed over two-thirds of the growth.

—In the fourth period of 1968-71 to 1974-77, cropping pattern has emerged as the significant contributor to the growth, though meagre; the yield effect having been relegated to a secondary place. Certain regions in the State revealed a pattern which did not strictly conform to the development pattern outlined above.

Any keen student of economics would immediately see the broad similarity between the experience of UP and the rest of India in the development of agriculture. During the early period of economic development area expansion chiefly contributed to the growth in agricultural production. But during 60s, strategy of agricultural development had to be modified as more land was not available to produce the required quantities of foodgrains and agricultural raw materials. Intensive methods of cultivation that were introduced could be practised only in areas which are favourably endowed in the matter of irrigation facilities. So the extension services of the government

and supply of modern inputs like improved seeds, chemical fertilisers, etc. were diverted to districts which have developed irrigation facilities. The high-yielding, short-maturity seeds were also introduced initially in these areas because of the availability of suitable facilities. The strategy pursued deliberately by the government, to meet the challenge of huge food deficits faced at that time, led to a steeper growth rate of only selected regions. A natural side effect of this policy was the widening of regional imbalances.

It is worth remembering that often policy choices available at any point of time pose a serious dilemma. Just before the introduction of HYV seed technology the country experienced two severe droughts which drastically reduced the availability of foodgrains. Adoption of these new seeds desirable from the point of immediately raising our food production conflicts with the need for rectifying regional imbalances. Was there alternative at that time to what was followed. Moreover, India is a vast country with wide divergences in the resource endowment. While certain regions posses fertile soils and plentiful reserves of water, others lack both these vital resources. When such wide differences exist, it is wondered whether it is at all feasible to attain a perfectly balanced development of all the regions. The suggestion made by the study to remove structural defects to achieve a regional growth is unlikely to be of any practical value to the policy makers.

The paper on 'Agricultural Development and Employment Intensity' contains some extremely valuable conclusions which can provide a sound basis for augmenting employment in the rural sector. A major finding is that the attainment of a certain level of agricultural productivity led to a diversification of rural economy in favour of non-agricultural activities. Therefore the first objective of planning should be to raise the agricultural productivity to the critical minimum level (Rs. 12000 per annum is suggested by the study) to enable the self-regulating comulative forces to start their operation. Then employment and income of agricultural workers would rise automatically. The lesson for the policy makers is to identify and remove the bottlenecks in the agricultural growth of low productivity areas through application of science and technology to attain this minimum level. The suggestion for a premature diversification of rural economy into non-agricultural activities also warrant a serious consideration. The experience of Punjab and Western UP in the development of agriculture and small industries provides ample support to this suggestion. There is no reason why this process cannot be repeated in other parts.

The analysis of 'Structure of Manufacturing Industries' in UP vividly brought out inter-related character of the large and small sectors. The study found that there is scope for developing both large and small enterprises as both these sectors complement each other—a fact which the Industrial Policy of the Janta Government did not fully appreciate. Another important suggestion which should be borne in mind by policy makers is the 'cluster approach'

for the development of industries. It is argued by the author that one should forget the controvercy of size and type of industries to be set up and seriously concentrate on the business of rapid development as the state is among the most backward states in the country. This argument is equally valid at the national level since many areas are undeveloped despite three decades of planning.

Papola's paper on 'Rural Industrialisation : Issues and Some Evidence' is extremely interesting. It also provides useful findings for formulating a sound rural industrialisation programme. The available evidence has been very ably analysed by the author. It showed that in the absence of a continous uprating of technologies, the rural industries are not likely to be a vehicle of sustained growth or a source of effective employment measured on an income-generation criterion. It is, therefore, essential that the planning efforts should be first directed to improve the capital base through injection of improved technology of the existing units rather than starting new units. An indiscriminate policy followed in the past to set up units in the small and cottage sectors is one of the major reasons for their high rate of mortality observed by many research studies. If the aim is to develop a viable small and cottage industry in our country the emphasis, as suggested by the study, is to promote those industries based on the utilisation of local skills, improve the technology of production and diversify the product range rather than, industries based on the traditional skills and technology.'

The paper on 'Spatial Diversification of Manufacturing Industries' analysed the geographical structure of industries in UP. The decisions regarding the location of industries are complex and often difficult to identify. In addition to economic considerations, entrepreneurs' 'whims' too play a part in the location decision. The study's conclusion that governmental incentives alone cannot stimulate industrialisation in backward regions highlights the inadequacy of present policies aimed at dispersing industries, It must be realised that a basic requirement for generating non-agricultural activities in any area is to attain a minimum level of agricultural development. Once the necessary level of development is achieved the incentives and provision of infrastructure can act as a catalyst to the industrialisation process. As the study has rightly emphasised, the influence of various factors influencing industrialisation are indivisible and in isolation most of them lost their significance. It is, therefore, necessary that an 'industrial development plan' encompassing all aspects including the types of assistance and incentives should be redrawn, instead of offering piece-meal incentives and doses of infrastructure.

The last paper deals with some aspects of entrepreneurs. It compares the differences in the entrepreneurs of UP and others at the national level. The study highlights the negative aspects of the Indian entrepreneurs: how trade union movement is controlled, how the consumers are exploited, how the taxes are avoided and how lobbying is done through their associations to

secure favours from the government. The private sector operating in a controlled and sheltered market, has always generated profits without being efficient. It is wondered how they would fare in a perfectly competitive economy where no unit which is not conscious about cost or quality is likely to survive. The public sector concept introduced in economy has always not facilitated in protecting the interests of the consumers. Verma's study, though provides valuable insights into the manipulations of private sector, did not unfortunately go into the question of how to counter this evil trend. All the laws passed in the country have miserably failed in protecting the poor consumer of India or to check these malpractices.

The book is a valuable addition to the growing literature on the subject and it should benefit the academic researchers as well as authorities involved in planning. □

Financial Management : Theory and Practice

Eugene F. Brigham

Second Edition, The Dryden Press, Hinsdale, Illinois, 1979
(Available in India through Macmillan India, New Delhi)

Reviewed by Dr. P. Chattopadhyay*

Finance plays a pivotal role in any enterprise system. Sensitive, organized financial management is, therefore, vitally important to the economic health of enterprises. A good and thorough understanding of the elemental functions of finance and financial management is a *sine qua non* of good financial management. The increasing complexities of the finance function and the complicated external phenomena on which successfull finance function depends as also a large number of techniques and methods of financial management have made the study of the financial management function an imperative not only by students of financial management, or for that matter any management, but also managers of both finance and non-finance functions who should have a more than nodding aquaintance of this function to make success of enterprise activities. The change process in the finance function and an almost totall dependence of the finance function on the non-finance functions make financial management not only important in its own way but also as a part of the total enterprise system. From this point of view, this book. runnning into its second edition in a fairly short time, is a welcome addition to the literature on the subject.

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Brigham has organised his book in seven parts embracing twentythree chapters. The first part contains two chapters, intending to introduce the subject matter, the conditions in which the finance function takes shape and the objectives that the finance function seeks to fulfil organisational variations and governmental policies are taken into view in this context. Part two is concerned with the development of a stock valuation model in the context of which the three chapters included in this part deal respectively with the concept of the time value of money and its utilisation in determining bond and stock values as also the concept of risk and its use in measuring risk and its impact on stock prices and rates of return. The third part deals with the analysis of financial statements and financial forecasting in two different chapters, touching on such familiar topics as ratio analysis and its limitations and a relatively unfamiliar topic, i. e., effects of financial statements on beta coefficients. It is pointed out in this context that an increase in the debt ratio will definitely increase the firm's beta — highly leveraged companies have high betas, other things being constant. Secondly, firms with weak liquidity positions and generally poor operating conditions also tend to have high betas. Both these factors tend to make earnings unstable and to increase the probability of bankruptcy and these tendencies, in turn, result in high betas (p.203). Financial analysis dealt with in this part centres on a set of ratios highlighting the key aspects of a firm's operations. Five sets of ratios, namely liquidity ratios, asset management ratios, debt management ratios, profitability ratios and market value ratios are presented with a pointer towards various limitations of ratio analysis that should be borne in mind.

In part four, the author presents details of working capital management, dealing in discrete chapters with cash and marketable securities, accounts receivable and inventories, and financing current assets : short term credit. The important aspects of working capital management are highlighted with reference to alternative strategies for fianancing working capital, the sensitive areas in working capital management and the tools and techniques in use for this purpose. The fifth part is concerned with capital budgeting. In this part the author deals with different issues confronted in capital budgeting and the problems related to evaluation of capital projects, application of discounted cash flow techniques, risk analysis in capital budgeting and replacement analysis. The sixth part presents problems connected with long-term financing decisions. In five chapters, the author covers long-term debt and preferred stock, target capital structure, the cost of capital and dividend policy. In the context of analysing the target capital structure, the author highlights factors that influence capital structure decisions, variations in capital structures among firms and ways of measuring the cost of capital. The important elements of dividend policy are underlined with reference to the concepts that are in use and the factors that guide adoption of different dividend policies by firms.

The last part deals with special topics in financial management, namely,

multinational finance, mergers, bankruptcy and reorganisation, leasing, warrants and convertibles and small business finance. In respect of multinational finance the author discusses the procedures relevant for analysing potential foreign investments, management of foreign assets and the state of international capital markets. Financial analysis of a proposed merger provides an insight into the typicalities of merger proposals and their reflection on the techniques of financial analysis used. The relevance of financial management techniques and approaches to small business is underlined by the author with reference to the characteristic features of small business and the problems that it faces in the course of its operations.

Cases and illustrations bearing on each important area dealt with in the book and a glossary have enchanced the value of the book to students and teachers, on the one hand, and managers, on the other. □

International Marketing Management : An Indian Perspective

R. L. Varshney and V. Bhattacharya

Published by Sultan Chand and Sons, New Delhi, 1980, pp. 308, Rs. 25.00

Reviewed by O. P. Jain*

International marketing management is no less complicated in techniques than vast and ramified in scope. Its appreciation and close knowledge both at the macro and the micro level are essential in the midst of growing global inter-dependence in commerce for the overall world prosperity. Its essentials and applications are to be grasped not only by business executives actually in the game but also by students of the subject at the graduate and the post-graduate level, since the latter provide sinews to the former. There is abundant literature on the subject written mostly by American authors especially in the context of their own marketing scene; but there is very little, if not altogether absent, a systematised and scientifically arranged material on the subject in the Indian perspective which is much less export-market oriented than the perspective in a number of other developing countries, not to speak of the developed ones.

This is the unique feature of the book under review whose authors, though justifiably obsessed with the Indian context for treatment of the subject, do

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not deny the usefulness of the works of foreign authors frequently referred to in the text. Their long experience in teaching and research-based studies of different aspects of the subject help them to have an insight into the problems associated with different stages of international marketing management.

Against the background of international trading environment and India's foreign trade in Part I and II, Parts III grapples with the practical issues of the subject, viz., identifying foreign markets, product planning for export, pricing for exports, market entry and overseas distribution system, distribution logistics for exports, promoting products internationally, marketing plan for exports, export finance, export documents and procedure, state trading in India and decision making framework for export operation. The treatment of these issues is based on the Indian case studies and Indian practices to the maximum possible extent so that the Indian students and business executives are confronted with the facts in practice and not as they are to imagine. The four appendices conspiciuously add to the value of the book: whereas the first appendix makes the readers aware of the export goal envisaged by the planners, the next two attempt to equip them with the sources of information needed for achieving the goal. The last appendix helps the student community in identifying the portions of the book for intensive study for achieving success in their examinations.

Export performance and potential of small-scale industries, for which fairly reliable data are available, could be included in Part II, especially in view of the emphasis on the subject in the Export Policy Resolution (1970). Similarly, certain concessions given by EPCs and TDA in membership fee to small scale industries could be given. Also absent are the provisions and facilities made available in the Import Policy 1979-80 for small industry export marketing consortia. The reviewer feels that a separate chapter could be devoted to the small scale industries in respect of their export performance and potential on the one hand, and their peculiar problems relating to international marketing management, on the other. Not much has been done for this sector in this regard as is being done in some of the advanced countries like USA and Japan.

Notwithstanding this, the book must prove a valuable and dependable guide to the business excutives and the student community due to an almost comprehensive coverage and the lucid style and above all, its reasonable price within the reach of all those interested in the subject. The authors must be congratulated for their excellent work for the benefit of all concerned with international marketing as a profession as well as a subject of study at the Indian universities and institutes. □

The Third World . . . . . Problems and Perspectives

Edited By Alan D Mountjoy

Macmillan Press, London, 1978, pp. 152, £ 3.95

Reviewed by Dr. Ram K. Vepa*

The 'Third World' as the developing countries are often termed, has been receiving increasing attention from economists, geographers, planners and administrators. Now it is the turn of the geographers and the book is a collection of articles from University lectures in Geography (of the British Universities) to work at some of the problems of the Third World. It represents, therefore, a somewhat different perspective from which these problems are conventionally viewed.

The problems themselves are somewhat 'old hat' : Population growth, Land Reforms, Technology Changes, Rural Development, Urbanisation, Foreign Aid, Trade, etc.

All these are issues that are endlessly debated by various organisations: so, it is perhaps unfair to expect any distinctly new approach or information that one has not read or heard many times before.

Even so, the book makes refreshing reading for more than one reason. At the practical level, all the contributions are written in simple and direct language which perhaps is to be expected from university dons from England; it is indeed a pleasure to read about the 'abstruse' problems of the Third World in simple English—so different from the high 'falutin' prose one meets with in international documents.

Secondly, all the contributors were looking at the particular problem they were writing on... from a somewhat similar viewpoint, namely that of a professional geographer. There is, therefore, a 'focus' to the many varied problems presented in the book....unlike similar books written by persons with utterly dissimilar backgrounds which bring such different approaches that leave the reader utterly bewildered and confused.... like the 'six blind men' of the fable, at least, they were looking at the same thing.

Thirdly, there is a rich and wide variety of experiences to choose from since each of the contributors seems to have special knowledge of one or the other of the regions which are lumped together under the appellation 'Third World'. And yet, there are wide varieties in the problems of the ASEAN group, or the populous countries of South Asia, the oil rich countries of the Middle

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East or the countries in Africa or Latin America. In a sense, the only aspect common to them is their stage of economic development but all else is different. A few are rich; many are poor; some are well endowed with resources, some have hardly any; there are rich human skills in many areas, in others, they need to be trained ..and so on. The book draws on this diverse background to look at the problems common to all. In the introductory and concluding chapters an attempt has been made to look at the problems in a perspective a difficult task for a diverse group with a wide variation in the problems they have to solve.

An important point made in the book is to recognise that while there are factors common to the countries of the Third World, there is also a 'uniqueness' about each of them which needs to be appreciated. Solutions that have been relatively successful in one need not necessarily succeed in another. On the other hand, the developing countries do have a 'commonness' in the difficulties they face and there could be a meaningful sharing of experiences between them. The book also makes the valid point that, too often, it is the Western academicians and other professionals who talk about the problem of that group: there are scholars and administrators of the Third World Countries who are beginning to see their own problems in a clearer prespective and more needs to be heard from them.

The book makes easy and enjoyable reading; the selection of problems has been done judiciously, although one would have wished to see a chapter on the Role of Education in Development, but then it is the privilege of an Editor to choose his topics. A useful bibliography suggests further reading on each of the topics for those who wish to know more. □

Marxian Exploitation and Inequality

Arun Bose

Published by Oxford University Press, 1980, pp. xxiv+237, Rs. 70.00

Reviewed by Dr. V. S. Mahajan*

The author of the book is a seasoned Marxist and has made several contributions on Marxian Economics. In the present volume, he has devoted his attention to the interpretation of two different versions of Marxian concept of capitalist exploitation theory. The first aspect, and which Bose rejects as it provides inadequate explanation of the exploitation theory, states that "labour

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is the only source of value (or price, or profit). Bose, instead, supports the alternative approach viz., "capital is nothing but a coercive social power acting on labour", which, according to him, has emerged from mature Marx unlike young Marx which had given the earlier incomplete theory of labour exploitation.

The reason for rejecting the first approach of labour theory of capitalist exploitation is that it "goes counter to some reasonable Marxian axioms about the nature of the capitalist system" i.e., "under capitalism there is no exploitation of labour by capital". Bose further adds : "Having been proved false, the first approach also fails to justify economic inequality among workers, specifically wage differentials under capitalism (for such a justification is one of the corollaries of the first approach)". The author stresses the need for reconstructing the version of Marxian labour theory of value which also takes into account "capital theory" approach found in Marxian writings.

This book can, undoubtedly, raise a lively debate on the new emphasis laid on the "capital theory" approach in contrast to "labour value" approach in providing explanation for capitalist exploitation. While hitherto it had been the "labour value" approach which has occupied the central role in supporting or criticising Marx on capitalist exploitation, it is very much refreshing to read Bose's contribution on capitalist exploitation in terms of "capital theory" approach. He arrives at this judgement after carefully looking into the contributions by Marx especially during his later life and which Bose quotes extensively in the Appendices. This is a welcome contribution on Marxian economics and should be read with interest by students and researchers of economic theory. □

The Design of a Maintenance System

Charles F. James Jr, B. N. Shenoy and Joseph Stanislao

Published by Asian Productivity Organisation, Japan, 1979, pp. 50

Reviewed by Y. Satyanarayana*

The industrial growth in the country as well as in the world is very slow during the recent past. To a great extent, this can be attributed to oil crisis. Added to this, the developing countries have been facing a number of problems like scarce capital to deploy for establishing new industries, replacement of equipment, less productivity in case of already established and running industries, lack of research facilities, etc. The cost of production is increas-

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ing, as a result of all these things. With reduced turnover, the industries are facing uphill task in coping up with the situation.

Further, the equipment utilisation studies have revealed that 35 to 40% of operating time is lost on an average in most of the industries. The down time due to maintenance because of frequent break downs, lack of skilled personnel, non availability of spares at right time, etc., generally contribute to a maximum extent in this regard.

Mostly this can be attributed to the lack of realisation of the importance of systematic maintenance at top level. On the face of it, maintenance appears to be the expenditure centre and this might have created a passive outlook with regard to the maintenance. The equipments, being new, might have tolerated lack of maintenance attention. But the deterioration started much earlier and at a faster rate, resulting in frequent breakdown and higher consumption of spares whose procurement too became a problem. Under these circumstances, the developing countries have to strengthen the area of maintenance to increase the equipment availability and to minimise, the expenditure. The only way is to systematise the plant maintenance. A number of books have been brought out to deal with the subject; but there are very few dealing with the mechanics of the systematic maintenance. The book under review deals with the development of maintenance system.

In the first chapter, the importance of capital equipment and the purpose of maintenance system are discussed. The authors felt that the system may engulf three basic components, namely, preventive maintenance, corrective maintenance and workshop. However, the management of spare parts, being one of the important issues, could have been well included in the list. It is rightly explained that the size of the maintenance organisation and level of the chief in the organisation would depend upon factors like size and technical complexity of the plant, capital investment, down time cost, etc.

The second chapter discusses procedure for development of maintenance system. A simple codification procedure and preparation of Master Equipment List (MEL) are considered as the basic steps. Aspects like different proforma to be used in P. M. System, deciding of frequency, preventive maintenance, work order etc., are dealt with. Development of frequency charts basing on a few weeks' experience of production personnel as suggested, may not be that effective. Similarly, the explanation of various elements of the system, if done through a schematic diagram, would have been quite impressive. Further, making lubricating service a separate entity instead of clubbing with similar frequent activities will certainly provide lot of advantage as 70% of the breakdowns could be attributed to improper lubrication. But there is no mention about the predictive maintenance, which has an important role in the present day maintenance field.

Usage of symbols for different activities like inspection, parts replacement,

etc., and indication of man-weeks in Master Schedule are quite informative. The preventive maintenance work order procedure described here is quite elaborate and provides ample guidance. Further studies can be carried out to analyse the objective and means to simplify the procedure and to eliminate the superflous forms like "work order not completed" etc.

The authors discuss the corrective maintenance system in the third chapter. Corrective maintenance is described as an aura of unplanned immediacy of emergency situations and frantic efforts to restore normal conditions. In other words, it is the maintenance effort diverted to the breakdown or malfunction of the capital assets. It has been explained through a flow diagram (?) oJ could be aptly called as tabular chart. As it is a well accepted fact, the authors too made no bones about the importance of work order procedure in corrective maintenance system. It is rightly pointed out that the jobs requiring more than 0.50 manhours need be recorded.

Instead of having two work order procedures, one for P. M. and one for C. M., a common procedure could have been an appropriate proposal. This would bring in a Central Planning Cell concept for maintenance function. The work order procedure may incorporate the aspects of criticality of equipment and the type of maintenance activity. This type of identification will enable the assignee supervisor (line supervisor) to deploy the crew properly. When there are two work orders for breakdown attending, if the crew available is only one he can deploy the crew to the critical equipment itself.

Surprisingly, the authors limited their discussion on the third basic element, Workshop, to just half a page. Only a mention is made about the general purpose type of equipment in workshop and the type of activity which is nothing but job-shop production control. Probably, the advantages and disadvantages with regard to the provision of workshop would have enlightened the readers.

'Topics in Maintenance' is the title for Chapter 4. References are made to control periodic summary reports, lubrication, equipment replacement, equipment operating policies, work measurement and incentives and maintenance inventories.

With regard to controls the point brought home is that systems should inconspicuously and inexpensively include control functions. It has been highlighted that the control ratios can be used to identify the erratic differences as well as to check up whether the performance is comparable to that of similar industries.

With regard to lubrication, one of the points highlighted is the need for variety reduction in the lubricants used and importance of Tribology. It could be that the authors thought of making the book quite comprehensive, for nothing much has been discussed about the rubbing action of the parts and wear and friction.

The discussions on other topics are of general nature and the name of the Chapter itself is not that conducive.

The book is the outcome of an assignment carried out by the authors, in developing a maintenance system in an organisation in India. As rightly highlighted by the authors in the introduction, that most systems vary in several areas, the system discussed in the book could serve as a valuable guide. There is an urgent need to develop and implement a systematic maintenance system. There is ample scope for the reduction of production costs and the maximisation of equipment availability in developing nations by putting into practice aspects like preventive maintenance system, proper work order procedure, well developed procedures for spares management, etc. □

Where the Money is in India and How to Get It ?

G. Vee

Published by IBH Publishing Company, Bombay, 1979, Rs. 60.00

Reviewed by Dr. P. Chattopadhyay*

Entrepreneurial activity in the context of economic development in a backward country like India centres on fund raising and fund utilisation for productive purposes of different kinds. The central place accorded to finance is not without reason. Scarcity of funds is a characteristic feature of any developmental process of the dimension and magnitude as experienced in India. It is thus appropriate that for providing a strong ground for entrepreneurs to take off, institutional set up has been strengthened on all sides by the establishment of a large number of financial institutions of different nomenclatures under the control of the Governments at the Centre and the States. Government have also formulated several schemes under which funds are dispensed in different doses. Knowing and judging these umpteen sources and costs that they entail are an important part of the calculative processes of investors and entrepreneurs. The author in this book touches an area which has been particularly sensitive from different standpoints. To tell the entrepreneur where to get money for productive utilisation would require, first of all, organised thinking about possible credibility gaps. In the chapter scheme adopted, the author effectively bridges this gap stating with a telling effect the role that money plays, the sources from which money can be had, the costs that are to be taken into view with reference to different sources of such funds and the care that should be exercised by the entrepreneurs in selecting projects, in calculating their viability and in implementing the project schemes with single-minded devotion.

In twentyone chapters, the author speaks of different institutions under the control of the Governments at the Centre and the States, the rules and regulations guiding dispensation of funds by these institutions and the prerequisites to be observed for obtaining funds from these institutions. He narrates different schemes evolved by Government under which concessional finance is made available to entrepreneurs in backward areas and in the small scale sector. The schemes for foreign investment and the incentives offered by Government are explained in some detail. In this regard, the role of the Indian Investment Centre is analysed for helping foreign investors in having collaboration in this country as also for helping joint ventures abroad. Speaking on multinationals, the author is of the view that there is sufficient room for them if they are to concentrate in areas which are primarily export-oriented or which require a high degree of sophisticated technology which is not available locally. He believes multinationals can certainly help in terms of exploiting the country's untapped natural resources. The chapter on franchising is interesting, though somewhat brief. The direct communicational style adopted by the author scores the point for him and for his readers in a spirit of togetherness. □

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Compiled by S. N. Vig* & C. V. Rao**

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