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Controlling—An Important Management Tool for Productivity

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Controlling is a major management function which must be performed by an organization to have long-run success. Controlling is a process of determining how the organization will get where it wants to go. Correct control will establish working relationships between resources that will assist the organization to get there and guide the various activities of its members toward achieving these goals. In addition to planning, organizing, and motivating workers, managers must control and modify existing organizational variables to have organizational success.

General Characteristics of Controlling

Controlling is the process of making something happen the way it was planned or designed to happen. Controlling is a management tool entailing three major components : (1) measuring phase, (2) comparing performance or output to standards, and (3) taking corrective or necessary management action. Included in this article will be three types of control systems—precontrol, concurrent control, and feedback control. The job of a controller will be analyzed to determine the importance of power to managers who are attempting to control, the possible barrier to controlling, and how to control successfully.

A control tool is defined as a specific procedure which provides information to managers in developing and implementing the best organizational control strategy. *Management by expectation* is a tool which allows only significant deviation between planned and actual output performance to be considered by management. *Break-even analysis* is another control tool to assist management in a process of generating information that summarizes various levels of profit and loss associated with output levels of production. Another control tool is *ratio analysis.* Ratio analysis is a process of summarizing the financial position of the organization. The last two control tools deal primarily with financial plans and human resource issues.

The process of developing information begins with the gathering of facts or statistics called data. Once this data is gathered, the data

are analyzed in some specific manner. The conclusions derived from data analysis are defined as *information*. Managers view information as conclusions derived from the analysis of data that relate to the operation of an organization. In general, four primary factors determine the value of information; appropriateness, quality, timeliness, and quantity. The evaluation of information is to determine the information value and the information is compared with the expected cost to obtain the information. Managers use this comparison to determine whether the information should be procured. Managers can use computers and other electronic tools for generating and analyzing information.

This leads to a specialized area of *management information system* (MIS). The MIS can be characterized as an organizational network developed to provide managers with information that will aid them in *decision making*. Planning, designing, implementing and improving an MIS are part of management control tools.

Controlling-Fundamentals

Control is a management process making something happen the way it was planned to happen. Planning and controlling are very difficult to separate and sometimes referred to as inseparable twins of management. Obviously, for control activities to exist, some activity or a process must be taking place within the organization. Therefore, controlling is nothing more than the process managers go through *to control*.

Managers must *measure current organizational performance* before mangers can determine what must be done in order to improve or increase productivity. Before measurement can be taken, some unit of measure that gauges the performance must be established. When this performance is established, the quantity of unit generated by the item whose performance is being measured must be observed. Managers must keep in mind that a wide range of organizational activities can be measured as part of the control process. Performance measurements are taken to assess human and machine productivity.

Once managers have taken a measurement of the organizational performance, the next phase in the controlling process is to compare the results with some *standard*. A standard is the level of activity established which serves as a base for evaluating organizational performance or its productivity.

After managers have measured actual performance and compared this measurement with established performance standards, they should take the necessary corrective action. *Corrective action* is a managerial decision to bring the organizational performance up to the level of the performance standards. At first glance, it seems fairly simple to take corrective action to eliminate the problem. In practice, however, it may be more difficult. To take corrective action, managers must be able to differentiate between a symptom and a problem. If the analysis indicates a particular problem exists, managers can solve this problem through system modifications.

There are three types of management controls : (1) precontrol, (2) concurrent control, and (3) feedback control. Each control system is determined by the time period in which the control is being implemented in relation to the activity being performed. The control that takes place before the work is performed is the precontrol. Precontrol reduces significant changes in desired work results before they occur. Management creates policies, procedures and rules, as a precontrol tool, to eliminate undesirable work results. When controls are conducted during the time the work is being performed, this control is called *concurrent control*. Concurrent control can relate to human performance, equipment performance and departmental or environmental appearance. Control that concentrates on past organizational performance is referred to as *feedback control*. When using feedback control, managers are attempting to take corrective action by reviewing organizational history over a specific time period. Most managers probably use some combination of all three control systems within a particular organization. This combination of control systems focuses on the quality of work *before* it is performed, *while* it is being performed, and *after* it has been performed.

The *controller* and *control* are basically two different functions. The controller's responsibility is assisting managers with the controlling function by gathering information and developing the necessary reports that reflect this data. The responsibility for taking corrective action based

on these reports belongs to the control manager and not the controller. Since the controller is not responsible for taking corrective action and typically advises a manager, the controller's position is primarily a staff position.

As in all organizations, the question of how much control is needed will depend on the results and economics of the control system itself. In general, managers and controllers should determine how much controlling activity is justified within a given situation. The process of comparing cost with expected benefit is called *cost benefit analysis.* Additional control should be included only if the benefit the organization receives as a result of performing the control activities is greater than the cost of performing them.

To control successfully, managers must understand the difference between *power* and *authority* as it particularly relates to control. Authority has the right to command or give orders. The extent to which the manager is able to influence others so that they respond to orders issued is called *power.* The greater the ability to influence others, the more power an individual is said to have. The total power managers possess is made up of *position* power and *personal* power. Personal power is power derived from a manager's human relationship with others. The position power is derived from the position a manager holds in the organizational structure. Managers can increase their total power by increasing their position or the personal relationship with others, which will ultimately influence their controlling capabilities. Since many managers have little control over the amount of position power they possess, they should try to increase their personal power to ensure that controlling will be successful.

Control Tools for Managers

A specific procedure or technique that presents organizational information or data in such a way that managers are aided in implementing appropriate organizational control strategy is called a *control tool.* Control tools help managers to detect strengths and weaknesses of an organization. The most common control tools are : (1) management by exception, (2) break-even analysis, (3) ratio analysis, (4) budgets, and (5) human asset accounting.

Management by exception is a control technique that allows only significant deviations, between what was planned and what actually resulted, to be brought to the manager's attention. Management by exception is based on the exception principle. The exception principle states that subordinates handle all routine organizational matters, while managers handle only nonroutine organizational issues. If appropriately administrated, management by exception yields the best use of a manager's time. Since management by exception brings only significant matters to the manager, this could be organizational strength as well as a weakness, depending on the overall situation. It is recommended that managers try to minimize the weakness and reinforce the strengths of this control tool.

Break-even analysis is the process of generating information that characterizes and summarizes various levels of profit or loss associated levels of production. Break-even analysis typically includes seven major components which are :

(1) *Fixed Costs* - are expenses incurred by the organisation regardless of the number of products produced.

(2) *Variable Costs* - are expenses that fluctuate with the number of products produced.

(3) *Total Costs* – are the sum of fixed and variable costs with respect to the production.

(4) *Total Revenue* - is all sales dollars generated by selling the manufactured products.

(5) *Total Profits* - are the amouut of total revenue that exceeds the total cost of manufacturing the products sold.

(6) *Total Loss* - is the amount of total cost of producing a product that exceeds the total revenue received from selling the product.

(7) *Break-even point* - is the total revenue received from selling the product equal to the total cost to produce the product. Therefore, the organization is generating only enough revenue to cover its cost and no profit or loss is

incurred. The break-even analysis is a useful control tool because it aids managers to comprehend the relationships between various costs, profit and loss within an organization. Break-even analysis can be either algebraic or graphic but care should be taken not to use this tool as a mechanistic means for making managerial control decisions.

Ratio analysis is the process of generating information that summarizes that financial status of an organization. This method calculates ratios based on various financial measures that are recorded on the organization's balance sheet and income statement. The ratio analysis available to managers for controlling organizations are : liquidity ratios, leverage ratios, activity ratios, and profitability ratios.

(1) *Liquidity ratios* - are ratios that show an organization's ability to meet upcoming financial obligations.

(2) *Leverage ratio* - are ratios that show the relationship between organizational funds supplied by the owners of an organization and funds supplied by various creditors. As more funds are furnished by creditors, the more leverage an organization is said to be using.

(3) *Activity ratios* - are ratios which indicate how well an organisation is selling its products in relationship to its available resources.

(4) *Profitability ratios* - are ratios directed to assessing overall organization profits and improving profits wherever possible. The major profitability ratios are the profits to sales ratio and profit to total assets ratio.

Ratio analysis is a control tool that assesses the financial position of the organization. These ratios provide information that can be used to assess the organization's ability to meet financial obligations, the relative amount of funds supplied by owners and creditors, the quality of activity within the organization, and the level of achieved profitability.

Budget of an organization is its financial plan showing how funds will be spent and procured within a given time period. A budget is another good managerial *control tool*. As information is gathered on actual expenditures and receipts within a specific operating period, any significant change from budgeted amounts may be uncovered. When a problem is detected, the managers can develop and implement a control strategy to make *planned* performance consistent with *actual* performance. Today, some managers feel that budgets can be valuable planning and control tools. They can also lead to some human relations problems in an organization. A number of strategies have been suggested to minimize the human relations problem caused by budgets. One such strategy is to design and implement a training programme for finance personnel, accounting personnel, production supervisors, and other personnel involved in the use of budgets.

Human asset accounting is another major *control tool* used by managers. In general, human asset accounting is the process of establishing the dollar value of human resources within the organization. This dollar value is derived by adding the cost necessary to replace an individual and the value of the individual's contribution to production. Some disagreement exists among various managers on how the human asset accounting process should be implemented. Some believe that human asset accounting is subjective and, therefore, should be conducted on an Informal basis. On the other side of the coin, some managers believe that the value of human resources can be measured objectively. Once these values are determined, these values should be included on the organizational financial statements along with other organizational assets. There is little disagreement on the great potential value of human asset accounting as a managerial control tool.

Control Tool Application

Which control tool is best for your organization ? The answer is not as simple as you might initially perceive since there is not one control tool which is better than any other. Each control tool has its individual application and needs. Each control tool furnishes managers with different information as it is related to the control of the organizational system.

Management by exception brings only significant deviation from planned performance to the attention of managers. Ratio analysis helps managers to evaluate the organization's ability to meet its debts, the extent to which debt is being used to finance the organization, the quality of performance, and earned profit levels within the organization. Break-even analysis helps managers to develop and implement control strategy regarding fixed costs, variable cost, and the selling price of a product. Human asset accounting determines the worker's value within an organization. Budgets provide a financial plan for an organization.

Each of these control tools provides managers with different information concerning the organizational structure. Successful managers normally evaluate all of this information to be better able to design and implement *control strategy* that best suits the organization as a whole.

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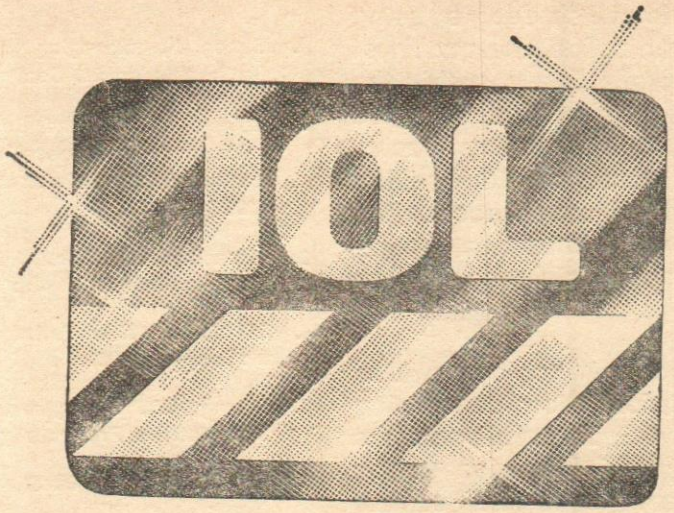
GANDHIJI TO H. G. WELLS

"Received your cable...You will permit me to say you are on the wrong track. I feel sure that I can draw up a better charter of rights than you have done...But what good will it be ? Who will be its guardian ? If you mean propaganda or popular education, you have begun at the wrong end...Begin with a charter of Duties of Man, and I promise the right will follow as Spring follows Winter. I write frome xperience. As a young man, I began life by seeking to assert my rights and soon discovered I had none—not even over my own wife. So I began by discovering and performing my duties to my wife, my children, friends, companions and society, and I found today that I have greater rights, perhaps, than any living man I know. If this is too tall a claim, then I say I do not know anyone who possesses greater rights than I".

—The Harijan, 13 October, 1940



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Improving Productive Behaviour

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In the introductory part of this article the author establishes the superiority of effective behaviour over efficient behaviour. According to him an effective person leads to the growth of the organisation while an efficient person maintains status quo only. In the second part of the article the author analyses effective behaviour into five elements viz : right physical environment, satisfaction of psychological needs, knowledge and skills in doing the job, job contents and the job context. In the last part of the article the author discusses the five elements and how to build these into the work situation.

The ultimate aim of every business is profits which in turn are intimately linked with the performance of its personnel. If people working in an organisation are productive, the organisation grows but if they are unproductive or low in productivity the company suffers. It is, therefore, of great importance that we must understand the factors that determine the behaviour of individuals so that these can be improved for the benefit of both the organisation and the individuals.

Elements of Productive Behaviour

To understand the elements of productive behaviour it is essential to know the precise meaning of what productive behaviour means. Usually productive behaviour is understood as efficient behaviour. But this to my mind is not the correct meaning. The dictionary meaning of efficiency is the state or the quality of being efficient or competence in performance or ability to accomplish a job with a minimum expenditure of time and energy or functioning in the best possible manner. The stress in all these meanings is on the methods of doing a job and the ultimate objective or end result seems to be ignored.

A productive behaviour to my mind is an effective behaviour which is quite different from efficient behaviour. Effectiveness means producing the intended or expected result or producing a deep and vivid impression. In fact an effective behaviour is that behaviour through which desired results are produced. Effectiveness is the skilful

use of resources to accomplish desired results. The stress in all these meanings is more on attainment of objectives than on methods in which resources are used.

A comparison between an efficient and an effective person makes abundantly clear the difference between efficiency and effectiveness.

An Efficient Person	An Effective Person
1. He does things right.	1. He does right things
2. He conserves resources.	2. He makes optimum use of resources.
3. He solves problems	3. He thinks of creative solutions
4. He reduces costs	4. He increases profits
5. He performs duties	5. He produces results
6. He maintains status quo	6. He effects growth
7. He is like an I. A. S Officer	7. He is a professional manager.

From the above discussion it is quite apparent that productive behaviour means effective behaviour and productivity in a job is job effectiveness.

Job effectiveness is a function of two factors

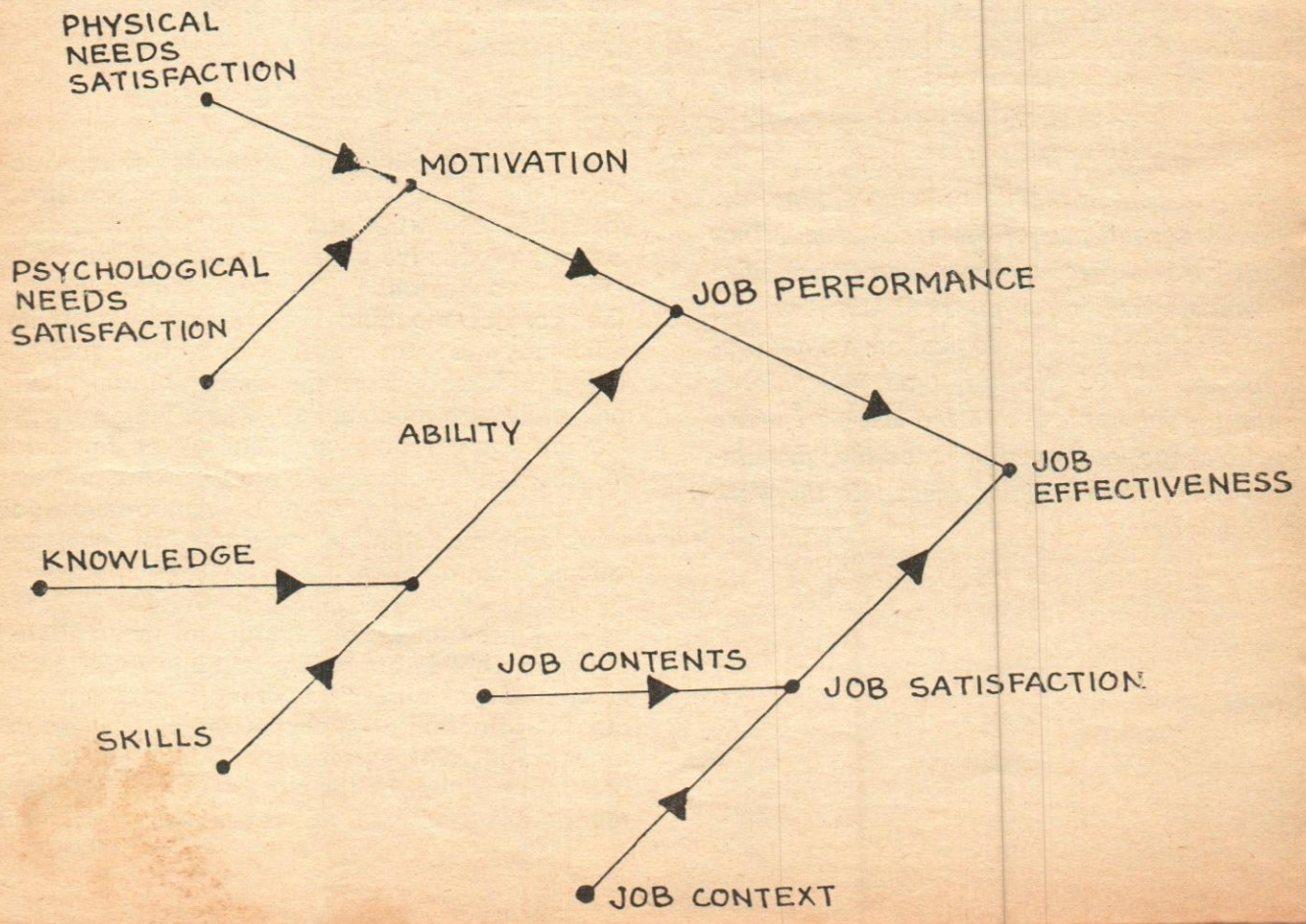
(a) Job Performance

(b) Job Satisfaction

Job performance is the result of ability of the person to do the job and his motivation to do it. Again ability depends on the knowledge and the skills of a person in a job and motivation is the result of needs satisfaction. Therefore if a person has the necessary knowledge and skills and his needs are met, he is most likely to be competent in job performance.

Job satisfaction is the product of job contents and the context in which the job is performed. If the job is interesting and meaningful and the atmosphere in which it is performed is free and full of trust the person doing the job is fully satisfied but if the job is boring and uninteresting and the atmosphere in which it is performed is permeated with hostility and suspicion there is nothing but frustration and dissatisfaction in doing the job.

The above can be expressed diagrammatically as below :-



The following elements of effective behaviour emerge from the above analysis.

1. Right physical environment.
2. Satisfaction of phychological needs.
3. Knowledge and skills in doing the job.
4. Job contents
5. Job context.

If through imagination and managerial skills we build the above five elements into a job, job effectiveness will automatically result.

Physical Environment

Physical environments consist of, on the one hand, machines, materials, methods and tools in use and on the other hand it comprises physical factors such as temperature, ventilation, seating, lighting, if both these types of physical factors are of the right type there is more effectiveness and if these factors are unsuitable the productive behaviour is hampered. Wrong tools, outdated technology, unsuitable raw meterials and obsolete methods of work performance will certainly lead to poor results. Similarly inappropriate temperature, ventilation, seating arrangement and lighting are bound to result in unproductive behaviour.

Psychological Needs

Many phychological forces act on a person and influence his behaviour. One of them is the hankering after an identity or a role. When the identity is acceptable to the worker and also viable in the group, the behaviour is positive, productive and motivated. But if what he wants to be is not acceptable to the group, the trouble starts and leads to a negative and unproductive behaviour.

Another factor is that every man wants to exercise control and influence on others. Any thwarting of this need also produces problems.

The third personal factor is the need for acceptance and intimacy with people with whom one works. Every one likes to be liked and accepted by the group and if this is not forthcoming, the person becomes miserable.

Also everyone has some personal goals. If these goals identify with the organisational goals the behaviour is motivated. If the worker is uncertain of achieving his goals while working for organisational goals, he abstains from extending his co-operation and waits and watches. If the worker is certain that he will not be able to achieve his goals, he will not make any effort towards organisational goals.

In fact a worker comes to work with certain needs such as adequate and fair compensation, growth and security and protection of his rights, fair and consistent discipline. If he is unable to satisfy these needs he becomes frustrated and problem to the organisation.

Knowledge and Skills for Doing the Job

The productivity of a person is directly related to his competence in a job. The more competent a person, the more productive he is. Also competence enables him to enjoy doing his work, his morale increases, he is easy to supervise and is free from faults such as absenteeism. But knowledge and skills do not automatically come to a worker. Even the best of persons must go through a thorough training before they achieve the required level of competence. The cream of universities either gravitate to Indian Administrative Service or to good commercial firms as executives but they do not become effective immediately and neither are they given any position of responsibility. They have to undergo a gruelling training for one to two years before they are considered fit for any responsibility Training is thus essential for getting the best out of a person. Any company that neglects this aspect of their work cannot expect to have a productive work force.

Job Contents

Contents of the job are an important factor in the productive behaviour of an employee. The worker must experience the work as generally important, valuable and worthwhile. This comes through skill variety, task identity and task significance. Skill variety means that the job requires a number of skills and talents. Task identity means doing a whole job or identifiable piece of work. Task significance is that the job has substantial impact on individual, group or community.

Another factor that makes a job attractive is the autonomy in doing the job. It is the degree to which the job provides substantial freedom, independence and discretion in scheduling the work and in determining the procedure to be carried out.

Yet another factor which gives meaning to the job is the feedback—the degree to which direct and clear information a person gets about the effectiveness of his performance. The more timely, objective and comprehensive the feedback the greater effect it has on improving job performance.

The above five factors and their impact on motivation can be expressed in a formula as below :-

$$\text{Motivating Potential Score (MPS)} = \left(\begin{matrix}\text{Skill} \\ \text{Variety}\end{matrix} + \begin{matrix}\text{Task} \\ \text{Identity}\end{matrix} + \begin{matrix}\text{Task} \\ \text{Significance}\end{matrix}\right) \times \text{Autonomy} \times \text{Job feedback}$$

These five factors result in high internal work motivation, high quality work performance, high satisfaction with the work, low absenteeism and turnover.

There are several methods which can increase the attractiveness of a job though these can be broadly grouped under three categories.

1. Work Rotation. It may be voluntary or obligatory but it will always increase skills and flexibility and increase skill variety.

2. Job Enlargement. This is achieved by including one or two additional tasks. This results in reduced employee fatigue. boredom and it broadens work skills. This however means lots of changes in work schedules which may be resisted.

3. Job Enrichment. It can be horizontal or vertical. Horizontal enrichment means changes in the immediate to enable the employee to exercise more control over his working speed and use more of his skills. It will result in greater autonomy, variety and worker's sense of achievement. Vertical job enrichment means Increasing employee's involvement in the organisation by delegation, decentralisation and participation.

Context of Work

Organisation structure, culture and supervisory style are the main elements of the context of the work. A defective organisational structure where activities are not grouped appropriately, span of control is too large, channels of communication either are not clear cut or are violated with impunity, no unity of command exists and responsibility does not match authority can produce serious hurdles while the right type of structure helps in smooth and effective work.

Unresponsive organisations which are characterised by fragmented jobs, tradition bound approach, fear of experiment where more importance is attached to form and ceremony than to means and ends and over-emphasis on formal authority leads to lower productivity and frustrated personnel.

On the contrary responsive organisations where open mindedness prevails, new ideas are encouraged rewarded and which provide economic and psychological security stimulate personnel and lead to higher productivity and higher morale.

Supervisory style is another important factor determining the behaviour of a worker. In a very comprehensive study conducted by Bowers, Bachman and Marcus and reported by Tannenbaum in his work "Control in Organisation," McGraw Hill, 1968, it was found that legal power which is the power ascribed to a chair, neither leads to high productivity nor to high morale. Coercive power which is usually exerted by autocratic and work oriented supervisors results in higher productivity in the short run but sows the seeds of tension, discord and rebellion. Reward power has purely a temporary effect on productivity and morale and also has a declining effect—to produce the same results, the quantam of reward must increase each time. Expert and referrent powers result in high productivity and high morale.

Job placement and promotion system are also important elements of the work context. This means filling of positions, establishment of channels through which individuals move from one position to another and standards to determine who shall move, when and where.

What are the possibilities of growth, what policies determine the upward mobility play very important role in determining organisational behaviour.

Any company that looks after the physical and psychological needs of workers, improves and keeps work skills up to date through appropriate training, continuously looks at job contents to ensure that jobs remain interesting and makes the context comfortable is sure to increase productivity and morale of its personnel.

A MAN LEARNS

"Sooner or later, a man, if he is wise, discovers that life is a mixture of good days, and bad, victory and defeat, give and take. He learns that it doesn't pay to be a too sensitive soul; that he should let some things go over his head like water off a duck's back.

"He learns that he who loses his temper usually loses out. He learns that all men have burnt toast for breakfast now and then, and that he shouldn't take the other fellow's grouch too seriously. He learns that carrying a chip on his shoulder is the easiest to get into a fight.

"He learns that the quickest way to become unpopular is to carry tales and gossip about others. He learns that buckpassing always turns out to be a boomering and that it never pays. He comes to realise that the business could run along perfectly well without him.

"He learns that it doesn't matter so much who gets the credit so long as the business benefits. He learns that everyone is human, that it does not harm to smile and say, 'Good Morning' even if it's raining.

"He learns that most of the other fellows are as ambitious as he is, that they have brains as good or better, and that hard work, not cleverness is the secret of success. He learns to sympathise with the youngster coming into business.

"He learns that bosses are not monsters, trying to get the last ounce of work out of him for the least amount of pay, but that they are usually pretty good fellows who have succeeded through hard work and who want to do the right thing. He learns that folks are not any harder to get along within one place than another, and the 'getting along' depends about 98 per cent on his own behaviour..."

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Survey of Waste Management Practices in India : Part-I An Overview

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This paper presents the details of a national survey on Waste Management that was conducted to estimate the waste generation rates, the amount of waste collected, recycled and disposed of, along with the methods adopted for the same, and waste reduction measures followed in various sectors of Indian economy to establish the current 'state of the art'. The paper is in two parts : Part 'I' provides the broad outlines encompassing sources of data, design of questionnaire, present practices, and major inferences; while the detailed analysis of data will be discussed in part 'II'.

Introduction

Visualizing the seriousness of the problem in the socio-economic resource structure of the country, the study of waste Management from systems point of view has been identified as a vital or crucial problem area in the Indian context. Waste Management is a multi-disciplinary activity involving engineering principles, economics, urban and regional planning, management techniques and social sciences, to minimize the wastefulness (1) of the system.

The generation of waste is inevitable with the functioning of any system. From the systems view point the term 'waste' has been defined as "any unnecessary input to or any undesired output from any system encompassing all types of resources".

In order to assess the quantum of waste generated, collected, recycled and disposed of in various sectors of Indian economy, a national survey on Waste Management was conducted, covering the possible and relevant sources of data. The entire national economy falls under the purview of the survey comprising nine sectors, viz., Agriculture, Irrigation, Power and Fuel, Steel and Mines, Industry, Transportation and Communication, Education, Society and Community Services, and Miscellaneous.

Classification of Wastes

Lack of coordinated work in the field of Waste Management has given rise to multiplicity

of terms and definitions of various types of wastes. Wastes can be classified in a variety of ways, depending upon the purpose for which classification is done. There could be four basic classifications as follows :

(i) On the basis of the resources wasted : Various types of resources are wasted at various stages in the system. Classification of waste on the basis of resources is shown in Fig. 1

(ii) On the basis of source of origin : The source of origin may serve an efficient and practical way of classifying waste, e.g.,

(a) Agricultural,

(b) Industrial,

(c) Municipal,

(d) Residential or domestic,

(e) Commercial,

(f) Office,

(g) Construction and demolition, etc.

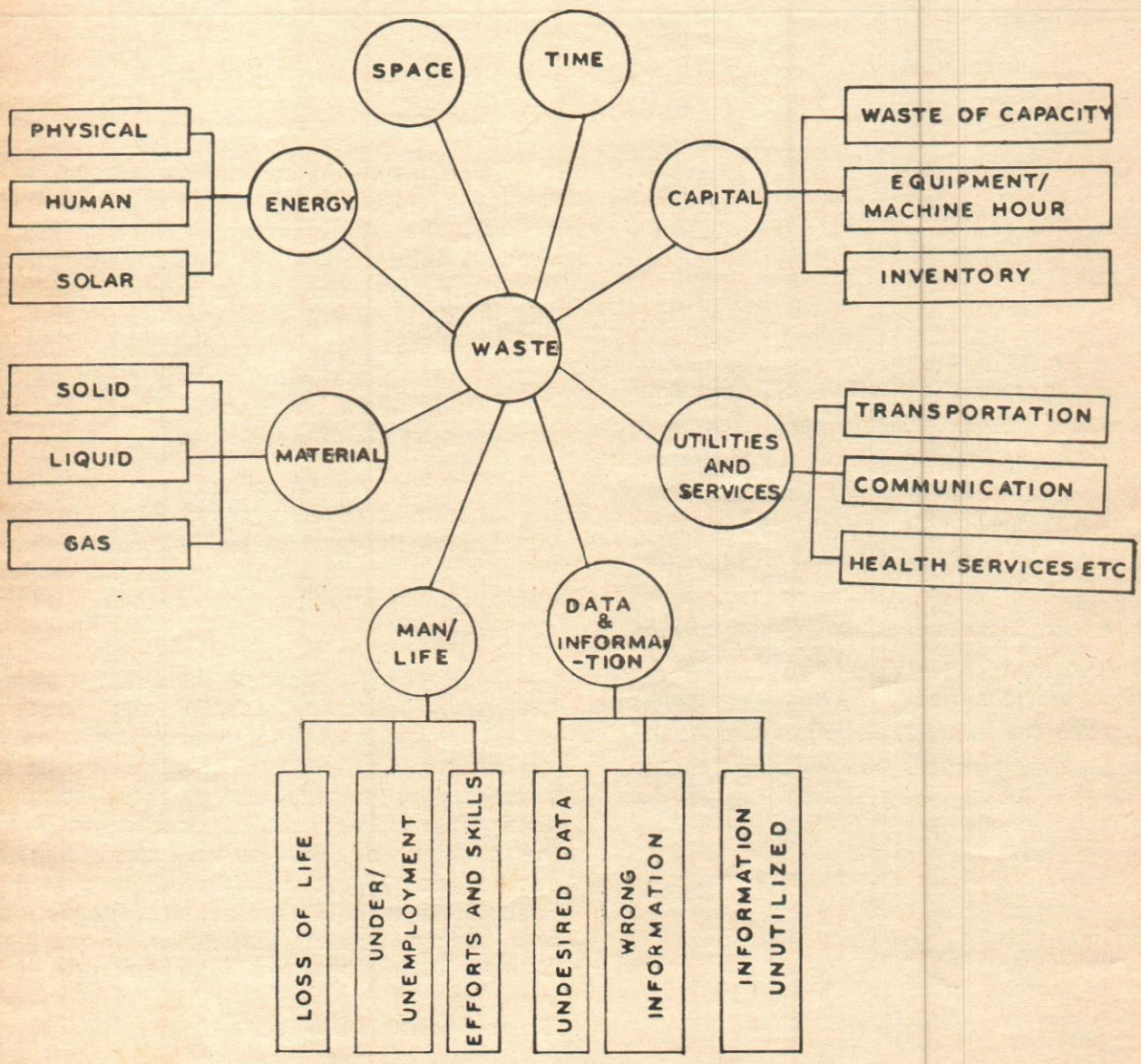

FIG. 1. RESOURCE BASED CLASSIFICATION OF WASTES.

(iii) On the basis of property : This classification is meant for material wastes only. Depending upon the property that affect the environment, wastes may be of two types :

(a) Hazardous

(b) Non-hazardous.

(iv) *On the basis of the recoverability :* As per the characteristic of resource, the waste may be :

(a) *Recoverable :* The waste that can be converted into some useful resource, e.g., material waste, energy waste reused in other processes.

(b) *Nonrecoverable :* The resources which are lost with time and cannot be regained afterwards, e.g., Manpower, energy, capacity, services, etc.

Sources of Data

In fact, every organisation consumes some resources and thus, in turn, generates waste in some form or the other. Thus every organisation may serve as a source of data on waste. The different categories of organisations have been studied, visualizing the possible fraction of total waste contributed by them. Some major groups of organisations considered under the survey, that may contribute to the substantial fraction of waste in the economy are :

(i) Industrial organisations in the Public Sector and Private Sector covering key industries like steel and mines, petroleum, chemicals and fertilizers, heavy engineering industry, automobile, locomotive, textile, etc.

(ii) Agricultural organisations
—Agricultural Development Centres,
—Agro-Industries, etc.

(iii) Municipal Organisations

(iv) Commercial Organisations

(v) Service Organisations
—Hospital,
—Transport,
—Communication,
—Electricity Boards, etc.

(vi) Research organisations.

The survey was conducted on sampling basis, in order to arrive at rough estimates of type and quantum of waste in a particular type of organisation. A high degree of confidence need not be associated with these estimated values. For details of waste in different types of organisations separate surveys should be conducted. (9)

In addition to the individual sources of data, the possibility of having compiled data in this field has been explored and many such organisations were brought under the survey, e.g.,

(i) Various ministries

(ii) Research Institutes, e.g. National Labour Institute, Indian Institute of Petroleum, Central Building Research Institute, Central Public Health Engineering Research Institute, Central Road Research Institute, National Environmental Engineering Institute, Indian Standards Institution, Indian Agricultural Research Institute, etc.

(iii) Other Government and voluntary organisations like Directorate General of Technical Development, National Productivity Council, Bureau of Public Enterprises, Planning Commission, Council of Scientific and Industrial Research, Loss Prevention Association of India, Petroleum Conservation Research Association, Khadi and Village Industries Commission, Central Statistical Organisation, National Sample Survey Organisation etc.

Data Collection

As the study was diversified in nature and the data were to be collected from segregated sources, the data collection phase was approached from different angles. The following methods were adopted for this purpose.

Personal Interviews

The problem was discussed personally with the senior officials of some of the Central Government Organisations and Research Institutes, and separate consultation summary sheets were prepared. Though enough quantitative data could not be obtained through this approach, these interviews proved to be very much useful in providing quantitative information regarding the waste in different sectors. This information helped in deriving the inferences regarding the

present status of Waste Management in India, and the availability and maintenance of data on this aspect. Some of the individual sources of waste generation have also been visited in order to collect the questionnaire responses personally.

Data from Published Literature

A rigorous survey of the published literature was done with a view to synthesize relevant data available. Research journals and Government publications were consulted. Most of the previous studies related to this field have presented the data on individual cases only, while very few survey reports are available in the literature. Majority of the Government publications do not contain any direct data on waste. Still this approach provided sufficient background for deriving some quantitative estimates of waste.

QUESTIONNAIRE SURVEY

Design of Questionnaire

A national level questionnaire survey was conducted in order to gather information on waste from individual organisations. A questionnaire was designed to meet the objectives of the study and to suit the multitude of organisations covered under the survey. The questionnaire was mailed to about 700 organisations on a sampling basis, in different sectors. Attempts were made to reduce the length of the questionnaire, keeping in view that no important aspect of Waste Management is left uncovered. The following points are worth mentioning regarding the design of questionnaire :

To facilitate the understanding of the requirements, the questionnaire was functionally divided into four parts.

(i) In part 'A' general information regarding the organisation was soilcited, with a view to convert information given in other parts into some common bases like waste per employee, or waste in terms of capital input, etc., so as to finally project the estimated values at national level. The general information regarding Waste Management programmes, incentives for waste, standardization, consumption monitoring, etc. was solicited to get an overall idea about waste-consciousness.

(Ii) Part 'B' was designed to collect data on waste generation rates and the measures taken for waste reduction along with the cost-benefit of such measures. Information was invited to determine the critical stages and the quantum of various types of wastes in order to find out the critical wastes that deserve immediate attention.

(iii) The data on collection and recycling of waste was required under part (c). Such data could be utilized for the design of collection systems, and to determine the present status of recycling and the multiple applications of various types of wastes recycled. This would indicate the potential for recycling, reuse and development of byproduct industries.

(iv) Part 'D' was designed to find out the present disposal practices, the quantum of various types of wastes disposed, the manpower and equipment engaged in collection and disposal and the pollution hazards caused. Such information would be helpful in checking the feasibility of alternate disposal systems, the efforts needed for environment control, and the planning for future disposal systems.

(v) Part 'E' required the specific information on major problem areas, causes of wastage, and particular inplant studies being carried out, with a view to reflect the areas and scope for future Research and Development in the field of Waste Management.

(vi) In part 'F', suggestions were invited on the role of Government/legislation, need for education and training etc. which may prove to be helpful in framing guidlines for national policy on Waste Management.

Response

Though the response of the postal survey was not appreciable, it was not very poor also. The very common responses were :

- There is zero waste and hence the information may be treated as nil.
- It is not possible to say anything about the waste.
- The problem does not apply to our organisation.

Some of the organisations showed interest by calling to depute personnel to collect the data,

directing to approach at proper source, or sending the duly or partially filled questionnaire. A brief summary of the outcome of this survey is discussed in the following sections.

PRESENT PRACTICES

Waste Collection

The results of the survey indicate that the level of collection efforts in the country are quite low and no organised system of collection has so far been designed. This leads to poor housekeeping, unhygienic living conditions, poor resource recovery etc.

Though in rural and suburban areas the households of low and middle income groups are contributing to a certain extent towards the segregation of metallic, plastic, paper and glass waste, still a major fraction of these wastes is being thrown as refuse, and is the major reason of poor disposal or recycling of vital resources. Often segregation is practised in a crude manner at many town dumps by unauthorized personnel. This is both unsafe and socially undesirable practice.

Onsite storage of solid waste has been treated as a neglected problem area. The household waste is still being dumped in open along the roadside which leads to environmental hazards and creates public nuisance. In majority of the industrial organisations the scrap is generally not segregated at the point of generation and is dumped haphazardly in open scrap yard along with rejected items and surplus stores in a jumbled up fashion.

Waste Recycling

The study has revealed that a major fraction of total waste Management efforts in the country has been contributed to recycling and there is a growing awareness to use the agricultural, animal, organic, bio, vegetable and other wastes alongwith recycling of paper, glass, ferrous and non-ferrous scrap, plastics etc. National Committee on Science and Technology has prepared a plan for the utilization and recycling of wastes. The standing committee on material conservation constituted by the Ministry of Industry in the D. G. T. D. has been very active in this area.

The Departments of Science and Technology has prepared a country report on utilization and recycling of agricultural wastes. Major projects on cocoanut, arecanut, cashewnut wastes, tea wastes, jute and cotton wastes, wood wastes, non-edible oil seeds and animal wastes have been identified and are being implemented by various CSIR and ICAR laboratories.

The actual quantitative estimates of recycling in the various sectors of the country could not be obtained. Some of the representative examples of the wastes reused/recycled are :

- Ferrous and non ferrous scrap
- Plastics
- Paper
- Garments
- Household appliances
- Machinery and equipment
- Chemicals etc.

Waste Disposal

The survey has indicated absence of organised efforts in this direction, and the disposal systems are not designed properly. Though some consultancy organisations have come up to provide designs of waste water treatment plants, the status of waste disposal practices in the country is very poor. Sewage disposal and radioactive waste disposal are areas in which some recognised work has been done. The common practices of waste treatment and disposal followed in the country are :

(i) Burning of waste in open air to reduce the volume.

(ii) Dumping of garbage at the outskirts of the city.

(iii) Dumping of garbage and other municipal wastes into the rivers.

(iv) Land filling has been started in some big cities but scientific design and planning is lacking.

(v) Composting of agricultural and rural wastes to produce manures is in practice. A compost plant in Gujarat is processing about 20,000 tons of garbage annually.

(vi) Incineration has been attempted to a very limited extent.

(vii) Ocean dumping, e.g., refinery wastes.

(viii) Disposal of fly ash into air via chimneys of power plants, furnaces, etc.

Major Inferences

With the limited response of the questionnaire survey, it was not possible to ascertain quantitative values to various aspects of all types of wastes. But the results of the survey proved to be very much useful alongwith the information gathered from personal interviews and literature survey to draw following major inferences :

(i) Waste is a measure of inefficiency. This was deemed to be the main reason for poor response.

(ii) Proper data on waste has not been maintained which clearly shows the lack of interest in this field.

(iii) There is no infrastructure to regularly collect and publish the data on waste at various levels.

(iv) No particular attention has been paid by the government in this field and waste has never been considered as a factor in national planning.

(v) The awareness in this field has grown recently and NCST, DGTD, NPC, KVIC and some other orgnisations have undertaken various projects for utilization of agricultural waste, energy conservation, material conservation, and environment control etc.

(vi) There is as such no separate Waste Management Department in the majority of the organisations, with exceptions like BARC etc. The function is performed to a limited extent by other departments like Industrial Engineering, Material Control etc., and the efforts are restricted mainly upto :

— declaration of scrap by inspection,

— collection of scrap/waste,

— disposal of salvable waste by auction or by sale to other firms,

— disposal of effluents, etc.

(vii) Industrial Engineering Department has been established in about 20-30% of the industrial organisations while in the service organisations and in the agricultural sector the application of I.E. techniques is very limited. The combined effect of I.E. techniques of reduction in wastage can release over 30% of the entire capital investment that is wasted at present and can also reduce the annual purchase bill over 10% for industry.

(viii) The capacity utilization of many of the organisations is very poor and is a major cause for the colossal waste of capital resources.

(ix) The manpower untilization is very poor, particularly in the Government and public sector organisations. The major fraction of the total manpower waste at national level is due to unemployment.

(x) At present most of the organisations are not running any particular programme for material, energy or environment conservation. Few organisations like L.P.A.I. P.C.R.A. etc. have been established which have started some related programmes. The World Conservation Strategy has been launched.

(xi) Incentive schemes have been started by most of the organisations, but the cost benefit analysis of the same is not being maintained. Waste has not been taken as a perameter in such incentive schemes.

(xii) As such no waste standards have been developed. ISI has introduced some standards in this respect, but the same have not been followed widely.

(xiii) There is a growing awareness towards standardization and ISI standards are widely adopted.

(xiv) Consumption monitoring is practised to a limited extent, but the consumption standards are not well defined in most of the organisations.

(xv) Waste is generated/caused at each stage in every organisation but some stages contribute to the major fraction of the total waste. The waste reduction aspect has generally been

ignored and is the root cause for poor productivity. Even though some efforts are being made to control the waste at various stages, due to lack of organised efforts the waste generation is not checked to the extent desired.

(xvi) The information regarding material waste is available with some organisations, particularly in the form of scrap disposal accounts and total annual disposal values in the balance sheets, while the data regarding other types of wastes is not readily available.

(xvii) Generally the segregation is done at the scrap yard which leads to lots of problems. Very few organisations are practising source segregation of scrap. Municipal waste is very rarely segregated to get various types of resources.

(xviii) No economic criterion has been described to decide the level of categorisation of scrap/waste.

(xix) The expenditure on collection, storage and disposal of waste is generally not accounted separately and most of the organisations treat such expenditure under miscellaneous head. Only some municipal organisations keep such accounts.

(xx) Though reuse and recycling of waste is taking place to a promising extent, the methods adopted for the same are not being studied systematically and scientifically. This is causing poor returns on reuse/recycling activities, thus discouraging investment in this field.

(xxi) Available estimates of the loss of life and property, as a result of natural calamities, and accidents etc., are very vague and no indepth studies have been carried out to find the fraction of losses that could be saved economically by controlling such events.

(xxii) Municipal organisations have their own disposal facilities while all other organisations in general give contract for the disposal of nonsalvable waste.

(xxiii) Though a variety of methods have been used for the disposal of salvagable waste, out of them auction is in vogue. Generally, the frequency of auctioning is decided on *ad-hocbasis*. D. G. S. & D plays an important role in public disposal.

(xxiv) In most of the organisations, effluents are directly disposed to the atmosphere, thereby polluting the atmosphere and causing health hazards. Some pollution control standards have been developed by ISI, and the Water and Air acts (11, 12) for prevention and control of pollution have been enforced, but the same are not being strictly followed. Very few concerns are dealing with the manufacture of anti-pollution equipment and providing consultancy services in this regard.

(xxv) Use of agricultural waste, industrial waste and other forms of organic wastes as raw material for different products is gaining momentum. Research work in the field of bio conversion has been taken seriously, and the development of alternative feeds and energy sources from organic wastes has been promoted. But most of the work is at laboratory stage, and very few field applications, e. g. biogas, are in existence.

The overall status of Waste Management in the country is found to be unsatisfactory and the management of wastes still appears to be an uphill task, despite the fact that maximum returns on Waste Management appear feasible. The detailed analysis giving critical stages, resources, sectors etc. alongwith quantitative estimates will be presented in part-II.

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(Part II of this article will appear in the next issue)

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Economic Order Quantity Under Variable Rate of Inflation and Markup of Prices

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The paper attempts to model the situation of a firm which being under the influence of varying rate of intensive inflation makes available the quantity discount. It opts for pricing policy considering constant markup on unit purchase cost.

Introduction

Buzacott [1] tried to model the inflation considering two cases, one with price subject to same inflation as costs and the other with the price depended on ordering policy. The author [2] evolved an EOQ model which is in consonance with the prevalent conditions such as the capital scarcity and inflationary burden in the context of developing nations.

The markup of prices is the concept ploughed by Wentz [3], Haynes [4], Lee [5] etc... The production –marketing interface and production—economics interface have been considered by Ladaney and Sternlib [6], Kotler [7] and Wayland [8]. Kunereuther and Richard [9] investigated the interrelationship between the pricing and inventory decision for constant deterministic demand.

The present inventory model tries to depict the situation of a firm under inflationary pressure which as a hedge against rising prices makes available the quantity discount. It considers an interaction with pricing policy that involves the markup of prices. The inflation rate considered in this model is not fixed but variable and therefore derivations and the results therefrom become more realistic. The net revenue accumulated at the end of fixed planning horizon is maximized here.

Assumptions

The model is derived under the following assumptions :

i) Demand is uniform at a rate of R units per unit time.

ii) Inflation rate K(T) (Rs./Rs./time) is not constant.

iii) The replenishing rate is infinite.

iv) Lead time is zero.

v) $h(t, t+w) = r.C(t).w$ is the inventory carrying cost for an item bought at time t and kept in stock until time $(t+w)$; r stands for the prevailing market rate of interest if the firms depend upon the borrowed funds. If they prefer, to plough back the profit, it can be interpreted as an opportunity cost of investment. C(t) is the unit purchase cost of an item purchased at time t.

vi) The selling price of the item, if it is sold during the period $(t, t+T)$ is $p(t, t+T) = \theta.C(t)$, θ being the fixed markup ($\theta > 1$).

vii) Shortages are not allowed

viii) [O, L] is the fixed planning horizon, such that $L = \psi t$, ψ being an integer.

ix) Z(L, T) is the net revenue function which is a real, single-valued function and is differentiable w.r.t. the decision variable.

Derivation of the model

K(T) is an inflation rate varying over time T. The simplest form that represents it is

$$K(T) = a_1 T \qquad \ldots\ldots\ldots(3.1)$$

The unit cost at time T of C(T) becomes through inflation a cost of C(T+E) at time (T+E) where

$$C(T+E) = C(T) + K(T) \cdot C(T) \cdot E \text{ as } E \to O \qquad \ldots\ldots\ldots(3.2)$$

$$\therefore \frac{C(T+E) - C(T)}{E} = a_1 T \cdot C(T)$$

$$\therefore \quad d\,C(T)/dT = a_1 T \cdot C(T) \qquad \ldots\ldots\ldots(3.3)$$

$$\therefore \quad C(T) = C_o e^{a_1 T^2/2} \qquad \ldots\ldots\ldots(3.4)$$

C_o is the cost at time $T = O$.

A firm usually continues to operate with a given technology under the increasing burden of inflation. The cost function will not be influenced by the technological variable very significantly. Inflation also guarantees a buoyant market due to the optimistic expectations. Under this situation the firm will opt for a rigid markup because it serves as a built-in adaptor in the revenue adjustments.

The preference for fixed markup would enable the firm to economize in accounting expenses. There is also an additional gain in terms of avoiding public criticism, government control or intervention as with fixed markup of prices firm has not to go for any rationale or persuasion to government or to public for the necessary revenue adjustments to take care of inflationary impacts on cost function.

Here the price is set as

$$p(t, t+T) = \theta.C(t), \quad \theta > 1 \qquad \ldots\ldots\ldots(3.5)$$

The Gross Revenue over planning horizon [O, L] is given by

$$\sum_{n=O}^{\psi-1} RT \cdot \theta\, C(nT)$$

As the purchase costs are subject to inflation where rate is considered to be variable here,

$$C(nT) = C_o\, e^{a_1 (nT)^2/2}$$

$$= C_o R T\, \theta \sum_{n=O}^{\psi-1} e^{n^2 \delta}, \quad \delta = a_1 T^2/2$$

$$\therefore \text{G.R.} = C_o R\, T\, \theta \left[\frac{L}{T} + \frac{a_1 L(L-T)(2L-T)}{12T} + \frac{a_1^2 (L-T)^5}{40T} + \frac{a_1^2 (L-T)^4}{16} + \frac{a_1^2 (L-T)^3 . T}{24} - \frac{a_1^2 (L-T) . T^3}{240} \right] \qquad \ldots(3.6)$$

$\therefore$ N.R. = G.R. − Total Costs over [O, L] ...(3.7)

The total inventory cost over [O, L.] i.e. C(L, T) is the sum of the purchase cost, inventory cost and set up cost. They are obtained as underneath.

i) **Purchase Costs**

Considering fixed discount policy throughout the planning horizon, C_1 being the discount

factor $C_o >> C_1$, the purchase costs over [O, L] become,

$$RT(C_o - C_1RT)\sum_{n=O}^{\psi-1} e^{n^2\varepsilon}$$

$$= RT(C_o - C_1RT\left[\frac{L}{T} + \frac{a_1L(L-T)(2L-T)}{12T} + \frac{a_1^2(L-T)^5}{40T} + \frac{a_1^2(L-T)^4}{16} + \frac{a_1^2(L-T)^3.T}{24} - \frac{a_1^2(L-T).T^3}{240}\right] \quad \ldots\ldots(3.8)$$

ii) **Inventory Carrying Costs :**

As defined earlier

$h(t, t+w) = r.C(t).w$.

Hence the inventory carrying costs over [O,L], considering the constant rate of discount as above, will be :

$$= \sum_{n=O}^{\psi-1} \int_O^T R.r\, C(nT)\, w\, dw$$

$$= \frac{RrT^2}{2}(C_o - C_1RT)\left[\frac{L}{T} + \frac{a_1L(L-T)(2L-T)}{12T} + \frac{a_1^2(L-T)^5}{40T} + \frac{a_1^2(L-T)^4}{16} + \frac{a_1^2(L-T)^3.T}{24} - \frac{a_1^2(L-T).T^3}{240}\right] \quad \ldots\ldots\ldots(3.9)$$

iii) **Set up Costs**

Let S(T) be the set up cost at time T.

$S(T) = S_o e^{a_1T^2/2}$, S_o being the cost at time $T=O$

These costs over [O, L)

$$= S_o \sum_{n=O}^{\psi-1} e^{n^2\delta}$$

$$= S_o\left[\frac{L}{T} + \frac{a_1L(L-T)(2L-T)}{12T} + \frac{a_1^2(L-T)^5}{40T} + \frac{a_1^2(L-T)^4}{16} + \frac{a_1^2(L-T)^3.T}{24} - \frac{a_1^2(L-T).T^3}{240}\right] \quad \ldots(3.10)$$

Hence the total costs over [O, L] is

$$C(L, T) = \left[RT(C_o - C_1RT)\left(1 + \frac{rT}{2}\right) + S_o\right] \times \left[\frac{L}{T} + \frac{a_1L(L-T)(2L-T)}{12T} + \frac{a_1^2(L-T)^5}{40T} + \frac{a_1^2(L-T)^4}{16} + \frac{a_1^2(L-T)^3.T}{24} - \frac{a_1^2(L-T).T^3}{240}\right] \quad \ldots(3.11)$$

From (3.6), (3.7) and (3.11) the Net Revenue

$$Z(L, T) = \left[C_oRT\theta - RT(C_o - C_1RT)\left(1 + \frac{rT}{2}\right) - S_o\right]$$

$$\left[\frac{L}{T} + \frac{a_1L(L-T)(2L-T)}{12T} + \frac{a_1^2(L-T)^5}{40T} + \frac{a_1^2(L-T)^4}{16} + \frac{a_1^2(L-T)^3.T}{24} - \frac{a_1^2(L-T).T^3}{240}\right] \quad \ldots(3.12)$$

which is a function of T.

We have to determine the optimum value of T i.e. T^* with a view to maximising net revenue for the system.

Using the cubic approximation for the terms in the form of e^x, from (3.12) $\rho Z(L, T)/\rho T = O$ results into seventh degree polynomial in T given as

$$\sum_{j=O}^{7} b_j T^{7-j} = O$$

where

$b_o = 1$

$b_1 = (5/3)a_1^2 E$

$b_2 = 160\left[\frac{C_o(\theta-1)}{120C_1Rr} - a_1^2L\right]$

$b_3 = -\left[\frac{240\,EP}{L} - 240\left(\frac{3P}{2a_1^2} - \frac{L^3}{32}\right) + \frac{S_o}{C_1R^2r}\right]$

$b_4 = -160\left[\frac{C_oP(\theta-1)}{C_1La_1^2Rr} - EG + H\right]$

$b_5 = 80\left[\frac{C_oG(\theta 1)}{C_1a_1^2Rr} - 2a_1^2EH + \frac{S_oP}{C_1a_1^2LR^2r}\right]$

$b_6 = 0$

$b_7 = -\frac{160\,S_oH}{C_1R^2r}$

and

$$E = \frac{C_1R - \frac{C_cr}{2}}{C_1a_1^2\,R\,r}$$

$$P = \frac{a_1L}{12}\left(1 + \frac{a_1L^2}{2}\right)$$

$$G = 3P - \frac{a_1^2L^3}{16}$$

$$H = \frac{1}{2a_1^2}\left(1 + 2LP - \frac{7a_1^2L^4}{120}\right)$$

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WITCHCRAFT OF PRODUCTIVITY

Sorcery or witchcraft was a recognised crime in medieval times. So was it in Rome, and in all rural societies. While women were the chief victims of this outrage, practically every aspect of rural life was affected, including agriculture.

It is said that, in Rome, a hard-working cultivator, who had a bumper crop, while his neighbour's crops were poor, was accused by them of having denuded their fields through witchcraft, by which he enriched his own field. The fact of the matter was that this farmer used to work secretly in the night on devising special instruments for broadcasting seed, watering, weeding, harvesting, etc. while his neighbours slept. The result was that he had a bumper crop while the crops of his neighbours were poor. They were naturally jealous and accused him of witchcraft. He went before the Magistrate carrying his bag of implements, admitted his crime, and threw before the court the contents of his bag, saying, "Here, Sir, are my instruments of Witchcraft".

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Inter-Plant Variations in Efficiency of Milk Processing in a Co-operative Federation

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The present investigation was undertaken to study the comparative operational efficiency of four milk plants of a Dairy Development Co-operative by examining their turn-over ratios. It was found that plants 'J' and 'R' were more resource-efficient than plants 'A' and 'B'. The study highlighted the need for enhancing capital productivity by using variable resources in all the plants.

Recently, massive allocations have been made in public, cooperative and corporate sectors to create viable milk marketing infrastructure in the country. Any further enhancement in allocation of funds with scant attention to the economic efficiency of the existing milk plants may jeopardise the balanced growth of agricultural sector itself.

Economic efficiency of milk processing necessitates monetary and physical transformation of input-output processes. Since these resources are individually and jointly responsible for the resultant output-mix, the computation of efficiency may not always approximate reality in physical terms. However, on time-spatial basis, the efficiency indicators help management decide the future course of decisions regarding use of input-mix for product lines. It is thus important that despite obvious methodological limitations, turn-over ratios are constructed for temporal inter-plant comparisons.

This study is an attempt to generate some inter-plant economic efficiency indicators of milk plants over time for a cooperative federation in a milk-surplus state of north-west India.

The Federation

The federation caters to the needs of marketing milk in a state, with the highest milk production (53 lakh litres per day) from the

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smallest proportion (2.5 per cent) of national breedable cattle population. The state accounts for about 11 per cent of the national milk production.

The federation in its present form emerged in 1977 from a corporation established in 1970.

The Plants

The federation has four milk plants[1]. For the sake of annonymity, the plants are nomenclatured as 'A', 'B', 'J' and 'R'. The particulars of the plants are summarised in Table 1.

The Data

The present study is based on secondary data collected from the four milk plants of the federation upto year 1978-79. The data set thus covered 6, 7, 9 and 3 years respectively for 'A', 'B', 'J' and 'R' plants. For all the four plants, the annual sequential data on raw material, salary and wages, power and fuel, water, stock and consumable stores items, marketing and distribution, overheads, rates and taxes was collected in three rounds. Information about capital investment committed by each plant was also collected. Additionally, the data pertaining to manpower employment quantity of milk procured and processed through various processing routes and sale prices of each product were also collected in annual sequences for each plant of the federation.

METHODOLOGY

Ratio analysis was employed to work out labour and capital productivity of the plants. Ratio analysis has been used widely, ranging from vehicle manufacturing firms (Jones, 1978), food and food products industry (Annon, 1980), bidi producing firms (Mathur & Dasot, 1980) to gold mines (Perisastry, 1980). Except one study (Annon, 1979), it has not attracted enough attention to be used as an aid to analyse the efficiencies of milk plants. In the present context, different ratios were computed to measure the spatial and temporal productivity of each plant. The following ratios were employed for the present analysis.

Labour Productivity

Two alternative ratios were computed to measure labour productivity. While the first was related to output (O-E), the second measure constituted labour productivity with respect to value added (VA—E).

Capital Productivity

Two measures of capital productivity were employed. The first measure constituted output as related to fixed capital (O—FC). The second

Table 1 : Date of commissioning and installed capacities of the plants studied

S. No.	Name of Plant	Date of commissioning	Capacity Lit/day	Product-mix
1.	Milk Plant 'A'	29-8-1973	20,000	Pasteurised bottled milk, sterilised flav. milk, ice cream and paneer.
2.	Milk Plant 'B'	28-10-1972	15,000	Sweetened condensed milk.
3	Milk Plant 'J'	5-12-1970	50,000	Milk powder, pasteurised butter, ghee and casein.
4.	Milk Plant 'R'	26-10-1976	100,000	Milk powder, ghee, pasteurised butter and casein.

1. As of 1978-79 there were four milk plants under the management of federation. Since then, one more plant was commissioned in 1980.

measure was constructed to yield output per unit of productive capital (O—PC)[2].

Total Productivity

Total productivity was estimated for each milk plant and for the federation as a whole by the ratio of total output to total cost (O—TC).

Finally, fixed capital to employment (FC—E) and working capital to productive capital (WC—PC) ratios were also worked for the plants studied, so to have an idea of capital-labour employment pattern overtime. All these ratios were estimated, using the current prices.

Concepts

For computation of productivity ratios and other efficiency measures, the following concepts were employed :

(i) *Value of fixed capital :* Value of the total operating assets employed by each milk plant represented the worth of fixed capital. The fixed assets can be evaluated for subsequent years by book value, i.e., historical costs, to arrive at gross values or book value less depreciation on historical costs to date to arrive at net values. Alternatively, replacement value today less depreciation charges adjusted for replacement costs are also employed for arriving at value of capital. For the present study, alternative of net value of capital representing difference between book value and depreciation was used. Thus value of fixed assets on historical costs less depreciation plus any new investment in the particular year was used to evaluate the value of fixed assets.

(ii) *Working capital* : Working capital was defined in the present context as the sum of funds used for meeting all the operational expenses incurred for supporting administrative, procurement, processing and marketing activities of each milk plant during the year. The following items for arriving at the working capital were included as procurement expenses net of salary and wages of procurement staff, electricity, fuel and water charges, raw material costs, i.e., raw milk, skim milk powder and sugar, stock and store consumed, quality control expenses, repair and maintenance of plant, machinery and factory building, and sales and other miscellaneous expenses.

(iii) *Total cost :* Total cost in the present context was defined to include value of items included in working capital, salary and wages, overhead expenses and charges of interest[3] and depreciation on fixed assets.

(iv) *Output* : It was construed to represent the value of products being manufactured at study plants.

(v) *Net value added* (NVA) : NVA for the present study was computed as follows :

NVA = Total value of output-mix less expenses on raw milk, sugar + SMP + power and fuel + water + stock and store, i.e., chemicals, testing and packing material.

RESULTS AND DISCUSSION

Labour Productivity Ratios

The results of labour productivity ratios for the milk plants studied and for the federation are set out in Table 2.

It can be seen from Table 2 that in case of milk plant 'A', barring the increase in initial year (1974-75), there has been a continuous decline in output-employee (O—E) ratios. In case of milk plant 'B' the O—E ratios registered increase till 1974-75. This was followed by a decline in 1975-76 and again a peak value in 1976-77. This peak was subsequently decimated by continuous decline from the year 1977-78 onwards. Milk plant 'J', on the other hand, has consistently registered increased trend in O—E ratios since 1970-71 till 1978-79. Only exception to this plant has been year 1977-78 which was marked by a slide in O—E ratio from Rs. 103661.91 to Rs. 88589.91. Similarly in its short life, milk plant 'R' registered increasing trend since 1976-77, barring a slight dip in O—E ratio in 1977-78.

2. Productive capital was defined to be constituted of both fixed and working capital.

3. Interest was charged at the rate of 9 per cent per annum on the original value of fixed assets. Depreciation was calculated by using reduced cost method. Interest at 9 per cent rate was charged by the state government for financial assistance given to the federation. For details, see "Annual Reports and Accounts". The Haryana Dairy Development Corporation Ltd., 1972-73, pp. 7.

Table 2 : Labour productivity ratios for study milk plants and the federation (1970-79)

(Rupees)

Year	Ratios	Plant 'A'	Plant 'B'	Plant 'J'	Plant 'R'	Federation
1970—71	O—E			5929.59		5031·17
	VA—E			—5242.16		—4447.90
1971—72	O—E			43759.91		37305.65
	VA—E			8905 62		7592.11
1972—73	O—E		7193.11	61238.37		49432.84
	VA—E		—4708.31	18039.79		14002.62
1973 - 74	O—E	12940.40	35534.26	62652.29		41804.90
	VA—E	—1637.11	3906.82	21680.45		11625.38
1974—75	O—E	48394.98	61171.22	88677.31		65311.42
	VA—E	1199.14	21130.00	20164.15		14143.36
1975—76	O—E	41635.33	49493.94	99806.58		64519.12
	VA—E	4186.97	15312.45	25202.75		15277.90
1976—77	O—E	32424.53	63271.52	103661.91	94852.00	72457.34
	VA—E	—206.78	17473.72	28499.04	21681.25	17223 84
1977—78	O—E	21665.84	35494.93	88589.81	89809.51	62704.06
	VA—E	871.13	12512.46	22416.92	19711.34	14867.60
1978—79	O—E	22070.53	17738.02	105923.10	149346.30	84433.65
	VA—E	2625.03	1540.81	20620.01	42170.79	19945.04
Average	O—E	29855.26	38563.85	73363.26	111335.23	53666.68
	VA—E	1173.06	9595.42	17809.61	27854.46	12247.77

where,

O—E=Output per employee
VA—E=Value added per employee

The inter-plant variance in O—E ratios overtime have a combined effect on the aggregated O—E estimates for the federation. For example, the increasing trend of O—E ratio for the federation since its inception in 1970-71 was discernible for three-year period. This was followed by sinusoidal pattern of increase in O—E ratio of one year, followed by a decline in next year. This trend has been continuing till 1978-79. The averages of the O – E ratios of the four milk plants and then for whole of the federation revealed that milk plant 'R' displayed the highest O—E ratio. This was followed by milk plants 'J', 'B' and 'A' in that order. The aggregated average O—E ratio as reflected by the federation turned out to be Rs. 53666.68.

The quantity of gross output evaluated at current year prices is a measure which can broadly indicate the productivity of employment. In business sense, productivity net of material expenses involved in payment for employed manpower gives the true picture. The same is set out in the form of value added to employee (VA—E) ratios for the study plants and for the whole federation in Table II. The results reveal that VA—E ratios for all plants and the federation excepting milk plant 'R' in their initial years were uniformly negative. This could be attributed to the time lag of actual start of production and hiring of employees. Overtime, however, VA—E ratios showed varying degrees of fluctuations in all plants. The overall average of VA—E ratios revealed that milk plant 'R' displayed highest VA—E ratio. This was followed by milk plant 'J', 'B' and 'A' in the descending order. The aggregated average of VA—E ratio for the federation worked out to be Rs. 12247.77.

A comparison of O—E and VA—E ratios in all plants and for the federation revealed that in general, the two ratios moved in positive direction. An increase in O—E invariably resulted in an increase in VA—E ratios. Exceptions were however, discernible in years 1975-76 for the

whole federation where these two ratios observed to be moving in opposite directions. The reason for this lack of correspondence can be traced to higher value due to price effect (not necessarily quantity) of the material used for milk processing. This reflects, albeit subtly, inefficiency of resource use on possibly two fronts, namely, lack of efficient inventory management by authorities to forestall the price effect and lack of efficient use of processing resource-mix in the study plants. From the magnitudes of O—E and VA—E ratios, it can be concluded that milk plant 'R' and 'J' had higher labour productivity than milk plant 'B' and 'A'.

Capital Productivity

Since capital is one of the scarce resources at the disposal of milk plants, the estimates of its productivity has important bearing on the efficient management of the plants. Essentially a higher rate of output per unit of fixed capital (O—FC) would be a desirable feature of any milk plant. But since in the long-run all variable capital also stands committed like that of fixed capital, the estimation of rate of output with respect to the productive capital is also a meaningful tool to judge the capital use efficiency of milk plants. These measures of judging the capital use efficiency for case milk plants and the federation are set out in Table 3.

It can be seen from Table 3 that in case of plant 'A', O—FC ratio was found to be lowest for the year of inception (1973-74) and was highest for the year 1974-75. This was followed by a consistent declining trend till 1978-79, excepting a slight recovery in 1978-79. In case of plant 'B', the ratio of O - FC increased initially till the year 1974-75. This was followed by a dip in the ratio in 1975-76 which was followed by a peak value of Rs. 1.915 in 1976-77. After this peak, the productivity of fixed capital diminished continuously till 1978-79. In case of plant 'J' and 'R' the productivity ratio of fixed capital (O—FC) increased continuously for the study period since their years of inception respectively in 1970-71 and 1976-77. It is also interesting to note that O—FC ratios for these milk plants were found to be more than unity for the study period barring the years of inception. The aggregate ratio for the four study plants as reflected by the ratio of O—FC for the federation was observed to be moving upward for the study period barring years 1973-74 and 1975-76 where a marginal decline in ratios was observed over their previous year ratios. On the basis of average magnitude criterion, plant 'J' was characterised with highest O - FC ratio (Rs. 2.771). This was followed by plants 'R', 'B' and 'A' in that order. For the whole federation, the average O—FC ratio for the study period (1970-79) was estimated to be Rs. 1.622.

Table 3 : Capital productivity ratios for study milk plants and the federation (1970-79)

(Rupees)

Year	Ratios	Plant 'A'	Plant 'B'	Plant 'J'	Plant 'R'	Federation
1970 - 71	O—FC	—	—	0.141	—	0.134
	O—PC	—	—	0.111	—	0.106
1971—72	O—FC	—	—	1.412	—	1.210
	O—PC	—	—	0.651	—	0.605
1972 - 73	O—FC	—	0.041	2.367	—	1.388
	O - PC	—	0.038	0.863	—	0.681
1973—74	O—FC	0.280	0.773	2.648	—	1.371
	O—PC	0.211	0.451	0.936	—	0.672
1974—75	O - FC	1.670	1.839	3.132	—	2.355
	O—PC	0.629	0.839	0.893	—	0.815
1975—76	O—FC	1.299	1.333	3.210	—	1.371
	O—PC	0.589	0.687	0.931	—	0.662
1976—77	O—FC	1.131	1.915	3.532	1.012	1.789
	O—PC	0.520	0.798	0.980	0.565	0.750
1977—78	O - FC	0.845	1.165	3.840	1.556	1.944
	O—PC	0.455	0.705	0.987	0.699	0.782
1978—79	O - FC	0.949	0.619	4.660	3.710	3.044
	O - PC	0.509	0.394	0.973	1.003	0.909
Average	O—FC	1.029	1.097	2.771	2.092	1.622
	O—PC	0.485	0.558	0.813	0.757	0.664

where, O—FC = Output per unit of fixed capital
O—PC = Output per unit of productive capital

The second measure of capital productivity (O—PC) which used total productive capital as denominator revealed that in case of plant 'A' the value of ratio ranged from 0.211 (1973-74) to 0.629 (1974-75). In case of plant 'B', it ranged from 0.038 (1972-73) to 0.839 (1974-75). In case of plant 'J' the O—PC ratio ranged from 0.111 (1970-71) to 0.987 (1977-78). Similarly for plant 'R' the ratio was found to be ranging from 0.565 (1976-77) to 1.008 (1978-79). Finally, for whole of the federation, the O—PC ratio was found to be varying from 0.106 (1970-71) to 0.909 (1978-79). The averages of O—PC ratios revealed that plant 'J' of all four plants displayed the highest ratio of 0.813. This was closely followed by plant 'R' with a O—PC ratio of 0.757. Plant 'B' assumed the third position and plant 'A' ranked fourth with a minimum capital productivity of 0.485. For the whole federation, the average O—PC ratio was estimated to be 0.664.

A comparison of O—FC and O—PC ratios in all study plants and the federation revealed that the two ratios moved in positive direction. An increase in one was followed by an increase in another and decrease in one was followed by a decrease in another. The only exception to this was observed in case of milk plant 'J' where the two ratios of capital productivity moved in opposite directions in two years (1974-75 and 1978-79). The results of O—FC and O—PC ratios conclusively proved that milk plant 'J' and 'R' were characterised by high rates of capital use intensities than that of milk plants 'B' and 'A'.

Total Productivity

The results of the total productivity for the milk plants as estimated by the ratios of total output to the total costs are set out in Table 4.

It can be seen from Table 4 that in case of milk plant 'A', O—TC ratio was found to be less than 1 for all the years of operation till 1978-79. So it can unequivocably be concluded that this milk plant could not cover the total amount of cost incurred to produce a unit of output during the study period. In case of plant 'B', the O—TC ratio was also less than 1 for the years 1972-73, 1973-74 and 1978-79. For the remaining period the ratio ranged from 1.101(1974-75) 1.222(1977-78). In case of plant 'J', barring initial years of 1970-71 and 1971-72, the ratio ranged from 1.062 (1974-75) to 1.198(1973-74). In case of milk plant 'R', the ratio increased continuously since its year of inception (1976-77). Barring the year 1976-77 the O—TC ratios for plant 'R' was more than unity for the study period. For the whole federation, the O—TC ratios were less than unity for the years 1970-71 and 1971-72 and for the remaining study period, the ratio ranged from 1.028(1974-75) to 1.111 (1978-79). The inter-plant comparison revealed that milk plant 'R' displayed the highest average O—TC ratios of 1.077 which was followed by plant 'J' with average ratio of 1.018. The average O—TC ratios were less than unity for the remaining study plants and the whole of the federation. It can thus be concluded that less than proportionate magnitudes of O—TC

Table 4 : Total productivity ratios for study milk plants and the federation (1970-79)

Year	Ratios	Plant 'A'	Plant 'B'	Plant 'J'	Plant 'R'	Federation
1970—71	O—TC			0.304	—	0.304
1971—72	O—TC			0.989	—	0.989
1972—73	O —TC		0.173	1.131	—	1.061
1973—74	O—TC	0.503	0 824	1.198	—	1.032
1974—75	O—TC	0.807	1.196	1.062	—	1.028
1975—76	O—TC	0.862	1.101	1.106	—	1.054
1976—77	O—TC	0.731	1.125	1.145	0.984	1.044
1977—78	O TC	0.682	1.122	1.142	1.018	1.057
1978 - 79	O - TC	0.747	0.673	1.081	1.229	1.111
Average	O - TC	0.722	0.902	1.013	1.077	0.964

where,

O —TC = Output per unit of total cost

ratios in milk plants 'A' and 'B' rendered whole of the federation to its inability to cover up the costs involved in manufacture of milk and milk products, despite more than proportionate share of O—TC ratios of plants 'J' and 'R'.

Capital-Labour and Working Capital-Productive Capital Ratios.

The changes in structure of productivity ratios can be traced to the temporal behaviour of fixed capital per employee (FC—E). The relationship between working capital and productive capital (WC—PC) can also reveal the structural weakness in the efficiency of the study plants. The results of these measures are set out in Table 5.

Table 5 shows that barring a few exceptions, the FC—E ratio showed a tendency of declining with the passage of time at all the study plants and for the federation as a whole. The interplant comparison revealed that plant 'R' was most capital-intensive among the study plants. The ratio of FC—E is bound to fall with passage of time since more and more persons are employed with increased level of processing activity. Thus, no definite conclusion can be drawn merely on the basis of three years' operational life span of milk plant 'R'. The second most capital-intensive plant was 'B', followed by milk plants 'A' and 'J' in the descending order. The overall FC—E ratio was found to be Rs. 34403.39 for the whole federation for the study period.

It can further be seen that ratio of working capital to productive capital (WC—PC) showed erratic variations over time at the study plants. These variations are caused mainly by availability of raw milk for processing. If larger quantity of milk is available for manufacturing milk products, then ratio of WC—PC is bound to increase and it will decrease when availability of milk is scanty. The inter-plant comparison pointed out that milk plant 'J' has highest average ratio of WC—PC (0.635), followed by plant 'R' (0.573), plant 'A' (0.480) and plant 'B' (0.408). The ratio for the federation was 0.530 for the study period of 9 years. The results conclusively showed that, with the passage of time, up to certain point,

Table 5 ; Capital labour and working capital—Productive capital ratios for study milk plants and the federation (1970-79).

(Rupees)

Year	Ratios	Plant 'A'	Plant 'B'	Plant 'J'	Plant 'R'	Federation
1970—71	FC-E	—	—	41935.83	—	37518.89
	WC—PC	—	—	0.212	—	0.203
1971—72	FC-E	—	—	30982.21	—	30868.41
	WC-PC	—		0.539	—	0.500
1972—73	FC—E	—	174244.24	25868.48	—	35590.09
	WC—PC	—	0.067	0.635	—	0.509
1973—74	FC-E	46125.65	45924.07	23657.45	—	30482.64
	WC—PC	0.245	0.417	0.646	—	0.509
1974—75	FC—E	28963.37	33260.06	28312.62	—	27731.29
	WC—PC	0.623	0.544	0.715	—	0.653
1975—76	FC-E	32047.37	37102.57	31090.60	—	47030.05
	WC-PC	0.546	0.484	0.710	—	0.517
1976—77	FC—E	28665.63	33024.77	29346.06	93715.19	40490.57
	WC-PC	0.540	0.583	0.722	0.441	0.581
1977—78	FC—E	25637.55	30466.40	23067.86	57717.55	32247.32
	WC—PC	0.461	0.394	0.743	0.551	0.597
1978--79	FC-E	23245.60	28693.12	22733.58	40254.18	27731.27
	WC PC	0.463	0.364	0.791	0.728	0.701
Average	FC—E	30780.86	54673.60	28554.95	63895.64	34403.39
	WC-PC	0.480	0.408	0.635	0.573	0.530

where,

FC—E = Fixed capital per employee
WC—PC = Working capital to productive capital ratio

almost each plant has desirable tendency to increase the ratio of working capital with respect to fixed capital.

Structural Relationship of Efficiency Indicators

Variables used in constructing all the indicators are output value added, employment, fixed, productive and working capital. Under normal circumstances, increase in value of products should lead to increase in value added, employment and magnitude of all other variables. However, in the form of ratios, their effective degrees of association are not known. In order to precisely know the inter-relationship of these ratios, zero order correlation matrix for these indicators was generated over time. Only results of the federation, are set out[4] in Table 6.

Table 6 shows that barring negative insignificant coefficients pertaining to relationship of FC—E with all other indicators, all other variates revealed a positive degree of association. It can thus be inferred that for the federation as a whole, increase in output was positively and significantly associated with increase in input. It can also be inferred that, for the federation under consideration, costs representing employment, fixed, productive, total and working capital have yet to enter competitive zone to exert sizable substitutability.

4. Plants 'A', 'B', 'J' and 'R' were initiated in different years beginning 1970. Specifically for 'A' and 'R' the number of observations was too insufficient to permit correlation analysis. Thus results on federation only are reproduced.

Conclusion

This study was aimed at locating inter-plant efficiency variations in four milk plants of a milk federation. The results revealed that despite temporal variations, output is intimately related with employment, fixed, working and total capital. The indicators, in turn, have also displayed intimate relationship over time in all the plants. The results reveal that on the basis of these indicator ratios, plant 'J' in the federation is most efficient, followed by plants 'R' and 'B'. For almost all pointers, plant 'A' needs a better resource-use strategy. As a matter of fact, it seems plausible to conclude that these two plants ('A' and 'B') have, over the period been eating into the overall viability of the federation. Timely action in improving these ratio indicators in these plants may go a long way to improve the viability of plants.

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Table 6 : Inter-indicator associations for the study federation (1970-79)

	O—E	VA—E	O-FC	O-PC	O—TC	FC—E	WC—PC
O—E	1.000						
VA—E	0.966	1.000					
O—FC	0.909	0.859	1.000				
O—PC	0 926	0.957	0.916	1.000			
O-TC	0.831	0.925	0.746	0.945	1.000		
FC—E	—0.085	—0.087	—0.473	—0.335	—0.178	1.000	
WC—PC	0.933	0.929	0.954	0 989	0.897	—0.387	1.000

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Management of Rural Development in Developing Economies—A Suggested Policy Approach

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Rural development is considered by many of its proponents as the expansion of urban facilities to the rural areas and the restructuring of the rural economy for the overall benefit of the society in general. In other words, rural development is a progressive policy of reducing the economic and social dualism existing between rural and urban areas in a developing nation. This article tries to analyse the concept and financial implications of rural development and possible policy guidelines for improving the level of standard of living of the rural population. The first section explains the concepts of rural development and analyses the structure of the rural economy. The second section suggests possible policy framework for the achievement of rural development objectives. The third section discusses the financial implications of rural development and suggests possible financial structure for the achievement of policy targets or objectives while the last section is the conclusion.

Rural development poses problems of concept, definition and strategy. The concepts of rural development are wide and varied. But concepts depend on the policies and strategies of rural development. Austin's concepts of rural development are restricted to the rural industrial development though there is some implicit mention of overall rural development. He classified the concepts into six broadly based areas namely :[1]

(a) Each country must design its own policy and programme according to its own objectives and resources which may in turn vary in details between the different rural areas.

(b) Since rural industrial development is closely inter-related with other sectors of rural life, an intergrated approach is desirable in which rural industrial development forms a part.

(c) Rural industrial development should be considered as a long-term venture.

(d) There must be built-in flexibility in the planning process for possible future accommodation of new experiments and trial of new ventures.

(e) Appropriate technology should be a priority.

(f) The necessary incentives must be granted to the rural inhabitants to help themselves.

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Concept (b) tries to broaden the idea of rural development to embody all types of rural activities and a systematic development of these activities. In brief, rural development entails the process of identification of rural economic activities and implimentation of rural development policies aimed at creating and/or expanding social infrastructures, evening out income and other economic dualisms between the rural inhabitants and their urban counterparts. When there is success in implementing these policies, the trend of rural emigration to urban areas may be minimised and the problems of urban planning may be alleviated. Rural development must as a necessity bring into focus the existing population and its growth rate if the achievement of the rural development scheme has to be a success.

In most developing nations, the urban areas are not much different from the rural areas. This goes to create the problem of definition of a rural area. Rural areas may be defined in terms of the existing infrastructures or population.[2] Where people cluster in a large number, a certain form of development must of necessity start. This may not begin from government initiative but instead from individual initiatives. Economic necessities in one way or the other induce people to become enterprising in order to provide themselves with these necessities and make some forms of profit from their ventures. For example, if a certain locality finds itself to have increased in number, they must construct houses, establish commercial activities, etc. in order to make some profits. But does this situation change such a locality from being classified as a rural area to an urban area ? For the purpose of this article, a rural area/community may be defined as an area having a population of less than 25,000[3] people without electricity and pipe-borne water supply whose major activity is farming at the subsistence level. If the main activity of a rural community is farming, it means that there are both material and human resources that must be tapped in order to improve upon agricultural production and other farm related and non-farm related activities. Then comes the problem of formulating policy strategies which can adequately help in achieving the desired objectives of what may be correctly termed integrated rural development. Must agricultural sector be developed at the expense of other sectors and vice-versa ?

Before there is any success in formulating strategic policies for the development of any sector or combination of sectors, a complete identification and analysis of the structure of rural economy and factors which can influence its gradual and balanced development and growth are absolutely necessary. This is because the different sectors of rural economy are so interrelated that the planning and development may make the whole idea of rural development incomplete and is in most cases a farce. It is a known fact that about 80% of the Nigerian population lives In the rural areas. Their primary occupation is farming but a small percentage of the rural population is involved in non-farm productive activities. Precisely, according to World Bank Policy Paper,[4] between 20% and 30% of the rural population in developing nations earn their incomes from non-farm activities. This is true if we consider the fact that the structure of the rural economy is composed of different inter-dependent sectors having the following component activities which are different from farm activities :

(a) Shoe-repairs (b) bicycle repairs (c) tailoring service (d) bakeries (e) fishing and the manufacturing of related fishing equipments (f) building construction (g) carpentery (h) canoe construction (i) educational activities (primary), etc. The list is no doubt not exhaustive but depends on the locality. This is a confirmation of the earlier assertion that rural incomes are from different sources. Same conclusions have resulted from different research activities (Erasmus and Johnson[5]. Developing only one sector of the rural economy may therefore end in a fiasco if other sectors are not considered.

Two stages of rural development are necessary before any meaningful take off of agricultural and industrial activities could be achieved.

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   Johnson; Allen : "Time Allocation in Machiguenga Community'. *Enthropology*, Vol. 14 (1978) pp. 301-310 Enthropology.

The first stage should be the provision of the necessary infrastructures and the second should be composed of activities aimed at improving production methods and qualities of goods and services in the rural areas. The second stage may be conveniently and easily achieved if the first stage has been well established. Or, can the second stage exist without the first ? This seems impossible unless in a situation where the development of agricultural, industrial and other sectors of the rural economy develop pari-passu with the development of the necessary infrastructures —electricity, pipe-borne water and good feeder roads. The complete absence of the necessary infrastructures has negative impact on the social, economic and political life of the rural population and is the main cause of emigration from rural areas to urban areas thereby raising the average age of the rural population above that required for active labour force. The implication here is that most members of the rural population are relatively inactive and relatively unproductive either because of old age or because of underage (school children still in the elementary schools).

Since the average rural family earns its income from different sources, the level of specialisation and intensification of production is unsatisfactory. The meagre income from farm and non-farm activities tends to induce the rural population to seek income from both sources. As a result of this, they spend less time on each category of productive activities. Consequently, they are usually able to produce only low-quality, low-volume goods or services. This implies that the whole matter of division of labour is relatively neglected and the line of demarcation between one type of activity and others (as measured by income and time) undertaken by a single family is blurred. As the old adage says, they all become "Jack of all trades but master of none".

The awareness of their productive deficiency, the apparent neglect by the central or any level of government, their inability to improve their standard of living and come out of the seeming slump tend to make them politically inactive. They seem helpless and passive as far as participation in the political affairs of the nation is concerned. It does not imply that they do not vote, but they tend to follow blindly the dictates of those who promise to redeem them from their pitiable conditions without adequate reasoning on the means of achieving this.

The state of affairs as it exists in the rural areas, therefore, tends to place them in a position or abject poverty. This is not disputing the fact that the relatively low levels of income and expenditure do provide them with potential savings margin. Moreso, there is also the problem of measuring most of the incomes and expenditures of the rural population since most of their transactions cannot be measured in monetary terms. This is because outside market transactions like gifts (of farm products and others) form a part of the rural household economic life (Hill and Stavenhagen)[6].

Even though there is an existence of potential savings margin, the actual use of these savings is a matter for concern. The rural inhabitants are often quite ignorant of investment opportunities. The main use of these savings are in purchase of landed properties or investment in small leased plots with palm or palm wine trees. The first case is to enable them expand the farming activities while the second case is for harvesting the palm fruits for both consumption and sales. It has been discovered by the author that before any tangible amount is used in the above purchase, most of the purchasers participate in the cycle savings scheme. This scheme no doubt does not produce any additional income by way of interest rate but instead, a small capital loss through contributions made by members to sustain the organisational activities and entertainment in each meeting day of members (mainly once a week) to decide who should carry the contribution for the following week.

With regards to the agricultural sector which we have noted as the mainstay of the rural economy, something should be done to increase the average production level from that of the subsistence level. The low level of production is no doubt caused by many factors, namely (a) time factor, poor seeds, inadequate supply of fertilser (b) lack of capital equipment (c) outmoded production technique and poor organisational methods (d) inadequacy of funds and (e) defici-

6. Hill; *Poly : Rural Hausa, A Village and a Setting*—Cambridge University Press, 1972.
Stavenhagen, Rodolfo : "*Basic needs, the Peasants and the Strategy for the Rural Development*" in M. Merfin ed, *Another Development.* Uppsala: Dag Hammars Kjold Foundation, 1977, pp. 40-65.

encies in keeping accounting records by small farmers. The rural farmers spend much of their time in non-farm activities (Erasmus and Johnson)[7] which are also sources of additional income. The poor conditions of seeds (due to non existence of storage facilities), the poor distributive systems and lack of adequate knowledge of the use of fertilizers combine to cause low level of production. The same thing could be said of the existing technology (if that is the appropriate word) which consists of simple primitive tools of production. Organised forms of production are either non-existent or poorly conceived. This is because individual type of production continues to gain grounds and therefore keeps rural families apart and continues to perpetuate the one family consciousness and a total distrust for non-family members (Banfield)[8] originating a situation that Banfield describes an "amoral familism" and disrupting cooperative activities. Inadequacy of credit facilities and deficiencies in keeping accounting records go further to zero out any possibility of progress.

All these chains of causations together cause stagnation of agricultural and other sectoral productive activities in the rural areas. The situation continues to perpetuate a state of poverty and implicitly disrupts any potential progress. Nevertheless, there are a few successful businessmen within the social structure of the rural communities. They try to exploit the feeble economic status of the others since they claim certain privileged economic status that most others do not fit in. Economic status here may be determined by the ownership of capital equipment (Awiti)[9]. In Eastern part of Nigeria, large livestock holdings (especially cows) were formerly a symbol of wealth. Such situations do not seem to exist anymore due to the existing primitive methods of breeding and feeding of livestock which are tedious and the inability of the people concerned to find access to modern methods because of the substantial financial outlay involved. How can the rural communities come out from this typical vicious Circle ? The main consolation is that all the societies may be seen as having a considerable exhibition of rationality but few have the techniques, the moral and scientific value systems and adequate institutional structures which can help in formalising the inherent rationality. Since the developed nations have gone through it, the developing ones must try to go through the same process.

Suggested Framework for Rural Development Policies : If rural areas must be developed, the only solution (Myradal)[10] is to rupture the chain of causations of underdevelopment and set in motion a self-sustaining growth. This is the breaking of both the endogenous and exogenous factors that retard rural development.

It is important to note that change and progress are not synonymous. But if change is effected, then progress must subsequently follow. Change will no doubt create victims and beneficiaries among the rural population and their kindred in the urban areas. This occurred in the 1860's in Italy (the appropriation of church land and others), in 1930's in America (the expulsion of small farmers) and in England (the enclosure movement). But change as it is should be brought about in a peaceful environment where the consciousness of the rural population is awakened towards cooperative ventures. The necessary incentives must be applied and most important of all, honesty and seriousness should be the guiding principles at both the policy level and the implementation stage. This change is for the benefit of not only the rural population but for the whole nation in its integral part. This is because change ought to bring about a harmonious relationship and coordination of all economic, social, political and cultural factors that identify all groups of people as belonging to the same nationhood. It will create a situation where there is less economic dependency among family members which is a pride for the nation. If we must break the negative trends of the past, we must develop a sense of national consciousness, reorder our priorities at both national and local levels, set up the institutional structures which can help in the identification, formulation, coordination and implementation processes which are relevant for achieving the desired development objectives. In order to arrive at any tangible

7. Erasmus; Charles J. op cit; Johnson; Allen, op. cit.

8. Banfield E : *The moral Basis of a Backward Society—A Study of the Southern Italian Peasants.* New York : Free Press, 1958.

9. Awiti; Adhu : "Economic Differentiation in Ismani, Iringa, Region. A Critical Assessment of Peasant Response to the Uyama Vijijini Programme" in *African Review*, Vol. 3, No. 2(1973) pp. 209-239.

10. Myradal : G., *Rich Lands and Poor.* New York : Hager and Row, 1957.

result of rural development, certain stage of development must be followed. In this paper, the following stages are suggested; (a) Provision of the necessary infra-structures. This will act as a catalyst to reawaken the rural population of being part and parcel of the nation. This is a way of helping the rural population to help themselves. The infrastructure includes good feeder roads, health services and the implementation of the rural electrification schemes. (b) The rural population should be made to organise themselves into more effective forms of cooperative movements/societies pertinent to farming, industrial, commercial and services activities. These movements or societies should be backed with necessary and well-articulated incentives. (c) Research and Development Centres should be established in all planned local areas. Each locality which may be defined as having homogeneous cultural and socio-economic factors should form a separate development area on its own Within this area, there should be a research and development centre which may initially be constituted by the engineers, planners, researchers, management experts and financiers. These categories of people abound in almost all the local government areas, but what is needed is the mobilisation of their potential skills for the welfare of the society. (d) The Research and Development Centres should carry out project identification, formulation, planning and design. Since project planning, design and implementation involve technology, different forms of technology should be adopted in three main stages, namely; (i) traditional technology, (ii) imported technology and (iii) a newly designed local technology.

The traditional technology can be upgraded for use in order to allow for a continuity in economic activities while trying to find an alternative form of technology. The imported technology should be adapted and improved in a way that suits the development objectives, prevalent or changing institutional structures, the environmental constraints and the supply of local resources. This type of technology will result in improving the quality as well as increasing the output of goods and services. The development of a local technology may be the most appropriate solution as this will take cognisance of the local factors and will facilitate repairs without any foreign dependency. All these steps will combine to help in guaranteeing continuity in production and improvement in quality since the local constraints and bottlenecks in improving the living standard of every member of the community must have been taken into consideration.

The national rural development policy must form guidelines for the rural development objectives of each locality. These policies must be specifically aimed at assisting the rural enterprises and services. These incentives should take the form of fiscal measures and training programmes. The level of incentives should be nationally determined although the existing knowledge (Baker and Bhargawa)[11] on the determination of the level of incentives for farmers is limited. Even though the results of some studies are presently available, there are considerable inconveniences of including them in a planning process. The local planning programmes should be aided and coordinated in such ways as to facilitate and enforce the use of local inputs. The agricultural, industrial and commercial set-ups should also be coordinated in ways such that induced growth of the rural establishments may result from the growth of urban industries. This process allows the rural establishment to expand along with the expansion of the urban establishments. It is a form of linkage arrangement. The manufacturer of spare parts and other forms of inputs for urban industrial establishment should be sited in the rural areas.

A national centre for research and development should take care of coordinating the activities of all the local research and development centres and the implementation of planned projects having in mind the available financial resources. The national policies should guarantee continuous research programmes for the improvement of the level of technology and management.

Much has been said about both the national and local policies, objectives and procedures but we seem to forget about the role individuals or groups of individuals and financial institutions should play. The individuals or groups of individual residing in the rural areas deserve comments as the success of any development scheme certainly depends on their reactions and willingness to cooperate in the achievement of the stated objectives. The willing-

11. Baker : C. B. and Bhargawa : Vinay K., "Financing Small-farm Development in India," *The Australian Agricultural Economics* Vol. 18 (1974) No. 2, pp. 101-118.

ness of these potential beneficiaries (rural population) to cooperate with the development schemes no doubt depends on the level of additional income to be derived from the increased economic activities which will be a direct result of the development programmes. Their reactions will depend on the positive impact of the scheme on social factors and different economic sectors. An example should be drawn from the agricultural sector as stated by Carpenter and Kunert[12] which says, "Farming populations have little risk bearing capacity and are very reluctant to change any proven practices without sufficient guarantees or evidence that the recommended changes will increase the output of what they consider 'essential to life commodities'. These groups also want to be assured that increased supplies of the essential commodities will not result in greater financial burdens which jeopardize access to their present meagre land resources."

Past impressions by the rural population of hearing development strategies for their areas without their actual implementation must be corrected. If this should be so, projected plans without adequate financial backing must not be announced as this tends to raise the hopes and aspirations of the people concerned. The non-implementation of development programmes after an announcement has been made tends to demoralise people and leads them to attach little importance to future programmes. They must therefore be backed with a sound local and national financial structure, international financial aid and appropriate fiscal measures.

Financing the Rural Development Programmes

The major problem of implementation of any development programme is that of finance. This same problem confronted the industrialised countries. The developing nations therefore have additional advantage of learning from the successes and failures of the then developing nations (now industrialised). This is not, however, disputing the fact that most of the developed nations still grapple with the problems of dualism in all its ramifications or what may otherwise be called north/south dichotomy within their national context. For example, in France and Italy, there are different development standards between north and south. All efforts aimed at rectifying these incongruencies in development between north and south seem to have defied any satisfactory solution. Is it caused by finance, or the lack of seriousness of the different governments or the unwillingness of the ultimate beneficiaries in helping the governments to achieve their stated goals ? If we watch the situation closely, we may find that a combination of all the above tends to compound the issues.

Coming down to the developing nations, it may seem that the problems are much more complicated but these do not defy solutions since the disparity in development within all the geographical areas of a particular nation is not much as compared to the situation in the developed nations. Local, national and international sources of funds for development purposes are wide and varied and should be adequately tapped and properly used. The problems of ability and possibly the willingness of different financial institutions to identify themselves with the development programmes must be solved. There must be conscious efforts aimed at mobilising most of the available savings and coordinating all the known sources of finance for the implementation of development objectives. Intra-sectoral relationship of the financial sector should be such that will facilitate the supply of financial resources to the desired areas while at the same time defining clearly, allowable types of transactions for each type of financial intermediary. All efforts should be aimed at breaking the local constraints which can distort the flow of funds to the desired project establishments. According to Cillet and Uphoff,[13] "Even if credit were an economic panacea— which it is not—in some communities or situations, social norms or group organisation are adverse to the operation of externally sponsored, formalised institutional credit activity...Probably the most common cause of such infeasibility will be the existence of a local power structure which short-circuits any efforts to get resources to small farmers or to preserve the benefits of innovation for him".

The national and local sources of finance

12. Carpenter; N. R. & Kunert, H.: Farm Management Research—A need for Rural Development Farm Management Notes for Asia and the Far East, Regular issue No. 4 p. 3, 1977.

13. Gillette : C. & Uphoff : N. : "The Credit Connection Cultural and Social Factors Affecting Small Farmer Participation in Credit Programmes"– *A. I. D. Spring Review of Small Farmer Credit* Vol. x1x, No. SR 119, p. 180 (1973).

for rural development programmes should consist of the following :

(1) Establishment of new types of financial institutions like (a) the rural savings banks (b) cooperative banks and (c) credit associations. These should act as primary centres for mobilisation of rural savings and local sources of credit for localised establishments. The banks should normally be coordinated at both the state and national levels. As an example, the "Cassa di Risparmio" in Italy have considerable regional characters (as to sources and application of funds) but at the same time are nationally coordinated by a central body with respect to operational policies. Some other banks (like "Cassa Rurale" *(Rural Banks)* and other forms of cooperative banks) exist side by side with each other but have local characteristics which are different from other banks that have national and international characteristics. By implication, the local banks should be capable of financing only cottage industrial establishments and other cooperative projects which can act as a base for developing the potential or latent entrepreneurial and managerial abilities of the rural population and at the same time create employment opportunites, provide incentives for self-development and an increase in the level of rural income.

(2) There should be planned intensification of branch network of the existing development banks and a radical deviation from the existing regional considerations which seem to characterise their present management and lending policies. The development banks have much role to play in economic development of the developing nations. This is true if we consider the long-term financial implications of development projects, the peculiarity of long-term nature of their sources of funds and the technical expertise which are supposed to be at their disposal. These banks should be considerably identified with project identification, planning and design and the financial aspects of project implementation.

An idea should be borrowed from the implementation of the German industrialisation programmes. According to Gerschenkron[14] the practices in the area of industrial investment banking in a backward nation must be seen as specific instruments of industrialisation. This must also be conceived as a supplement for the acute shortage of capital and entrepreneurial talents. Inadequate supply of skilled manpower or the incompetence of the individual entrepreneurs are not problems peculiar to only the present developing nation. They existed at every stage of development of any developed nation. Overcoming such deficiencies is a matter of willingness, concentration of available efforts, seriousness of the different planning and development bodies and others directly or indirectly concerned. According to Gerschenkron, these deficiencies were considerably rectified by the attitudes of the Industrial Investment Banks.

"In Germany, the various incompetencies of the individual entrepreneurs were offset by the device of splitting the entreprenurial functions. The German Investment Banks—a powerful invention comparable in economic effect to that of the Steam Engine-were in their capital supplying function a substitute for the insufficiency of the previously created wealth willingly placed at the disposal of entrepreneurs. But they were also a substitute for entrepreneurial deficiencies. From their central vantage points of control, the banks participated actively in shaping the major and sometimes even not so major decisions of the individual enterprises. It was they who very often mapped out a firm's paths of growth, conceived far-sighted plans, decided on major technological and locational innovations and arranged for mergers and capital increases".[15]

With the improved knowledge in technological innovation, financial management and a wider range of sources of finance (national and international), the developing nations must try to maximise the use of these available (though limited) resources for their overall benefit. On the national front, all the banks (financial intermediaries) and non-bank financial intermediaries should cooperate for a successful implementation of the rural development plans. Since the financial aspect of any development programme is of long-term nature, loans for the purchase of industrial machineries should be made jointly by commercial banks, state investment institutions and development banks. This should, however, embody a

14. Gerschenkron, Alexander —*Economic Backwardness in Historical Perspective;* Cambridge, Mass : Harvard University Press, 1962, p. 12.

15. Gerschenkron, Alexander —*Continuity in History and Other Essays;* Cambridge : Mass : Harvard Unviersity Press' p. 137.

provision which allows the commercial bank loan to be repaid within a year or two if a syndicated loan is, say for a period of four years. Lease financing should be a priority in financing the fixed capital input of agricultural ventures—farm machineries, plants for agro-based industries and grain/seed storage facilities. Government participation should be both direct and indirect. In the first case money should be provided for farmers and other rural cottage industrialists either through the commercial banks or the rural banks. Provision for subventions to productive ventures should also be made by the government. The indirect participation should be through the provision of infra-structure and fiscal measures aimed at facilitating the establishment and expansion of agricultural and industrial ventures. The rural banks (savings, credit associations and cooperative banks) should be involved in providing both short-term and medium-term loans to the rural productive establishments. This is because they are in a position to know the abilities of the beneficiaries to repay these loans. Loan repayment is influenced by two main factors (i) the resources for effecting loan repayment and (ii) the willingness to repay the already contracted loans. The ability to repay loans is predetermined before such loans are conceded although it may be probabilistically determined due to unpredictable future events that may unfavourably deviate the flow of funds from the expected path. The willingness to repay loan is a matter of character and a problem to be resolved by those who have a long-standing character assessment of the potential beneficiaries. This is a matter for local people to assess the local people and hence the importance of the local financial institutions.

International sources of funds must at the same time be utilised for those projects having substantial financial outlay which is commensurate with the dimension of the project and the impact of the quantity of the product in the market.

Rural areas are important economic areas which are in need of development. Before any meaningful development can occur, the assessment of the structure (economic activities and population) of each area is very necessary. This will enable the policy makers to evolve the type of policy that will be suitable for such areas and the type of financial intermediaries which may be involved in providing the necessary financial resources.

PRODUCTIVITY FORMULA

"It is futile to discuss the past. Effort should be concentrated on doing the right thing in the future."

— Jawaharlal Nehru

Productivity
1981, XXIII, 2, 147-164

Simulation Model for Perspective Planning—Case of a Steel Plant

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A simulation model of Rourkela Steel Plant (RSP) has been designed to forecast its future in tonnage of output as well as in financial terms using the technique of System Dynamics. Models have also been designed to understand behaviour of steel demand, supply of coking coal and power supply. The behaviour of Inflation has been forecast using an Indian Economy Model. The RSP model runs based on the outputs of other models of demand, supply and economy. This exercise is a systematic and quantitative approach to understand the forces of change as far as future of RSP is concerned and then use this understanding to calculate the future state of RSP under several sets of assumptions. As soon as the assumptions are recast, the new future state for the next 10 years or more can be recast. The present model is a representation of the collective wisdom of management translated in the form of mathematical relationships. It gives an understanding of what makes the production and profit behaviour dynamic from one month to the other in the long run.

Introduction

National Productivity Council (NPC) and the West German Experts together with executives from Rourkela Steel Plant (RSP) have designed a Computer-Based Dynamic Planning Package for the use of the management of Rourkela Steel Plant based on the principles of System Dynamics. System Dynamics approach to corporate planning combines the strength of managers with strength of the computer. Experience indicates that managers are generally able to specify the detailed relationships among corporate strategies, resources, competitive variables and company performance. However, managers are unable to determine accurately the dynamic behaviour implied by these relationships. Human intution is ill-suited for calculating thousands of interactions over time. The computer is highly efficient at carrying out such calculations. Construction of a computerised corporate model offers the following benefits:

- It allows the management to take into account a greater number of factors than can be considered with intution alone, such that a set of policies can be developed for the large portion of the company rather than its parts,
- It provides a means of explicitly calculating the effect of different strategies on corporate behaviour.
- The model is a vehicle for testing the response of company policies to

different economic, competitive and environmental scenarios.

— Finally, construction of the model forces managers to examine the company as a whole, question current practices and take long-term view of the company and its environment.

With those benefits in view, the planning system of Rourkela Steel Plant was designed based on System Dynamics Principles.

System Dynamics.

System Dynamics is the latest modelling technique available for designing mathematical models which can be used for the purpose of planning. It differs from other modelling techniques inasmuch as it uses a Systems Concept which enquires into the components of a system and their inter-relationships, with a view to explaining the dynamic behaviour of the system. An important attribute inherent in this technique is the constant search made when applying it to get an answer to a simple question 'what affects what ? Answer to this question is an essential prerequisite for proper planning through mathematical modelling. System Dynamics models are designed based on two beliefs :

(i) Causal feed back loops are the primary cause of dynamic behaviour shown by most of the systems;

(ii) system structure can be completely represented with the help of

— feed back loops and

— variables of two types

- ☐ Levels and
- ☐ Rates

When variables of a system are connected with one another in such a way that one variable is the cause of change in the value of another, a cause-effect relationship is established. While developing these chains of relationships one discovers, at times, a closed loop; for example, consider 'A' as one variable of a system as shown in Exhibit 1.

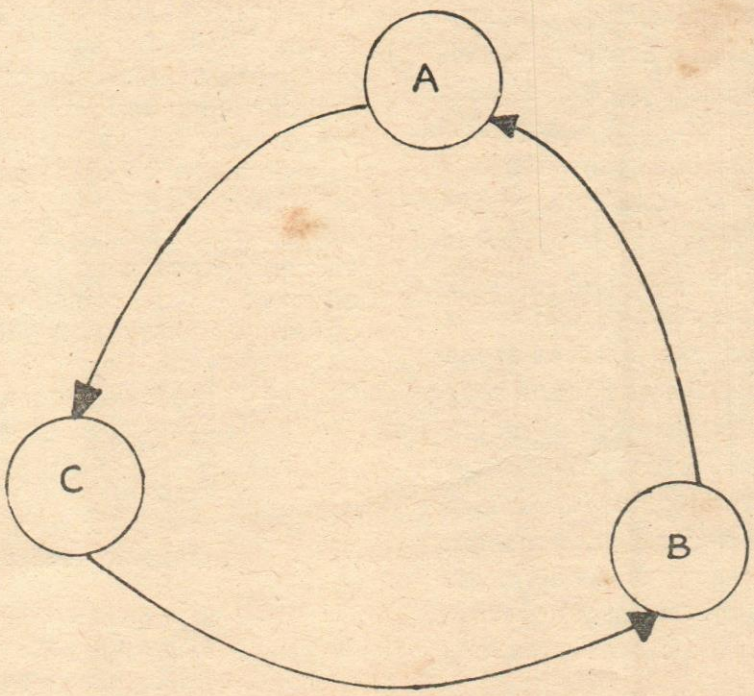


EXHIBIT-1

Let us say 'B' is another variable of this system whose change in value causes change in the value of 'A' . 'C' is another variable of this system which causes change in the value of 'B' when value of 'C' is changed. In case one further discovers that 'A' causes change in the value of 'C' when value of 'A' is changed, a causal loop between the three variables of the system being considered has been established. It represents a basic characteristic underlying the design of the system.

Such a loop as shown in Exhibit 1 is the fundamental cause of dynamic behaviour observed in various systems. One can thus understand the complete behaviour of a system in a situation where all the causal loops of the system under consideration have been discovered. This understanding can then be used to design a System Dynamics Model which can then be applied to simulate the behaviour of the system under consideration.

System Dynamics combines in itself virtues of traditional management concepts, capabilities of feed back theory and computer power for simulation.

The three salient features of System Dynamics Methodology are :

- Emphasis on understanding causes of dynamic behaviour.
- Inclusion of all variables relevant to problem behaviour.
- Focus on policy design rather than decision making or forecasting.

It views a system in terms of the following six different flow elements :

- People
- Money
- Materials
- Orders
- Capital
- Information.

From a System Dynamics perspective all systems can be modelled using level and rate variables, with auxiliary variables used for added clarity and simplicity.

Planning Package of RSP

The RSP planning package is constituted of a number of System Dynamics models which have been designed for the purpose of computing the probable future states of the following target variables :

- Inflation
- Demand of RSP products
- Supply of Coking Coal and power
- Production of 9 finished goods and 8 semi-finished goods.
- Inventories of
  - ☐ Raw Materials
  - ☐ Work in Process
  - ☐ Finished Goods
- Sales, Expenses, Assets, Loans
- Profit and Return on Assets.

To compute the probable states of these target variables, the following models have been designed :

- Economy Model
- Demand Model
- Production Model
- Supply Models
  - ☐ Coking Coal Supply
  - ☐ Power Supply.
- Inventory Models
- Financial Models.

The output of some models are inputs to others as shown in Exhibit 2.

The various models have been separately programmed, tested and validated, with the exception of the Financial Model which does not have a separate identity but has to be seen in conjunction with Production and Inventory Models. Finally, a package combining Production Inventory and

chasing power in this period. However, in view of the inherent time lag entailed between the incidence of phenomena and the remedial action becoming effective, temporary imbalances are created, leading to recessionary trends and finally fluctuations in Gross National Product.

— Where the national income gets distributed in such a manner that the purchasing power exceeds the installed capacity of the Consumer Goods Industry, the model will generate an inflationary trend (Demand Inflation). The magnitude of the inflationary trend is dependent upon the extent of imbalance that takes place between the available purchasing power and the available capacity.

— another cause that gives rise to an inflationary trend is any imbalance in the allocation of National Income towards Wages (of employees) and Profit (of Entrepreneurs). Where the share of profit in relation to wages sinks below a defined level, the profit generated becomes inadequate to finance the necessary investments in Consumer Goods Sector required to produce the additional consumer goods to meet the higher demand represented by the higher wages being paid. Under such circumstances the investments are financed from the savings of people.

Two outputs of the economy model are given in Exhibit-3 and Exhibit-4. The difference between these two graphs explains the inflation component. Given in Exhibit-3 on the horizontal axis is Net National Product at Factor cost and Current Prices Against time in years on vertical axis. Similarly in Exhibit-4, Net National Product at Factor Cost and constant prices of 1961. Comparison between these two values of Net National Product at same point of time gives the inflation value.

Steel Demand Model

Steel being a primary input to all spheres of our economic activity, its demand is closely related to needs of national economy. Different economic indicators have been used at different times to project the demand for steel but reasonably accurate projections are only possible when the demand for such item of steel is separately calculated in respect of each sector of our economy by estimating its use in various items constituting that sector and then integrating these Demands over the total economy. Demand analysis of this nature requires detailed knowledge of the inter-dependence of all the sectors of our economy. This demand model designed here consists of three sectors, viz.,

— Population Sector

— Economy Sector

— Steel Demand Sector.

Population sector calculates the population of India from continuously changing life expectancy and birth rate parameters which in turn depend on food availability and industrial production. The economic sector with its linkages with the population sector calculates the yearly changes in the Primary, Secondary and Tertiary sectors of the economy after giving the consideration to monsoon variations, consumption pattern of population, saving habits, foreign aid, capital formation and capital allocation to various sectors of the economy. The steel sector then establishes the relationship of each steel product produced by RSP with consumptions and investments of various sectors of the economy. Thus establishing its demand on a national basis, the Rourkela Share is then calculated therefrom.

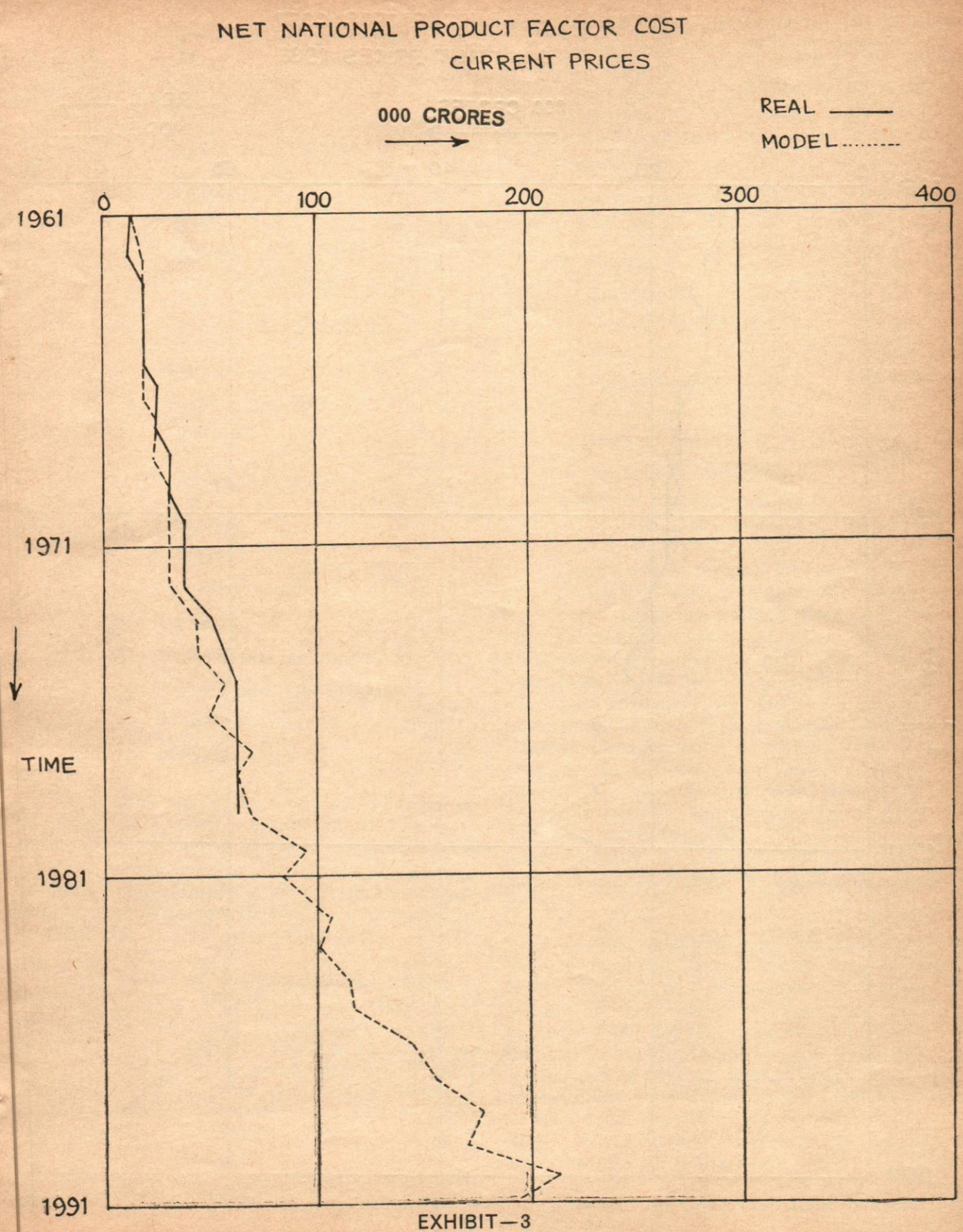
Economic sector is the most important sector of the demand model, as it simulates the economic scene based on which the steel demand has been arrived at. The Economic Sector consists of various sub-sectors, each one further divided into its sub-sectors. The main sub-sectors included in Economic Sector of Demand Model are :

— Primary sector of economy

— Secondary sector of economy

— Tertiary sector of economy

— Government expenditure (includes foreign exchange)


NET NATIONAL PRODUCT FACTOR COST
CURRENT PRICES
000 CRORES
REAL
MODEL
0
100
200
300
400
1961
1971
1981
1991
TIME

EXHIBIT—3

the past years has revealed that a part of the revenue generated by the economy has been spent by way of government expenditure on various items listed below :

- General Public Services
- Defence
- Education
- Health
- Social Security and Welfare Services
- Housing
- Economic Services

Government investment in manufacturing sector has not been considered in this section as this has been covered by Economic Sector where no differentiation has been made between Public and Private Expenditure. Both of these sectors have been clubbed together. Allocation of Government expenditure to the seven sectors has been given by table functions with time as the input.

Finally the model simulates 15 items of capital expenditure, 9 items of consumption and 7 items of government expenditure. Thus, we have 31 possible sources of demand for each product of steel. It may be pointed out that Demand Factor, i.e., the content of steel in each rupee spent in each of these 31 areas is different. Once these Demand Factors are known, the demand for steel item in question can be easily calculated.

Demand factors for all the steel products of RSP have been estimated in tonnes of steel per rupee spent in each of these 31 areas of expenditure. By totalling the demand for a product in all the 31 areas, we obtain the total demand of the product in question.

A sample output of this model based on pessimistic assumptions about exogenous variables is given here for illustration in Exhibit-5. Plotted in this graph are both the demand simulated by model and actual demand which has been taken, same as actual sales in the past.

Power Supply Model

This model has been designed for the purpose of understanding the points of time, when ;

- power shortages are likely to be faced by RSP in the future and
- the extent to which the power supply will fall short of demand at these points of time.

Three sectors for generating power have been included in the model, viz.,

- Thermal Generation by OSEB
- Hydel Generation by OSEB
- Power Generation by RSP

The power generated by the first two sectors i.e., thermal and hydel when put together represents the total power generated by the Orissa State Electricity Board (OSEB). RSP gets a fixed share of this power. The total power available to RSP is the share of power received from OSEB and the power generated by its own power plant. Generation capacity of all the three sectors of power supply has been modelled based on the capital employed in these sectors. Capital employed in each sector is growing, based on the investment plans of these sectors and is getting depleted through usage.

The capital employed at any point of time when multiplied by the defined output-to-capital ratio gives the installed capacity. This installed capacity is now adjusted to get available capacity by multiplying it with a given availability factor. This factor represents the capacity not utilised, arising out of reasons such as shortages of inputs, breakdowns, labour unrest, etc. While the available capacity in case of thermal and RSP power plant is taken as utilised capacity, in case of Hydel the impact of a good or bad monsoon is also considered, based on a given monsoon pattern of the future periods. A good monsoon results in increased generation of power and a bad monsoon leads to poor generation of power. From the generation of hydel and thermal sectors, the share of power for RSP is calculated, which is then added to generation of RSP's own power plant, for the purpose of arriving at the total power availability for RSP. This available power is provided as an input to the production model of RSP.

P- 17 -PESSIMISTIC SCENARIO STEEL DEMAND MODEL-DYNAMO VERSION 1.00

ALL INDIA STEEL DEMAND OF RSP PRODUCTS MODEL=1 RAISD=2 REAL

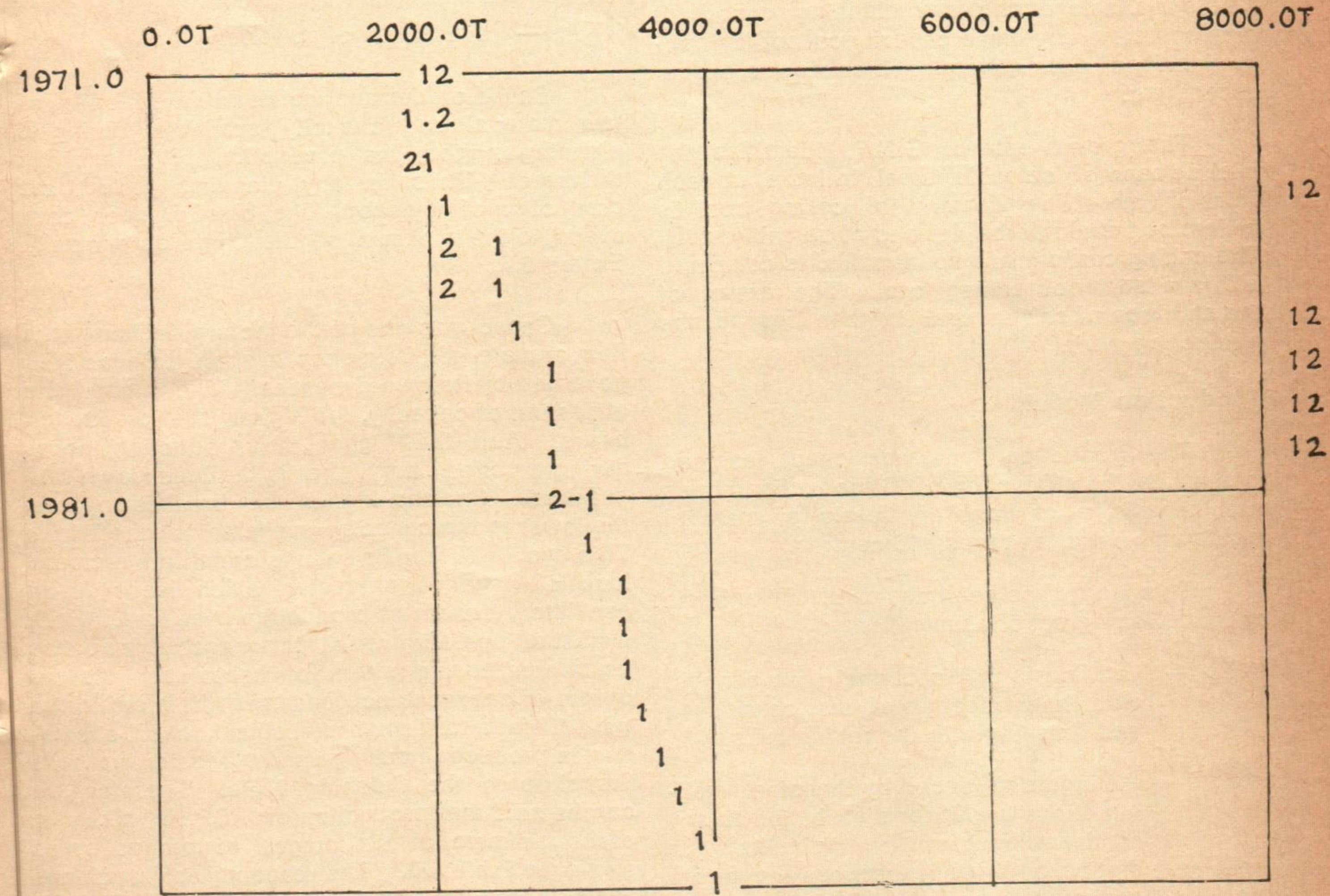


EXHIBIT- 5

Coking Coal Supply Model

The Coking Coal Supply Model has been designed to simulate coking coal shortages in the future.

This Model represents the established reserves of coking coal. It excludes the unestablished reserves of coking coal. This model considers the Net fixed assets invested in mining of Coking Coal and represents through it the installed capacity of coking coal production.

While the net fixed assets invested in Coking Coal Mines get progressively depreciated, the fund allocations made by the Government

through its Five-Year plans will result in installation of new assets, thereby augmenting the installed capacity.

Available capacity of Coking Coal production has been modelled as a function of net fixed assets, the output to Capital Assets ratio and the availability factor.

The availability factor reduces the capacity that is available during any planning period. It represents the unutilised capacity caused by non-availability of power, frequent breakdowns, labour unrest, etc.

The growth rate of G.N.P. identifies the total demand of saleable steel in India at each point of time. The demand of coking coal is understood through the demand of saleable steel. The coking coal demand so identified is compared with availability of coking coal. The extent of the shortage of coking coal is then fed to the production model.

Production Model

The Production Model has been designed to simulate the production of 16 production shops and behaviour of inventory levels of material inputs and outputs at these 16 centres.

This Model has been designed on the basis of the following set of assumptions :

— the flow is unidirectional, commencing with the production of the coke oven and finishing with the rolling mills.

— the ingots produced by the steel melting shops are fit for distribution to any of the subsequent rolling mills (no distinction is made between the ingots produced by open hearth furnaces and L. D. convertors, based on any quality criterion).

The production model consists of a variety of levels of Inventory. Barring a few, most of these levels are represented in units of tonnes. These include vital raw materials like coal, and ore and work-in-process inventories like coke, hot metal, ingots, slabs, plates, hot strips and tandem strips and finally 8 different varieties of finished goods. The arisings of scrap have also been modelled.

The workload of each workshop has been computed after taking into account the mechanical breakdowns, electrical breakdowns, minor repairs and capital repairs. In arriving at the capacity, three additional factors have been taken into account :

— number of machines and equipments

— crew strength

— availability of power.

Based on demand/workload, availability of raw material and capacity available, during a planning period, the production of a shop is arrived at. Thus, in any planning period, the production of any shop, like blast furnace, coke ovens, is the minimum of the three as shown in Exhibit 6.

Capacity is one of the factors deciding the flow of materials from shop to shop. Capacity is governed by its own dynamics. The higher the utilisation of capacity, the higher the production hours. And the higher the production hours during a period, the higher is the breakdown rate in future. And the higher the breakdown rate, the lower is the capacity available in the future. This cycle will thus be seen to constitute a closed loop of negative character which leads to an oscillatory pattern of production over time. Each workshop operating within this negative loop has its own particular pattern of behaviour. As the output of one workshop becomes the input to the next, it leads to further intensification of oscillation in production during its progression from the first shop to the finishing Mills. Therefore, it can be said that production of RSP is minimum of the minimum of six stages of production as shown in Exhibit 7. The capacity of machines will be augmented by growth in demand of RSP products.

In computing the strength of employees, the model simulates employee turn over caused through retirement and other causes, thereby identifying the manpower gap, which is then closed by further recruitment.

The model simulates in respect of each shop the number of breakdowns, minor repairs, capital repairs during the planning period, based on running hours.

PRODUCTION OF A SHOP

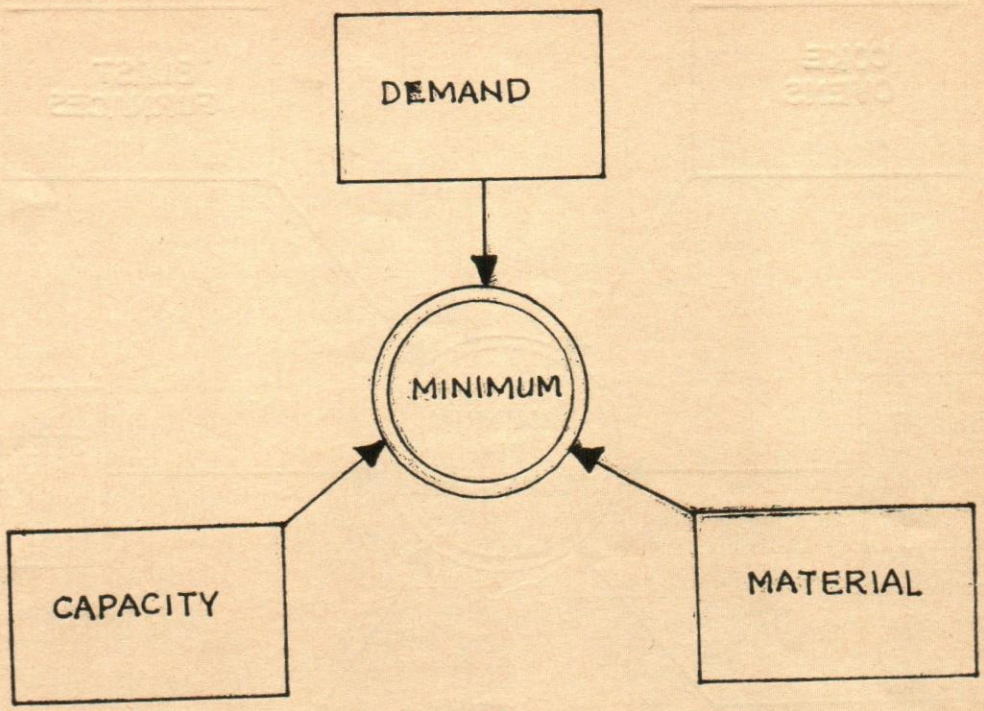


EXHIBIT- 6

Using this model, production of each shop has been estimated on a monthly basis for a period of 72 months, 48 months in the past and remaining 24 months into the future. A sample computer output is given in Exhibit 8.

Horizontally placed in this exhibit is monthly output of LD Ingots in tonnes, Vertically arranged are the time of 72 months. Plotted in this exhibit are both real/actual output (RPLD) represented by '1' and simulated output (LDIT) represented by '2'.

Inventory Models

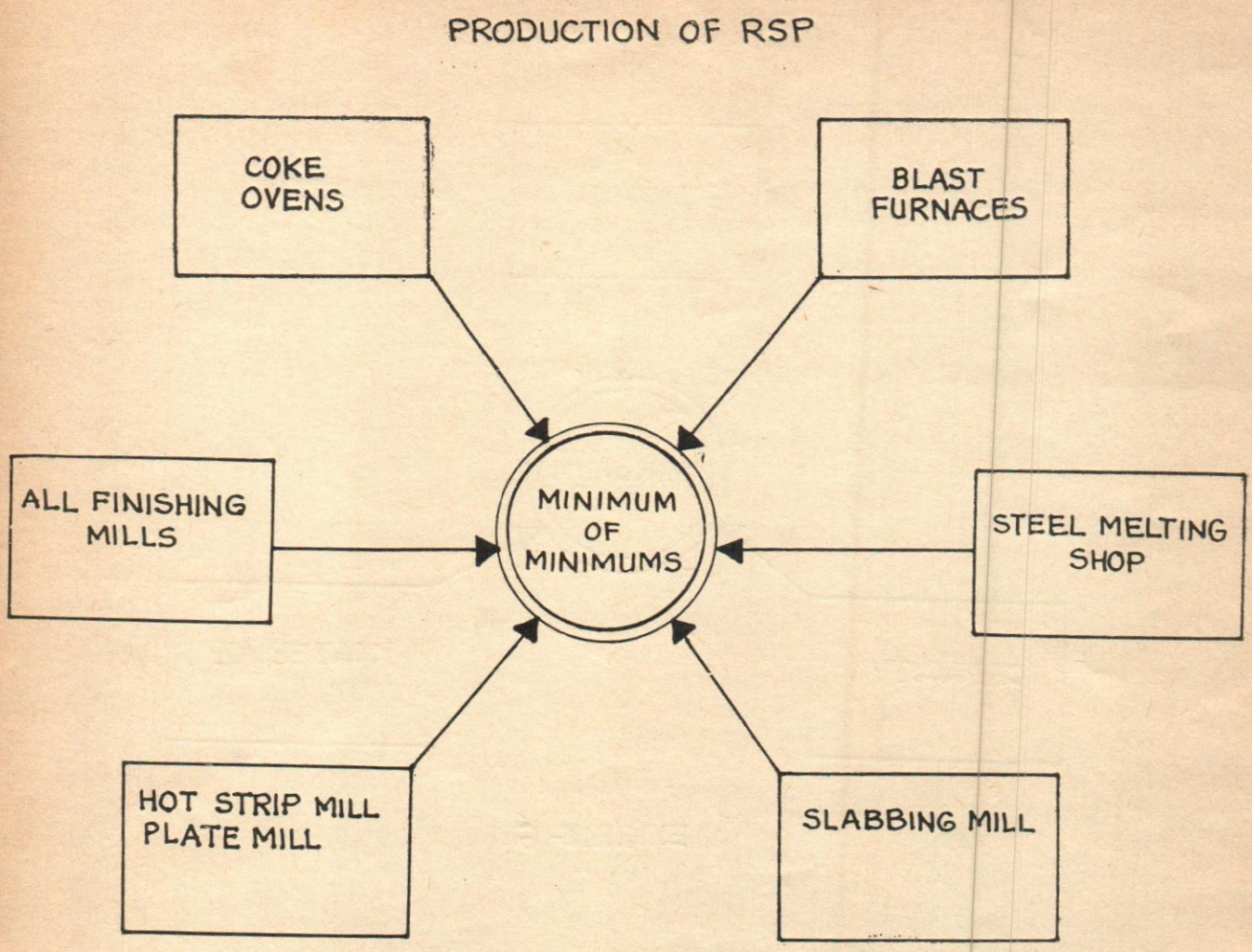
The Inventory Models have been designed to simulate the behaviour of the following categories of inventories :

- Raw Materials
- Overhead Materials
- Availability of Coke
- Capacity available of Blast Furnaces
- Workload of the Blast Furnaces

The consumption of the remaining four raw materials, namely manganese ore, limestone, dolomite, quartzite, has been expressed in rupees and the consumption has been computed in direct proportion to the production levels of the shops where these are used.

The consumption of all categories of overhead materials, other than spares, has been computed in direct proportion to the production of saleable steel. The higher the quantity of saleable steel produced during a period, the higher is the consumption of overhead materials.

The consumption of spares is determined by the total down time of the various production shops.



EXHIBIT—7

Financial Model

The Financial Model has been designed to simulate

- Return on Assets
- Operating Results
- Sales
- Expenses
- Cash
- Loans
- Total Productive Assets.

Some of the assumptions underlying the model design are :

- the total operating expenses of each shop in any planning period are directly proportional to the production of that shop during that planning period.
- all administrative expenses like travelling, telex and telegrams, postage, telephones, printing and stationery, are fixed in nature and vary in relation to inflationery trends.
- there is no constraint on inflow of cash from borrowings

The grand total of the expenses modelled

P- 53

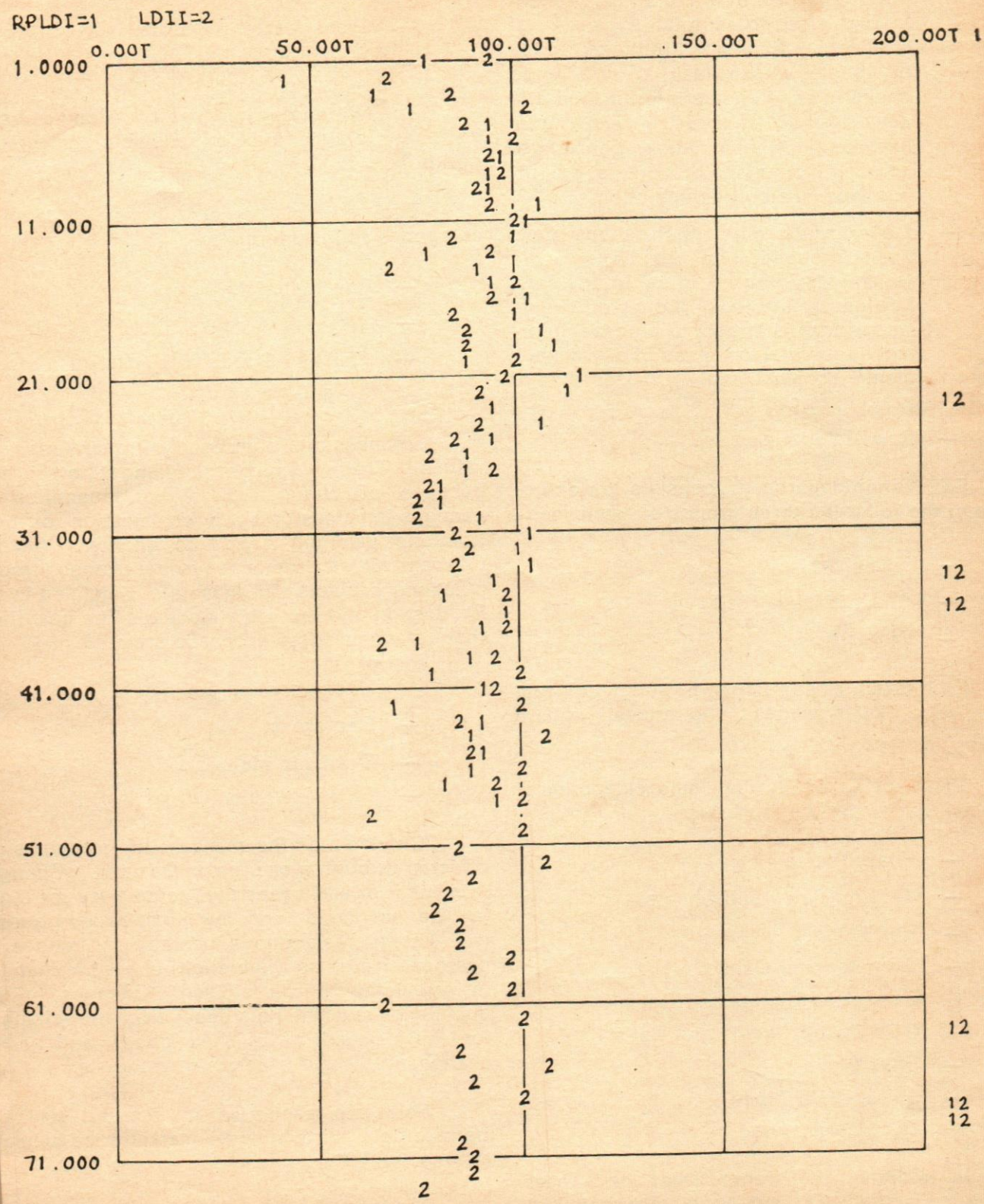


EXHIBIT-8

are the following :

- Total expenses of all 16 shops henceforth referred to as total expenses of Realisers. Realisers are those groups of people whose task is largely to convert raw materials into finished and semi-finished goods. The total expenses of any shop consist of personnel expenses of workers, operating expenses and depreciation.
- Departments other than shops have been grouped into 10 departments which are referred to as Informisers. Informisers are those groups of people whose task is largely to process information. Total expenses of any department consist of expenses of executives and their staff.
- Raw Material expenses

Each shop/department consists of one or more of the following three groups of employees :

- Executives
- Administrative Staff
- Workers

Each group having its own personnel rate inclusive of salary/wages, allowances, welfare costs, etc.

Sales of the following nine categories of finished goods have been modelled.

- Heavy Plates
- Medium Plates and Sheets
- Hot Strips
- Tinplates and Coils
- Galvanized Sheets and Coils
- Cold Rolled Sheets and Coils
- ERW Pipes
- Spiral Weld Pipes
- Electrical Sheets

In addition, the Scrap Sales have been included. Fixed and Current Assets are modelled. In the fixed assets, only machine assets have been included. The model computes two types of machine assets :

- Gross Machine Assets
- Written Down Machine Assets.

The written down values of machine assets have been considered for calculating depreciation only.

The current assets consist of four categories of Inventories :

- Raw Materials
- Works-in-process
- Finished Goods
- Overhead Materials.

Expenses are composed of quantities and values. These expenses change over time because of changes in either quantities or changes in values or by a combination of both from one planning period to another. All the different values used in the model change through inflationary effects and these are simulated In the Production and Inventory Models. The quantities that determine these expenses are :

- Machinery and Equipment
- Employees
- Overhead Materials
- Raw Materials.

Change in the number of machines is effected through a change in Demand. Changes in number of employees are caused by changes in the workload and by employee turnover (retirements, resignations, deaths). Changes in overhead materials are brought about by changes in production hours utilised. Changes in the quantity of raw materials depend on the changes for the demand of finished goods and on the changes in the yield factors of materials.

Sales are generated by demand and the market price. In this model, market price behaves exponentially.

The cash flow shows incoming and outgoing streams of cash represented by sales and

expenses respectively, resulting in surplus or deficits of cash. In the case of deficit, the model generates the borrowings that are required to bridge the gap. In case of surplus, it indicates, on a going basis, the extent to which borrowings can be reduced.

The level of long-term loans is determined by the investment needs identified in the production system. The outflow of cash represents payments to meet the operating expenses (excluding depreciation), interest payments to service long-term loans and loan repayment instalments of the long-term loans, the last two representing outflow on Captial Account.

Applications

Major applications of the Perspective Planning System of RSP may be summarised as follows :

- It simulates within no time as many probable future states as may be required by the number of scenarios.
- It helps through its cash flow model to establish the precise credit lines/ borrowings that will be needed in the future.
- In addition, it shows the extent of long-term borrowing that will be required to finance capital investments over the planning period.
- It helps to understand the movement of personnel during a planning period.
- It helps Management to evaluate capital investment decisions on a correct and neutral basis.
- It can be used to identify the bottle-neck shops with relevant factors (materials capacity, demand interdependences) amongst the 16 shops of the Steel Melting Zone and the Rolling Zone of RSP.
- It helps to evaluate the projects which have been identified for bringing about cost reductions, achievement of higher productivity and modernization.
- It makes it possible to understand the number of projects required to be implemented so as to bridge the gaps discovered,.
- It simulates the outcome of various policy decisions (of changes), thereby ensuring that future policy decisions are made on a rational basis and it can also be used to evaluate policy decisions in the past.

Advantages

The main advantages of the Perspective Planning System of RSP may be summarised as follows :-

- It considers all relevant factors and their inter-relationships, thereby assuring a degree of accuracy which is not achievable in the other planning forecasting systems.
- It documents all the input variables (scenarios) so that from the deviations resulting from their comparison with actuals one knows which of the projected probable future states are wrong.
- It gives a correct measure of the "gaps" that have to be bridged in the long range.
- It identifies all controllable variables which influence the corporate objectives of production and profit of RSP.
- It simulates with substantial accuracy the incidence and extent of inflation and also recession, during a planning period.
- It simulates the outcome of various policy decisions (of changes), thereby ensuring the future policy decisions are made on a rational basis.
- It yields an integrated and comprehensive planning system which is modular in nature where any needed additions and alterations can be easily incorporated at an economic cost.
- It identifies all the information that is relevant to the objective set by management, thereby eliminating extraneous information,
- It saves valuable management time that

is otherwise spent on deciding investment priorities,

- It simulates Model variables in 'DYNAMO' language that are directly identifiable with the physical variables.
- It's programme language called 'DYNAMO' is simple to operate and can be easily learnt. The mathematics involved is also simple.

Acknowledgements

Thanks are due to Mr. Olaf Kleine under whose leadership the project was executed. Dr. N. K. Gupta and Shri K. K. Garga shared the responsibility of designing the Steel Demand Model. Executives from RSP under the leadership of Dr. R K. Iyengar provided all the necessary inputs for the model design. My colleagues in NPC Shri R. Ramesh, Shri P. Bhattacharya, Mrs. Rama Kashinath, and others have contributed to make this project a success. Last but not the least, thanks are due to Mr. Ashoke Banerjee for explaining these models in easy and lucid prose.

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REASON FOR LOW PRODUCTIVITY

"Many Industrialists", says Mass Production, "would rather spend £100,000 in new plant and equipment than £1,000 on planning how to use it . . ."

Productivity
1982, XIII, 2. 165-169

Productivity and Computer

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The article starting with the concepts of Productivity and Computer describes the type of productivity improvement which computers can give. It stresses the point that after some limit increase of manpower cannot solve problems and computerisation becomes essential. The article asserts that time is not far off when PER CAPITA KILOBYTES would become the indicator of productivity at the national level and suggests that 1983 be declared as INDIAN INFORMATION TECHNOLOGY YEAR.

Productivity Means Improvement

Productivity is defined by different people in different ways since the background of these different people has something to do with it. Some define it as the ratio of the market value of goods and services (Price) to the value of resources needed to provide them. Another definition puts it as the ratio of total output of goods and services to total manhours. Yet another puts productivity as a concept which tries to quantify 'what we do and how well we do it ?'.

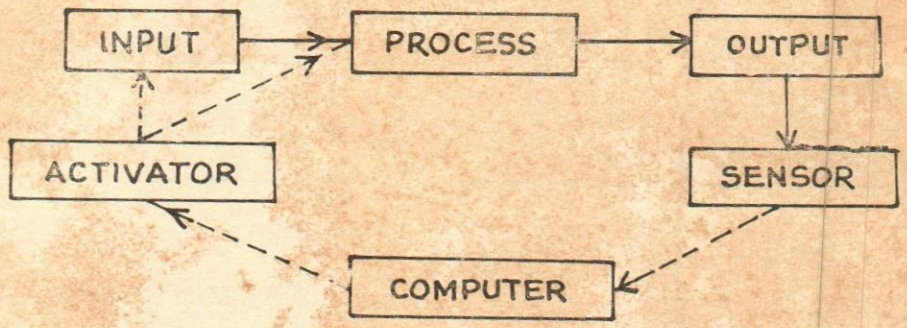
Whatever may be the definition, the underlying feature is productivity signifies IMPROVEMENT; it may be in terms of higher efficiency, increased effectiveness, higher quality of outputs, or lower cost of input, etc. The concept of improvement implies that it is a relational concept and not an absolute concept, as it means achieving something more than what it was earlier. Further, this improvement, to be acceptable, should be beneficial to the society.

Productivity–Mechanisation–Automation

Industrial revolution and mass production techniques were a boon to mankind in that they increased the muscle power of men multifold thereby increasing the productivity of man's, physical efforts. In that era, productivity was found to have a positive relation to the degree of mechanisation, *al beit* the hue and cry made about the potential loss of employment resulting from mechanisation. Mechanisation required a man to watch the output, and accordingly take action to

set it right. This action could be manipulating input/process or both. Automation tries to take over as much of this feedback action as well, thereby relieving the man of mental fatigue.

Many times automation cannot be accomplished without the use of a computer due to one or more of the following reasons :



i) Complex calculations involved in deciding the action corresponding to a sensed situation.

ii) Time allowed between sensing and action being less.

iii) Requirement of fast communication of information from sensing point to the actuating point.

As mechanisation, automation has also given rise to apprehension of loss of employment. However, studies by various agencies have revealed that employment displacement due to automation has been either marginal or more than offset by the increased oppportunities created by an automation-aided growth.

Computer–Basically an Adding Machine with Huge Memory

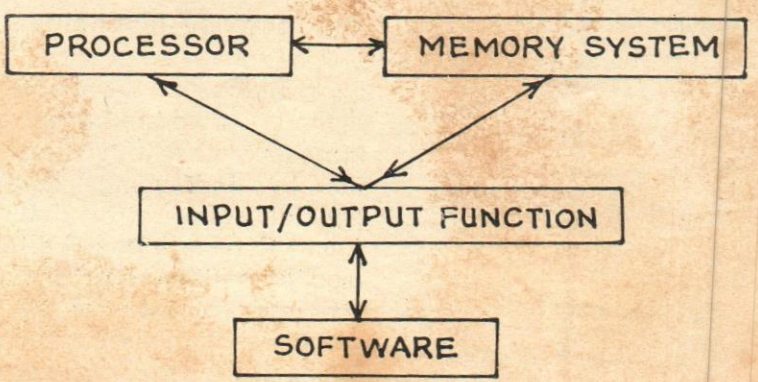
In simple words, the computer consists of four major components.

i) Processor—Basically an adding machine, but doing it at the speed of light/electronics. (Any function can be broken down to addition, e.g., substraction is nothing but addition after changing sign, multiplication is repeated addition, division is repeated substraction, and so on.....)

ii) Input/output function —This consists of various media and devices (called as peripherals) and a method of relaying and translating instructions and data into a machine-understandable code.

iii) Memory System —It is a system of storages from which the processor draws the information it needs to make calculations.

iv) Software—The system of the logical instructions, which activates the above three components.



The capacity of a computer is basically measured in terms of 'KILO BYTES'. BYTE is nothing but a unit of storage of information and a kilobyte is normally taken as 1000 bytes. (In practice it is 1024 Bytes due to the basic structure of the computer).

Computing-Data Processing-Communicator

Computers were originally conceived as calculating or computing machines, meant for mathematicians and other scientists for the complex calculations and interactions. Extension of computers' capability to manipulate alphabets, thereby making it as a data processor, threw the flood gates open for its wide use in industries and other organisations. Further extension of its capability to that of a communicating media is opening new vistas of computer applications. Already people are dreaming of talking with computers, though a limited oral interaction, with lots of restrictions, is already a reality.

Computer and Productivity

The contribution of computer to productivity can be summarised under three major heads, viz.,

a) **Information Production**

Faster and more accurate processing of information under High - Volume - Transaction-Environments. For example, paybill processing, Billing (Water, Electricity, etc.), Voting, Exam marksheet printing, etc.

b) **Asset Utilisation**

Timely control information improves the utilisation of assets. For example, an airline reservation system that quickly allocates and updates seat reservations to get the maximum out of the available resources; a production planning control system that changes schedules as per the revised priorities; thereby minimising the increase in work-in-progress inventory. As another example, the information on fund utilisation can be used by the planning body to shift funds from projects of low-expected usage to that of high-expected usage, thereby improving the utilisation of funds.

c) **Information for Planning and Decision Making**

Collection and analysis of information that improves the quality of planning and decision-making. For example, a computer-based planning model can simulate the effect of alternative strategies on the profitability of the company.

Computer and Unemployment

Computer has been found to be highly beneficial, where the arithmetic involves repetition, iteration, and successive approximation of where there is analysis of large volume of data. For example computerised accounting systems increase accuracy of records, allow increased frequency and consistency in reporting and reduce clerical labour required to post ledgers and perform arithmetical calculations. The major benefit in all these applications is the saving in manpower cost. Therefore many condemn such applications in a country having phenomenal unemployment problem. However, close scrutiny would reveal this to be short-sighted, as can be seen from the following two situations.

Situation—1 : an Insurance company

Let us say, a particular insurance company has one clerk per 10,000 policies. When the company grows and the number of policies increase, business economics does not permit increase of one clerk per every 10,000 policies added, because if all inputs are increased corresponding to increase in output, there is no increase in productivity and growth without productivity would couse inflation. Even if such policy is adapted, it will create an army of clerks with its resultant problems of space, supervision, etc. So practically the service suffers. The same is the case with similar service organisations like Banks, Water Boards, Electricity Boards, etc.

Situation-2 : Railway Reservation

How many intending passengers spend anxious moments till the last date of journey when only the reservation is confirmed. Ofcourse, some may get away with adapting money tactics. Basically this is a system problem. Let us say, a particular train has 500 berths. Out of this, may be 100 are quotas from different stations for which the clerk receives messages for reservation.

He goes on reserving for the rest 400 berths. When he reaches the 400th berth, may be there are already some 50 cancellations; but still any new applicant is given a waitlisted ticket. May be a little bit of greasing would motivate him to renumber the non-cancelled reservations and give somebody a confirmed ticket even at this stage. But it is inhuman to expect him to do this every time due to following reasons :

a) He has to do this renumbering everytime a cancellation takes place.

b) He has to do this for each date of reservation

c) He has to do this for every train for whose reservation he is responsible.

Thus the number of times he has to do it in a day would be

$$\sum_{i=1}^{T} \sum_{j=1}^{D} C$$

C—No. of daily cancellations for a date for a particular train

D—No. of days, advance reservation is made

T—No. of trains allotted

This is something no manual system can do effectively, even if the number of clerks are increased. Computerisation of this would not only increase the service to passengers but also reduce the No. of passengers resorting to alternate modes of transport due to anxiety of having a reliable booking.

Some New Trends

Computerisation of information production has brought to the focus two new developments which can make a sea change in productivity, when appropriately applied. They are :

(a) Computer-based Publication

(b) Word Processor

Computer-Based Publication

It is an integrated system of automatic text entry and editing, text composition and phototype setting. This has reported cut down the cost of printing by as much as 40%, especially in cases like legislative publications, where the number of modifications to the original text may be many and more frequent. Besides, it gives the advantage of speed and versatility.

Word Processor

The word processor (WP) is a dedicated computer. A micro-computer normally processes business data, but a WP has software restricted to the processing of the text (example, standard notices letters, mailing list). The WP has a hardware similar to that of micro-computer, except for the slightly modified key-board.

The Common elements of a WP system are :

a) a key board — INPUT

b) a visual display unit INPUT/OUTPUT.

c) a central processing unit

d) a storage facility

e) a printer — OUTPUT

Conventional systems store information on paper arranged into a suitable filing system. This takes lot of space and is also expensive. In the case of WP, the information is stored in a 'Floppy' (magnetically coated soft disc). A typical 8" floppy can store 250 A4 pages, which can be retrieved in a few seconds. More sophisticated WP software provides the facility to create and search files across many attributes. For example a personnel file can be set up and examined on a number of attributes like education, experience, specialised training etc., to find a set of suitable persons for a particular assignment.

Apart from this storage economy and fast access, WP can easily interface with most of the electronic systems for communication purposes. Thus simple messages, reports etc., can be transmitted through the telephone line or microwave link over short and long distances. Thus WP has a tremendous impact on administrative productivity, where large volumes of standard correspondence or reports are required. However, when used for non-repetitive office work it can prove to be a typically expensive typewriter.

Measuring Computer's Impact on Productivity

To develop a precise objective measure of productivity shifts due to computers is difficult due to the problems in benefits that can be ascribed to the computer alone, with the presently available information. If one has to do this, probably a computerised information systems is necessary. Thus to know 'whether computer has improved productivity' requires a computerised data base. However, opinion surveys done by various agencies have indicated that Productivity, internal mangement control and over-all effectiveness are positively associated with the implementation of computerised management imformation.

National Productivity Indicator – Per Capita KiloBytes

Visualising productivity of different nations with different value systems is a tricky matter, especially when you have countries so different in their degree of development and standard of living. The per capita income gives a distorted picture, as it depends on money values. Hence other indicators were discovered. A layman's indicator was measures of foodgrain productivity, based on one or more of the following :

a) Average No. of hours an average citizen has to work to earn a loaf of bread

b) Percentage of people engaged in agriculture or food production

c) Yield per acre of land

As the emphasis shifted from food to goods, availability of goods indicative of higher standard of living were increasingly resorted to for the purposes of comparing productivity of different nations.

Some examples are :

a) No. of television sets per person

b) No. of cars per person

c) Square meter of housing area per person

d) No. of telephones per person

Now that these goods have become common and almost taken for granted as basic necessities, any improvement has to come by way of providing better services. Productivity of services has high co-relation with information and information productivity has been positively associated with increased use of computers. Hence time is not far off when the major indicator of productivity would be the number of computers per person, or rather the number of KILOBYTES PER PERSON, as computers vary in size. Thus, we have to use PER CAPITA KILOBYTES in the place of per capita income.

Indian Information Technology Year 1983

Realising the fact that 'INFORMATION' is a key resource, various Governments have come out with their own schemes. Japan gives low-interest loans, to industries/organisations. Poland funds directly national institutes. West Germany sanctions financial grants through a complex system of advisory boards consisting of scientists, employer representatives. Notable among them is the British Government, which declared INFORMATION TECHNOLOGY YEAR 1982 and the concerned minister described this development as "a significant shift of resources to backing the sunrise industries of the future". The UK Government set aside £600,000 for the nationwide awareness compaign to improve understanding and encourage application of the rapid developments. Another £80 million was set aside for aiding the development and implementation of the technology. Some of the projects selected for support were

a) Micro Processor Application Projects, &

b) Robot Support Programme.

It is time that we also start thinking of similar schemes. To start with, may be, we should persuade the powers-that-be to declare 1983 as IIT 83 viz., INDIAN INFORMATION TECHNOLOGY YEAR 1983 and back it up with well conceived compaigns and aid schemes.

Productivity
1982, XXIII, 2, 171-183

Objectivity in Industrial Research—Organizational Effectiveness and Efficiency

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Formulating plans, developing technological know-how and transferring that to industries for commercial exploitation are indicators of productivity of any R & D organization. This article discusses the organizational effectiveness and efficiency of non-profit industrial research organizations. To show the potential for improving effectiveness and efficiency, a brief survey of the Indian scene is presented by the authors, The complete cycle of activities of the industrial R & D organization is discussed.

Like several other terms in the management profession entailing semantic confusion, 'objectives' have been found to project different meanings. There are, perhaps, as many definitions of objectives as there are managers. Notwithstanding these varying definitions—both in content and context—there is a general agreement that they refer to a desired future state[1] of affairs anticipated within a specified time period. Objectivity is reflected in the extent of sincerity of efforts for defining the objectives themselves, for specifying the plans-of-action aimed at accomplishing such objectives, and for efficient implementation of these plans-of-action.

The success or failure of any organization is primarily dependent on two inter-related factors :

(i) Indentification of the desired state of affairs in future, based on a thorough understanding of the iterative mutual influence of the whole range of environmental factors and the organizational systems, and

(ii) Concerted and sincere pursuit to implement the plans-of-action indentified in (i).

(i) Views presented in the article are those of the authors and not necessarily of their parent organizations.

(ii) The article is an outcome of the research work being pursued under the supervision of Dr H. C. Visvesvaraya. Director General, Cement Research Institute of India, and Dr P Natarajan, Professor, IIT, Delhi.

Whilst the former represents organizational "effectiveness", the latter is reflective of the organization's "efficiency".

There are approximately 600 organizations in the public sector and about 400 companies in the private sector which pursue R & D and related scientific and technical activities in India. Those in the public sector account for about 90 per cent of the total annual expenditure of about Rs. 4500 million on R & D efforts and related scientific and technical activities in the country[2] (*). The facts that (i) most of the research organizations in the public sector are non-profit-oriented; and (ii) the application of the concepts of corporate planning to management of industrial research have been posing unique and also challenging problems in such organizations, have prompted the authors to concentrate their discussions on non-profit industrial research organizations in this article.

This article is an attempt to illustrate the industrial research climate in India, followed by a discussion on the activities that many of the non-profit industrial research organizations are pursuing; however, it so happens that such activities are being consciously recognised and formally planned only in a few instances. Based on these facts and the concepts of corporate planning as applicable to the management of industrial research, an Objectivity Model has been described. The operational aspects of implementing the plans emanating from such a model are discussed vis-a-vis suggested management structure for the purpose. Although this article broadly concentrates on presenting the authors' views and concepts in relation to organization of industrial research and management thereof in general, these are briefly supplemented by an example of a hypothetical industrial Research Organization in the chemical and allied industrial sector.

The objectivity of an industrial research organization, as conceived above, is an indicator of its productivity. The output of such an organisation is in the form of technological know-how which could be adopted for commercial use by other industrial units. This know-how would obviously be dependent on what specific plans were formulated in terms of projects to be pursued and on how these plans were executed, i. e. on the process of generation of know-how within the organisation. In other words the productivity of the organisation would depend on the following three elements :

(i) the formulation of plans,

(ii) their pursuit to generate the desired know-how, and

(iii) transferring the generated know-how for adaptation for commercial exploitation.

Incidentally, it should be obvious that the identification of objectives is included in the first element. Productivity would not be the summation of the effects of these, but would be the product of these.[3] Consequently, it would never be more than that of the element having minimum efficiency.

Assuming that (i) the identification of objectives and formulation of plans-of-action in the form of specific projects in a typical public sector research organization can be taken as 50 per cent efficient, (ii) the utilization of its infrastructural resources to generate the desired know-how as 75 per cent efficient and (iii) the efficiency of transferring this to the industrial units to be 75 per cent (these estimates may be rather optimistic in intuitive judgement), the overall productivity of the organisation works out to be only 28 per cent ! It may be stressed that the last two factors can be made to approach unity by improving the management practices in the utilisation and control of infrastructural resources. Inadequate understanding of the organizational system as a whole and the influence of environmental factors thereon while identifying the objectives and formulation of plans would, however, drastically reduce the overall productivity.

Organizational effectiveness comprising the identification of objectives and projects based on the concepts of corporate planning and efficient implementation of these projects to enhance organizational efficiency thus deserve far-reaching importance than hitherto visualised.

The Indian Scene

In order to bring fourth the role of the environmental factors and the organizational system, both of which are discussed subsequently, a very brief survey of "the Indian scene" is presented. Though not intended to be compre-

hensive or to show the interlinkages, this could help to throw some light on the potentials of improving both the effectiveness and the efficiency in a way typically possible if due analysis of all the factors is undertaken.

It may be noted that with progressive dilution of foreign equity in various companies, the industrial scene in India is progressively advancing towards a state where it could attempt to delink itself with the erstwhile foreign principals whose subsidiaries they had earlier been.

The nearly 600 organisations in the public sector and over 600 companies in the private sector spread all over India spend about Rs. 6000 million annually on research and developmental and related scientific and technical activities, the share of the former (public sector) being around 90 per cent of the total spending. Out of this, a maximum share of about 26 per cent goes towards the promotion of industrial development, followed by 20 per cent for agriculture, forestry and shipping, 19 per cent for defence, 17 per cent for transport and communication, 6 per cent for exploration and assessment of earth, seas etc. 4 per cent for general advancement of knowledge, and the remaining 8 per cent for other miscellenous aims.[4]

As regards the chemical and allied industrial sector alone, the organizations in the public sector account for about 30 per cent of the total expenditure and the companies in the private sector spend the remaining 70 per cent. The expenditure by companies in the chemical industry and allied groups has been the highest which is about 35 per cent of the expenditure in the total private sector. According to the Department of Science and Technology (India)[5], this high level of R & D expenditure in chemical and allied industries may be attributed to high technology, frequent obsolescence of processes due to new technological advances and market competitions involved in chemical industries. The R & D activity in the private sector is generally aimed at enhancing operational efficiencies and profitability. One of the studies on management practices for R & D in various companies had concluded[6] that in contrast to the experience of American or European Corporations, failure to pursue effective in-house R & D in Indian companies does not appear to be adversely affecting the future prospects of the company. Another empirical study[7] also showed that many companies were inclined not to go into R & D in any significant way because there was really no need for it.

The non-profit industrial research organizations in the public sector have been delegated the national responsibilities of providing technological support to respective industries by (i) developing new products, processes and equipment, and (ii) convincing and pursuading industrial units to adapt these for commercial use. Most of the private companies and some of the undertakings in the public sector have been concentrating their research and developmental activities only for improving existing products, equipment or processes. Most of the efforts of non-profit industrial research organizations in the public sector, though appreciated to be academic interest, have not been commercially viable because of lack of cost-consciousness and possibly some indifference to market requirement[8]. There is thus a gap between the two.

Generation of technological know-how is mostly undertaken by the non-profit public sector research organizations. The administrative system in these organizations tends to stifle the innovative process of generating technological know-how; this is further compounded by inadequate definition of the desired-technological know-how. The efficiency with which this know-how could then be transferred for adoption mostly by the private sector companies for commercial exploitation would obviously be limited because of a lack of an appropriate interface between the two. Meagre spending by all concerned on experimental development for commercial exploitation of of research results accomplished at massive costs, the former being just one-fourth of the latter[9], is an indicator of the lack of this interface. All these factors contribute to low productivity in terms of inadequate returns, on whatever basis they have hitherto been measured. Even though the efficiency of generating the know-how and transferring this to commercialisation could be enhanced by improved utilization of the organization's infrastructural resources through stricter monitoring and control practices, yet, unless the plans on which these subsequent actions are to be undertaken have themselves been appropriately conceived and defined in detail, the overall productivity would continue to be low.

This necessitates one to understand the

organization as a total system, i.e., to study and analyse the output from the organization, the beneficiaries for whom these output are intended, the strong and weak points inherent in the organization vis-a-vis the various foreseeable opportunities for growth and threats to the organization from the environment in which it operates. Such an analysis would help one to identify and define the purpose, the mission (or line of business), the corporate objectives, the organizational strategy, the marketing objectives and research objectives and the specific projects to be pursued for the overall success of the organization. The interrelationships amongst these have been developed and elaborated through an Objectivity Model presented in the following sections.

Generally R & D constitutes a functional activity along with other activities in companies in the private sector as well as a few production-oriented public sector organizations. There are several organizations in the public sector and a few companies in the private sector where R & D happens to be the overall aim of the organization, i. e., the organization is committee to producing technological know-how and is also responsible, within the national perspective, for implementation of such technological know-how but has no authority or control over the agencies expected to implement these. Whilst identification and defining of the missions, objectives and strategies for the companies having R & D as one of the many functional activities is easier – being quite similar to that for any profit-oriented company—the same is somewhat difficult for organizations having R & D as the overall aim. For organizations pursuing research, which involves substantial uncertainty and multiple objectives, a clear-cut distiction amongst the organizational purpose, mission, and various objectives as well as a methodology to identify and define them becomes very critical for the success of the organization. The root cause of inadequate returns from huge investment in research stems from a lack of understanding and appreciation of these take-of levels, notwithstanding the development of the interface referred to earlier.

Organizational Activities

Any industrial R & D organization has necessarily to 'help 'the industrial sector to which it caters. The help that any industrial sector could need may include financial resources for investment, encouraging policies, technological know-how, manpower, etc. Of these, the industrial research organisation should aim to provide a direct support through technological know-how and indirect support by means of training the manpower or suggesting appropriate recommendations to be considered for implementation by the Government. Technological support to the respective industries thus forms the basic mission or line-of-business of such industrial R & D organizations.

In order to perform this role, the organization must, *ab-initio,* comprehend the existing problems faced by the industry and should also identify and define the future developmental needs (refer Exhibit) 1. The initial step, being also the most important one, requires intraction between the several functionaries within the organization and, more importantly, with the representatives of the industry. Having identified the problems and needs, ideas require to be generated for attempting solutions to such problems (ideation).

The formal identification of the overall Organizational Objectives (or Corporate Objectives) becomes a pre-requisite in this context. These objectives need to be defined from a relative analysis of :

(i) the environmental opportunities and threats to the organisation both of which, in turn, are identifiable from environmental appraisal through technological forecasting[10], and

(ii) the strengths and weaknesses of the organization which, in their turn, emanate from its infrastructural resources and their development practices.

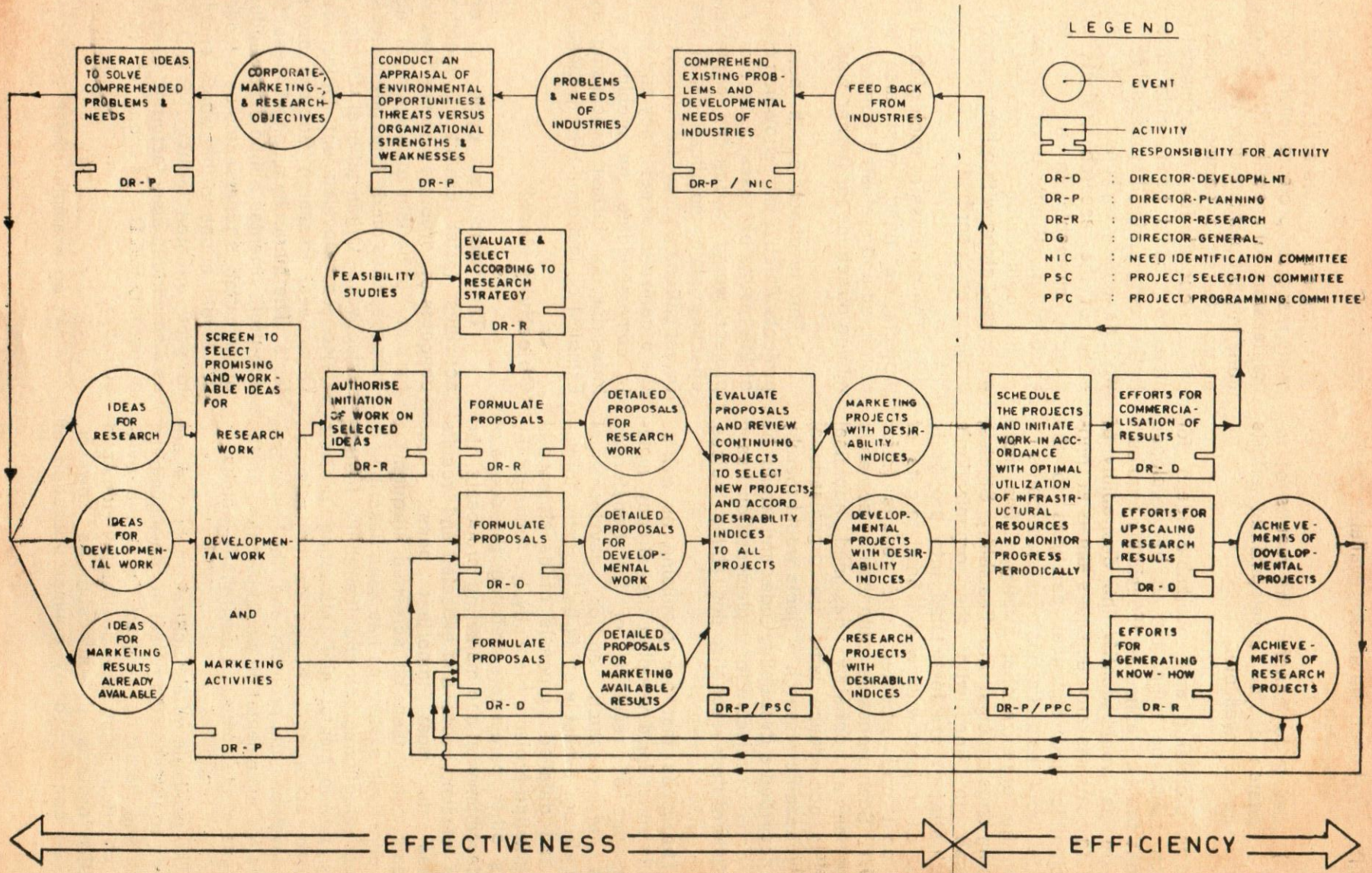
The formulation of Corporate Objectives is discussed in greater detail in a subsequent section.

The ideas subserving the identified needs of the industries have to conform to the framework of the Corporate objectives. All the ideas could them be screened to select those that are promising and workable for any of the following purposes :

(i) initiating research work,

ORGANIZATIONAL ACTIVITIES FOR INDUSTRIAL R & D

EXHIBIT 1



(ii) developing the already available results of research,

(iii) aiming to transfer the results of research and/or developmental efforts already available.

The promising and workable ideas for research could be supported to be developed into what could be termed as "Feasibility studies". Such studies would identify the desirability of launching some research activities aimed at finding scientific and technical solutions to the industrial problems and needs of interest conforming to the organizational strategy. The more promising ones amongst the Feasibility Studies, appraised in line with the organization's research strategy, are formulated into proposals of research projects with well-defined targets of time, cost and expected end results (refer Exhibit 1). Such proposals could then be screened through an appropriately designed appraisal system in accordance with the organisational strategy; specific research projects would thereby on be accorded a desirability index and would be the selected or rejected for implementation based magnitude of their respective desirability indices.

The ideas that are promising as well as workable either for developing the already available results of research or for transferring results of research and/or developmental efforts already available could be directly formulated into detailed proposals of developmental and marketing-projects respectively. Amongst the various other parameters defining the scope of such developmental and marketing proposals, the targets of time, cost and expected end results comprise the most important ones. These proposals could then be screened through the same appraisal system as has been described in the preceeding paragraph and desirability indices of the developmental and marketing projects computed accordingly. Selection or rejection of the developmental projects and the marketing projects for implementation would be based on the magnitude of the computed desirability indices.

The available infrastructural resources are allocated to the selected research, developmental projects and marketing, projects, with the overriding criterion being the desirability indices of respective projects; the allocation is, however, also to be conditioned by optimal utilization of resources.

The end results achieved from the pursuit of many research projects might call for developmental work for upscaling the laboratory investigations in pilot plants before the end results could be transferred for commercial exploitation. Appropriate proposals for developmental work, in such instances, could be formulated and processed further alike erstwhile proposal for developmental work as already explained. The end results from a few of the research projects might also be directly amenable to transfer for commercial exploitation. Proposal of marketing such end results could also be directly formulated and processed along with other proposal of marketing projects as described.

The progress of each of the three types of projects on hand must also be periodically monitored and evaluated concurrently for ascertaining directions for further work.

The feedback on the pursuit of marketing projects which is aimed towards commercialization of the results of research and/or developmental projects would educate the organization towards effecting such modifications in the pilot plant investigations as may be necessary to enhance the organizational efficiency and would also help in comprehending the problems and needs of industries for further processing as depicted in Exhibit 1 on improved effectiveness.

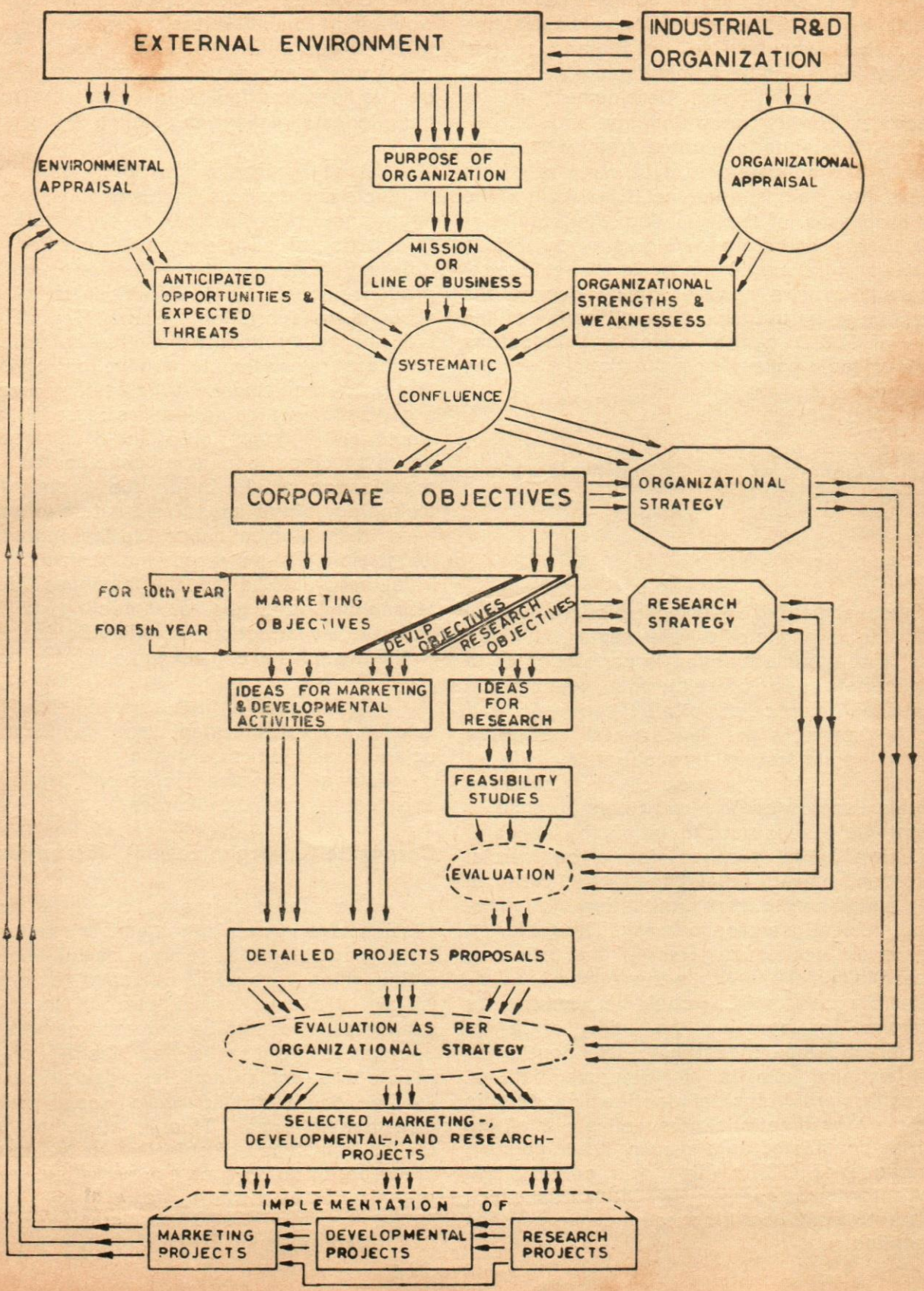
Objectivity Model

The complete cycle of organizational activities (refer Exhibit 1), together with the concepts of corporate planning flow from and also form part of certain organizational attributes—its Purpose, Mission or Line-of-business, Corporate Objectives, Organizational Strategy, Marketing Objectives, Development Objectives, Research Objectives, Research Strategy and specific projects. The hierarchy amongst these for a typical non-profit-oriented public sector industrial R & D organization is represented as a model in Exhibit 2. Modifications to this would enable adaptation to profit-oriented industrial R & D organizations as also various manufacturing companies having industrial R & D as one of their functional activities.

As an example, these attributes are des-

OBJECTIVITY MODEL FOR AN INDUSTRIAL R&D ORGANIZATION

EXHIBIT-2



cribed in relation to a hypothetical industries R & D organization –Central Chemical Research Institute (CCRI) –in the public sector which has been assumed to be responsible for disseminating technological know-how to the Indian Chemical and Allied Industries. It is postulated *a priori* that CCRI has research and development as its ultimate aim. Commercial exploitation and marketing of R & D results generated from within the Institute are to be monitored by it as part of its responsibility from a national view-point; the actual processes of implementing the results of R & D, in this regard are to be pursued by various companies which are not under its direct control or authority. It can, however, only influence the regulations so as to promote the utilization of the results of R & D by the concerned industries through suitable policy recommendations to the Government.

The scope and characteristic of the organizational attributes of the Objectivity Model are now described.

Purpose

Establishment of an organization, industrial or academic, in public or private sector, is proof by itself that it has a function to perform so as to achieve certain results. The purpose, which would be under the influence of both the economic and the social factors, is the fundamental motivation or continuing aim lasting throughout the life of organisation[11]. Whilst a research organization in the public sector could identify its purpose as "efficient use of resources to satisfy the needs of its clientele", the purpose for a commercial organization, having research as a functional activity, would be "to work profits through effective and efficient use of resources". The preferred emphasis on economic gains in the latter as compared to social benefits in the former is obvious. The purpose for CCRI could be identified as "Assistance in improving the utility of Indian Chemical and Allied Industries". No doubt, the overall national aim is to improve national progress through industrial development; this is true in the overall national perspective with all the industries considered as a system. While defining the purpose of CCRI within this context, it is essential to view it *apropos* the industries which the Institute will be catering to; hence the purpose as identified.

Mission

Organizations engage in such activities as would help to achieve their purpose by pursuing missions or lines-of-business which enumerate the products and/or services to be made available by the organization within the environmental boundaries visualised in defining the purpose.

What emphasis one may attach to the products and services, in this context, is of utmost importance. To illustrate, an organization having 'production of sccoters' as its mission is in a different business than the one which also produces scooters but identifies its mission as "ground transportation". Bharat Heavy Electricals Ltd. has rightly identified itself as being in 'energy business' rather than in production of electrical and power equipment. Whereas any commercial organization, which undertakes research as well, would define its mission of line-of-business based on its specific products, a public-sector research organization would be in the business of the technology of the industries it caters to and would have "technological support to the industries" as its mission. Thus a research organization dealing in leather would be 'in the business of leather technology', and the one dealing in cement, concrete, construction and allied fields would be 'in the business of cement and allied technologies'.

CCRI could, thus, ideally have as its mission : "Advancement and application of scientific and industrial research in the fields of chemistry and chemical technology, relevant to the chemical and allied industries."

Corporate (or Organization) Objectives

The stated purpose and the identified mission of the organization enable one to specify more narrowly the environmental boundaries within which it would be operating. The question, which follow, would be "What specific achievements should be endeavoured within these boundaries ?" That is, the desired or needed results to be achieved by the organization required to be identified and their scope defined in measureable terms. This, in other words, calls for the formulation of objective at various levels in the organization such as marketing, research, organization as a whole, etc.

As argued by Argenti, objectives are the

reason for the very existance of an organization. Objectives are the desired results or events in the future, failing to achieve which the organization itself fails. He has, through a three-question-test[12], suggested that the true objectives of an organization are those which the organization would try to achieve in all circumstances, the organization wants to achieve for its survival, and if it failed to achieve, the organization would fail as an organization and would, therefore cease to exist.

In addition to the 'organizational' objectives people working in the organization too have objectives. Individuals have 'personal' objectives and they would like to be in an organization which presents least conflicts between their personal objectives and those of the organization. In the circumstances of sellers' market prevalent in India, the job opportunities are so rare that most people have to grasp whatever opportunity comes their way. What is most important in such cases is to ensure a maximum fit between the personal objectives at least at the level of the Chief Executive (and, if possible, those of senior managers) and those of the Organization. Despite the need to have such compatibility of objectives, it is often extremely difficult to understand inter-personally and, more, to match individual objectives.

The objectives of the organization as a total system are called Corporate Objectives. These represent conceived and desired results or events in quantified terms in the future. These Corporate Objectives form the reference base for all subsequent activities of defining the organizational strategy, marketing objectives, development objectives, research objectives, research strategy and the specific cost, and time-bound projects.

In the context of an R & D organization wherein the research activities may lead to result in a least predictable way, the Corporate Objectives could suffer from an obvious tendency on the part of the organization to keep them quantitatively vague. If the Corporate Objectives, which form the prerequisite for the marketing, development and research-objective to be followed, remain vaguely defined, there would obviously be ambiguity and lack of coordination at the subsequent stages. The co-existent uncertainty at the probability of achieving alternate results at various stages of research activities clearly point to the need to have well-defined Corporate Objectives and also the objectives of marketing, development and research developing thereform in detail; it is only then that, in all eventualities, the organizational efforts could be justified as having been directed towards the specified objectives.

As regards formulation of Corporate Objectives, it is understandable that a systematic confluence of the anticipated opportunities and expected threats to the organization from the external environment in which it is functioning, and the strengths and weakneses of the infrastructural resources comprising manpower, equipment facilities, finances, management practices adopted, etc. would form the basis to identify such Corporate Objectives as well as the Organisational Strategy to achieve them. The "opportunities" anticipated could be identified based on the national plans and programmes of growth for the particular industry as obtainable, for example, from the Plan documents published by various national agencies such as the Planning Commission, National Committee on Science & Technology, Council of Scientific and Industrial Research, etc. As regards "threats", in almost all the research organizations in the public sector, there is hardly any competition posed either from some parallel research organizations or from the small research centres of the private companies which (latter), in most cases, restrict their efforts towards testing and quality control activities for product and process improvements. "Strengths and weaknesses" are inherent in the infrastructural resources, in general, and the management practices adopted for deployment of these resources, in particular.

Reverting to the hypothetical example, the purpose of CCRI being to assist the chemical and allied industries by way of providing technological know-how and services, the CCRI could attempt to enumerate its Corporate Objectives by the following process. It would need to direct its efforts towards :

(i) Enhancing productivity of existing units;

(ii) Reducing costs for establishing new units;

(iii) Developing new technologies for commercialization;

(iv) Sustaining the organization on its own earnings.

Whilst the relationship of the first three achievements with the "purpose" appears to be obvious, the fourth one may need some elaboration. Research organizations like CCRI in the public sector are financially supported, to varying extents, through grants-in-aids by the Government. Although such grants-in-aids are provided from the tax-payers' money, every such organization should ultimately endeavour to sustain on its own earnings through research sponsored by the industry. This serves a dual purpose :

(i) In its endeavours towards self-sustenance, it attempts to reduce its requirement of grant-in-aid, thereby contributing to social gains; and

(ii) Encouragement to research sponsored by industry automatically strengthens the interface between the industry and the organization.

In view of the necessity to have quantifled targets against which performance could be subsequently measured :

(i) Enhancing the productivity of 100 existing units by 12 per cent over the next ten years;

(ii) Reducing the costs for establishing new units by 10 per cent during the next ten years;

(iii) Developing indigenous technologies for 15 per cent of the products currently being imported within the next ten years; and

(iv) Increasing the component of sponsored research to 40 per cent of the annual budget in the next 10 years.

It may be emphasised that the more existance of a quantified target against which to measure performance is much more important than the quantified value of the target.

A time frame of ten years in the above is attributed to the fact that these objectives constitute the standards against which the performance of the Institute in relations to its external environment could be evaluated. The performance evaluation of such Institutes must accommodate one full cycle of the process starting from identification of the problem of industry, generation of project ideas, preliminary feasibility studies, project proposals, selection of projects, project completion, developmental efforts and finally transferring the results of these to industry for commercial exploitation, and hence the time frame of ten years (refer to Exhibit 1). More discussions on the time frame of objectives would be presented when describing the objectives of marketing and development.

In practice, the objectives are frequently poorly defined, and remain obscure, not documented, not communicated, or even non-existent. Incidentally, the definition of objectives and their conversion into specific which, in turn, can be translated into action and measured by tangible accomplishments are the major bottlenecks in research organizations.

Organizational Strategy

As the infrastructural resources of manpower, equipment and services are deployed to pursue such of the research, developmental, and marketing projects as have been selected for accomplishing the Corporate Objectives, the allocation of resources to each of them must obviously be justifiable by the extent of their contribution towards these objectives. Here, one may understand strategy as the preferred pattern of deployment of resources. The strategy, however, needs to be spelt out in detail at two hierarchical levels : (i) the organizational strategy as a whole aimed towards achievements of the overall organizational purpose, and (ii) the research strategy towards the generation of desired scientific and technical know-how. Discussions on the latter are deferred until after dealing with the marketing and research objectives.

In order to spell out the organizational strategy in detail, two aspects have to be taken care of : (i) the components of the strategy covered in the accronym ASARAMOM (Add, Subtract, Alter, Rearrange, Adapt, Magnify, Opposites, or Minify) must be exhaustively studied; and (ii) based on whatever is chosen, a 'desirablity index' must be developed for the competing alternatives, which in the present context would be time—and cost-targetted projects, as a criterion for evaluation and judgement before final choice. In other words, an exercise in ranking

of alternatives would be needed.

The search from among the components of the strategy can be typically illustrated by posing questions such as :

i) Whether it (the organization) should concentrate on the marketing—and research-objectives being currently pursued ?

ii) Whether any addition or deletion to the list of these is necessary ?

iii) Whether the research projects should be based on newly discovered scientific/technical know-how, i.e., be technologically oriented ?

iv) Whether projects should be conceived to fullfil some identified need of the country, i.e., be market-oriented ?

v) In what specific areas should the organization remain ahead of some of its parallel organizations ?

vi) Whether the organization should strengthen its capabilities based on the scientific disciplines involved, such as heat transfer, mass transfer, thermodynamics, distillation, Crystallisation, etc., or based on multi-disciplined problem areas classified according to the products ?

This is not an exhaustive list but is only an illustrative one, emphasizing the possibilities of accomplishing the Corporate Objectives by varied approaches.

A quantitative criterion for evaluation and judgement of competing alternatives, i.e., projects, could be developed on the following lines. All the Corporate Objectives are accorded relative priority weightages in line with their expected contribution towards the overall organizational purposes; these weightages should add to 100. Various proposals for marketing, developmental, and research projects are then evaluated for their expected contributions towards the weighted Corporate Objectives. The expected contributions of each project proposal towards each of the Corporate Objective could be intuitively specified in terms of percentage (10 to 100) impact and a quantified value of the total contributions of the project proposal towards all the corporate objectives computed therefrom. The probability of achieving the expected end results for each of the project proposals within the specified time and cost targets, subject to the constraints of infrastructural limitations (in terms of resources and management practices) is also to be identified. The quantified value of the total contribution of any project proposal, when multiplied by the respective probability and divided by the respective cost of the project proposal could be set out as its "desirability index". This is a measure of the extent of the overall achievement of the organizational purpose per unit cost. Besides for the new project proposals, these desirability indices could be periodically worked out for continuing projects. After arranging in the decreasing order of the magnitude of such indices, three separate lists for marketing, developmental and research projects could be evolved. Constraints of infrastructural resources would then dictate optimal decisions regarding initiating new projects, accelerating or retarding continuing projects, dropping some other projects, etc., along with the allocation of resources for each.

The Corporate Objectives devolve into marketing, development and research objectives as has already been stated; discussions on these latter ones follow immediately.

Marketing and Development Objectives

Whilst the research objectives respond to the environment within the organization, the marketing objectives react to the interface between the output from the organization in the form of technological know-how and the input to the industry for utility towards commercial exploitation. Such an interface, therefore, mirrors the marketing objectives of the organization.

In the hierarchy of objectives, it is true tha the research objectives should contribute towards the achievement of development objectives and these two taken together should contribute towards the achievement of marketing objectives. It may, however, be noted, in this context, that :

i) In some instances where the results of research projects are directly amenable to transfer for commercial exploitation, there would be no need to have the Development Objectives as the

Marketing Objectives would themselves provide directions for implementation of specific marketing projects which in turn, would have been formulated from the results of research projects; ,

ii) In some other instances where the results of research projects require to be upscaled in pilot plant before transfer for commercial exploitation, the Development Objectives would tend to fuse into the Marketing Objectives as the latter would distinctly provide overall directions for implementation of both the results of the developmental projects and the developmental project themselves.

The scope of Development Objectives has accordingly been assumed to be in integral component of the Marketing Objectives.

To illustrate through the example of CCRI already considered, to following could constitute its Marketing Objectives :

(i) Keeping the chemical and allied, industries abreast of latest technological developments;

(ii) Increasing the component of sponsored research to 25 per cent of the annual budget in the next five years; and

(iii) Establishing the feasibility of producing, on large scale, 10 percent of the products currently being imported, within the next five years.

It may be noted that whilst the Corporate Objectives have earlier been identified for a period of ten years, the marketing objectives have not been attempted with five-years targets. A few comments on the time-frame of the objectives would now be in order.

Time Frame of Objectives

As already discussed and represented in Exhibit 2, the Corporate Objectives devolve into the marketing, the development, and the research objectives. Whenever the Organization initiates an exercise in planning the attributes of the Objectivity Model, it could attempt the achievement of its Corporate Objectives by the following three sets of activities :

(i) Transferring the results of research and/or development available in the organization, at that point of time, for commercial exploitation :

(ii) Upscaling the results of research already available in the organization at that point of time for subsequent transfer for commercial exploitation; and

(iii) Pursuing some research work for finding scientific and technical solutions to the felt needs (and, to a lesser extent, to the existing problems) of industries which (the solutions) could subsequently be upscaled and/or transferred for commercial exploitation.

Whilst the first two sets of activities are identifiable from the Marketing and Development Objectives, the third set of activities could be spelt out from the Research Objectives. The hierarchy of these objectives in relation to the time frame for planning is also represented in Exhibit 2. It may be observed that the farther the year for which marketing, development, and research objectives are being specified from the reference base year in which the planning exercise is being worked out, the maximum contribution towards the Corporate Objectives should be by the research activities to be initiated in the base year and the minimum contribution should be by the marketing activities initiated in the base year, the contribution of developmental activities falling between the two.

Elaborating further on the time frame of objectives, it may be mentioned that the ten-year targets of the Corporate Objectives could be accomplished by pursuing during the tenth year, for instance, the efforts of marketing the results of R & D as available in the organization till the ninth year or even during the tenth year through essimilation and incorporation of technological know-how from outside sources and through the generation of technological know-how by the pursuit of research, and developmental projects within the organization. Besides the majority of efforts of marketing the R & D results, some developemental efforts (and, possibly minor re-

search efforts) would also need to be pursued for the accomplishment of the ten-year targets of Corporate Objectives which (targets) are verily a measure of the organization's performance in its external environment.

Marketing Objectives with five-year targets could be defined for evaluating the organization's performance internally; such evaluations could be utilized for monitoring and, if necessary, modifying the targets for the Corporate Objectives and/or for rescheduling the efforts being pursued. Research Objectives of five-year span would co-exist alongside these Marketing Objectives. Whilst the five-year Marketing Objectives also include the exploitation of the developmental results for shorter-time research projects, the five-year Research Objectives should essentially aim at incorporating long-term research projects as well. The developmental results of successful long-term research and the consequent development-projects, which (developmental results) would be available for commercial exploitation, say, in the eighth or ninth year, would contribute to the achievement of Marketing Objectives only as late as then. Such contingencies would, in turn, enable the accomplishment of the ten-year targets of Corporate Objectives only terminally.

Research Objectives

Vagueness in the quantification of research objectives has been acquiesced by many for reasons of the "uncertainty element". Paradoxically, because of this uncertainty itself, it is desirable to stipulate certain reasonably quantified targets. The targets, which could be quantified initially on intuitive expectations, help in directing the deployment of resources, evaluating the performance and refixing the targets thereafter cyclically.

The following are a few typical Research Objectives likely to be adopted by the CCRI;

(i) Development of a new polymer with improved corrosion resistance and physical characteristics for different applications within the next five years;

(ii) Development of indigenous technology for producing organometallics in the next five years;

(iii) Development of improved, low-cost technologies for ten currently produced drugs within the next five years;

(iv) Indigenous production of ten hitherto imported drugs within the next five years;

(v) Creation of facilities to conduct pilot plant distillation studies within the next five years;

(vi) Development of technological competence in respect of plant and machinery for certain listed petro-chemicals and sophisticated organic chemical complexes within the next five years; and

(vii) Advancements in the frontiers of know-how on liquid—liquid extractions in the next five years.

That the targets in the above typical descriptions go no more than beyond the time frame is as though unavoidable in the initial stages. Once the specific projects with well-defined targets of time, cost and expected end results are taken on hand for achieving these objectives, the level of performance of these projects which could be monitored periodically could be utilized for quantifying the Research Objectives progressively on a cyclical pattern.

Whilst targets of time frame and expected end results have been described to the former six Research Objectives, the seventh one has only the time target. This is attributable to the desirability of directing some proportion of efforts towards basic or fundamental research which is considered necessary for every such industrial R & D organization to varying extents. The fields in which such fundamental work could be pursued are dependent on the pace with which the respective state-of-art is advancing, on the availability of the talent and financial resources, and on its (fundamental work's) relationship—to whatever extent conceivable—with the potential needs of the concerned industries in future.

Research Strategy

Continuing from the discussions on the strategy in general and organizational strategy in particular for ongoing and new projects

for marketing, development and research activities (refer section onorganisational strategy) elaboration on research strategy is attempted now.

Research strategy which is reflective of the pattern of deployment of resources for generation of desired scientific and technical know-how is subservient to the organizational strategy and as such forms a component of the latter. Recall that all the project proposals as well as continuing projects were described to be subjected to an appraisal system conforming to the organizational strategy through a criterion of "desirability index". In much the same way, it would be desirable to develop a methodology for appraising promising feasibility studies for research, and to adjudge their compatibility with the organizational strategy.

Just as Corporate Objectives were accorded relative weightage points for developing a critarion for organizational strategy, the criterion for research strategy could be developed by according relative weightage points to the Research Objectives to total up to 100. Each feasibility study (refer Exhibit 1) could then be evaluated for its contribution towards the achievement of all the Research Objectives. The probability of achieving the anticipated end results subject to the constraints of infrastructural resources is also to be identified. The total weighted points for any feasibility study, multiplied by the probability and divided by the cost gives it a "research preference index". A list of feasibility studies is made in the decreasing order of these indices and depending on the expected extent of their (feasibility studies) conformation to the organizational strategy, detailed project proposals for research are formulated in order of preference. These proposals must qualify by well-defined targets of time, cost and expected end results. The proposals should also incorporate an implementation plan together with the specification of milestone events and decision points for monitoring and control.

Projects

To realise the gamut or research, development, and marketing-objectives, the organization would prescribe specific tasks or jobs or assignments for pursuit. In the public sector research organizations, "directional assignments" are generally entrusted to various departments or sections through executive orders by the Chief Executive Officer, specific time targets are sometimes specified for these assignments. It has been observed that greater effectivenees and enhanced efficiency could be possible by adopting project management concepts within the scope of which specific projects are entrusted to project teams which, in turn, are constitued by nominating suitable officials from infrastructural divisions to these teams.

Before initiating work on the projects, detailed implementation plans in the form of PERT networks highlighting all inter-linkages should be worked out by the Project teams. An analysis of such schedules are drawn up and a scheme for monitoring the progress also approved.

Management Structure

As the awareness for research and developmental activities is increasing, the emphasis towards accountability of R & D is also gaining ground. The inevitable effort in this direction aimed ultimately at ensuring adequate returns from R&D is evident in that the support to various national laboratories and institutes is being gradually changed from establishment-orientation to project-orientation. Whilst the latter based on projects management concepts is a welcome step towards accountability of individual projects within the organization, it also entails some disadvantages. The disparity between the policies, rules and regulations governing industries and R & D juxtaposed to the underlying assumptions for successful application of project management concepts impose considerable stresses and strains in the projects management organization; in some circumstances, these stresses and strains have even resulted in causing loss of faith in project management concepts. Besides this, manpower is one of the biggest infrastructural resources and the nature of R & D being what it is, it is generally neither possible nor desirable to keep any single official working only on one project. This had led to multiplicity of responsibilities which, within the more-informal-than-formal systems prevailing in such industrial R & D Institutes, has diluted the aspect of individual accountability. Both the establishment-oriented, and project-oriented systems are being followed with varying degrees of compromise. Such an organizational structure which judiciously integra-

tes the functional and project orientations has been described by Toffler as "Ad-Hocracy". He opines that 'we are witnessing the breakdown of bureaucracy and the arrival of a new organizational system that will increasingly challenge and ultimately supplant bureaucracy'[13]. A similar system has been suggested for the CCRI, as illustrated in Exhibits 3 and 4.

Whilst an establishment-oriented system is suggested to be followed within the four divisions of Planning, Research & Testing, Development and Administration & Finance, for various organizational activities contributing essentially to the organization's effectiveness (refer Exhibit 1), project-oriented system is suggested for formulating detailed implementation plans of selected projects and for executing them, i.e., for organization's efficiency.

The Chief Executive Officer of the Institute has been designated as the Director General (DG) and he is responsible for general direction and supervision of all the institutional activities. He will be the Member-Secretary of the Council of Management (or Governing Body or Board of Management) which shall have the ultimate authority of approving and sanctioning plans and budgets for the Institute. The DG shall have the responsibility and, of course, the matching authority, as delegated by the Council, for all executive actions.

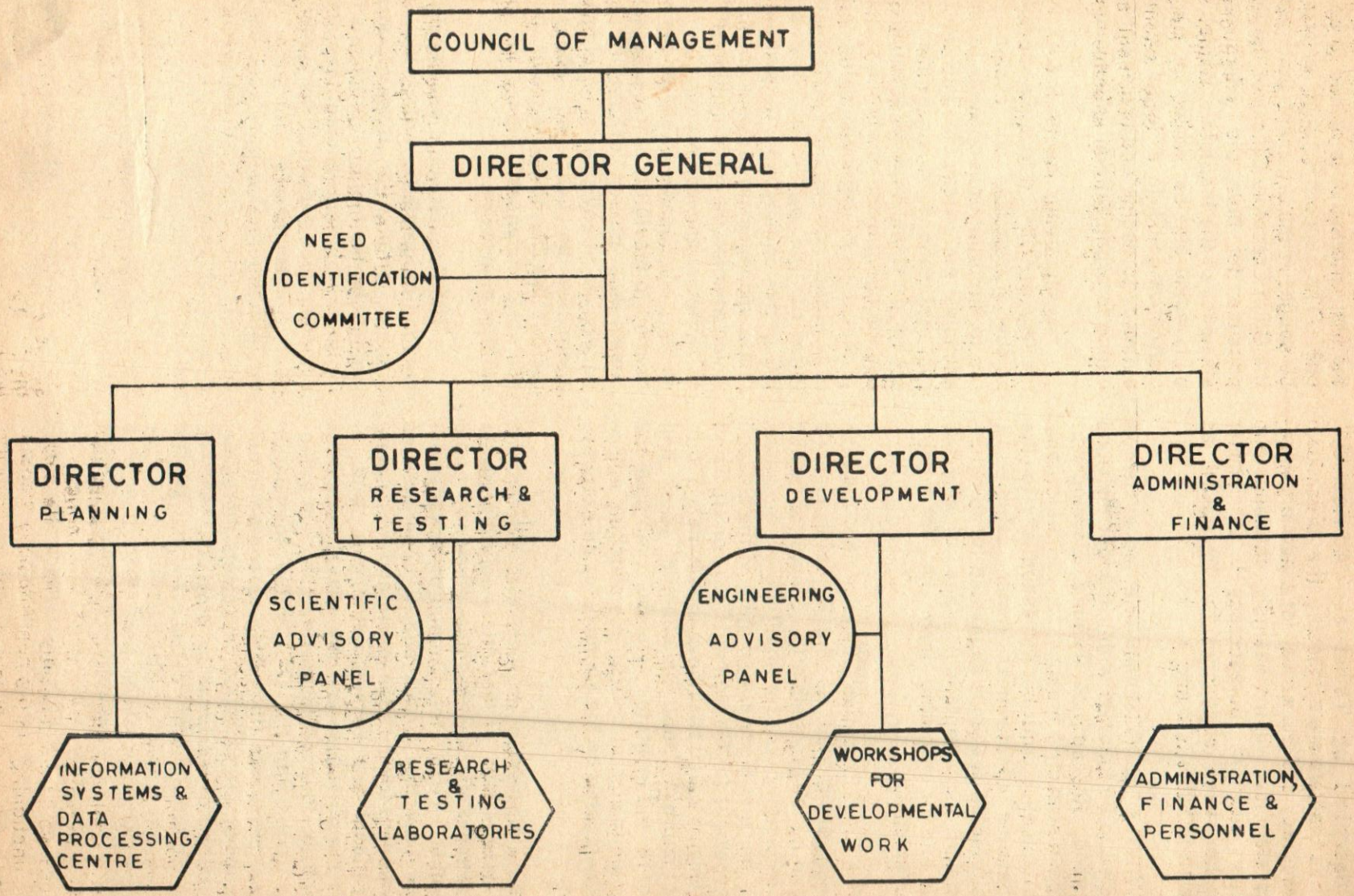
As a digression, at least two alternatives in the management of activities contributing to organizational effectiveness and efficiency could be possible. Firstly, the Council of Management could (i) prescribe broad and flexibile policies for developing long range plans and formulating organizational and research-strategies, and (ii) approve the objectives and the annual budget for the Institute. This would provide sufficient authority and flexibility to the DG in the formulation of project proposals (including, of course feasibility studies), the selection of projects therefrom, the allocation of resources to projects, followed by their monitoring and control. In the second alternative, the Council of Management could, over and above the scope of the first alternative, also retain with itself the authority to approve selection of specific projects. This additional constraint on the DG would considerably reduce his flexibility of functioning. In the contemporary context, particularly for large organizations of the type visualised in the hypothetical example of CCRI, the first, alternative is opined to be the preferable one. The support for such a preference would be sought in the argument that the DG who is the Chief Executive Officer of the Institute is responsible for both the eflectiveness and the efficiency of the Institute. Whilst this responsibility would still be vested in him, the second alternative could, to a large extent, reduce his authority to decide and implement actions contributing to organizational effectiveness.

In any public sector R & D organization of the type of CCRI, it is quite common to find a number of exercises and assignment being referred to the organization mainly by the Government agencies and occasionally by the relevant industrial associations. Many-a-time, such requests are for providing some informative analysis which, despite being much smaller in scope as compared to the scope of projects being pursued in the organization, do require the deployment of some infrastructural resources. The success of the DG in this context, lies in instituting an appropriate management system in the organization which enables the identification of such exercises as either supplementary or, preferably, complementary components of one or the other activities relating to feasibility studies, formulation of proposals and pursuit of specific projects being undertaken at any given point of time. The second alternative, as described above, would also restrain the DG, to some extent, in adjusting to such circumstances. Hence the preference for the first alternative.

The Council would specifically be approving the long-range plans, criteria for organizational strategy, criteria for research strategy, annual budgets for the Institute, proposals for strengthening the infrastructural resources and staff welfare activities, etc , and would be sanctioning appropriate funds therefor. In order to provide for the infrastructural welfare activities, it would be desirable to have an "Infrastructural Development Committee" as a sub-committee of the Council. All other requirements of infrastructural strengthening such as manpower, equipment, technical facilities, etc., should get reflected in the projects of the Institute; these projects should be evaluated by a Project Selection Committee with the DG as the Chairman. The Director-Plann ng may be the Convenor and the three other Directors of the Institute and two of the Council members

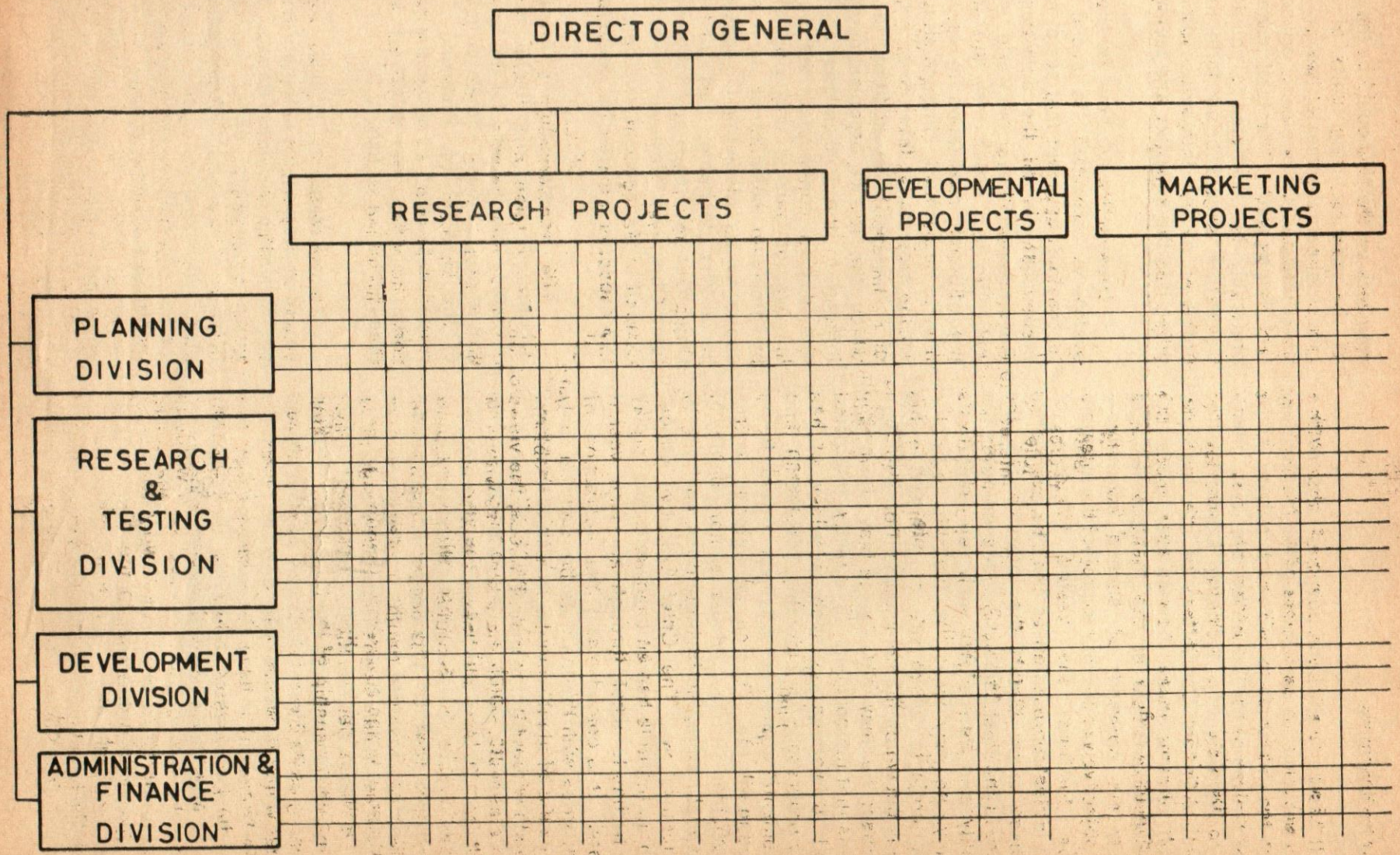
SUGGESTED MANAGEMENT STRUCTURE OF INDUSTRIAL R & D INSTITUTE

EXHIBIT-3



SUGGESTED OPERATIONAL STRUCTURE OF INDUSTRIAL R & D INSTITUTE

EXHIBIT-4



may be its members.

It has generally been observed that with a view to ensuring the usefulness of the institutional work to the industries to which it caters, some representatives of the industries are also nominated to the Scientific Advisory Committee (or Research Advisory Committee) of the Institute. In such circumstances, how-so-ever much the Chief Executive Officer of the Institute—who is normally the convenor of such a committee—might objectively endeavour to project the interests of the Institute, the vested interests of the industries' representatives can't be overlooked and these might distort the interests of the Institute in the final decisions. Depending on the capability and plans of any such representative's company, he may want the Institute to pursue certain projects which are of interest to his company but which the company is not equipped to puruse; he may also try to play down any activities that his company is directly interested in, and is working on such activities or has already progressed considerably. Research and developmental efforts, to whatever extent being pursued in all the research laboratories/centres of companies in the private sector, being of confidential nature, the Institute does not get to know about these. The Chief Executive Officer of such an Institute has an unenviable role to play in that he has to steer through all such vested interests. It is opined that if the interaction of the industries with the Institute be handled only to the extent of ident fying the industrial problems and needs without going into the technical and scientific aspects, which constitute the means to solve these problems and needs, the views of the industries could be obtained without unduly entailing the flow of knowledge about specific projects of the Institute to the representative of the industries. It has accordingly been suggested to have a "Need Identification Committee" (NIC) under the chairmanship of the DG, with Director of Planning as its convenor. It may be emphasised here that whilst it would not only be desirable but also beneficial to have the intraction with the industry for purposes of identifying their existing problems and developmental needs as also for commercial exploitation of research and/or developmental results available, it would be better not to have their interference in the appraisal of various proposals for selection of specific projects. Besides the D rector of Research and the Director of Development from the Institute, othrer members on the NIC could be the executive heads of the manufacturing units of a few selected industrial establishments; two or three members from relevant Government agencies would be included as well. The total membership should preferably be restricted to about 12 to 15. The Committee should bring forth the technological problems of the industries without necessarily going into the scientific and technical details.

Irrespective of how far the Governmental system is committed to social welfare, it is increasingly apparent that social welfare attitudes predominate in all the activities supported by Governments all over the world. In such a scheme even projects which may not strictly pass the list of benefit cost ratios in varying degree may have to be pursued. (In such situations, financing for the projects is taken to be beyond the scope of this paper.) In addition to the functions which the R & D organization may take on conforming to the implications of Exhibit 1, they should also continuously be on the look-out to improve not only its image but also its revenues by providing consultancy services within the scope of its Marketing Objectives. This could be a very desirable part of the Corporate Objectives as already mentioned under Organizations Objectives. However, the extent to which the Council of Management must lend its attention to this aspect is a matter for deliberations.

The transformation of few of the problems deliberated upon and finally recommended as probables into the plan for the future aud generation of project ideas should be the responsibility of the Director of Planming. The executive responsibilities of pursuing the various organizational activities may admit of variations from those identified in Exhibit 1.

In the Research Division, deperding on the nature of the projects being pursued, there should be 'Scientific Advisory Panels' for individual or group of projects, under the Chairmanship of Director of Research. Besides internal scientific staff, members on such panels should also include professionals from academies and learned institutions There should be an 'Engineering Advisory Panel' for the Development Division under the Chairmanship of Director-Development; it should have representatives from manufacturers/suppliers of pilot plants.

As regards organization of infrastructural resources within the Institute, the Planning Division should have the information systems and data processing centre; the Research Division should have the research and testing laboratories; and the Development Division should have various workshops for developmental activities.

Conclusion

Overall success reflected in the productivity of industrial R & D organizations is dependent on both the effectiveness which the objectives and plans are defined and the efficiency with which the infrastructural resources are utilised to pursue these plans. Whilst the efficiency of infrastructural utilization could be maximised through the adoption of stricter monitoring and evaluation practices, improved effectiveness can be achieved from a thorough understanding of the influence of environmental factors on the organizational system. Identifying and defining the Corporate Objectives constitute the core of this exercise. Formulating the marketing, and research, objectives from these, followed by selection and initiation of specific time, and cost-targetted projects, largely completes the planning function responsible for "effectiveness" of the industrial R & D organization. A management structure based on a combination of establishment, and project, oriented systems would be in order; and has been suggested as an illustration for better accountability of the organization. Discussions on these have been briefly supplemented through a hypothetically conceived non-profit industrial R & D organization in the chemical and allied industrial sector.

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PRODUCTIVITY OF INDUSTRIAL RESEARCH

"If the productivity of research is to be increased, then project selection, budgeting. and control must be placed on a more logical and scientific foundation. and not left entirely to the hunches, intuition, and guesses of individuals and committees. This does not mean that management will be absolved from all planning responsibility ; research is the antithesis of certainty, and all that formal systems can do is to increase the ratio of objective to subjective criteria on which plans and decisions are made".

A Hart

SPECIAL SECTION

ON

PRODUCTIVITY

IN

PUBLIC DISTRIBUTION

SYSTEM

Productivity
1982, XXIII, 2, 193-195

Productivity in Public Distribution System

—the national workshop and its recommendations

The two days National workshop was convened by National Productivity Council, in collaboration with the Ministry of Civil Supplies, Govt. of India, Food Corporation of India, Central Ware Housing Corporation, National Co-operative Development Corporation and National Co-operative Consumers Federation on the 10th-11th August, 1982 at Vigyan Bhawan, New Delhi to evolve appropriate concepts and techniques of productivity in the case of public distribution system and to arrive at right strategy and plan of action to achieve productivity improvements in the form of reduced costs and increased consumer satisfaction.

While inaugurating the workshop Shri A. K. Mazumdar, Secretary, Ministry of Civil Supplies said that the distribution system has come to stay as a major element of the Indian economy. The debate, whether there should be a public distribution system at all, had ceased. The focus today is on improving the procurement, stocking and the distribution net work for reaching the essential commodities to a large section of the population.

These operations involved thousands of individuals spread over the length and breadth of the country and only dedicated co-operative efforts would ensure the success of the system.

Given the conditions obtained in India, the public distribution system ensures supply of certain essential commodities to the common man at a pre-determined prices throughout the year. This acted as a deterrent to the private trade which varied prices to increase profits.

Shri R. V. Swaminathan, Union Minister of State for Agriculture and Rural Development delivered a special address on the 11th August, 1982. While endorsing the comments made by Shri O. N. Chibber, Commercial Manager, Central Warehousing Corporation regarding wastage of 6.6 per cent of the total production of food grains because of lack of adequate storage facilities, the minister said the storage system left much to be desired. He said the Government paid a subsidy of Rs. 460 crores every year for the functioning of the public distribution system. This could be minimised through scientific storage and planned transportation and distribution.

The validictory address was delivered by Shri B. C. Gangopadhyay, Secretary, Department of Food, Ministry of Agriculture. Earlier in his welcome address Dr. A. N. Saxena, Director General of National Productivity Council said that several aspects of the public distribution system should be improved so that the consumer got his needs at a reasonable price easily.

The National Workshop made the following important recommendations for consideration and implementation by the concerned agencies.

Concepts and Objectives

1. The Government of India and State Governments should invest under plan funds, for infra structural development of Civil Supp-

lies Corporations/Essential Commodities Corporations. This is necessary for strengthening the permanent character of the Public Distribution System.

2. The State Governments should also provide managerial subsidy for opening retail outlets by Civil Supplies/Essential Commodities Corporations and also for the capital cost for construction of godowns in rural and remote areas.

3. The Public Distribution System should be made to serve all sections of the population and particularly the vulnerable sections.

4. It should deal with all essential commodities as well as items of local needs so that the retail outlets become viable.

5. The Government of India should consider the desirability of issuing quarterly allocation of essential items to the State Governments.

6. A line of credit for the needy fair price shop dealers should be made available.

7. Finances for the public sector corporations and co-operative agencies handling essential commodities should be given at a concessional rate.

8. The Reserve Bank of India should not make any distinction between the guarantees provided by the Central Government and State Governments.

Procurement, Warehousing and Transportation

9. In order to minimise losses and achieve reduction in operational costs:

   a) A chain of multi-purpose rural godowns should be constructed;

   b) The design of the wagons handiing foodgrains should be improved to avoid losses during transportation;

   c) The open storage at railway yards should be avoided;

   d) The system of Kacha Aarhtiya/Commission Agent for procurement should be eliminated; and

   e) The market committees should give greater attention to cleaning and drying facilities for foodgrains.

10. The Central and State agencies dealing with Public Distribution System should strive for improved logistic planning and coordination for uninterrupted supply of essential commodities of right quality by the supplying departments to the fair price shops and to the consumers by the fair price shops.

Operational Problems

11. The agencies concerned with Public Distribution System at the Central and State levels should pay immediate attention to introduce effective and efficient managerial systems so that PD system operates efficiently and productively.

12. A need for carrying out comprehensive study to identify "High" cost centres in the Public Distribution System and evolving action plan for achieving cost minimisation was emphasised. Such a study should spell out the scope of various productivity and management techniques in cost minimisation.

13. The conventional packaging and outmoded handling systems at multiple stages should be replaced with bulk packaging and mechanised handling with in-built minimal handling points.

14. Sealed samples of food grains are provided to fair price shops for ensuring that quality of foodgrains available there is the same as that supplied by the FCI/State Corporations. It was, however, felt that the existing system may be examined for its effectiveness from the point of view of quality assurance to the consumers.

15. Compliance with ISI specifications in respect of essential items other than foodgrains should be enforced for quality assurance.

16. The State Governments should encourage measures for building up consumers movements to take care of consumers interest.

17. As a corrollary to recommendation number 4, it is necessary that the fair price shops are encouraged to extend their areas of operation beyond essential commodities so that they could become commercially viable.

18. There is a need to gradually develop a commercial outlook in the agencies dealing with Public Distribution System. It is also necessary to examine the avenues for reduction in Central Government subsidy.

19. The transport system from the state distribution point to the fair price shop should be so designed that the scope for adulteration is minimised, if not altogether eliminated.

20. The Public Distribution System in some of the States is working highly successfully. It was suggested that success models should be collected and circulated among the various other State Corporations/agencies. The success models should provide the analysis of the causes contributing to the success of the system and likely pitfalls against which precautions need to be taken.

21. The Co-operatives have developed considerable infrastructure and they should be encouraged to deal with the distribution of essential commodities.

In the following pages three selected papers presented at the workshop are reproduced with the consent of authors for the wider readership of PRODUCTIVITY.

Productivity
1982, XXIII, 2, 197-204

Role of Civil Supplies Corporations in Productivity Improvement in Public Distribution System

Dr. MANENDRA MOHAN
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For productive functioning of the public distribution system, the civil supplies corporations have a vital role. The author examines the conventional productivity measures and advocates projective productivity measures. It is suggested that civil supplies corporations should orient themselves as marketing organisations rather than allocating authorities. Inducting professional marketing experts on the board is also desirable.

Public Distribution System

The Public Distribution System has come to stay as an intrinsic part of the egalitarian infrastructure of the country. The rationale of the system and its objectives are fully appreciated by different shades of public opinion, owing to the inherent national perspective of the system. The major concepts at the root of the system are :

a) To extend availability of 'essential goods' to all households which need them and at locations within their convenient reach.

b) To ensure that these goods are sold at specified fair prices through the retail outlets designated as Fair price Shops.

It must be apreciated that the initiation of the system is not merely a regulatory measure. It is an extension of the philosophy of participation of public authorities and organisations in matters of broader public interest, in response to the changing requirements of the society globally. Drawing on the experience of North America, Wilson observes :

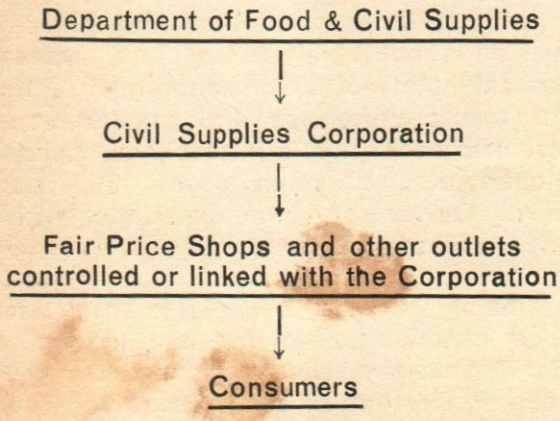
"Mainly, we rely on private enterprises to produce material goods but are putting ever heavier emphasis on the public sector to provide services in the form of roads, post offices, flood control, defence, research and development, recreational facilities, sanitation, urban transit

and so on. These activities and trends, with all their diversity from country to country, constitute the essential ingredients of the welfare state; its fuller development marks the great difference between the economic policy of the twentieth century and that of the nineteenth."[1]

The need for installing a public distribution system was felt in periods of shortages of essential goods such as foodgrains, edible oils, sugar and kerosene following the removal of the regime of rationing. The problems of availability of these goods and others covered by Essential Commodities Act in terms of quantities required per household, place of availability and prices, however, continued with occasional periods of relief. The Departments of Food and Civil Supplies have to act as watchdogs of the situation as well as procurers and providers of essential goods with the help of the concerned government organisations. While fully realising the basic need for having public distribution system, it would be worthwhile to examine the major feature of its operation and, in particular, the role of civil supplies corporations which have been set up in several states in order to strengthen the functioning of the system. The focus on these corporations is highly relevant as the basic purpose of having them is to bring in increased efficiencies in the system and also to provide additional services to consumers, especially the most needy ones.

Civil Supplies Corporation

The administrative perspective in respect of civil supplies corporations would take the following form :



This linear model, which may well represent the concerned decision makers' perspective and functioning of corporations is obviously a legacy of the war time rationing system, which extended far beyond that period in India owing to continued shortages. The expression, "Fair Price Shops", in that conext is merely a clarification that commodities retailed by these shops may also be obtained elsewhere, at market prices, which may be 'fair' or otherwise.

The main objectives of a civil supplies corporation are essentially the same as the Department of Food and Civil Supplies, in respect of supporting the public distribution system, for instance, "To engage in, promote, improve, develop, counsel and finance production, purchase storage, processing, movement, transport, distribution and sale of foodgrains, foodstuffs, and any other article whether declared essential or not and provide services and assistance of all kinds for the said purpose, including capital, credit, means, resources and technical advice and assistance as also trade in goods whether declared essential or not and to undertake any activity regarding Civil Supplies as directed by the State Government from time to time, and also to take such measures as the company may think fit for strengthening the consumer movement."[2]

The articles of association would normally include incidental objectives or, ancillary to the attainment of the main objectives, a long list of activities in case need arises for expanding or diversifying into any of these. The list of such activities may be very comprehensive. In the case of Gujarat State Civil Supplies Corporation, for instance, it runs into sixtyfive paras. Our major concern, however, will be with the main objectives of civil supplies corporations.

Conceptual Issues

Some of the basic issues may be stated in order to be able to take an analytical approach in respect of the establishment of civil supplies corporations and their functioning.

1. Wilson, George W., The Welfare State, Business Horizons, 8-2, Summer 1965, p. 35.
2. The Gujarat State Civil Supplies Corporation Limited, Memorandum and Articles of Association (Date of incorporation 26 September 1980), para A1, p. 1.

Concept of Essentiality

Essentiality is a relative concept. Even amongst the very low income families there will be different gradations with regard to their preferences. Furthermore, it will be fair to assume that a gradual upgrading in respect of the type and quality of 'essential' goods will be expected by buyers as the standard of living rises, although very very slowly.

Price Parity

Prices at which goods have to be sold by Fair Price Shops may be determined according to the procurement prices and any other special factors considered by the Department of Food and Civil Supplies. Corporations are more likely to be concerned with ensuring that all fair price shops in the state sell goods at same prices. In the case of certain areas in the state which are favourably placed because crops are grown there or because of seasonal factors, say at times of harvest, offtake from fair price shops in those areas during certain periods may be effected.

Viability of Fair Price Shops

Experience has shown that fair price shops are more active or increase in numbers in times of shortage. When essential goods are more freely available or differentials between open market prices and 'fair' prices are narrow, turnover declines, margins fall and the number of fair price shops also drops.[3]

Availability of Stocks

In order to meet consumer needs without inconvenience or hardship, stocks have to be available at the fair price shops and, well in advance at godowns, warehouses or any other stocking points owned, managed or contracted by the corporation. If retailers do not get their stocks in time and have to make repeated trips for obtaining stocks, their own costs and inconvenience increase in the face of limited personnel support. That leads to losses and demotivation of retailers.

Controls or Coordination

In order to ensure that prices charged by Fair Price Shops are the same as specified and bonafide consumers are not denied the allotted quantities of goods, or harassed, it is necessary for the Corporation to have a control mechanism. There is an obvious issue whether to have primarily administrative control system or to develop and practice a managerial approach based on the use of feedback and coordination with the aid of relevant data.

Allocation or Free Availability

As a conceptual point we must also consider whether a civil supplies corporation is merely doing allocation and making sure of the physical distribution logistics. In that case there is little difference from the way the civil supplies departments function. If the major objective of these corporations is strengthening consumer movement and providing consumer satisfaction, the objective should be to make free availability of essential goods or at least to orient their thinking and planning along those lines. We should not disregard this concept out of hand, on grounds of supply constraints.

Distribution or Marketing

The central issue which corporations have to face is whether they are merely procurement and physical distribution agencies or they are prepared and geared for developing a marketing orientation and outlook. There is a substantial difference between the two. Restricting the management objectives to allocation and physical distribution approach may appear simple and convenient. However, the job of the corporation is not completed when supplies of stocks are made available at the godowns or even at fair price shops.

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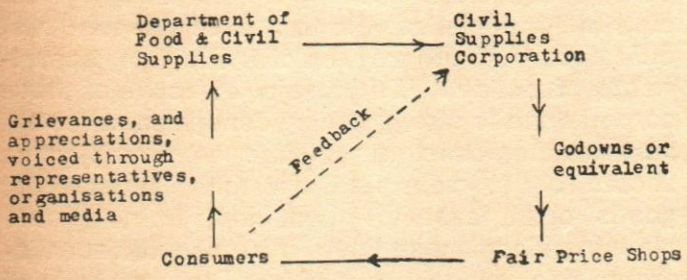
3. The author of this paper was coopted as the external professional member of an Informal Committee on Fair Price Shops set up by the Government of Gujarat at the suggestion of the Chief Minister to look into the problem. The Committee consisting of senior officials of the Department of Food and Civil Supplies, chaired by the Secretary of the Department, submitted its report on 15 December 1980. Its recommendations included an increase in the discount allowed to fair price shops on foodgrains, upward adjustment of transport subsidy and rationalisation of the rebate structure and waiver of professional tax (levied in Gujarat State) for the shops with a turnover of upto Rs. 3 lakhs. The recommendations of the Committee have been accepted and implemented and this has contributed to a reduction in the monthly variations in the number of fair price shops in the state and also an increase from 9,502 in July 1980 to 10,378 in December 1981.

Sensitivity to consumer needs and convenience can be developed only if corporations consider themselves via media of providing and enhancing consumer satisfaction and not merely meeting their needs for essential goods. As pointed out above, needs are relative and subject to change.

We should, therefore, propose the consideration of the following interactive model which allows for response and feedback links.



Productivity—A Wider Perspective

In the context of a detailed discussion on productivity of public distribution system, it is necessary to take a somewhat broader perspective in view of the conceptual issue raised above. To reiterate, if the public distribution system were to be equated with an organisation created for physical distribution logistics *per se*, the problem becomes somewhat mechanical and oversimplified. Productivity improvements are indeed necessary and should be attempted and perfected in respect of the major elements of conventional distribution system such as those mentioned below.[4]

1. Warehousing
2. Transportation
3. Changes in Inventory carrying cost
4. Obsolescence, including damage/spoilage for perishable products
5. Value of alternative facility use
6. Production/supply alternatives
7. Value of cost concessions
8. Communication and data processing costs
9. Order handling, including back orders
10. Channels of distribution, considering different types, i.e., cooperative or private owned outlets amongst the fair price shops and intermediaries used or likely to be used, if any
11. Customer service costs
12. Inventory capital costs
13. Packaging

In both the articles under reference, the authors emphasise substantial contribution that can accrue from increased efficiency and various improvements in distribution system to overall profit margins of the company, the necessity of taking an integrated look—"the total cost approach"—the need for involvement of the top management of the company in distribution-related decisions. Furthermore, Parker points to the societal implications of lack of efficiency of distribution and overall, in marketing :

> "Society can no more afford inefficiency in marketing than it can afford wasteful methods of production; the social cost is no less real. Likewise, companies which fail to improve the efficiency of their distribution activities will fall behind in our (USA) competitive economy".[5]

The next substantive point which we must consider is the *raison-d'-etre* of having civil supplies corporations. They too have to function to an extent in a competitive environment, looking from the angle of the somewhat better off consumers who have the choice of buying essential goods from channels other than fair price shops. It is not, therefore, merely a question of social

4. Based on—
   a. Lakashman, R. and Stolle, J. F., The Total Cost Approach to Distribution, *Business Horizons*, 8-4, Winter 1965, pp. 33-46, and
   b. Parker, D. D., Improved Efficiency and Reduced Cost in Marketing, *Journal of Marketing*, 26, April 1962, pp. 15-21.
5. Parker, D. D., *op. cit.*

justice but of enlightened marketing management orientation, whether those consumers who have no choice because of financial reasons or lack of access to shopping centres should be taken for granted and treated as merely being at the receiving end. The concept of productivity, although not fully appreciated in a conventional context, should certainly include a longer-term perspective. Referring to a dictionary definition of productivity (or productiveness), it also imbibes "generative source of continuing activity" as the fountain-head, of which productivity is the external manifestation—a flow for which various measures relating to the critical parameters of the concerned system can be devised and used for purpose of evaluation and future guidance.

It is suggested that an assessment of productivity of civil supplies corporations should be made by treating them as marketing organisations especially established to serve the consumer interest, and to take special care of the underprivileged segments. These underprivileged segments exist due to certain constraints on household incomes or locational factors, or their vulnerability to exploitation by unscrupulous traders during periods of shortages. Therefore, civil supplies corporations can strengthen the public distribution system not only through cost reductions, wherever possible and desirable, but also by aiming consistently at providing enhanced value and better services all along the line, i.e., to their immediate customers, fair price shops and through them or otherwise to ultimate buyers and users, families and households countrywide.

Conventional Productivity Measures

It is imperative to make a beginning with what may be termed as conventional features of productivity in order to distinguish them from projective productivity approach to be dealt with next. The following list is intended to be illustrative and not necessarily comprehensive :

Warehousing

Improvement in creation of warehousing and maintenance as well as superior administration has several benefits. It may help civil supplies corporations in reducing costs and minimising losses due to spoilage and damage to goods stored. Fair price shopkeepers can get better service and, in turn, reduce their own costs. Alternatively, a saving can be achieved by the corporation on transport rebate given to fair price shops to compensate for differential distances from godowns.

There can be no rule of thumb for achieving better warehousing logistics. In Gujarat, the Civil Supplies Corporation has 412 godowns under its control, having been handed over all godowns earlier maintained by the Department of Food and Civil Supplies. The Kerala State Civil Supplies Corporation makes extensive use of storage facilites of the Kerala State Warehousing Corporation. Both approaches can be equally efficient.

Inventory Carrying Costs :

It would be worthwhile examining how the costs of holding inventories in godowns, whether owned by the corporation or through lease or contract arrangements, is taken into account. If inventory rotation is properly coordinated at the godowns, it can lead to cost savings on that account. These savings may be passed on to fair price shops as higher discounts or to consumers as lower prices or absorbing price increases originating from inflationary pressures. A possible approach towards achieving savings on inventory holding is to work out a supply schedule for fair price shops served by a godown.

As an illustration, a GSCSC godown has to supply to about 250 shops on an average, i. e., approximately 10 shops per working day. It is likely that more than one trip per month may be required by each outlet either because of non-availability of stocks of some commodities or lack of cash resources with the shopkeeper. In actual practice, the average number of retailer visits per godown per day may be 20-25. It should be possible to study the pattern of visits by retailers and their quantum of purchases and use that information to match the inventory levels with expected purchases through the month.

Efficient Administrative Procedures :

Godowns and warehouses run by a civil supplies corporation are basically no different from cash and carry outlets operated in a number of Western countries from where wholesale purchases may be made. Here too, the fair price shopkeepers have to pay cash. The payment of

cash, however, has to be made to a bank and not directly to the godown in-charge. Furthermore, a permit may have to be obtained from the official of the supplies department, authorising the lifting of goods purchased, after having checked in advance their availability at the godowns. These three activities have been brought under the same roof in several godowns by the GSCSC by persuading banks to open their counters in godowns and having the supplies department official (malmatdar) also present in the godowns for issuing permits. There is surely scope for further simplification of procedures which is ultimately in the interest of the fair price shopkeeper and can also be instrumental in saving public funds.

Projective Productivity Measures

Evaluative approaches, outlined above, can give an indication of economies achieved and should be highlighted by corporations. There is, however, an Inbuilt tendency to assess performance in terms of financial results. That can be misleading even for companies which have primarily a profit orientation and more so for companies like civil supplies corporations. Therefore, it is necessary to evolve suitable norms for assessment of performance if we want to take into account projective aspect of productivity and not only the conventional framework referred to above.

Retailer Motivation :

The number of fair price shops will no longer be a performance indicator once it keeps pace with the required norms according to population and location criteria. We have to look beyond the current operational characteristics to see how value addition can be continuously built into the system. In the context of provision of stocks to retailers there are certain factors such as availability at godowns, proper quality of goods supplied and streamlining of administration procedures which are largely within the domain of civil supplies corporations. It may be necessary to go one step farther to meet financing needs of deserving and needy shopkeepers so that this factor does not come in the way of their replenishing their stocks. In Gujarat, efforts are underway to pursuade banks to extend finances for this purpose. This move may only be marginally reflected in productivity improvements in distribution system and less so in profit and loss account of the corporation. Yet, it will be major step forward if retailers remain motivated with the additional support and consequently consumers stand to get a better deal. Presently there is no accounting, perhaps not even consideration, of the time factor of consumers and none whatsoever of frustration and disillusionment which they face when they have to make repeated trips to get their 'rations', a terms still commonly used.

Extension of Product Range :

There are 15-20 essential commodity groups which have to be treated with certain degree of flexibility to take into account whatever limited varieties of goods like foodgrains, pulses and edible oils may be supplied through fair price shops, leaving aside products like kerosene and sugar. The regional variations are also relevant. The Kerala State Civil Supplies Corporation has selected 18 groups of essential commodities. As an extension of retail outlets of the public distribution system, the Corporation has opened about a hundred Maveli stores since September 1980 which are owned and operated by it. There is provision for supplying some 36 products to stores, categorised as below :

	Types/items
Rice	5
Wheat flour	3
Gram and cereals	9
Edible Oils	4
Salt and spices	11
Sugar & Jaggery	2
	36

It must be added that there is usually no limit on quantities which may be purchased from Maveli stores and no card is required. Only in periods of acute shortage a restriction may be placed on the quantity of purchase. Prices of goods, taking into the quality, would be higher than for the corresponding product group in fair price shops but lower than market prices. Maveli stores, are managed by employees of the Corporation, who are usually of the rank of a Lower Division Clerk.

The Maveli experiment which is reported to be highly successful is a useful illustration of the product mix and pricing policies and should be considered an intrinsic part of the projective productivity concept. As a subsidiary point, it also raises the question of administration and control which is apparently successful with the Corporation's direct involvement. On the other hand the Kerala Stores also started by the Corporation with the target of having one such store in each panchayat and also providing occupation to educated unemployed were a miserable failure. The start was made with some 250 such stores and the number has now dropped to barely 10. Apparently, this plan was misused by many unscrupulous traders who planted some of their own relations qualifying under the category of educated unemployed. They were provided initial financing and were supplied goods at wholesale prices by the Corporation. The concept was the same as that of Maveli stores. In fact Maveli stores followed because of the failure of the proposed network of Kerala stores.

Expansion of Economic Activity

The question of promoting trading activities more and more into the hinterland through promotion of entrepreneurship, if necessary and functional, is one of far reaching consequence. It is not merely a question of having a retail outlet in rural locations not earlier covered adequately or provision of essential goods at fair prices, or as a corollary, providing for educated unemployed. Economic activity in villages has to be seen as a rural income generation device even in a small way.[6] Furthermore, the question of motivation of rural population for purchasing the slightly extended range of goods should not be overlooked. Facing the stark reality, it is not merely that 53% of the country's population is below the poverty line. These persons, and many more, see little hope of improvement in their lot for years, perhaps generations to come. An unostentatious display of goods which may be within their reach physically and eventually financially is to them a ray of hope. The inherent concept of essential goods may be irrelevant to them if many such people are unable to afford them. That is why the concept of essentiality has to be examined threadbare both in respect of an upward gradation and also the present state when large proportion is even below that level of essentiality. While taking up the question of extension of product range, changing the product mix, and extending the reach of distribution channels under the auspices of civil supplies corporation or through their involvement, one way or another these basic issues have to be given the importance they deserve.

Productivity in Purchasing and Procurement

Procurement and purchasing programmes of civil supplies corporations are an important and, at times, critical part of their total operation. This obviously requires skills in the purchasing function when supplies are being obtained for non-governmental agencies or directly from growers. It must be appreciated that marketing orientation of corporations, as strongly recommended above, will be of considerable help to them in bringing continued efficiency and cost savings in their purchasing activity too. Receptivity to environment and keeping aware of market trends will be instrumental in avoiding possible pitfalls. In fact the psychological proximity to markets is a distinct advantage for a corporation as compared with a government department. Furthermore, an active corporation can provide facilities or help in creating conducive conditions for producing/processing products it is dealing in or may be planning to diversify into. The articles of association of civil supplies corporations provide for such objectives and they should not remain a dead letter.[7]

Conclusion

In this paper, an attempt has been made to present a conceptual framework in which the role of civil supplies corporation may be examined in futuristic perspective. These corporations were established as an extension of departments of food and civil supplies and their boards are usually constituted of government officials mostly drawn from within that department. In terms of organisational efficiency and broadening their horizons it would be worthwhile considering induction of external professional persons on the board.

6. Industrial Credit and Investment Corporation of India Limited, Rural Marketing : A Pilot Study, Bombay, October 1979.

7. Gujarat Civil Supplies Corporation Limited, op. cit., for instance, vide paras B1, B6, B8, pp. 1 and 2, especially. Also, para B41, pp. 7-8, referring to rural development.

Civil Supplies Corporations should orient themselves, rather convert themselves, into full-fledged marketing organisations. Purchasing and procurement which is an important part of their activity will also have the benefit of professional outlook with the recommended reorientation. Unlike the departmental system, corporations should not overemphasise their allocative authority and distributive responsibility.

Productivity should be interpreted in a broader perspective so as to include projective aspect of productivity apart from conventional goals and measures of productivity and various standard procedures which may be used for setting and achieving the desired norms. Some illustrations for enhancing productivity and bringing in the concept of conventional productivity have been detailed. Greater attention has been paid to projective productivity.

The expression, Projective Productivity, has been used specially to elaborate on the expensive role of civil supplies corporations as against their maintenance of supplies role. With the inherent support of Food and Civil Supplies departments, these corporations can make the public distribution system not only more effective but also imbibe it with more potent and far reaching social purpose and find ways and means of implementing plans and programmes devised for fulfilling this objective. New experiments in the field are referred to and pointers to futuristic productivity perspectives of civil supplies corporations have been given.

We must realise that the public distribution system in terms of marketing philosophy and practice is a novel experiment. The Nirodh marketing programme, originated in India, was also a first in many ways. That concept has been successfully adopted in many of the Third World countries. Civil Supplies Corporations can make a major contribution towards the success of the public distribution system and extending its frontiers.

PRODUCTIVITY
IS A GENERATIVE SOURCE OF
CONTINUING ACTIVITY.

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Warehousing and Public Distribution

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Warehousing for public distribution system can help the people in remote villages to get the necessities of life and also raise their economic level as products are made available at stable prices to the buyer and remunerative prices to the seller. It can create infrastructure for procurement, storage and distribution of commodities at strategic locations and eliminate hardship to people and save transport cost. The author has highlighted the social, economic and other benefits of having a well organised system of Warehousing-cum-Distribution Centres.

Warehousing

Warehousing is an economic activity. Warehouses serve time and place utility. These provide infrastructure required for physical distribution of goods. The warehouses help in maintaining a regular flow of commodities and even out the supplies despite vagaries of weather and transport bottlenecks. Warehousing requires special skills. There are many advantages of public warehouses over private warehouses.

Warehouse Receipt issued by a licensed warehouse can be negotiated by endorsement and delivery. It may be pledged with a bank as a collateral for drawal of loan. The goods covered by a Warehouse Receipt can be marketed without their physical transfer.

Public Distribution

A well organised and efficient system of public distribution of essential commodities is a *must* for a vast and developing country. This is necessary to ensure that the benefits of new economic programmes filter down to the weaker sections of the society. The present system of public distribution in India needs to be strengthened, revamped and expanded.

It is also necessary to streamline the institutional credit facllities, reorient the marketing systems, eliminate or reduce the need of middlemen and strive for stability in prices to protect the interest of the producers and the consumers.

The geographical expansion of public distribution system involves additional burden on resources. The procurement and selling prices of many commodities are often fixed on social and other considerations and not on cost basis only. Hence, extension of this work is likely to result in higher element of subsidy. It is imperative to find ways and means of reducing the cost of public distribution. One way is to enlarge the scope and area of activities of the public agencies engaged in this task.

Three-Tier System

The scheme of warenousing in the public sector comprises of a three-tier system. The Central Warehousing Corporation operates warehouses at centres of all-India importance. It also provides specialised warehousing facilities. Its associates, the State Warehousing Corporations, run warehouses at State and district level and the cooperatives provide warehousing facilities at the taluka and village levels. Thus a homogeneous and articulate system of warehousing is developing in the country at all levels.

Role of Cooperatives

Development of rural economy is closely linked and dependent on the progress of cooperative movement. The cooperatives embrace a wide range of activities – procurement, credit, marketing, manufacture, processing, storage and distribution of essential commodities. The cooperatives help in pooling of resources, skills and expertise by participation of the people in the programmes and schemes designed to benefit them. These are also playing an important role in the distribution of various commodities in urban areas.

The co-operatives, by virtue of their role and organisation, can be used as a vehicle for increase in productivity and improvement of the rural economy. These have a vital role in the implementation of various rural development programmes.

It may be necessary to enlarge the scope and functions of the cooperatives and reorganise them, where required, to help in streamlining the public distribution system. The co-operatives will have to put up structures for storage, distribution and connected services. There is need for multi-purpose co-operatives at the grass root level as well.

Increase in Productivity by Reduction in Storage Losses

At farm and community level, proper storage facilities are not available. It is estimated that, due to improper storage, there is a loss of around 6.6% of the total production of food-grains in the country. Grading and categorisation is also not properly done. The provision of warehousing facilities by co-operatives in rural areas will help to remove such shortcomings and improve productivity and rural economy by :

- Proper storage and care of commodities, thereby minimising deterioration and loss in storage.
- Serving as focal points to popularise preservation techniques in the area.
- Functioning as demonstration centres to develop code of storage practices for different commodities and help create awareness of proper storage.
- Training farmers and providing facilities for sale and distribution of essential and other commodities.
- Providing assistance, at minimal cost, to the organisation engaged in price support and price control schemes of the Government.
- Creation of infrastructure for procurement, storage and distribution of commodities at strategic locations and elimination of strain and avoidable cost in transport.

Warehouse as Distribution Centre

There are different types of warehouses. The location, size and design of a warehouse depends on the purpose for which the warehouse is established. The warehouses are often utilised for marketing and distribution of essential commodities by various public sector organisations and trade.

Public warehouses play an important role in the distribution of goods of all kinds. These

help the users in reducing their distribution cost and provide them flexibility in organising their marketing strategies. The public warehouses discourage the tendency of hoarding and create confidence in the local public about availability of essential commodities. They also act as catalyst for production, distribution and economic development of the area.

The National Productivity Council, New Delhi, had carried out a study on "Impact of Warehousing on Distribution of Selected Commodities". It concluded :

- Farmers who availed of warehousing facilities retain their surplus for a longer period as compared to non-beneficiary farmers. This helped the farmer to avail higher prices for their produce in the off-season.
- Significant variations in prices were observed in case of pulses and jaggery between the beneficiary and non-beneficiary areas.
- Numbers of stockouts/shortages have been drastically reduced in the area served by warehouses.
- Availability of the fertilizers at the right time in sufficient quantities has a direct bearing on its prices. Farmers in the non-beneficiary areas were relatively at a disadvantageous position as to prices of fertilizers due to poor availability.
- Operation of various Central and State Procurement agencies have been facilitated by services of public warehouses.
- Warehousing facilities have helped in elimination of wholesale points. The requirements for seeds which were earlier fulfilled by the dealers were met partly by stocks kept in warehouses.
- Due to better quality of stocks maintained in the warehouse, many beneficiary farmers have started selling their produce as seeds to gain extra earnings from their produce.
- Depositor farmers and traders due to their continuous inter-action with warehousing staff are aware of many scientific practices for safe storage.
- Farmers in the beneficiary areas were found to be at an advantage as to remunerative prices for their produce and none had to sell his produce under distress.

The above study highlights the distinct role of public warehouses in maintaining the quality of commodities which are highly sensitive to storage environment and distribution of essential commodities. This study also underscores the need for establishment of warehousing-cum-distribution centres.

Location of Warehousing-cum-Distribution Centres

Factors to be considered in locating a Warehousing-cum-Distribution Centre (WCDC) are : (a) population of the area proposed to be covered, (b) distance of the farthest village (c) number of regulated markets around the area, (d) arrivals of main crop, (e) banking facilities, (f) foodgrain production, (g) milling facilities, (h) net surplus of commodities, (i) and type and quantity of essential commodities to be distributed.

The criteria for location of WCDC also depends on : (a) goals to be achieved by stock-piling, distribution, marketing, etc. (b) transportation charges to and from the centre, (c) lead time assigned for building inventory and delivery time, (d) demand distance, (e) operational cost, (f) socio-economic objectives and utility, and (g) strategy of evening out supply and demand as a public purpose.

Size and Design of WCDC

The main factors to be considered while determining the size and lay out of a WCDC are :

- The area and population to be covered by the WCDC.
- Production of main crops, cottage and small scale industry.
- Total arrivals of marketable surpluses in the mandi.
- Quantum of essential commodities required to be distributed.
- Present and projected distribution of agricultural inputs.

The main requirements to be satisfied by a WCDC are :

- Facility to store and handle a variety of commodities and store different types of packages.
- Provide for heavy turnover of the stocks to meet the needs of public distribution.
- Storage of small consignments brought by a large number of individual producers in a manner that facilitates their identification and handling.
- Banking facilities and arrangements in the area.
- Need of a functional office and residence of manager.

Besides the structural requirement for safety and use of local material, as far as possible, the design and specifications of the structures will have to take into account. such as : (a) storage of small packages in racks, (b) isolated compartments for hazardous goods, if any, (c) separate accommodation for non-foodgrains commodities, (d) provision of verandah for drying wet commodities and operational purposes, (e) effective ventilation to provide aeration, (f) moisture proof floor and walls, (g) plinth height to be adequate, based on local rainfall and other conditions, (h) rat-proof doors, etc, (i) seismic-proof foundation and super-structure, and (j) leak-proof roof.

Constraints

The existing organisations, facilities and structures of co-operative societies are not adequate to take up the functions of warehousing and distribution work as envisaged under WCDC scheme. There are a number of constraints which need to be removed and necessary arrangements and facilities made to make a WCDC a success. Many areas/organisations which undertake this work are generally found to be waiting and/or lacking in one or many of the following :

- Availability of adequate funds and organisational capabilities.
- Technical expertise for undertaking large-scale construction programmes.
- Trained personnel in quality assessment.
- Expertise in handling and preservation of various commodities.
- Equipment and chemicals for determination and proper preservation.
- Inspection and stock verification systems and facilities.
- Uniformity in stock accounting procedures.
- Banking and marketing facilities and incidental services.
- Proper coordination amongst the various agencies.
- Marketing, processing and transport facilities and expertise.

National Grid of Rural Godowns

In order to fill up the gap left by major storage agencies like Central Warehousing Corporation, State Warehousing Corporations, Food Corporation of India and Co-operatives, the Department of Rural Reconstruction has taken up a project for establishing a National Grid of Rural Godowns. This scheme envisages creation of a network of rural godowns in States and Union Territories to meet the storage requirements of agricultural produce, particularly of small and marginal farmers, and inputs like seeds and fertilizer. The main objectives of the scheme are :

- To prevent distress sale of foodgrains and other agricultural produce by extending them credit facilities against pledge of stocks stored in the rural godowns.
- To ensure remunerative prices to the farmers by storing their produce in well managed godowns till favourable prices are obtained.
- To reduce quantitative and qualitative losses by providing scientific storage.
- To create additional opportunity for employment in rural areas.

The capacity of the godowns will vary from 200 MT to 1000 MT according to the need. At the state level, the scheme is to be implemented by the Department of Rural Development under the direction of a State-Level Coordination Committee which is to include the representatives

of State Government, State Department of Agriculture, Cooperation and representatives of Nationalised Banks, Cooperative Banks, Food Corporation of India, State Warehousing Corporations, etc. State Goverment may entrust the work of construction and management of rural godowns to Co-operative Societies, Agriculture Produce Market Committees, State Warehousing Corporation or any other such organisation. Necessary training to the managers of the rural godowns appointed by the implementing agencies is to be imparted by SWC/CWC. The rural godowns are to be affiliated to SWC for effective supervision.

Financing of the scheme provides for subsidy and loan. The Central and State Governments are to contribute 25% each as subsidy and the balance 50% is to be raised as loan from banks.

An essential feature of the scheme is the issue of a negotiable Warehouse Receipt (WR) for stocks deposited by the farmers in the rural godowns. The Reserve Bank of India has extended concessions for grant of loan by banks against pledge of W R issued by the management of a rural godown established under this scheme. The scheme also envisages a suitable training programme to the educated rural youth preferably women to groom them as competent managers for rural godowns.

The scheme of rural godwns is designed to oversee the problems of small farmers and help them in marketing of their produce. This scheme provides for many function envisaged for a WCDC. However, there are some operational and other constraints which stand in the way of successful implementation of this programme, a few of which are given below :

- A warehouse of small capacity is not economically viable. The rural godown may not achieve an average annual utilisation of over 50%. This will further inflate cost. Hence, the agency managing rural godowns will have to undertake other connected activities to minimise the financial burden of operating such godowns.
- The procedure of availing credit facilities from banks often distracts farmers for psychological and other reasons from utilising the facility. Simplification of this system is necessary and the rate of interest on loan needs to be reduced further.
- Selection of sites for rural godowns having regard to the relevant factors. Holding power of the farmers in the area and incentive(s) to cover a part of the additional expenditure on carrying charges.
- The systems of market intelligence and marketing of produce after discharge of WR from the bank, where required, need to be streamlined and rationalised.
- Local customs may work against the change. A lot of extension and social work is required to be done to adopt the new system.

Social Benefits

The establishment of WCDCs as an integral part of rural development will transform, the socio-economic conditions of the people in the area in course of time. The social benefits that would accrue by having such centres in properly selected areas are many. These will improve productivity in relevant fields of activity. The following are the benefits.

- Creation of psychological satisfaction and confidence amongst the local people. Affording a better opportunity to the public of exercising effective supervision over the public distribution system.
- The existence of well-designed and managed godowns near the producers will extend the facility of proper storage of foodgrains and other produce of the area.
- The presence of well-stocked warehouse nearer to consumers will tend to discourage hoarding and other anti-social activities.
- Provide impetus to the cooperative movement and help in decentralisation and democratisation of storage and distribution activities, by creating the

Traders :

- Will obtain loan from banks easily.
- Will benefit from grade and specification notified in Warehouse Receipt and avoid verification of quality and transportation of goods to the market place.
- Will get services of marketing centres for purchases.

The activities of procurement, warehousing, preservation, agricultural finance, accounting and marketing require special knowledge and experience. Therefore, it is essential that well-qualified and trained persons are engaged for this work. The successful implementation of the scheme depends, *inter alia*, on the selection and involvement of all concerned with the programme. Governments, Scheduled Banks, public and cooperative agencies can jointly provide necessary training, establishment of Warehousing-cum-Distribution Centres and oversee their functioning to ensure that the goals set for the same are achieved in a phased manner and at a reasonably fast pace too.

Conclusion

The social, economic and other benefits of having a well-organised system of WCD Centres at rural and community level with proper linkages with procurement and distribution organisation at the district and metropolitan town levels have been highlighted in the foregoing paragraphs. This system will add to efficiency, productivity and real income of the weaker sections of society.

The Central Warehousing Corporation is at present operating 348 warehouses having a total capacity of 43.19 lakh tonnes The State Warehousing Corporations are running 1050 warehouses with a total capacity of about 50 lakh tonnes. A number of Central Warehouses, particularly at the metropolitan towns, are being used for public distribution of foodgrains and other essential commodities. Some warehouses are also utilised as procurement points by the various public agencies.

The establishment of WCDCs needs to be given a fair trial, with such modifications as will suit local conditions. It will help to ameliorate the economic condition of weaker sections of the society, in the rural areas and also increase the efficiency and productivity in procurement and distribution of essential commodities. The suggestions made in this paper warrant due consideration by all those concerned with the public distribution system and development of rural economy.

This paper is based mainly on a Study that the Central Warehousing Corporation had carried out some years ago for the Government of Assam for establishment of Warehousing-cum-Distribution Centres at *Gaon Panchyat* level The author was a member of this Study Team.

If A equals success, the formula is A=X+Y+Z. X is work, Y is play, Z is keeping your mouth shut.

—Albert Einstein

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Productivity at the Retail Point

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The Fair Price Shop is the most important link in the entire chain of public distribution system. The cost of institutional retailing in essential commodities is between 2.38 to 3% of the sales turnover. Potential co-operative institutions are discouraged to take up this service because of number of constraints inherent in the operation of Fair Price Shops. However, the cooperative sector is expected to play a greater role in retail distribution of consumer items in the future.

According to the latest estimates there are, in all, about 300,000 licenced retail outlets. About 230,000 of these fair price shops are in the private sector and about 72,000 in the co-operative sector. The number of these licenced Fair Price Shops is expected to grow upto 350,000 by the terminal year of the current Five-Year-Plan. About 80% of the Fair Price Shops are located in the urban areas. The main thrust, in the coming years, would be directed to the rural areas where such new retail outlets are expected to be setup This would be done mostly with the help of the co-operative sector. Thus, the existing share of about 24% of the total number of FPS in the co-operative sector is likely to increase upto 35%. In other words, almost one third of the Fair Price Shops, within the public distribution system, are expected to be managed by the co-operatives by the end of the Sixth Five-Year-Plan.

Co-operative retailing has made great strides in the recent past. The annual retail sales turnover of the distributive co-operatives has grown from Rs. 1250 crores in 1977-78, to Rs. 1500 crores in 1978-79, and to about Rs. 1600 crores in 1979-80. It is expected to develop to Rs. 3600 crores by the terminal year of the Sixth Five-Year Plan, 1984-85. A sizeable share of the estimated retail trade of Rs. 3600 crores by co-operatives, in the urban areas as well as in rural countryside, is expected to be for the controlled commodities sold through licenced fair price shops under the Public Distribution System.

It could, therefore, be assumed that the co-operative sector is expected to play an increas-

ingly larger role, so far as retailing in public distribution is concerned. To obtain an overall idea of the Public Distribution System's retail points, we could examine, in depth, the retail operations of Fair Price Shops run by the co-operatives.

Cost of Retailing

On the basis of sample data collected by us in the NCCF for a number of studies of the co-operative retail outlets, the average annual sales turnover and the operating costs, in % to sales, of an outlet, operating a Fair Price Shop, work out as follows :

S. No.	State/Towns	Average annual Sales Turnover	Operating Costs in % to sales
1.	Uttar Pradesh as a whole	Rs. 2.80 lakhs	3.16%
2.	Kanpur	Rs. 2.75 ,,	2.38%
3.	Lucknow	Rs. 2.92 ,,	3.14%
4.	Ghaziabad	Rs. 2.47 ,,	2.98%
5.	Tamil Nadu	Rs. 2.08 ,,	2.66%
6.	Maharashtra	Rs. 5.66 ,,	3.98%
7.	Orissa	Rs. 1.66 ,,	5.36%

A good portion of the sales-turnover of these retail outlets is for rationed goods, except in the case of Maharashtra.

In two of the studies carried out earlier by the NCCF on small-sized cooperative retail outlets, one for the urban India as a whole and the other for the rural countryside in Tamil Nadu, the operating costs, in % to sales, work out as follows :

	Av. Annual Sales Turnover	*Operating Costs in % to sales*
1. Small retail outlets (urban India)	Rs. 1.40 lakhs	5.30%
2. Small outlets (Rural Tamil Nadu)	Rs. 1.06 lakhs	2.95%

About 25% of the urban outlets sales, were for controlled commodities and the remaining 75% for non-controlled commodities. Their operating costs at 5.30% to sales were covered with the help of higher gross margins generated by sales of non-controlled goods.

The operating costs at 2.95% to sales incurred by rural outlets in Tamil Nadu do not include the interest costs. If this is added, the operating costs would go beyond 3%.

From the above we may see that the annual sales turnover of a retail outlet running an FPS ranges from a minimum of Rs. 1.66 lakhs to Rs. 5.66 lakhs. About *79 67%* of retail outlet have annual sales turnover of upto Rs. 3 lakhs.

The operating costs in % to sales of these retail outlets range from 2.38% to 5.36%. The operating costs in the case of *77.96%* stores is above 2.50% and *68.64%* of outlets above 3% to sales.

The purpose of the above presentation is to establish the point that the cost of institutional retailing of essential commodities, even if these be rationed goods, comes to a minimum of 2.38% upward to sales. About 70% of the retail outlets incur operating costs at 3% or more than 3% to their sales turnover.

Gross Margins

As against this, let us examine the amount of income generated by these retail-units through the ration-goods sales.

On the basis of a random survey, we assume that a ration-card holds good, on an average, for 6.75 units of rationed goods. Accordingly, based on the Delhi prices, the make-up (profit) in % to cost-price and gross-margin (profit) in % to selling-price would work out as follows :

Item	Qty. for 6.75 units (15 days)	C. P.	S. P.	Profit	Mark-up % to C P.	Gross Margin % to S P.
	Kg.	Rs.	Rs.	Rs.		
Wheat/ Atta	33.75	48.97	50.28	1.31	2.67%	2.60%
Rice	13.50	27.28	27.81	0.53	1.94%	1.90%
Sugar	3.03	10.99	11.06	0.07	0.64%	0.63%
Maida	6.75	14.18	14.51	0.33	2.33%	2.27%
Suji	6.75	13.77	14 10	0.33	2.39%	2 34%
	63.78	115.19	117.76	2 57	2.23%	2.18%

It is seen that gross-margin in % to sales (at SP) works out to 2.18%. If items with lower gross margins like edible oils are added to the above computations, the overall gross-margin in % to sales (at SP) is likely to further come down. We have earlier tried to establish that the cost of retailing works out to a minimum of 2.38% upward and in above 70% of the cases the retailing cost works out to 3% and above.

Let us also take into account income from the empties and 'non-operating' expenses. Based on the quantum of rations issued for an average of 6.75 units per ration-card, and the consequent number of empties available, the income from empties in per cent to selling price for ration per ration card, other non-operating expenses, and tota l income would work out as follows :

(a)	Income from empties (in % to SP) @ Rs. 6.10 persugar bag and Rs. 3.80 for other empties.	2.09%
(b)	*Less* Transport Costs @ Rs. 2.50 (including weighment, unloading and loading charges) per qtl.	1.35%
(c)	Net income from empties (in % to SP)	0.74%
(d)	*Plus* Gross Margin (% to Sales)	2.18%
(e)	Total Income (% to SP)	2.92%

Handling loss allowed, at best, would cover loss in transit and stock shortages in retailing and storage in the shop.

From the above we can draw our conclusions. The income from the sale of controlled goods would barely cover the operating costs of 3% and above incurred by about 70% of the institutional retail outlets.

Obviously, such a situation would not suit the institutional retail outlets. It would suit much less to retail outlets in the private sector.

Uneconomic trading margins would perhaps be one of the biggest factors responsible for lack of enthusiasm on the part of viable cooperatives institutions in coming out to manage the Fair Price Shops within the public distribution network. A good illustration in support of this assertion, would be that of Super Bazar in New Delhi. With more than sixty branches, a large number of them serving the economically weaker sections, the Delhi Super Bazar has not operated a single Fair Price Shop during its life span of over sixteen years. The capital's other large co-operative stores which do operate Fair Price Shops, have often asserted that their operations in this area of activity are uneconomic.

Similar reliable data on Fair Price Shops operating in the private sector by individual owners could not be gathered. Therefore, the level of their economic trading operations could not be assessed with a fair degree of reliability.

Some Constraints

The Fair Price Shops, both in the private as well as the co-operative sector, seem to be faced with a number of constraints that adversely affect their efficiency and the consequent operating results. Some of these constraints are as follows :

(i) There is a general complaint that the supply arrangements are not good. Goods are not supplied on time. The shopowners are, more often than not, made to visit the godowns more than once before supplies are effected.

(ii) Incidence of non-supply of one item or the other is not uncommon. Shop owners do not necessarily receive supply of all idented goods at one time. This results in increased costs and inconvenience to consumers.

(iii) Since payments for goods are collected in advance, finances of the shops get blocked in the event of partial supplies.

(iv) Quite often the quality of goods supplied is not sasfactory. It is, in fact poor.

(v) Delay in issue of permits by the concerned authorities, it is claimed, is a common occurrance.

(vi) Allegations are frequently made about demands for payment under the table by the Suppliers.

(vii) Since institutional shops are unable to comply with such demands, they are given lower priority in supply of goods.

(viii) Incidence of supply of short-weight bags on the one hand and accountability of stocks to the civil supplies department on the other is creating difficult situations for the fair-price shop operators.

(ix) In some cases, shop-owners complain of the shoddy treatment meted out to them by the suppliers and other related agencies.

Non-supply of goods on time is probably a factor that in the long run proves advantageous to the shop-owners at the cost of the consumer. This helps in increasing the incidence of non-drawl or partial drawl of goods by a fairly large section of consumers. Such quantities can be channelled out to open market through a variety of devious means. Gap between the issue price of a controlled item and its market price, proves a good incentive to the shop owners to devise all ingenious means they could think of.

The problems faced by consumers will not be dissimilar to the ones listed out for shop-owners. These will perhaps, be sharper in severity.

The authorities who actually deal with the business of public distribution system day in and day out would, of course, know of the extent and nature of such problems. With all the experience and expertise at their command they would perhaps be trying to sort out these problems. A random consumer survey should help us in guaging the degree of success such official efforts have been able to achieve.

FPS and the Public Institutions

It would, perhaps, improve matters if development of Fair Price Shops by public agencies, like co-operatives, residents' welfare associations, gram panchayats, consumer welfare institutions and the like, are encouraged. Proliferation of Fair Price Shops within the "public welfare sector" should help minimise malpractices prevailing among the privately-owned outlets. FPS run by public institutions would be subject to a better discipline. Their larger presence should help in exercising a healthy influence on privately owned Fair Price Shops.

Fair Price Shops, be they owned by individuals or public agencies, should be answerable to the collective membership of ration card-holders attached to a fair price shop. Residents welfare associations, consumer forums, etc. could play some role in exercising their influence toward better working of these retail units.

In order to improve the overall performance of retail outlets within the public distribution system the following few steps could be considered :

i) As discussed earlier, the gross margins for various items allowed to the FPS should be rationalised to enable the shops to run on economically viable basis.

ii) A range of assortment of goods with higher margins should be allowed to be added to the ration-shop operation. This will help the shops to improve their viability.

iii) While supply-support for the core commodities like wheat, rice, sugar, etc., should be hundred per cent, as is being done now, in the case of other higher margin commodities, to be added to the existing range of core commodities, official agencies should help the licenced retail outlets in obtaining supplies on favourable rates and terms direct from the marketing channels. This should make their merchandise prices highly competitive.

(iv) A degree of standardisation on the number of units attached to a retail outlet should be developed. This will help in improving the general performance of the system. This should also help in planning and controlling, in regulating supplies and in minimising the extent of malpractices.

(v) A beginning could also be made to standardise shop premises, shop lay-out, selling equipment and man-power for these retail outlets. This will help in efficient running of the fair price shops.

(vi) Because of high rental costs for shops and low margins on rationed goods, many a fair-price shop operator is inclined to switch over to other more remmunerative lines of business. In view of this, local authorities should offer shops on concessional rent to such public agencies that may come forward to manage fair price shops.

(vii) Assistance of collective membership of ration-card-holders, residents welfare associations, consumer forums, etc. in monitoring the operations of these outlets may be obtained.

The public distribution system retail outlet is the point with which the consuming public is in constant contact. FPS symbolises the public distribution system. The efficiency level of its operation, the degree of satisfactory service that it renders to the consuming public, and the resultant image that it develops, will evaluate the overall operations of the public distribution in the public mind. It will also evaluate the efficiency level of the supply-supporting organisations like the FCI or the Civil Supplies departments.

It is, therefore, essential that we pay a closer attention to the PDS retail outlet.

. . . In order that people may be happy in their work, these three things are needed. They must be fit for it ; they must not do too much to it ; and they must have a sense of success in it.

John Ruskin

Productivity
1982, XXIII, 2, 219-221

EXECUTIVE READINGS

Transfer of Technology Among Developing Countries

T. N. Chaturvedi, Gitanjali Publishing House, New Delhi, 1982, pp. i-xiii and 102, Price Rs. 60.00

Reviewed by ; S. C. Vajpeyi
Development Commissioner Delhi

In their desire to industrialise fast to modernise their economies and to improve the levels of living of their people, the developing countries have been importing technology from the advanced countries. To start with, the developing countries had hardly any experience in this field and faced many problems with regard to the suitability of the imported technology. There was also lack of proper appreciation in the developed countries about the requirements of developing countries. In many cases, the transfer of technology was linked with the aid programmes thereby restricting the choice of the recipient countries. Unfortunately there has been a tendency of growing technological dependence of the developing countries on the advanced countries.

Inspite of all these problems, some developing countries like India have managed over the years to diversify their industrial base and develop indigenous technology in many areas suitable to their requirements. In this small but well documented book, the author brings out the immense scope for transfer of technology among developing countries and the need for strengthening mutual cooperation in this vital field. The author has given some useful suggestions for strengthening this cooperation.

The various aspects of the subject have been discussed under the following headings :

Modes of Technology Transfer; Initial Economic situation in Developing Countries and Need for Technology Transfer; Transfer of Technology from Developed Nations and Issues Involved; Benefits of Technology Transfer Among Developing Nations; India's Approach to Industrialization and Policy relating to Import of Technology; India's Capabilities for Role in Export of Technology to Developing Countries; Suggestions for Effective Transfer of Technology Among Developing Countries and Need for a Promotional Agency.

The exposition of the issues involved in the transfer of technology and suggestions for strengthening cooperation among developing countries in this regard, show wide perspective and deep insights into the subject by the author.

The book will be of value both to administrators and others in the Third World who are concerned with this important subject.

Strategy for Industrial Development in the 80s

C. Rangarajan, Rakesh Khurana, Anand P. Gupta H. . Pathak, Charan D. Wadhva,

New Delhi : Oxford & IBH Publishing Co., p. 242 Price Rs. 60

Reviewed by : K. C. Dhanda
N ew Delhi

Strictly speaking it is not a book but a mere collection of

papers by five professors at I.I.M. Ahmedabad. Had any one of the authors written a detailed introduction theorising about strategy and linking all the five papers with the theory the utility of the papers would have certainly increased. To reproduce the papers without any effort to link them leaves a reader dissatisfied.

As discusssed below the general level of the papers is intensely mediocre. Prof. Rangarajan's paper is a fairly good analysis of our industrial scene since independence. He has correctly summed up that industrial growth in the past decade has come up against both demand and supply constraints. According to him sharp fluctuations in agriculture outputs and slow rate of growth in public savings and therefore public investments have inhibited the demand for industrial consumption goods and capital goods. However in prescribing remedial steps he has concentrated on sustained growth in agriculture and a high consumption rate and completely ignored the role of export promotion and import substitution for which our country is most suited because of lower wages, availability of technical skills and raw materials and comparatively pollution free atmosphere.

Prof. Rakesh Khurana's paper on Policy towards large business is a well documented attempt on the growth of big business and the steps that have been taken by Government to prevent concentration of wealth in a few big houses. He has discussed in detail the impact of licensing and M.R.T.P. Act and has tried to establish that there has been further concentration of wealth in the top 10 houses from amongst M.R.T.P. undertakings themselves and also core industries have not done so well. But Prof. Khurana has failed to indicate any clear future trend and neither has he suggested any process by which to prevent the concentration of wealth in a few hands.

Prof. H. N. Pathak's paper on "Small Scale Industries in this Decade" suffers from a serious defect in so far that it is based on 1968 A.S.I. data which for purposes of predicting future trends are both inadequate and outdated. Also this paper raises a number of questions without answering any of them. For instance he observes that technician-entrepreneur who has been the pet person for promotional policies till recently is found to have certain limitations in managing industry but he fails to give a clear cut reply as to who should replace the technician and how. The Second point he makes is that small scale industry has failed to generate employment for fear of unions but has no solution of this problem. In fact this paper creates more confusion than it clears.

Prof. Charan D. Wadhva's paper on "Export Development Policies and Plans" is less academic but more practical. He clearly states that the world trading environment for developing countries like India has become even more gloomy now as a result of deepening crisis of stagflation in most of the developed countries. According to him it is likely to be further worsened if the OPEC decides to carry out fresh increases in price of oil. Internally the re-emergence of supply bottlenecks in terms of the availability of power, coal, diesel, pig iron steel, cement etc. and the political uncertainty have already threatened the erosion of industrial output and exports of non-traditional products. Additional constraining factors in promotion of exports are inability of our products to compete at prevailing international prices in foreign markets and lower profitability of sales in exports as compared to domestic sales. This is the only paper which clearly spells out major elements of the National Export Strategy in 1980s wherein he explicitly states that the country need not have exports at any cost.

Prof. Anand P. Gupta's paper on "Fiscal Policy for Industrial Development" is perhaps the weakest paper out of the whole mediocre lot. The author has devoted more attention to tax incentives and their impact on industrial investment as if industrial investment is the only goal of tax incentives.

To sum up the title of the book "Strategy for Industrial Development in 80s: Challenges & Opportunities" promises too much and the promise has not been fulfilled. All the five papers are nothing but a review of the three decades of industrial growth and the role of the Government in dealing with the various problems of industry. There is hardly any worthwhile mention of the directions about the future. The claim that all the five

papers are futuristic is not borne out by the contents. Also it seems that all the authors are of the view that the only challenge that may be faced by the industry in 80s is the attitude of the Government towards industry. Strangely enough important challenges such as energy crisis, population, explosion, technologies revolution, worsening industrial relations, galloping inflation coupled with stagflation, environmental pollution and corruption in public life have been completely ignored.

Crop Production in Salt Affected Soils

K. S. Dargan, O. P. Singh and I. C. Gupta, Central Soil Salinity Research Institute, Karnal

New Delhi; Oxford & IBH Publishing Co. 1982, pp. 276
Price : Rs. 72

Reviewed by P. K. Chibber, Senior Soil Scientist, I. A. R. I. New Delhi

The book covers 258 pages divided into four parts and 14 chapters. Very useful and valuable information mostly from Indian work, has been compiled and discussed in detail. It will serve as a very useful reference book for the research scientists and post-graduate students. However, it raises some doubts when one considers its usefulness to the extension specialists, field workers and progressive farmers as claimed by the authors, because many chapters are loaded with mathematical models and equations which are beyond the perception of a non-scientist like a field worker or a progressive farmer.

It appears that enough care has not been taken at the proof-reading and vetting stages, as several printing and editorial mistakes appear in the text.

Further, from a meagre data available, conclusions have been drawn having a tinge of overstatement and too much generalisation.

The quality of photoprints is very poor and they do not serve the purpose of visual illustrations for which they are included in the book. Reproduction might have improved had they been printed on glazed paper.

Part I deals with Introduction, Historical matter and characteristics of saline (alkal) soils and runs to 40 pages. Historical portion is very brief. It could be stretched further to cover 2-3 pages more. No reference has been made to an important "Seminar on Salinity and Alkali Soil Problems" held at IARI in 1962, which had given birth to the present Central Soil Salinity Research Institute.

Part II deals with Reclamation and Management problems and runs through pages 40-194, spread over 7 chapters. Here very valueable scientific information has been compiled. There are several mathematical models and equations which may be useful to a scientist, but an extension specialist or a farmer would be least interested in them. It would have been much better if at the end of Part II, one chapter were added summarising all the reclamation and management problems in a proper sequence for this category of readers.

Part III deals with crop Production Technology with particular reference to salt affected soils. This is a very useful addition to the book for all categories of readers.

Part IV deals with the economics of reclamation. Although, the figures may not be valid today or tommorrow, they clearly indicate whether a feasible reclamation project will be profitable or not.

No doubt, the book contains lot of useful information, there is scope to improve it further. Part II dealing with Reclamation and management problems can be suitably revised to make it more intellegible to the extension workers and progressive farmers.

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1982, XXIII, 2, 223-228

TIME MANAGEMENT

A Select Bibliography

The British Council Library, New Delhi

Agents See Time Management as Key to Survival

Anonymous

National Underwriter (Life/Health) v86n27A 24,55 July 5, 1982

A serious erosion of income faces insurance agents who do not effectively utilize their time, according to Edward M. E. Healey and James R. Maddux, speaking on time management at the annual meeting of the Million Dollar Round Table in Atlanta. For survival, agents must be more productive through better time management to increase their incomes. Changes in insurance products, estate tax laws, and the economy require alterations in agents' plans if business goals are to be achieved. At one time, simply selling larger policies compensated for changes in policies and cuts in premiums made by insurance companies. This is no longer sufficient with some of the newer products; commissions can be dramatically reduced for an equal amount of premiums that the insurance companies receive. The following suggestions can help agents utilize their time more efficiently: 1. delegate extraneous activities to others, 2. simplify business details, 3. allocate extra time, 4. purchase and implement the Million Dollar Round Table's "Time Stretcher" module, and 5. regularly review time efficiency efforts. To further enhance productivity, agents should schedule one hour of uninterrupted quiet time during which they may reflect on important activities or develop any thoughts that may surface.

Descriptors : Insurance agents & brokers ; Time management; Productivity; Insurance; Sales

Managers Can Avoid Wasting Time

Ashkenas, Ronald N. ; Schaffer, Robert H.

Harvard Business Review v60n3 98-104 May/June 1982

Although much attention has been paid to improving workers' productivity, the problem of managerial time wasting remains unsolved. Most cures for this problem focus on the symptoms-long meetings, unnecessary telephone calls, and tasks which should be delegated. Underlying these symptoms is anxiety that comes with having to perform innovative activities. The 3 requirements of executives'jobs are : organizing day-to-day activities, improving performance under pressure, and getting subordinates to be more productive. Because these requirements cause so much anxiety, managers retreat to performing more routine tasks that they already know how to do. No matter how hard busy managers try to change their work patterns, anxieties will drive them back to time-wasting activities. The following critical ingredients make work more meaningful : 1. The need is obvious, urgent and compelling. 2. Accountability is clear. 3. The result of the action is predictable. 4. Feedback is immediate. Unfortunately, managers' jobs often have a minimum of these characteristics. A strategy is recommended for infusing zest into anxiety-provoking job requirements, beginning with breaking jobs into short projects and defining goals more effectively. References.

Descriptors : Organizational behavior ; Managers; Anxieties; Time management; Productivity

How the Boys in the Office Mishandle Time

Parker, Susan T.

Iron Age v225n7 44,46 Mar 1, 1982

If US companies want to improve their productivity and profits, they must teach time management to their white-collar workers. However, white-collar workers first must examine the ways in which they waste or mismanage time. Business meetings are often worthless in terms of what they attempt to do, and they often do not start on time. Long lunch hours and excessive use of business phones for personal use are also part of the problem. The poor time manager is one who has to stay late at the office each night and one who lacks the ability to manage people. The effective time managers are ones who are well-organized and who work against the clock, even when they are not under deadline. They know how to handle people and are effective at delegating authority. They establish priorities for themselves and they are good problem-solvers and planners.

Descriptors : White collar workers : Productivity; Problems; Executives; Time management

Improving Managerial Productivity

Brooks, Julie K.

Computerworld v15n47 In Depth 5-10 Nov. 23, 1981

The current focus on productivity has made managers more aware of their performance levels, both in their professional and personal lives. An individual manager can improve his own productivity and help in improving the productivity of his working group, organization, and company. Some tools for accomplishing this include : 1. time management, 2. communication tools and reports, 3. productivity awareness programs, 4. group interaction sessions, and 5. measurement and tracking programs. Time management is the key for controlling a daily work schedule to meet both business and personal objectives, while communication tools and reports are used to exchange information in organizations and working groups. Productivity awareness programs give managers a background on how to improve their performance. Group interaction sessions are helpful in improving communication and defining units of measure for the working group. Measurement and tracking programs can define improvements in terms understandable to execute management. Tables.

Descriptors : Managers; Productivity; Improvements; Time management; Productivity measurement; Data processing

How to Improve Your "Timing"

Hurston, Clifford J., Jr.

Management World v10n8 17-18, 44 Aug. 1981

Using time effectively is one of the most important skills a manager can possess. Improved time management increases productivity. A manager can help himself analyze his use of time and improve overall performance and productivity. One method of analysis involves keeping a diary of activities with the goal of answering 3 diagnostic questions; 1. What am I doing that really does not need to be done at all ? 2. Which of the activities in my time log could be handled by someone else ? 3. What do I do that wastes the time of others ? Before compiling the diary, a manager should review his job description to help recognize priorities and work objectives. Formal and informal time management studies indicate that managers waste valuable time because of unexpected visitors, customers, fellow employees, telephone interruptions, lack of organization and planning, and socializing during business hours. Smart managers are able to squeeze more minutes out of every hour by planning activities in advance, using the mail and telephone wisely, and keeping track of how long they engange in face-to-face conversation. They master time by mastering themselves.

Descriptors : Time management; Skills; Managers; Supervisors; Productivity; Improvements

'RO Method' Tailored to Fit Programmer Needs

Toth, K.

Computerworld v15n13 SR/51-SR/52 Mar 30, 1981

The RO (results-oriented) method will improve programmer productivity. To implement it, the programmer, or manager, starts each day by writing down precise, specific tasks to be accomplished by the end of the working day. At the end of the day, the ones finished are circled; the more circled, the better an RO day it has been. Managers, or programmers, can easily judge the quality of their performance for that day. A programmer using the RO method who can accomplish most of the listed tasks daily is utilizing RO well. The main reason that the concept works so well is that it introduces order into the working day of the user Unless there is focus in the work process, an individual can get easily sidetracked by the intellectual nature of the programming task. RO introduces mental discipline and draws attention to particular tasks that are important to reaching an ultimate goal.

Descriptors : Results; Methods; Planning; Time management; Productivity; Computer programming

Start Right, End Right

Douglass, Merrill E.; Douglass, Donna N.

Personnel Administrator v25n9 20 Sep. 1980

Getting a good, productive start can result in a successful, productive day. There are several things which aid in being a successful early starter : 1. Be prepared by drawing up a plan for each day and focusing on what is to be accomplished. Development a plan for each day, and schedule the activities which are most important for tomorrow. Lay out things that are needed the night before, and pull files or other material before leaving the office the night before. 2. Exercise regularly, rest properly, and eat an adequate diet. 3. Concentrate thoughts in the early morning. 4. Examine the first hour of the day at work. 5. Do not wait until deadlines pile up. 6. Clarify objectives for each day, and set worthwhile goals. Starting early can give an individual a psychological edge, a head start, and perhaps more luck. People who begin early seem to make things happen right more often.

Descriptors : Time Management; Productivity

Improving Administrative Productivity

Buetow, C. P.

Cost & Mgmt (Canada) v54n3 42-45 May/June 1980

The traditional method of tackling administrative efficiency has been to subject the organization to systems analysis which seldom makes any significant improvements in productivity within the administrative departments. In the last decade, much emphasis has been placed on computerized operations or on the use of more effective equipment, rather than on the more effective use of people. However, the increase in efficiency which should result does not always materialize. Productivity should be reviewed on a more continuing basis, as management is often unaware of the marked difference between the assumed and actual attendance hours. Organizations are often staffed for peaks, but this can reduce efficiency. Also, tasks are frequently not allocated effectively. The solution to increased efficiency is usually greater awareness of the problem. Work sampling can be used to determine what percentage of time a person is working at a desk, using the telephone, accessing files, or walking between work stations. Above all, management should set a good example for his department.

Descriptors : Administrative; Productivity; Efficiency; Time management; Guidelines

Five Ways to Improve Your Personal Productivity

Pollock, Ted

Production v85n6 123-125 June 1980

The key to improving personal productivity is not to work harder, but to work more intelligently. Simple psychology can be used to organize work efficiently. Unpleasant jobs can be done first. Difficult assignments can be put aside and picked up later. Work should be in sight so that it will not be forgotten. Decisions can be made quickly so that the job is out of the way. Work can be simplified by : 1. picking a job problem, 2. breaking it down to its details, 3. questioning each detail, 4. developing a better way, and 5. applying the improvement. To create more time, work can be organized around 'core' activities. Some work can be planned ahead by dividing the future into its logical compartments and placing appropriate tasks into each one. To avoid being part of the problem, it is necessary to : 1. follow through, 2. give a little, 3. concentrate on one problem at a time, 4. avoid broadcasting the problem, and 5. take the impasse in stride.

Descriptors : Productivity; Improvements; Time management; Efficiency; Guidelines

It Pays to Be on Time

Rhodes, Lucien

Inc. 58-64 June 1980

Simplicity Engineering, a manufacturer of heavy-duty vibratory equipment, was suffering from slumping sales when Jim Parsons took over as general manager in 1975. Parsons initially revamped the sales force, but that did not solve the company's problems. An outside consultant was hired, and it was discovered that Simplicity was not on time. Quotation turnaround time, which should have been no more than 5 days, was averaging 15 days. Parsons and the consultant set out to correct this problem. When a bid arrived from a salesman, it had to be processed through 3 departments; machine sales, engineering, and cost estimating. Salesmen were trained to submit complete bid packages, reducing the processing time of returning the package for omitted or incorrect information. The machine sales department improved processing of bid packages for engineering, and recordkeeping was improved. Engineering became more thorough in its evaluations of packages for errors and omissions, and records were organized to reduce work required for orders which were similar in nature. Cost estimating had been performing well all along and needed little improvement. Preparing the departments and sales force cut the bid turnaround time down to 5 days, and was responsible for Simplicity's 25% sales gains in 1978 and 1979. A coordinated system-type effort was the answer to Simplicity's timing problems.

Descriptors : Productivity; Improvements; Scheduling; Timing; Time management; Case studies; Late

Time Demystified

Arnold, Merrell

Data Management v17n8 32-34 Aug. 1979

The lack of a clear definition of what time is results in numerous inefficient actions. Time is a system of reference by which the occurance and sequence of activities and events can be understood and described. Therefore, time cannot be managed, controlled, saved, killed, used, or abused. It can be observed and compared with other concepts such as quantity of results, amount of activity, the aging process, or any changes in state of being. Activity, inefficiency, and effectiveness are three concepts related to productivity. Managing time consists of learning and practicing the techniques for organizing and acting on the tasks that make up individual lives. Prioritizing of activities consists of evaluating courses of action and performing those with the highest potential payoff. The manager should delegate any task can be done by someone else. Meetings and conferences that are poorly planned and conducted are major time wasters.

Descriptors : Managers; Time management; Delegation of authority; Productivity; Efficiency

The Incredible Time Machines

Olson, Kirtland H.

Minicomputer News v5n12 23-24 June 7, 1979

Microcomputers can help entrepreneurs increase their ability to do more in less time. In big businesses 20% of the jobs bring in 80% of the dollars, so it is important to get started right away wih the most useful pieces of equipment. The following ideas should be kept in mind in order to benefit the most from microcomputer assistance : 1. Databases should be kept small to minimize the problems of maintaining the data. 2. One should conserve the time of the thinkers by reducing their doing time and making their thinking time more productive. 3. Repetitive problems should be solved to get multiple dividends of free time. 4. Partial solutions should be used to speed up most of the job. 5. The computer should be used to arrange the output for people to use. Software for micros can be bought but it is often of poor quality. For this reason it is best that the user learn to write his own programs.

Descriptors : Microcomputers; Managers; Executives; Time management; Efficiency; Productivity; Improvements; Personal; Computers; Applications

Identifying the Factors Which Slow Down Your Work Production

Rough Notes V122n2 34-36 FEB. 1979

Employees and managers have found that while a stack of work may be easily handled on one day, a comparable amount of work may seem overwhelming or more difficult on another day. It may not be the situation itself, but the way reactions are made to the situation that cause slow downs in work. Allowing negative factors to drain energy impairs efficiency. The key to solving this problem is to identify the negative factors and to either eliminate them or devise a shield to protect against them. Louis B. Lundborg, San Fransisco's retired chairman of the Bank of America, states that in order to provide a shield against a particular negative factor, an approach should have 3 essential ingredients : 1. Do not accept an assignment that a subordinate can handle. 2. Make it clear that the subordinate will take the assignment and complete it. 3. Even with difficult assignments, let the subordinate make recommendations or solutions. The key is to delegate, and the payoffs comes in develop-

ing more strength, initiative, and competenca throughout the ganization.

Descriptors : Time management : Managers : Subordinates; Delegation of authority; Management development; Productivity; Efficiency.

The Difficulties of Managing Time

Shirk, Minor S.

The office v89n1 124-126 January 1979

No one seems to have the time to do everything that he wants to in the time available to him. The power of interruption is an important factor of which to be aware in time management. Developing a plan to minimize, control, or eliminate interruptions is a key to successful time management, and planning a period of unavailability is one way in which to deal with the problem. There are a number of measures that can be taken to avoid interruptions. One way is to avoid drop-in visitors. and another is to allow someone to screen telephone calls. One way to manage time is to measure your effectiveness as a professional. Set a goal and allow a set length of time in which to accomplish that goal. Strive to accomplish more in the time allocated. Attemptirg too much at once is a prime factor in wasting time. Never make unrealistic estimates of the time needed to accomplish a task. Another major time waster is the inability to say "No." The individual who can successfully manage his time is generally the one who can successfully manage his life.

Descriptors : Time utilization: Time management; Guidelines; Productivity; Efficiency

Strictly Personal

Pollock, Ted

Production v82n5 103, 105 Nov. 1978

Most of us don't use nearly all of our potential. No matter how you work now and how efficient you are, you can improve the caliber and amount of work you turn out by simplifying it. There are obstacles to be overcome, including : 1. resistance to change, 2. resentment of criticism, 3. Insecurity due to the fear of simplification, and 4. complacency about the way you work now. You must be aware of these reservations and recognize what is holding you back. Once you have the proper attitude, you can simplify your work by : 1. selecting a job problem that requires a good deal of time and energy and that your recognize is slowing up your work, 2. breaking it down to its component parts, so they can be analyzed, and 3. questioning each detail. People under your supervision will produce better if : 1. you consider their feelings, 2. they are judged by results, not by pat rules. 3. they have a sense of direction-you should set goals, and 4. you demonstrate high expectations for them. You can waste time by investing in matters that do not contribute to the end achievement, by failure to discipline yourself, and failing to accomplish what you set out to do.

Descriptors : SELF HELP (PEOPLE); SUPERVISORS; Time utilization; Supervison; Productivity; Improvements; Creativity

Is Your Time Well Organized ?

Agency Sales Magazine v8n5 16 May 1978

The old cliche, "Time is money", is particularly true where salespeople are concerned. The day's results are determined by the number of contacts made among customers and prospects. A checklist of 15 items from "Time Management Seminars" is presented. For better use of time; : 1. Use a daily time organizer-some kind of notebook or record of appointments. 2. Do one thing at a time, and divide activities into logical parts. 3. Batch items together that can best be done as a unit. 4. Reduce the number of tasks, and discard those that can be eliminated. 5. Reduce the frequency of tasks. 6. Reduce the length of the task; cut it in half, it possible. 7. Avoid negative efficiency, if super-perfect is not necessary, just do a creditable job. 8. Phone calls should be recorded; avoid the spindle of "while you were outs". 9. Answer correspondence on originals through Xerox copies where practical. 10. Use standardized letters. 11. Use slack time for less important, routine tasks. 12. Take a 5-minute vacation daily to relax. 13. Make an appointment with yourself for planning. 14. Use traveltime for other purposes-to listen, review and think. 15. Set a deadline and keep it.

Descriptors : Time Management; Guidelines; Sales people; Planning; Time utilization; Goals; Methods; Efficiency; Productivity

Delegation The Only Way!

Manage v30n3 24-25 May-June, 1978

Delegation, a well-recognized management tool, is often misused or ignored by managers for reasons ranging from simple lack of know-how to full-fledged fear of competition from subordinates. However, as benefits of delegation far outweigh its difficulties, most managers can find 3 ways to increase overall effectiveness by its use and techniques : 1. Delegate to eliminate or reduce time-consuming chores. 2. Delegate to upgrade subordinates' skills and abilities. 3. Delegate to extend the scope of management and get more accomplished. The first step in effective delegation is to identify what is to be done that does not require special managerial skills and abilities. Deputize a subordinate to oversee delegated work and chart assignments, skills, priorities, and time commitments of other employees to facilitate task shuffling. Delegation of work can provide free and effective on-the-job training, streching capabilities and challenging subordinates to more responsibility, authority, and commited trust of the manager.

Descriptors : Delegation of authority; Managers; Subordinates; Management styles; Management development; Techniques; Time Management; Productivity

A Formula for Making Every Hour Count

Warihay, Phinomena

Administrative Mgmt v39n3 28-29, 106, 108, 110 March, 1978

Managers using an Effective Time Management Formula (ETMF) save wasted time, resulting in increased productivity. By recognizing employee role-playing, an alert manager can minimize wasted time by applying both himself and his employees to : 1. being aware of how time is spent, 2. confronting offenders, 3. not playing martyr, 4. skipping retaliatory measures, 5. developing strategies to initiate change, and 6. counseling, not

consoling. Taking 100% charge of self requires that the manager and employee take total charge of how time is spent. Implementing ETMF involves taking total charge of the job by having : 1. an understanding of what is expected, 2. an awareness of how time is spent, 3. the ability to prioritize activities, 4. a tool for monitoring progress, and 5. a few minutes a day for doing nothing. The manager's role is providing these essentials. Using ETMF is more than charting and graphing workloads, as it is an operating philosophy. Employees, consciously deciding to engage in valid. productive, interpersonal relationships and taking charge of their jobs, have increased goal-related productivity.

Descriptors : Worker efficiency; Time utilization; Time Management; Employee evaluations; Goal Setting: Productivity; Management; Priorities

How to Squeeze Seventy Minutes out of Every Hour

Levinson, Robert

Real Estate Appraiser v43n5 34-38 Sept./Oct. 1977

There are 5 basic areas of time use that a good manager should concern himself with each day. They are : 1. Start by planning your day in advance. 2. Give people development your super-AAA time priority. 3 Move at least one improvement step forward each day. 4. Give your operation a daily once-over, 5. Ratain taskmaster control over everyday essentials. The manager should take positive steps to plug time leaks. Various time-waste signals include : 1. complaints, 2. too much gabbing, 3. paper work pile-ups, 4. idle time, and 5. efficiency drain, Time productivity can be boosted by sharpening your systems, and it is best to work side by side with your staff. Trim time consuming fat with management shorthand.

Descriptors : Time Utilization; Management; Employees; Productivity; Efficiency

How to Stop Wasting Time.

Steffen, R. J.

Supervisory Management, Vol. 27, No. 5, May 1982, P. 22-25., Journal.

Productivity of managers can be improved through better time management. The manager must do the most important task first and be organized. Goals must be determined and priorities established.

Descriptors : Productivity : Manager; Efficiency; Time Management; Evaluation.

Managing Your Time Puts You in Control.

McMahon, J.

Manage, Vol. 34, No. 2, April 1982, P. 3-4, 23., Journal.

Managers can best control their time by delegation of authority. Unpleasant tasks can be handled first, Consolidation of meetings is a great help.

Descriptors : Time Management; Delegation of Authority; Productivity;

Time-Recorder Systems.

Davis, E. S.

Office, Vol. 95, No. 3, March 1982, P. 176, 178., Journal,

Time recorders can enhance productivity. General categories of this equipment are listed. A written set of specifications must be made prior to design. Pointers for choosing a vendor are offered. An audit should follow installation.

Descriptors : Productivity; Office; Office Equipment; Equipment; Time Management; Time Saving.

Warehouse Productivity,

Davis, D.

Distribution, Vol. 81, No. 2, Feb. 1982, P. 68-71., Journal.

Eleven warehouse managers used a Labor Management System developed by the American Warehouseman's Association to contain labor costs, set performance standards and increase productivity. Major material handling functions are broken down into Time Measurement Units (TMU). Used together with a flow chart of the specific materials handling technique, standard times and amounts for a given operation are determined. This information helps management determine the percentage of productivity they are currently receiving. project the numbers of employees needed if the workload was to increase or decrease or develop more cost effective ways of doing the same operation. Monitoring of the system over a period of time will identify the improved performance and efficiency of changes in operations. Specific examples of the use of TMU are provided.

Descriptors Productivity; Warehousing: Time and Motion Study; Materials Handling; Labour Costs; Time Management; Flow Chart; Performance; Manpower Planning; Labor Management; Examples.

Time Management - But What About Your People ?

Gilsdorf, J. W.: Rader M. H.

Supervision, Vol. 43, No. 11, Nov. 1981, P. 6-8., Journal.

Time management, which is task, not people, oriented must be used judiciously. A time log can be positive but it would sometimes reflect personal conversations, and other indirectely related activities to management, if management is to enjoy positive relations with subordinates. Subordinates must not be subjected to a closed door policy which impairs their information, and related decisions. Screening calls and mail can be costly if mishandled by an employee who is unable to distinguish the important call. The eighty-twenty rule for productivity can foster favoritism. Meetings with subordinates only for the purpose of specific discussions tend to negate the motivational possibilities of opended talks. Stricking too firmly to the agenda for a meeting can exclude creative input. Supervisors may personally gain a great deal with the use of time management, but should not do so at the expense of harming their subordinates' performance.

Descriptors : Time Management; Employee Relations; Management Policy; Productivity.

How to Improve Your "Timing"

Hurston, C. J. Jr.

Management World, Vol. 10, No. 8, Aug. 1981, P. 17-18, 44., Journal.

Time is a precious resource; A manager must know how to manage it. By improving the use of time, productivity can increase, by compiling a diary, A manager can check time use. A method for doing so is outlined. Analysis of the diary is then necessary.

Descriptors : Management; Productivity; Time Saving; Efficiency; Time Management

Be Chary And Wary of Business Lunch—as Host or Guest.

Cummings, M.

Marketing Times, Vol. 28, No. 5, Sept./Oct. 1981, p. 25-27., Journal.

Time Management Suggestions are given. With major emphasis on business meals. Business lunches must be productive, not merely pleasant. in order to be worthwhile. While relaxed discussion of important matters is important, obvious bribes, confrontations. Political ploys and courtesy invitations should be avoided at business meals. Other time-management suggestions include making lists, setting priorities, using time blocks, filling dead time, using the telephone to improve efficiency, improving meeting efficiency, using waiting time, and delegating authority where appropriate.

Descriptors : Management : Manager; Time Management ; Time saving ; Productivity ; Delegation of authority

Boosting Productivity with the Four-Day week.

Bekassy, V.

Management World, Vol. 10, No. 6, June 1981. p. 12, 13+., Journal.

After ten years' Experience with the concept of the four-day work week, Grolier, Inc., Publishers, relates positive results. Employee morale was boosted, Productivity was maintained, and absenteeism and employee turnover were kept down. Service also improved. How grolier arrived at the decision to adopt the four-day work week is explained.

Descriptors : Four-day work week; Productivity; Absenteeism; Time Management; Morale; Employee Behavior; Attitude

Coping with Success : Tips for organizing your work and your life.

Stratton, D. J.

Armed Forces Comptroller, Vol. 26, No. 2, Spring 1981, p. 4-6., Journal.

Practical suggestions are given for dealing with Time Management. The essence of time management is to work better rather than harder or longer. Other areas covered include the organizing principle, organizing lists, systems, paper, and the importance of a calendar. Ten pointers for success are listed. Relevant books are mentioned.

Descriptors : Organization; Management; Time Management ; Productivity

Long-Run Changes in the Workweek of Fixed Capital.

Foss, M. F.

American Economic Review. Vol. 71, No. 2, May 1981, p. 58-63, Bibliog. 15, Proceedings.

A study is Made of the change in the workweek of fixed capital in manufacturing from 1929 to 1976. The study concerns itself with the weekly hours of plant operations. The average workweek increased about twenty-five per cent during this period reflected in longer days, but fewer days per week. This reflected twenty-two per cent of the gross capital stock increase. The raise was due to increased capital intensity and increased continuous operations in industry.

Descriptors : Capital; Measurement techniques; Manufacturing; Productivity; Time Management

Three Basic Ways to Manage Your Time Better.

Anon

Professional Report, Vol. 11. No. 1, Jan. 1981, p. 18-20., Journal.

Techniques of Time Management can help increase productivity, and improve effectiveness. Three methods of Time Management include the priority method, the goal-oriented method and the time-log method. General Principles include seeing time as a measurable asset, Learning to delegate, not demanding perfection, and seeing effective Time Management as a way of life. The priority method lists tasks to be accomplished daily from most to least important. It assures that attention is given the most important tasks and that these are completed before going on. With goal-oriented method, you list lo

Descriptors : Time Management : Time saving; Executive; Productivity; Management

Time : Managing the Most Mismanaged Resource.

Harper, S. C.

Managerial Planning, Vol. 29. No. 1, July/Aug. 1980, p, 27-30., Journal.

Time is also a resource of which there is a shortage. Planning use of time helps develop and capitalize on opportunities, rather than reacting to problems. Return on investment and cost-benefit analysis are terms helpful in budgeting time. Periodic time audits direct time into the most productive channels.

Descriptors : Time Management; Productivity; Planning; Cost benefit analysis; Return on investment

A Car Worker's 40% Year.

Lee, M.

Management Today, Feb. 1980, p. 80-82., Journal.

British workers, especially in the automobile industry, are often accused of working too little. After calculating exactly much time he actually spent at work last year. One car worker was shocked by his own results. After adding up vacation, sick leave, strike-time, idle or laid off-time and down-time. This car worker found that 40.2 percent was not spent in working on the job. Also, 37.5 per cent of the time during a working day was not spent working.

Descriptors : Great Britain; Automobile Industry; Productivity; Labor; Strike; Time Management; United Kingdom.

Why Rotating Shifts Sharply Reduce Productivity.

FLY. R. D.

Supervisory Management, Vol, 25, No. 1, Jan. 1980, p. 16-21.

An employee working a frequently rotating shift experiences a loss of productivity due to the loss of sleep. The body clock controls the day and night functions of the human body. When this is frequently disprupted, there is a loss of Motivation. alertness and judgement.

Descriptors : Flexible Schedule; Health; Health hazard· Human Resource Development; Management; Performance; Productivity; Staffing; Stpess; Time Management; Working conditions.

Suffering from Information Overload ?

Rader. M.

Management World, Vol. 8, No. 12, Dec. 1979, p. 9-11.

Information overload is the result of more imput than output information. This can cause stress resulting in illness. A person can only function in communication and decision making If he can efficiently receive and process information. Managers trained in speed reading and time management were happier and more productive while successfully controlling information overload.

Descriptors : Communication; Information Theory; Management; Mangement Functions; Management Strategy; Management style; Production; Productivity; Self Regulation; Stress; Time Management; Time saving

Peter Drucker on Management : Concentrate on 1. Liquidity, 2, Productivity 3. Growth Strategy.

Anon

Management Review, Vol. 68, No. 12, Dec. 1979, p. 40-41.

Peter Drucker speaks as a corporate and economic analyst. His Theories help management see clearly their own situations and move into changes which bring about improvement. Management must study their Productivity, liquidity and growth strategy.

Descriptors : Growth; Liquidity, Management; Market Analysis; Money Supply: Productivity; Time Management.

Alternative Work Schedules : The state of the art.

Newstrom, J. W. : Pierce, J. L.

The Personnel Adminstrator, Vol. 24, No. 10, Oct. 1979, p. 19-23, Bibliog. 5

Non-traditional forms of work scheduling, such as compressed work week or 4 day with 40 hours. Discretionary working time, or part time employment, are supported by early research. Implementation suggestions include attention to changing workforce values, employee understanding and acceptance, and employee participation wants, choice, design, implementation, and evaluation of alternative work schedules could improve Quality of Worklife.

Descriptors: Evaluation; Flexible Schedule; Human Resource Development; Job analysis; Job motivation; Job Satisfaction; Labor Force; Management; Participative Management; Personnel Management; Productivity; Quality of Life; Scheduling; Staffing; Time Management; Working Conditions.

MANAGEMENT EFFICIENCY IS A WISHFUL DREAM WITHOUT COMPETENT SUPERVISORS IN YOUR TEAM.

EDITORIAL

In this issue of PRODUCTIVITY, the theme for research and effective executive action differs from that of the preceding and the forthcoming issues. Infact, on the culmination of the year of productivity, it seeks to highlight that a productive system which provides goods and services forms key to our productivity growth, improved standard of living and the national welfare. As a productivity year gift, it offers a specimen portrait on productivity system in its multitude : problems and prospects, determinants, measures to improve, sectoral analysis, interdependence with other systems, contributions from management and innovations. Somewhere in the restructured, varied agenda for the October-December Issue, you will come across a new perspective, you have ignored hitherto, which will emerge as a guide-post for your thought and action.

While articles come to us from several disciplines both academic and professional circles, the pattern you find in this issue is new to the nature of PRODUCTIVITY. You should not be astonished by the varying space provided to different aspects of the productivity system. The organisational problems of public systems deserve utmost attention in view of their below par performance stemming from severe crises they have been facing in recent times. As a diagnostic case study of "Managing Development Through Para Statal Systems" (Tewari) indicates, the crises in internationally financed public system can be avoided and, thus, performance improved, if efforts are made to formulate corporate policy and design organisational structure and relationships much before its formation. If you work with a public sector financial corporation or otherwise, you are keen to understand the factors which hinder or help its organisational effectiveness, go through Mishra's paper on "Some Determinants of Organisational Effectiveness". I am sure, you will come with a new perspective or reinforce the one you already hold that precise statement of organisational objectives (goals), centralisation, autonomy, supportive control, participative decision making, fair treatment and open communication system play a decisive role in this aspect of organisational behaviour.

The baffling marketing and sales problem of a very large organisation with high quality-high price products, operating in a competitive market flooded with relatively cheaper and poorer quality goods, has been tackled in "Dealing with Price Quality Interface" (Srinivasan). If you are engaged in a commercial bank or interested in its problems, the diagnostic analysis of the causes for failure of perfomance budgeting system and measures to improve it through participation in the article "Putting PBS to Effective Use" (Bhattacharyya) will attract you. While going to make huge investment of money towards modernisation through technological changes in order to enhance their productivity, the core sector industries must analyse the benefits from such projects. This can be done by productivity-based approach as explained and exemplified in Ray's "Evaluating Technological Improvement". The movement of large companies using functional layout towards a cellular systems design which forms a rapid production management technique, is lucidly addressed by Basak and Tripathy in their article on "Designing Cellular Manufacturing Systems". The article "Synthesis of Optimal Dairy Product Lines" (Gangadharan and Kalla), aims at improving productivity system, suggests linear programming model to evolve an optimal-mix in a milk processing plant within a myriad of technical, economic and marketing constraints. The resolution of coal transportation problem at national level by developing a distribution schedule purporting to minimise the cost and avoid the delay within the rail route capacity and grade of coal, is realistically addressed in Sinha and Chaudhuri's article "Minimising Coal Distribution Cost".

Two articles deal with problems and prospects of productivity. While the article "Measuring Total Factor Productivity" by Jaiswal and Thakar analyses the problem of measuring total factor productivity for industrial sector from a mathematical standpoint indicating modification in the earlier system and empirical verification of the proposed measures, Singhania's article "The

Eternal Flowline of Productivity" visualises prospects of productivity from religious and moral perspectives blended with recent developments in the area of human resource management.

The perpetual challenge to human resource managers in the form of improving inadequate motivation arises in Stanislao's "Motivating for Productivity". Indeed, motivation forms a major determinant of human productivity and it can be effectively mobilised, if attempts are made to focus attention on people variables. However, in developing countries, it should also be kept in view that wages play a crucial role along with human factors in the process of motivating workers for improved productivity. The issue of interdependence between productivity and wages from the standpoint of a developing economy (Nigeria) is critically examined by Osoba in her article "Productivity and the Wage System". Notwithstanding the utmost significance of human resource management, the relevance of value management, described in Gopalakrishnan's "Value Management for productivity", as one of the most appropriate organisational integrators, cannot be denied for ensuring improved productivity, cost effectiveness and multiplier gains.

If you don't find within the above series of articles something that relates to agriculture sector, take a look at the articles "Analysing the Impact of Credit on Small Farms" (Singh and Gill) and "Resolving Food Problem Through Innovation" (Ojha). While the former indicates the gains stemming from credit to small farmers at a district level in Punjab, the later shows as to how innovation in certain delineated areas can help the nation to resolve its food problem for millions in the future.

Knowledge can be obtained in both comprehensive and capsule forms. If you are keen to obtain knowledge on productivity system in its capsule form, refer to the column "Search for Knowledge". It will help you to explore varied information about national economic performance and prospects, measures to improve public sector management, cluster plan for production and employment, relationships between decision styles and organisational effectiveness and between formal training and skill development for effective managerial performance, determinants of employee and managerial performance, a production model for cement industry, industrial entrepreneurship and productivity and determinants of rice productivity.

The column "For Your Bookshelf" will provide you an objective appraisal of four books on health, Asian experience in the area of export promotion for small industry products, instrument science terminology and economic development.

Beyond this will happen, if you would write to us modifying and/or extending what you read in this issue.

Productivity in Brief

237 Thinking Ahead
Managing Development Through Para-Statal Systems
Tewari, R. N.

Describes a case study of an internationally financed state enterprise indicating determinants of corporate goals and functioning, project components and people's reaction, analysis of the problem, aftermath of incomplete decisions, implications for region's development and issues in the management of public system.

243 Ideas for Action
Putting PBS to Effective Use
Bhattacharyya, H.

Describes objectives of performance budgeting system in nationalised commercial banks, outlines policy guidelines for implementing this system, indicates the procedure for collection and interpretation of external and internal environmental data for drawing up a performance budget and suggests participative style of management to make it effective.

251 Dealing With Price-Quality Interface
Srinivasan, R.

Analyses situations in which quality assumes significance in consumer's perception of the value of goods and services stressing marketing strategic considerations and economic and psychological dimensions of price and quality and describes marketing and selling implications of these situations providing guidelines for sales task.

258 The Eternal Flowline of Productivity
Singhania, S. L.

Analyses the concept of productivity, highlights its significance for professional excellence with special focus on human factors, examines its role in a growing economy, identifies key areas in managerial-action syndrome and emphasises the essentiality of goals.

264 Measuring Total Factor Productivity
Jaiswal, M. C. and P. H. Thakar

Provides background information and methodology for measuring productivity in industrial sector and supports these measures with the aid of an empirical study in five large industries in Gujarat.

275 Some Determinants of Organisational Effectiveness
Mishra, R.

Describes theoretical perspective, problem and hypotheses, methodology and results of an empirical study purporting to analyse organisational objectives, structure and process variables as moderators of organisational effectiveness in three public sector financial Coporations in India.

287 Motivating for Productivity
Stanislao, J.

Describes the general characteristics of motivation, examines communication process as a prerequisite to motivating, stresses leading and managing activities as an integral part of motivation and analyses the process of motivation as a major management function to accomplish long-run results.

292 Designing Cellular Manufacturing Systems
Basak, P. C. and D. K. Tripathy

Describes the design of cellular manufacturing system suitable for plants using functional layout based on recent researches and a case of central repairing shop of a large integrated steel plant.

296 Synthesis of Optimal Dairy Product Lines
Gangadharan, T. P. and J. C. Kalla

Provides linear programming formulation and indicates optimum plan scenario with a view to ascertaining the optimum product-lines under varying technical and economic considerations and identifying areas of resource maneuverability in Milk Products Factory, Vijayawada.

302 Minimising Coal Distribution Cost
Sinha, K. P. and S. R. Chaudhuri

Analyses existing coal distribution system, identifies transportation as a basic problem and describes different steps in Vogel's approximation method (VAM) to minimise coal distribution cost at national level.

312 Analysing the Impact of Credit on Small Farms
Singh, J. and J. S. Gill

Describes methodology and results of an empirical study conducted in Patiala district of the Punjab state to analyse the impact of credit on production and farm income in respect of small farmers with a view to enabling them to take rational borrowing decisions.

319 Evaluating Technological Improvement
Ray, J. K.

Describes the concept of productivity as synonymous with profit on investment and

suggests productivity based approach to analyse the effects of technological change with the help of an example from a steel rolling mill.

323 Productivity and the Wage System
Osoba, A. M.

Examines the process of wage determination and wage adjustment, describes nature of productivity and its role in wage determination and analyses trends in industrial sector productivity in Nigeria indicating interdependence between process of wage determination and productivity at individual and national levels.

331 Value Management for Productivity
Gopalakrishnan, R. V.

Describes the synonymous concepts of value analysis, value engineering and value management, cites suitable examples to illustrate the selectivity of value management, highlights its contribution to group creativity, and indicates several advantages stemming from this sophisticated management methodology as a measure to accomplish effective results.

338 Resolving Food Problem Through Innovation
Ojha, T. P.

Analyses the food problem for the growing population, suggests use of modern agriculture system and optimal utilisation of technology, irrigation and other measures indicating food production trends in India and abroad and pinpoints a tendency towards over consumption of food to fatten animals in developed countries.

345 Search for Knowledge
Provides information in capsule form about :

Indian economic performance and prospects (Vaidyanathan, A.).

Measures to improve public enterprise management in developing countries (Hope, K. .R).

An evaluative analysis of cluster plan for production and employment in Raichur district (Thaha, M. and D. Shanthudu).

Decision styles and organisational effectiveness in Indian business organisations (Maheshwari, B. L.).

The determinants of employee performance in a medium large nondurable manufacturing plant (Brown, C.).

Formal training, skill development and job performance of managers in development banking institutions (Maheshwari, B. L.).

Some correlates of managerial performance at middle and lower levels (Bansal, P. C.).

A production model with two labour inputs for the cement industry (Subrahmanyam, G.).

Industrial entrepreneurship and productivity in Andhra Pradesh—structure, growth and performance of small and large scale manufacturing sectors (Rao, V. L.).

Assessment of factors affecting rice productivity in Madhya Pradesh (Sarup, S. and R. K. Pandey).

350 For Your Bookshelf
Provides appraisal of the following books :

All about Good Health—What the World's Best Doctors have said—Simplified (Barnard, C., C. N. Parkinson and M. K. Rustomji).

Export promotion of Selected Small Industry Products : Asian Experience (Jaitle, T. N.).

Dictionary of Instrument Science (Ramalingom, T.).
Economic Development (With Special Reference to Problems of Underdeveloped Countries) (Mahajan, V. S.).

Index of Advertisements

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Vol. XXIII, No. 3, 1982

PRODUCTIVITY

Notice to Contributors

Productivity, an official journal of the National Productivity Council of India, is published quarterly in April, July, October and January. It disseminates knowledge on productivity system to facilitate economic growth, provides a forum for interdisciplinary discussions and forms a bridge between scholars and practitioners. It is being restructured to publish manuscripts reporting results of empirical research on productivity system and application of research results to the solution of problems in business, industry and government along with experienced-based, reflective articles distilling basic truths, philosophies and thoughts. To serve its dual audience, the practising executives and the scholars, manuscripts must be prepared to meet the criteria of technical soundness, readability and practicability. Usually, the manuscript should relate to the following areas :

(a) Productivity system : Problems and Prospects
(b) Determinants of Productivity System
(c) Improving Productivity System
(d) Productivity System by settings
(e) Productivity Vs other systems
(f) Managing Productivity System
(g) Innovations in productivity system

With exceptions, the length of manuscript should be restricted to around 5000 words. Two copies of the manuscript should be submitted, double spaced and typed on one side of the paper. A cover page embodying abstract of the manuscript, bio-data of the author (s) and a declaration that it is an original contribution and has neither been published nor submitted for publication elsewhere, should be attached. References and notes should be in double space separately in the order of their citation in the text of the manuscript and must be complete in respects of publisher, place of publication, year and page number (s) (for style refer to the latest issue). Graphs and designs should be drawn in Indian ink only. Tables should be typed on separate pages at the end. Contributors will receive a nominal honorarium and 25 copies of the reprints of their papers after publication.

The views expressed in the Journal are those of the individual contributors and not necessarily of NPC.

NOTICE TO PUBLISHERS

We shall be glad to include reviews of recently published books in the areas of economics, commerce, management and agriculture relating to productivity in general. Publishers should send two copies of books intended for review to the Editor.

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All editorial communications should be addressed to the Editor, 'PRODUCTIVITY', and business communications to the Director, Business Management and Publications, National Productivity Council, 'Productivity House' Lodi Road,

Thinking Ahead

Managing Development Through Para-Statal Systems

TEWARI, R. N.

Much ahead an internationally financed state undertaking is established, care should be taken to evolve corporate policies, organisational structure and relationship to avoid crisis situations.

This is a CASE study of an internationally financed state undertaking operating in the field of production-processing-marketing of a produce raised over a widely scattered area. Fate of the produce determines, quite critically, the economy of the multitude of producers and marketeers. As a study of corporate policy in Public System. It deals, among others, with two important aspects as follows : (a) Whether para-statal system should carry out opinion survey, as a part of the feasibility study, when the environment is one of expectation and the producers are mostly, but for the actors with extraneous interests, unaware of innovations being canvassed (b) The more crucial aspect of corporate policy, of the arrangements required between the Corporate System and the State; those to be established before establishing the undertaking. It establishes that much before a corporation is established specific issue of corporate policies, organisational structure and relationships, as a part of a System, should be resolved prior to the international donors get on the scene. Otherwise, later on, donors by and large, fall into the organisational trap – undertaking is maintained as extension of Department in terms skills, procedures and style – of the entire system

Dr. R. N. Tewari was till recently SBI Chair Professor at the XLRI—Jamshedpur and is currently heading the Study and Research Division in the AIMA, New Delhi. *He is thankful to the students of Xavier Institute of Management and Labour Studies, Jamshedpur and participants in EDP (1980-82) for their comments.*

The External Environment

Hinterland of IFME[1] is an area where economic fortune (industry and agriculture alike), naturally politics is in it, of the State/ Region's economy centre around three products : forest produce, fruits, mainly apples and in one field crop. Area-spread of these crops, as also of the horticultural industry dependent on apples, is concentrated in two three districts only; 8-10 Blocks in these districts alone would account for 75 per cent of marketed surplus. Concentration of economic power and dominance of rural elite with urban roots are apparent facts affecting all aspects of economic life including industrial locations.

Select aspects of the economic environment which affected the IFME, on which this CASE is based, are given below :

1. About 70-80 per cent of the apple orchards are in small sizes i.e., below 1.20 hectares; on an average located at a distance of 5 kms, or more from roadhead. Orcharding being relatively more profitable (not many alternatives are available as the terraine is hilly) increasingly low and middle income group people are getting into this business as their main occupation; in relatively fewer

1. IFME deals with production, processing and marketing of horticultural produce including export. This case has been prepared by the author on the basis of his prolonged association with a Feasibility Study, later in monitoring-cum-advisory capacity, for a state govt's submitted proposal to the IBRD/IDA mission. All names and identies have been changed to disguise identities.

cases as a subsidiary occupation. Bigger orchards are really big, size-wise and market power-wise and, are owned by highly educated individuals who have built up an image[2] for their produce (brand); such growers have very intimate links in the trade centres like Delhi; to a lesser extent elsewhere.

2. Most of the smaller growers and a section of middle sized orchardists would go to 'preharvest contractors', usually the middleman is a commission agent-cum-dealer in Delhi doing business with/or without financial partnership with a local rich man, an orchardist, selling the coming harvest as early as in January-March (about 5-7 months in advance of the harvest). At this stage trees are in the early stages of flowering. This protection[3] provided to growers is conceived as : *Firstly*, giving them funds for their own and orchard's upkeep. *Secondly*, the 'Chowkidari' cost is saved as this responsibility would then fall upon the contractor, who has to provide for the watch and ward of the orchard till harvesting is over. *Thirdly*, it is viewed as a sort of 'headgiving operation' insuring the grower against natural vagaries, market risks and inconveniences of handling the produce. The point to be noted is that the "preharvest contracting" is not to induce *'technology transfer'* or its diffusion through the system, as one may notice in the case of 'peas' 'sugarcane' and such other crops where the preharvest contracting is like *System Selling*.

3. Channels adopted for sale and destination of the consignments vary. To neutralise such differential, quoted below is the price-spread for the most popular variety of apple only through the channel that fetched the highest price. Out of the consumer's rupee, on an average, Re. 0.40 is received by the producer. Highest receipt was of Re. 0.66 in a year when apple production was the lowest in last five years. When the crop condition is marginally better, say 15-25% above the normal, this spread would widen when vulnerable growers could only obtain 23.8% of the consumer's rupee. In a bumper crop year, when output all around is likely to be up by 40-60 per cent of the normal, instances are available when the sale proceeds remitted by trade channels to such growers could cover the marketing cost plus a few rupees in return of 16½ kgs. apples in a box. In any case culls are either thrown out and/or fed to the cattle in the absence of any sizeable arrangement for processing—approximately 15,000 | 20,000 tonnes of culls is obtained in the region. Since there is no facility for mechanically cooled storing and preservation in the producing region; output of apple of the region starts pouring into Delhi; from U.P. hills in the months of July-August followed by supplies from lower hills of Himachal Pradesh around end-September till November; H. P.'s peak off-loading will coincide with Jammu and Kashmir's supply. Supplies from higher hills may continue till December but in trickles. Three additional features of IFME's hinterland have a bearing

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2. As illustration, I give only one out of their many ways; in apple production about 20-25% are culled fruits, unfit for table purpose consumption and bad weather would increase the proportion of the culls to 40-60% of the produce. By screening this output of culls one can separate lots of better culls to be sold at a very cheap rate. Bigger growers would market their main produce under their brand name; part of the culls will be sold out in the name of their servants. Due to their economic power and old contacts (a historical fact, occassionally due to better technology obtain through contacts with the State authorities, they would always receive a better price. Middlemen in Delhi would also like to pay such growers a little more to retain links; that in turn helps in establishing middleman's hold in that area (for getting consignment from other growers too).

3. Of course one may have reservations, quite a valid concern, about the cost-effectiveness of this type of protection i. e. the contractor pays the money in instalments, a part of it is paid almost at the maturity and then at the picking stages of the fruit. The rate at which the contractors evaluate the orchard is a highly doubtful one; this allows them wide margin to cover against the vagaries of the usual types. In case the crop fails badly, due to natural diamity, such a contractor usually gets-off with allowances/reduced payments. Price received by the producer, out of the consumer rupee under pre-harvest contract, is typical of sale under duress. Further more, post harvest care under the present system is almost nonexistent thus causing damage to the fruit which in essence is the loss of the consumer.

on the Case and deserve to be mentioned here :

(i) About 82% of consignments had Delhi as their first destination. Most consignments were auctioned under cover; repacked/ redirected to other stations in India, mostly by road or placed into cold storages in Delhi.

(ii) Post-harvest care is negligible, absence of grading and standardisation is complete; tone and pattern of marketing is set by Delhi (a re-exporting centre) not a regulated market till recently. Quality apples did not reach other important markets like Bombay—Madras Kanpur in large quantities; off-season price of the stored varieties (after allowing for risks and storage losses) fetched better returns. In other words, consumers have got adapted to inferior products which in the long-run would workout as a positive hinderance for organising fruit trade on scientific lines and for[4] expanding the market, if at all one intends to cater to the needs of the masses.

(iii) Around October and then in April/May, some tropical fruits appear in the market; apple consumption records a steep fall around December for the middle income group. This decline is very steep and gradually its consumption would disappear, till the next crop reaches the market. Competing fruits vary from region to region. During summer, consumer takes more to cold drinks, synthetic as well as to natural juices in which the share of the apple is nominal. In the absence of any organised product and market development effort, apple consumption is viewed as a luxury in any case from December onward.

Goals of IFME

IFME was thus established in 1973/74 to attain the following goals :

(a) To protect the economic interest of the growers as well as of the consumers. This eventually demanded public action, an organisation in the public sector to handle the commodity;

(b) envisaged programmes not be merely as a 'substitute' for the existing trade-channels, but should strive vigorously for System Selling through pre-harvest and post-harvest care of the crop; to introduce scientific management of the orchards and fix maturity standards for picking the crop. Thus, preharvest care and market management, geared to service the weaker section was given priority.

(c) That the undertaking would phase a programme of developing product-mix; market development programme including overseas trade; for the fruits of the region such as apples, stone fruits, etc. and should subsequently take-up other perishable commercial farm outputs of the farmers (Processing and marketing only).

In the final analysis it should operate in a fashion that an average fruit consumer

4. Keeping in view the cost of the most common product like apple juice retailed by private companies like Mohan Meakins, opinion in general was that apple and its products are luxuries though such should not be the case. Let us take the apple juice : according to a study, technoeconomic feasibility, 190 ml. bottled juice could be sold@ Rs. 1.40 per bottle (1975-76). If we compare this retail price with the prices of competing synthetic (of course synthetic drink appeals to consumer for reasons other than nutritional value alone) one would have reasons to plead for a large scale product as well as consumer education programmes, so that masses could get fresh juice. However, private sector juices priced as they are (cost plus what the market can bear) have tended to limit its market.

in India may be able to receive quality fruit and fruit products at a reasonable price while ensuring a fair return to the growers.

Project Activities

The project provided packing and forwarding services for 40,000 tonnes of apples (55,000 tonnes gross) before grading by 1977. Of this 20,000 tonnes were to be handled by the IFME on 'fee basis' for growers, who chose to continue selling apples through commission agents on consignments as is the existing practice.[5] Another 10,000 tonnes were to be packed, forwarded and marketed on a commission basis. The remaining 10,000 tonnes were to be purchased by the IFME and, after packing and forwarding, transported to its cold storage units operating in major consumer centres. It was also proposed to provide a market for the culls estimated at 25% of apples to be handled by the IFME that is 10,000 tonnes to be processed as juice concentrate and as juice. A part of apple and juice were targeted for overseas trade.

Thus, IFME proposed to cover a wide range of activities, and the factors considered in formulating the project have been broadly summarised in the earlier paras.

Analysing the Problem

Development of the entire project was to take 3-4 years and waiting without operating business would have strained the State's resources. Delay in organising the work had political implications too and was adversely affecting the enthusiasm generated earlier, during the Techno-economic and Feasibility study work. Delays in taking the programme off the ground was thus causing hardships to the vulnerable growers, depression among the staff assigned to the IFME and criticism of the Government that it lacked the political will for radical change in programmes.

With the enthusiasm of the workers, of its Chief Executive and the political bosses, IFME had to start its operation like any other trader with a sense of social responsibility; without the full package of facilities and infrastructural, without mechanical graders/ cold storages in the producing areas but with some in the terminal markets; without the large fruit processing plant but had a mini-plant of 150-200 tonnes in-take of culls, and without the pre-harvest service package to the growers so as to attract grower's participation in its trade system.

During the first year of its business IFME encountered two very difficult problems which typify complexities that public systems would face frequently (for the time being assume that adequate managerial skills were available at all the levels).

1. Those related to people's expectations and their reactions to the proposed innovative procurement and grading system, and in general to the psychological environment that can be ascribed to the establishment of a State Undertaking in an area of felt needs.

2. Those generated by the competitors-cum-vested interests who saw a challenge to their established power-business.

Problem No. 1

To gauge systematically people's reaction to IFME's ability, initially to work without much innovation but with a sense of social responsibility, a quick study was conducted. Certain results of this study are reproduced :

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5. The strategy was to innovate in stages :

   (a) Initially, IFME should franchise the trade and work as a socially motivated business agent with a view to get a foothold in the existing business-it visualised to offer a better deal to the weaker growers in this phase too.

   (b) Gradually, to expand its operations in a manner to wean away growers from the hold of private traders and provide them pre-harvest and post-harvest care and finally, it visualised to procure and market through it; after establishing all the project components.

1. FORM OF PARTICIPATION

All the growers but for an insignificant number, felt that as and when IFME comes-up with its innovative system, they would prefer to sell their production "outright" than on consignment basis. Only four farmers wished to participate under "consignment sale service" and another four under "custom service".

2. GENERAL STATEMENT

Only 70 per cent of the growers contacted agreed to respond to the issues raised before them. Out of those, only seven per cent felt that IFME was a good project because it would provide fixed prices and purchase culled apples. Other responses were :

	PERCENTAGE OF RESPONSES	
1. The project is a fraud	41 segment that doubt undertakings' ability	
2. We have severe doubts		
3. We are uncertain about it		
4. Commission agents may prove to be too strong for IFME to get rid-off,		
5. We never heard of IFME	6	
6. We want no help	6	
7. Grading and packing should be done in the orchards	5	Others did not feel the necessity for grading
8. We will sell to any one offering the highest price	8	Represent untied segment
9. If properly implemented and managed, the project can be useful.	34	Audience open for trial.

Equipped with this feed-back, somewhat hostile environment, partly borne out of delays, IFME took a plunge into business with the hope that its performance and the emerging infrastructure would be able to clear the doubts and, break reservations of growers. This expectation induced the staff to work with a zeal and "Adhat" shops were taken-up on lease/rental in Delhi and Bombay and in a few other centres; services of commission agents (who agreed to work for IFME) were utilised to auction the consignments. Thus, the strategy was to franchise trade at places, while at other stations, a large scale branch was established.

Then started the trouble : orchardists filed statements of consignments handed over to the IFME for sale and of those consignments sent through established trade channels, complaining that for the consignments delivered on the same day IFME sale proceeds were much lower than those of private traders. It caused a stir, gave anxious moments, leading to heart searching. What worried most was that it's alleged in-efficiency had portents powerful enough to wash away the goodwill among the few who were willing to join IFME. It reflected adversely on the competence of the dedicated officials and executives who had taken the bold step to join IFME for a good cause. A methodological question arises about feasibility study : Was it appropriate, relevant and valid, to conduct an opinion survey whether orchardists would use a highly innovative system about which they were, by and large, ignorant ?

The management's problem was how to meet this threat.

Problem No. 2

Hostilities sprang-up from two sources : *Firstly*, from the competitors in the trade and from the much publicised social goals e.g., in matters of advance for packing material and cash components made to parties in anticipation of their commitments to sale through IFME; it was pointed out that 'people'

with contacts and 'better-off' orchardists had greater access to the system. Such affluent farmers could obtain sale-proceeds earlier than the smaller producers. In a way this problem eroded the very ideal upon which IFME was founded. After the first marketing season was over all the facts could be collated and then only the truth could be ascertained and analysed; the IFME made deliberate attempts to take corrective measures for the next season.

Secondly : IFME was almost the only major undertaking headed by a technocrat who could obtain very different terms and pay-scales for himself and the staff. In a way, IFME's organisational structure and operational flexibility was frowned upon by those in the government or those left in the Department. One has to remember that IFME was one of the several units and that it could not hope to alter the basic premises of the civil administration unless it was allowed to be completely delinked from the state administration. The question is what could have been done earlier, keeping in view the environmental pressures, to ensure that such distortions did not occur ?

Issues

1. Was it advisable for the IFME to have gone for business without the full component of the "package" ?

The argument advanced in favour of starting the business were that : if commission agents can operate without all the facilities why not the IFME ? Certain possibilities commended this belief : that of gaining work experience; operating on lower margin than the established trade, to create competition, as well as IFME would be able to earn and meet the overhead (establishment) costs which otherwise could not be reduced. A few in the administration also felt that getting involved in servicing farmer's need (production and pre-harvest care) would involve a much larger burden. By assuming the role of 'trader' only, IFME can hope to avoid certain complications plus technical responsibilities.

2. In a situation like this, when the project is faced with a hostile audience, what should be done to obtain acceptance ?

Remember that for the through-put in the System we are dealing with an unorganised production line, which has other sensitivities also.

3. Apart from the usual practice to issue directions to 'do this' and 'do not do this' what other avenues are open to remedy the evil; to ensure that the target audience, the weaker section, got the real benefit ?

4. Lastly, but most important, is the phenomenon of 'innovation' in any enterprise. In this case introduction of mechanical grading, operating mechanically cooled storage in the producing areas, weaning growers away from the clutches of vested interests and authorising a highly flexible management procedure in a millieu of 'rule book' oriented state authority represents innovation/change.

Conspectus

Since then (when these problems were faced and crisis situations handled) there has been a change in the Government; the technocrat in the top management cadre has been replaced by a civil servant and special procedures have given way to established rules. However, for all intents and purposes, we have the commitments of the IFME, in terms of social goals and activity composition.

What this CASE intends to achieve is :

(a) to demonstrate intricacies of innovative production-cum-service with a larger number of production units;

(b) through discussion, and by consensus, to evolve a range, of indicators as well as to identify problem areas that a devoted senior manager/administrator in PS should watch for. Regional development would

(Contd. on page 250)

Ideas for Action

Useful proposals, developments and trends for the consideration of practitioners

Putting PBS to Effective use

Why performance budgeting system has failed and what can be done to revitalize it in commercial banks

BHATTACHARYYA, H.

The paper reviews the existing performance Budgeting System (PBS) of commercial banks in nationalised sector. It is observed that PBS has not been able to fulfil its desired objectives. It has been reduced to the level of mere target-setting exercise. The author has analysed the reasons for its failure and proposed an alternative strategy to make the system effective. A participative style has been advocated where the planning process takes up a bottom-up approach and integrates the individual goals of the managers with those of the organisation.

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Historical Roots

Performance budgeting system is in operation in public sector banks for nearly ten years. It was first introduced in State Bank of India in 1972. Later on, at the initiative of Banking Department, Government of India and Reserve Bank of India, performance budgeting system was introduced in other nationalised banks from 1973-74. At present, excepting one bank the system is in operation in all other nationalised banks.

It was felt that after nationalisation, goal priorities of the banking industry underwent a sea change. Profit no longer remained a dominant maximization parameter for the industry. It has retrograded itself to the level of a constraint which needs to be satisfied only while social objectives have been set to be programmed for maximization. The vast expansion of the horizon of the commercial banks during recent years have made many of the existing systems and tools of management outdated. The need for proper planning was felt to realise the new goals of the industry and exercise effective control and monitoring of performance. Performance budgeting came as a handy tool towards realisation of these desired objectives.

Is PBS Attaining Its Objectives ?

Performance budgeting was originally designed to be a bottom-up process with

a participative style of management where lower rung of the organisation was to participate effectively in the planning process. It was hoped that with time the new system would become a habit and a way of life. Primary objectives of performance budgeting system (PBS) as are found in the Budget Manuals of various banks can be broadly classified under the following heads:-

1. Planned growth of branch under three main dimensions, namely, deposit, advances (with greater emphasis on priority sector advances) and profit.

2. Management control of branch/bank performance.

3. Self-monitoring of performance on a continuous basis.

4. Facilitating better communiction between various levels of organisation in a reversible way.

5. Developing competence in branch managers in planning bank's business.

In a recent study conducted by National Institute of Bank Management, Bombay, it was revealed that the primary objective of PBS, as viewed by the branch managers and their regional managers, related to the management control of branch performance. Other objectives are relegated to a very low level. Moreover, a large percentage of regional managers feel that PBS does not have any specific advantage in monitoring branch performance over the traditional practices like target-setting, etc. There is a growing feeling which is shared by both the lower and middle management rank that performance budgeting is nothing but a new name for target-setting with the main objective of deposit mobilisation. While drawing up performance budget due importance is not given to other objectives like advances (although, recently some more emphasis is given on priority sector advances under pressure from government) and profit. In fact, during the post nationalisation era profit consciousness is weaning out very fast. As a result, it would not be out of place to mention here, that many of the Indian banks under nationalised sector are at present operating at a loss on their Indian operation and thriving only on the profit accuring from foreign transactions.

This dismal picture of the present day status performance budgeting system in commercial banks may lead one to think in terms of scrapping it altogether. But a system, because it has been administered badly, does not lose its importance, particularly when the Indian banking industry is expanding at a fast rate on all horizons. Planning is still a *sine qua non* for these monolithic organisations and performance budgeting has, therefore, to stay inspite of its bad start. Besides, the operational managers of banks feel, as revealed by NIBM study, that PBS is an effective tool and they want to use it for realisation of its every objective. This finding alone should lead us to think in terms of devising supporting subsystems to make the PBS function properly. This paper aims at analysing the reasons of failures and present alternative proposals for making the PBS working.

Improving Policy Guidelines

Performance budgeting drill starts with Head Office issuing policy guidelines to regional heads who in turn prepare quidelines for branches under their control within broad framework of H. O. guidelines. In practice, in most cases guidelines are vague and do not provide adequate inputs for drawing up performance budget at the branch level. Hardly, any rationale is given for arriving at a certain policy objective so that it can be meaningful input at the hands of branch managers. A study of policy guidelines issued by various banks give a feeling that the policy makers have primarily relied on past performance data and the present policy is nothing but a projection of existing level of operation into the future. Excepting the deposit and priority sector advances other objectives are not quantified. These two are also done in such a way that policy targets of the bank as whole are taken to be

targets of individual branches also irrespective of their present level of growth. The guidelines do not also quantify the profit level to be achieved and only as sweeping statement about lowering costs etc. is made. Although performance budgeting was designed to cover all the operations of the bank, it is found that several banks seem to cover only a few activities like deposit and advances. Other areas which are becoming more and more important these days, like manpower buegeting, recovery of advances, nursing of sick units and improving customer service hardly find a place in the policy document. It is necessary, therefore, that the policy document should be prepared covering the following aspects :

1. The budgetary goals for deposit, priority sector advances, and traditional advances should be given in quantified terms which should then be broken down into various sub-goals under each head. For example, instead of indicating a total deposit growth, it would be wise to break it down into various types of deposit, namely, savings, fixed and current deposits and separate growth rate is specified within the aggregate growth budgetted. This way it can be related to cost factor of obtaining funds for the bank. At present, no such distinction is made and branch managers try to obtain deposit disregarding the cost of servicing it even at a time when there is a flush of fund in the economy. Many managers will be happy to get a deposit under a fixed term than campaigning for it in current and savings bank accounts. Cost of obtaining fund is still a very remote consideration weighing in the minds of managers while campaigning for deposits. Once the policy document spells out this aspect in clear terms it will force the managers to look into their own deposit structure and work for rearranging it in such a way so as to keep the cost of fund at the minimum.

Similarly, policy indications for advances should be given sectorwise in quantitative terms and the income and cost implications spelt out in detail. A direct link has to be established between growth in deposits and increase in advances and its net effect on the income of the bank.

2. The rationale behind arriving at every policy decisions has to be elaborated in the policy document. How it has scanned and interpreted the external and internal envirment of the organisation and the data on which the decisions are based should be incorporated in the guidelines so that branch managers may compare and relate the interpretations and findings to their local environment and draw fruitful conclusions which will serve as important inputs for performance budget. Although the policy guidelines are expected to deal in issues at the macro level only, it would be worthwhile to relate interpretations and implications to the branch level and their impact on local environment as far as possible so that the document is not viewed by the managers as something far above their heads with which they do not have much to do except for filing as a sacred document. One of the reasons behind the branch managers' reliance on performance data only for drawing up performance budget may be attributed to the fact that the policy document does not serve as additional input which can be meaningfully utilised at the branch level. Performance budgets of banks, therefore, remain a reactive exercise and not a proactive venture which interprets enviornment intelligently and translates opportunities into results.

3. The guidelines should spell out goals of the bank in respect of recovery of advances and programme for nursing of sick units during the budgetted year. It should give the data of the present position of the bank under these two heads and lay down the programme for the coming year and its cost implications. This will enable the regional heads and branch managers to know the aggregate position of the bank and relate their own performance under these two heads and budget accordingly. At present, these two important aspects are dealtwith separately by the bank and these do not form a part of performance budget. As a result, many calculations that go into drawing up of per-

formance budget go wrong when it is being implemented because its impact on several other areas like manpower, facilities, profit etc. are not taken into consideration.

4. Although improvement in customer service is being talked about everywhere and Budget Manuals of some of the banks do speak about it in their introductory part, surprisingly, the format of performance budgets does not provide for it. It is not difficult to have a fair idea of the present status of customer service in any bank under different heads of public transactions from a study of inspection reports of branches. It can also be quantified, e.g., time taken for encashment of a cheque, days taken for sanctioning of credit proposals, etc. The policy document should discuss the overall picture and lay down goals in quantified terms.

5. While thus laying down the goals under various heads as discussed above the policy document should indicate approximate manpower requirement during the coming year under different categories. A commitment in this respect has to be made as this is the most touchy area where mutual trust had been belied in the past. The document should also spell out the additional burden the bank is undertaking and relate it to different goals to be achieved. Policy guidelines issued by various banks do not spell out their commitment in additional manpower but finishes it by one sweeping statement of keeping the manpower cost to the minimum. This is often interpreted by the managers as a negative commitment only and reduces the PBS to a mere exacting device which gives nothing but takes everything.

6. Having thus determined various goals and analysed their cost and income implications, expected profit level should be laid down in a deductive way so that managers can understand the rationale behind it and do similar exercise for their performance budgets. Policy statements, hitherto, do not give adequate importance to profit. The casual manner in which profit is dealt with in the policy statements, the often illogical mechanism of transfer price and more than adequate importance given to deposit and priority sector advances are responsible for receding profit consciousness amongst branch managers. The policy document must, therefore, bring home the point that a minimum level of profit is the barometer of efficiency without which the organisation cannot exist for long.

Starting from Environmental Data

At the branch level, exercise for drawing up performance budget begins with gathering and scanning of environmental data. Budget Manuals of nationalised banks prescribe a format for collecting environmental data. But almost no where any attempt is made to provide for a methodology for scanning and interpreting these data and convert them into meaningful inputs. As a result, it remains a 'form-filling' exercise and nobody, not even the regional head, cares about what are put there. The 'environmental data' as prescribed in the Budget Manual thus, do not serve as additional inputs and branch managers go back to past performance data only and rely on their own ideas about local environment for drawing up performance budget. The collection of 'environmental data', therefore, remains a wasteful exercise.

One of the reasons behind such a dismal state of affairs is that the format for collection of these data has, in most cases, been drawn up by the economists of Planning & Development department of commercial banks who have no idea about how the branch manager's mind work in scanning the local environment. No link could, therefore, be established between managers' own way of collecting and interpreting environmental data and the format prescribed in the Budget Manuals, making the latter alien at the hands of the managers.

Even before the PBS was introduced branch managers had long been gathering and interpreting environmental data in their own way and they had not been doing very badly. They evolved their own methodology

of converting these data into meaningful inputs. Only difference is that their methods remained in their own mind and, at times, they failed to take the macro environment into consideration. This knowledge could have been improved and systematized for further dissemination. A cross-section of managers may be interviewed for this purpose and a suitable format drawn up incorporating and improving upon the suggestions made by them. The proforma for collecting environmental data will then be meaningful to them.

The next step is to provide a methodology for converting the environmental data into inputs for performance budgeting. Here also, the methods, hitherto, adopted by branch managers may be analysed and systematized. A simple input-output model at the local level can be drawn up. As the methodology is simple and more standardised and the economic variables at the micro level are not many it would be ideal for interpretation of major environmental data. It may be surprising to observe that most of the managers do have in their mind some sort of input-output model when they interpret environmental data for development of bank's business.

Budget Manuals of all nationalised banks provide for external environmental data only. External environment by itself is of no use unless internal environment is conducive for exploiting the opportunities thrown up by external environment. An excellent opportunity for deposit mobilisation or a profitable advance cannot be seized of if there is non-cooperation of staff or shortage of hands and space. It is necessary, therefore, that equal importance is given to internal environment of the branch, otherwise, it will be frustrating for a manager who has to draw up a challenging budget on the basis of excellent external environment but fail to realise it owing to a difficult internal environment. The Budget Manual must, there ore, provide for bringing out sharply the main features of both external and internal environment which collides against and conforms to each other.

As the environmental data is the basis for drawing up performance budget, it is necessary that clear understanding is reached between the branch and regional offices about collection and interpretation of these data. At present environmental data hardly form a basis for settlement of branch budget and the superior authority often pushes up the branch budget without any additional information on branch environment. The few minutes allowed to each manager for settlement of budget hardly gives him any opportunity to review his environmental data and justify the figures arrived at by him. As a result, the whole thing once again turns out to be a mere target-setting exercise and the branch manager often budgets a lower figure knowing fully well that it would be pushed up at its final settlement. But once the environmental data and their interpretation get settled at the initial stage, the final budget settlement process goes on smoothly between the branch manager and the regional head because, then each will be armed with facts and would not argue or bargain in vacuum.

A Participative Style for Results

Performance budgeting system assumes a participative style of management. It is a bottom-up process where all members of the organisation participate effectively at every stage so that when the final plan is drawn up its implementation becomes smooth; every body doing his part of the job already agreed upon by him. But in an authoritative bureaucratic structure which is prevalent in all nationalised banks, performance budgeting exercise remains a one way process where top issues directives for the lower level to follow without question. It has been observed by the author and vindicated by NIBM study that budget settlement meetings have come to be mere rituals where higher authorities come prepared with the targets of each branch and hand them over to the managers who are expected to accept them with or without fruitless whimper. In case of smaller branches, sometimes meetings are never called but targets are communicated to them through

letters which often do not have any bearing on the performance budget submitted by the branch. No rationale is given for any upward revision of budgetted figures and in no case figures are revised downwards even when reasons demand so. The writer remembers one instance where the group of managers of a bank operating in a district jointly sent a budget for deposit mobilisation to their Zonal office which was much above aggregated targets fixed for individual branches operating in the district. These managers settled amongst themselves the figure for additional deposits to be mobilised during the budgetted year by each branch and they all agreed to help each other towards attainment of the budgetted figure. But unfortunately, to their dismay, the proposal was turned down by the zonal office and they were asked to stick to their individual targets as originally fixed.

In order to inculcate a participative managerial style (and performance budgeting process is the ideal place for it), it is proposed that within the broad framework of policy guidelines, the drawing up and settlement of performance budget for the region may be left to the branch managers; the higher authority playing the role of helper and observer only. The system will work in the following manner :

(1) Each year before the budget drill commences, the regional head will call a meeting of all branch managers working under him. He will review the past performance, analyse and explain the policy guidelines. He will submit to the meeting the following additional information besides what is contained in the policy guidelines :

i) Category-wise cost of servicing a unit of fund (in lakhs).

ii) Net income arising out of one unit of investment under different sectors vis-a-vis income accrued to the branch on transfer price if no investment is made at the branch.

iii) Approximate cost of additional manpower—category - wise; and approximate level of income required to sustain each additional hand.

(2) He will inform the meeting of the time by which tentative budget should be submitted to him and final date by which the final budget should be drawn up. The time gap should be at least a week.

(3) He will now explain the spirit and purpose of handing over the job of drawing up regional budget to the managers themselves and also explain his role as observer and helper only. He will call upon the managers to form a committee from amongst themselves for steering the budget exercise. The committee may have a chairman or convenor if the managers so decide. The functions of this Budget Steering Committee will be as follows :

i) It will call the first meeting of the managers as early as possible to review past performance, help each other for scanning environmental data and get them settled with the help of regional office. Any doubts remaining in the mind of managers regarding interpretation of policy guidelines may be discussed and got clarified from other colleagues. It is expected that sharing of knowledge amongst themselves will clear many doubts. If still some points have not been properly understood (which will not be many as they become experienced over years) the Committee may approach higher authorities for clarifications and report the same back to the managers. The date of the next meeting will be fixed in the first meeting itself when managers will come ready with their tentative budget proposals.

(ii) The second meeting will discuss the tentative budget proposals of

each branch. The Committee will try to steer the discussion in such a way that proposals remain valid within the broad objectives laid down in policy guidelines. As the process is democratic with people of almost similar status the managers will be able to better understand the problems of each other and thus, soon a feeling will be generated to pull up a weak branch by mutual help. Similarity of goals and problems will make the bond stronger. The Committee will see that aggregate of individual budgets present a viable growth rate for the region and conform to the ultimate goals of the bank as a whole. It is important that budget proposals for each branch are finalised in this meeting itself. If necessary, time can be extended with suitable adjournments.

(iii) The Committee will then present the budget proposals to the regional head and hold discussions. The latter must be careful not to exercise any mandatory powers and impinge upon the autonomy of the Committee. If he finds that the budget presented by the Committee does not conform to the objectives of the bank he may point out the variation and make suggestions for improvement.

(iv) The Committee will then convene another meeting of the branch managers and review the budget proposals in the light of suggestions put forward by the regional manager and draw up final budget.

(v) It is expected that at this stage no wide gap between overall goals of the bank and the region will remain and a consensus budget finally drawn up. If however, there still remains some major deviations then the budget may be sent by the Steering Committee to the Central Performance Budget Committee at Head Office with the comments of both regional manager and the Steering Committee for final settlement.

In between various meetings of the managers, they will individually hold informal discussions with each other and exchange ideas for drawing up performance budget.

It is expected that the entire exercise will be over within a month. A PERT/CPM flow chart may be drawn up as suggested by the author in his article published in The Economic Times 3rd May 1976 to further systematize the exercise.

Reviewing PBS

At present, review of performance budget is done by the controlling office every quarter. The NIBM study has indicated that PBS seems to be playing only a small role in monitoring branch performance. It has become a routine job of form-filling at the branch level and routine comments (if, at all) by the regional office. Self-monitoring of branch performance, one of the main objectives of PBS, appears to have been completely defeated in the existing system. Moreover, by the time regional office send their comments they become very old and no time is left to take any corrective measure.

It is proposed here that primary job of reviewing performance budget may also be handed over to the Steering Committee and the review is done every half-year immediately after the closing of accounts. At this time actual performance data for all the operations are available which will facilitate comparisons with budgetted figures. Six-month period gives a longer time to plan for major corrective measures or revise the budget. Managers working in a contagious region are better placed to know each other's performance earlier than the regional office. The Steering Committee will call a meeting of all managers within a fortnight of half-yearly

closing of accounts. In this meeting performance of individual branches will be reviewed. Resons for both positive and negative variances should be discussed in detail and alternative corrective measures proposed.

The Committee will then present the review and alternative proposals to the regional manager immediately after the meeting. It will return to the managers with the views and suggestions of the regional manager and finally adopt selected corrective measures. The entire exercise should be completed within three weeks of closing of accounts.

The Prerequisites

The system proposed here will be more effective when a region comprises about 30 to 35 branches only spread over a contagious area.

It requires some patience and restraint on the part of regional office and full commitment by the top management. At the initial stage it may make a false start which, however, should not startle the management. Careful and restrained handling will ultimately make the system ingrained in the culture of the bank and over time a participative style of management will emerge. It is not necessary that this alternative system has to be introduced in all the regions at a time. One or two regions may be chosen at first for experimentation and later on, the experience can be dissiminated over other regions. Gradually, more and more regions can be brought under this new system

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(Contd. from page 242)

depend on the internalisation of the project goals and on the executive's ability to percieve complications/hostilities—the ability to harmonise diverse pulls is critical to the success of the intermediate governments.

As it is, the rural social order is afflicted with the dominance of the 'rural rich', and 'urban elite' groupings; massive programmes of rural development through corporations seem to have failed to make much of a dent in the situation. Continuation of this trend would adversely affect the creation of a more humane and just society. One can only hope that some day we succeed to develop modalities to channalise the 'elite' structure for diffused growth and social justice.

Study Guide : Enlist the three critical areas that ought to have received priority by the IFME while developing the organisational framework and strategy.

Dealing With Price Quality Interface

SRINIVASAN, R.

What the marketing and sales department of a large organisation should do to effectively meet the baffling problem of 'high price—high quality' stemming from the interaction between price and quality of products in a competitive market

In a competitive marketing environment very large organisations with high quality products sold at very high prices find it difficult to compete in the market with relatively cheaper and poorer quality goods manufacturers. In this context, the role of the field sales force becomes critical in effectively blunting the competitive edge on the price front through non-price factors. This article essentially looks at the price-quality dimension from the standpoint of economic and psychological impact it has on the consumer and provides a selling strategy which should emphasise the benefit over cost as the basis for promoting price/quality by the manufacturer.

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The Determinants of Value

Price is the *value* of exchange of goods and services in the market place. The concept of value in defining price naturally should give us an idea of how price can be related to non-economic consideration for exchanging goods. This arises mainly because value at the individual, group, sociological and psychological levels has different connotations and different degrees of acceptability for the same factor. To exemplify the statement further: A consumer who chooses to buy an undergarment may take a purely economic decision based on price; the same individual, if he comes from a middle-or higher-income group, would choose his material keeping in view his peer group and social status. Thus, he may be willing to pay a little more for the same functional material. However, when it comes to choosing an After Shave Lotion, or a perfume, his psychological association of the product will determine its value and concommitant price he is willing to pay. Having accepted this value-related definition for price, we are now ready to look at the various factors that go into developing the construct of value. These are: The product itself; the implied attributes of the product; the benefit associated with the product; the needs of the consumer and the degree of satisfaction of these needs through the product; the perception of the consumer about the quality, the brand and the image of the supplier.

Thus, we find that quality is just one of the factors contributing to the consumer's

perception of the value of goods and services. There are, however, certain instances when quality takes on a more important dimension of value over the other factors. Some of these situations and their implications to adopting a suitable strategy for selling are being tackled in the following pages.

The Competitive Strategy

The quality of a product is reflected in terms of the product attribute perceived by the consumer. A marketing manager can effectively combine the price and quality aspects to evolve a competitive positioning strategy for the product.[1] Fig. 1 maps the quality and price on two different dimensions and evolves a nine-cell matrix for competitive strategy.

Product Quality	PRICE: High	PRICE: Medium	PRICE: Low
High	1 Premium Strategy	2 Penetration Strategy	3 Super Bargain Strategy
Medium	4 Over Pricing Strategy	5 Average Quality Strategy	6 Bargain Strategy
Low	7 Hit and Run Strategy	8 Shoddy Goods Strategy	9 Cheap Goods Strategy

FIG. 1

(Source : See Reference 1, Page 86)

Thus, we have an intrinsic premium product strategy for a product of high quality being offered at high price, and, conversely, a cheap goods strategy when the product is low on both price and quality. In between these two extremes, other possibilities can be considered to effectively place the product to meet specific target markets. Given this framework, the implication to selling would follow effectively as an effort to translate these strategies to consumer satisfying communications. This aspect is being discussed in detail towards the end of this paper.

Economic Aspect of the Interface

Economists essentially prefer to focus the effect of price on demand of a product. A lot of simplifying assumptions are made as to the product and the market from which a demand vs. price curve, as shown in Fig. 2, follows :

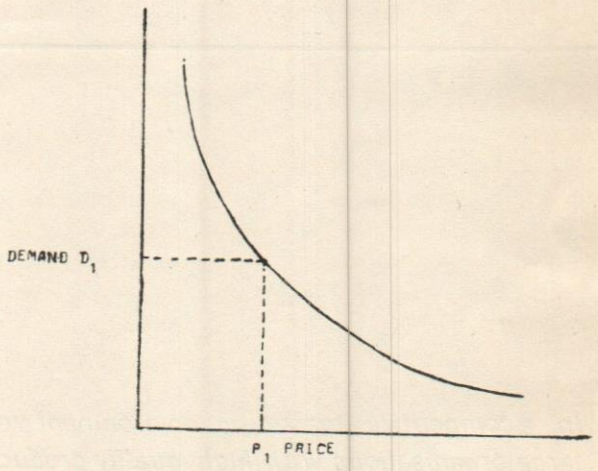

FIG. 2

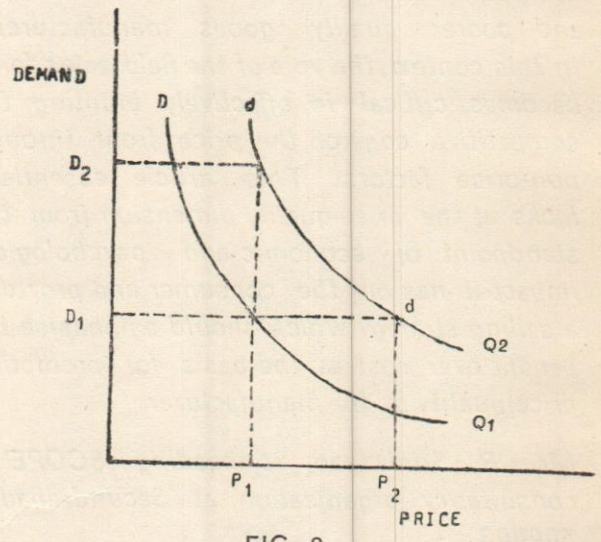

FIG. 3

However, this curve assumes a homogeneous product and hence demand is only a function of price. If we introduce the dimension of quality into this phenomenon, we can conceptualise the situation as shown in Figure 3. Here, the curve DD corresponds to quality level Q_1 and the curve dd corres-

ponds to a higher quality level Q_2. Thus, we find that for the same level of demand D_1, we can obtain a higher price P_2 if the quality alone is increased. Similarly, if the price is kept constant and quality is improved, we can have higher demand at D_2 over D_1 for the same product. The converse of this situation would also follow the same logic. What does this analysis show ? It indicates that under normal conditions, the other things being kept constant, we can expect either higher price for higher quality or larger demand at higher quality, if the price is kept constant. Part of the marketing logic of relating price and quality in this fashion follows from this approach.

The economic dimension of quality vs. price acts in two other ways. From the production point, considerations of quality add to the cost, which, in turn, may affect the price. We have used the word *may* only to indicate that it is not necessary to pass on the added cost of quality to the consumer by charging a higher price. This is quite possible where there is intense competition or a large volume of business is prevalent, so that costs can be absorbed. However, the economic point of view and, in turn, the marketing consideration, the cost aspect of quality, certainly influence the pricing decisions in many practical situations. Whether this forms a rational or necessary approach is beyond the purview of this paper. One comment is, however, pertinent from the marketing point of view. Price vs. quality, keeping the costs in view, would be an important consideration while taking major decisions on the product itself, such as *introduction*, *continuance*, *modification* as also the *segment of market* at which the company's products are aimed.

The second aspect of this dimension arises from the *consumer's perception* of quality in relation to price. Several studies have focused attention on this. Further, the pattern of success and failure case histories reported over the years enables us to make certain observations on this price vs. quality relationship :

1. The customer's perception of the price vs. quality is influenced by the amount of information he has on the various factors concerning a product. Thus, it has been found that, in the absence of sufficient information on other factors, consumers generally tend to relate higher price with higher quality, if price is the only information available.[2]

2. The consumer's perception of price vs. quality is guided by the frequency of purchase of the product. Thus, one finds that the commonly purchased articles of consumption, such as toiletries, food articles, etc., exhibit within the same product/brand category, low correlation between price and quality.

3. Consumers tend to have a concept of a band of price within which they exhibit confidence in the quality of the product.[3] For a given product category, say, transistor radio sets, there is a threshold (minimum price level) below which the consumers will doubt the quality of the product. This minimum level will vary from customer to customer, but usually we can expect this to be within a range for a given population of customers. Similarly, at a higher price, the maximum a customer is "willing" to pay also has a limit beyond which he would feel the price too dear. This also varies from customer to customer, but can be expected to lie within a range. Between these two extremes of price limits, related to the perception of price vs. quality, one can always find customers for a product of a given quality. This concept has been tested under different circumstances and for different products and found to be generally applicable to a wide range of durable products.

4. The perception of price vs. quality is affected by the benefits offered by the supplier. These benefits are related to such factors as social status implied by the label, place of purchase, appearance, personal relationship of

sales person, availability, quality of service, breadth of line of the supplier, technological and design service, etc... Accordingly, we find that the construct value encompasses and includes quality in an indirect way, in terms of the socio-cultural and economic factors incidental to the purchase situation.

5. Finally, the 'risk' associated with the purchase of a material will also influence the price vs. quality perception. When it comes to buying capital equipment, an industrial buyer would consider the risk of breakdown and wrong choice on their economic activity, while a consumer may be willing to pay more for a particular category of medicine which may otherwise harm his health if the quality is not assured.

Psychological Aspect of the Interface

The consumer behaviour studies show[4] that the consumer does not necessarily act rationally, as the economist would like us to believe. For actions of consumers have shown a perceptible deviation from the logical and expected behaviour. The perception of price vs. quality in a large number of situations can be better explained if we take the psychological impact of price and quality on an individual

1. Psychologically, a consumer's price judgment is a judgment of 'value-for-money', where value would refer to use-value of some commodity for some person or persons. The use of value is a subjective matter and hence personal factors other than needs influence the price judgment.

2. Price judgments are relative, not absolute; relative to what is known of other prices as well as being relative to the significance attached to the associated use-values. Thus, any perceived cheapness or dearness of a given price will be a function of the prices being charged for similar goods; for instance, textiles, food, consumer durables, like TV and fridge.

3. Psychologically, there appears to be a *'normal' or standard* price for each discernible quality level in each commodity class, and this normal price tends to act as an anchor for judgment of individual prices. Classical examples of this can be the price levels in cigarette categories, soaps, as between mass consumption and premium variety, etc..

4. Further, there is a range of tolerance (or region of indifference) about each such standard and its associated quality level. However, the amount of price variation that has no effect on sales appears to differ with different products. So much so that products are priced among competing brands clustered around a central tendency, as in the previous example of cigarettes, soaps, toothpaste, TV, etc..

5. The normal standard price will tend to be an average of the prices being charged for similar commodities. That is how any new entrant in the market fits his offering around this standard.

6. There is a general tendency for the *range of prices* offered to affect the price *judgement*. If a new product, or an existing product, is priced too high or too low, it may be rejected as not belonging to this class. In the first case, the contrast effect operates in that the high prices are not attributed to high quality alone. In the second case, the threshold effect operates in the sense that below a minimum level of price, the intrinsic products quality is questioned.

7. When the range of prices is extended by the introduction of a new product or repricing, a shift in judgment of standard price is more likely than when the range is restricted. This implies that when the prices are increased at the lower end, then the judgment of standard price will shift upwards, whereas when the prices at the upper

end are extended, only a slight change may be perceived in the standard price. This has already been observed in the case of such items as vanaspati, detergents, etc..

8. Prices will be seen generally as a set of ordered categories, such as cheap, fair dear, etc., rather than as forming a continuum. This implies that prices will be seen as clustered around certain levels which will be subjectively evaluated by the consumer. This can be particularly observed when, just after a purchase, an individual is asked how much he paid for a product. It is more likely he may not remember the exact amount, but would comment that he had got it cheap, or that it was a costly buy.

9. Price judgments imply the mapping of both price and quality, and the matching of these maps. This means that a buyer prepares, in his own mental framework, a categorisation of objective prices into qualitative values, such as dear, fair, and cheap, while at the same time, the objective quality is also similarly categorised into superlative, superior, good, poor, etc. Then the process of price judgment involves, symbolically, mapping of this categorisation of price and quality, one over the other. If the mapping is horizontal and one to one, then the perception of a correct price exists. If the price categorisation shows a higher level, compared to the quality, an impression of over price prevails, and vice-versa (See Fig 4).

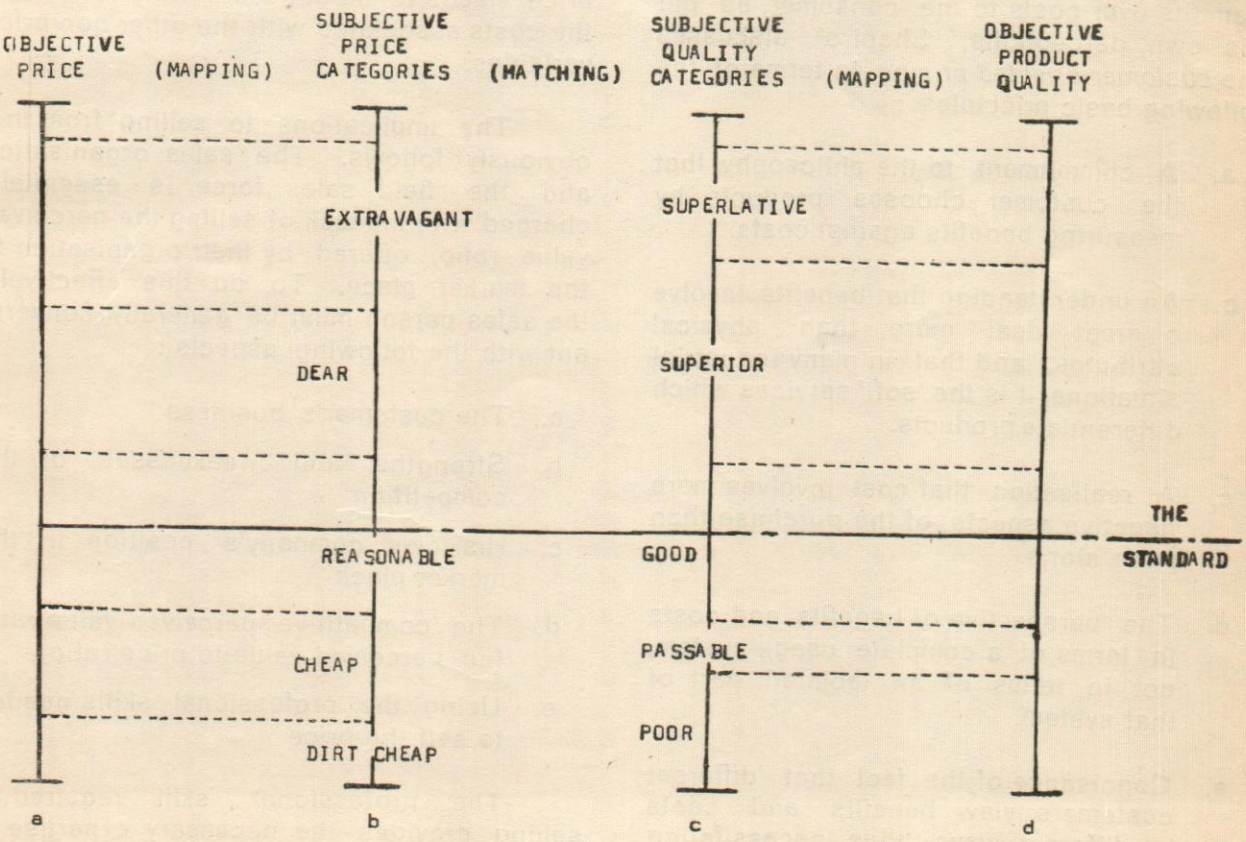

FIG. 4 : THE SUBJECTIVE MAPPING OF PRICE AND QUALITY DIMENSIONS

Source : Taylor, B. and G. Wills (Eds.), *Pricing Strategy*, London, Staples Press, 1969. p. 104.

10. A change in price may induce changes in the quality attributed to a product and vice-versa, *other things remain the same.*

Marketing and Selling Implications

The aforesaid discussion brings us to the significance of non-price factor on the perceptions of the consumer, even though price is a very visible variable available for the marketer.

Thus, the price setting in the modern business context is necessarily customer-oriented, keeping the customer's needs in view.

Customer-oriented pricing is different from demand-oriented pricing, in the sense that the pricing is focused to provide excess benefits over costs to the consumer, as per his own perceptions. Shapiro[5] discusses the *customer-oriented pricing* in terms of the following basic principles :

a. A commitment to the philosophy that the customer chooses products by measuring benefits against costs.

b. An understanding that benefits involve a great deal more than physical attributes, and that in many industrial situations, it is the 'soft' services which differentiate products.

c. A realisation that cost involves more negative aspects of the purchase than price alone.

d. The perspective of benefits and costs in terms of a complete usage system, not in terms of an isolated part of that system.

e. Cognisance of the fact that different customers view benefits and costs in different ways, thus necessitating careful market segmentation.

f. The application of graphic techniques to understanding the position of products and product lines in terms of customer needs and competitive offerings.

The perceived value concept, discussed earlier, is directly related to the benfits mentioned here. The effort of marketing is to make the ratio of the perceived value to price (perceived value ratio) as high as possible (assuming that it is possible to quantify the perceived value). This implies that conceptually, in order to increase the perceived value ratio, it is not necessary to manipulate price alone, but one can try to increase the perceived value (that is, the benefits) to the consumer through manipulation fo other non-price factors. The marketing manager can thus focus his efforts on other marketing variables to project a higher perceived value ratio to his consumers for his product offerings. This implies that price needs to be utilised mainly to recover the costs associated with the other non-price variables.

The implications to selling from this obviously follows. The sales organisation and the field sales force is essentially charged with the task of selling the perceived value ratio, offered by their organisation to the market place. To do this effectively, the sales person must be generally conversant with the following aspects :

a. The customer's business

b. Strengths and weaknesses of the competition

c. His own company's position in the market place

d. The competitive perceived-value ratio (i.e. perceived value to price ratio)

e. Using the professional skills needed to sell the price

The professional skill required in selling provides the necessary expertise to analyse the problem situation to evolve a suitable selling plan to meet a customer need. The need for expertise in the sales person has been identified as an important

factor in influencing the price-quality barrier in a consumer[6]. The consumer's perception of the level of expertise in a salesman helps in shifting the price-quality barrier of the consumer towards his product more favourably.

Guidelines for Sales Force

As we have already discussed, quality is an attribute of the value dimension of a product to a consumer whereas price is the sacrifice a consumer is willing to make to obtain this value in exchange. Today, a large number of traditional, low technology product lines are faced with this problem of high price, high quality in a competitive market. The role of the sales force becomes critical in meeting this competitive challenge. Necessarily, the emphasis for effective selling must shift from price to non-price factors. But the ultimate goal ought to be to sell benefits to the customer in exchange for his price sacrifice. Some of the following considerations would be useful in properly planning and achieving a selling task, under these circumstances :

1. A sales person must know his customer and his needs, problems and critical areas. He must evolve a selling plan to meet the specific need and solve the customer's problem.

2. He must provide a quantitative analysis of the benefit vs. cost for his products vis-a-vis the competition, converting the quality-price dimension effectively in terms of benefits and costs.

3. He must approach the problem of selling, not as a one-time affair, but as a continuing function of maintaining mutually beneficical relationship with the customer.

4. He must, wherever possible, emphasise the total package of services provided by his organisation and convert these into tangible benefits.

5. It is essential for the sales person to have a thorough knowledge of his company, his product's strengths and weaknesses in relation to his competitors. This information can be appropriately used to meet any objections in selling.

6. As discussed earlier, the sales person must have a clear understanding of the policies and strategies behind the specific marketing decisions, concerning price and quality, of the company. This will help in evolving specific selling plans.

7. The sales person must make it a point to regularly give feedback from the market place on the various developments and moves of the competitors, which will be quite useful in taking timely technical decisions, wherever necessary.

8. Finally, the field sales force must understand its role in effectively communicating the company's product and service offerings to the market as the best option to meet the market's needs.

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