VOL. VI NO. 1, SPRING 1965

PRODUCTIVITY

SPECIAL SECTION ON HUMAN RELATIONS

NATIONAL PRODUCTIVITY COUNCIL JOURNAL

NATIONAL PRODUCTIVITY COUNCIL

The National Productivity Council is an autonomous organisation registered as a Society. Representatives of Government, employers, workers and various other interests participate in its working. Established in 1958, the Council conducts its activities in collaboration with institutions and organisations interested in the Productivity Drive. Forty-six Local Productivity Councils have been established all over the country and they work as the spearhead of the productivity movement.

The purpose of NPC is to stimulate productivity consciousness in the country and to provide services with a view to maximising the utilisation of available resources of men, machines, materials and power; to wage war against waste; to help secure for the people of the country a better and higher standard of living. To this end, NPC collects and disseminates information about techniques and procedures of productivity. In collaboration with Local Productivity Councils and various institutions and organisations it organises and conducts training programmes for various levels of management in the subjects of productivity. It has also organised an Advisory Service for industries to facilitate the introduction of productivity techniques.

Recognising that for a more intensive productivity effort, the training and other activities of NPC designed to acquaint management with productivity techniques, should be supported by demonstration of their validity and value in application, NPC has decided to offer a PRODUCTIVITY SURVEY & IMPLEMENTATION SERVICE (PSIS) to industry. This Service is intended to assist industry adopt techniques of higher management and operational efficiency consistent with the economic and social aspirations of the community. PSIS is concerned with the investigation of management and operational practices and problems, measures of improvement and their implementation. NPC has also established at Bombay a special Fuel Efficiency Service.

NPC publications include pamphlets, leaflets and Reports of Productivity Teams. NPC utilises audio-visual media of films, radio and exhibitions for propagating the concept and techniques of productivity. Through these media NPC seeks to carry the message of productivity and to create the appropriate climate for increasing national productivity. This Journal is an effort in the same direction.

". . . Human relations is the development to joint purpose and motivation in a group. Applied to industry, it is the integration of people into work situation in a way that motivates them to work together productively, cooperatively, and with economic, psychological, and social satisfaction.

". . . The three important goals in human relations in industry . . . are to get people (i) to cooperate, (ii) to produce, and (iii) to gain satisfaction from their work. When these goals are achieved, the result is a successful group effort . . . "

—Keith Davis

Contents: Next Page

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The Editor invites well-written contributions in the shape of articles and suggestions for improvement of productivity in industry and in all other related fields of activity. The length of the articles, though not restricted, should ordinarily not exceed 2,000 words. Articles should be typed in double spacing, on one side of the paper only, leaving a reasonably wide margin. A brief summary should also be provided.

Photographs and other illustrations are welcome, but should be restricted to a minimum. For each one, the appropriate place of insertion in the text should be indicated.

Latest books on technology, economics, social sciences, and on all other subjects having a bearing on productivity will be reviewed in the Journal. Books should be addressed to the Editor, 156 Golf Links, New Delhi-3.

P R O D U

Vol. VI, No. 1

CONTENTS

I V I T Y

Spring 1965

OUR COMING ISSUE

In view of the country's paramount need of a massive improvement in the productivity of agriculture, the National Productivity Council, drawing upon the cream of the world's research resources in the field of Agriculture, will publish, this Summer, a bumper volume containing original research work done in the field in the USA, the UK, Israel, Australia, and New Zealand, as also the work that is being done all over India at the recently started agricultural universities, agro-economic centres, etc. The experiences of administrators, like MS Randhawa, AD Pandit, Tarlok Singh, and Ajit Prasad Jain, and a number of others, are also being made available.

Among foreign contributors are: HS Burtt, Chairman, British Productivity Council, Committee on Agricultural Productivity; Sherman E Johnson, United States Department of Agriculture, Washington; EA Saxen, Bureau of Agricultural Economics, Australia; Orion Ulrey, Michigan State University; Vernon W Ruttan, The International Rice Research Institute, Manila; WH Senior, Department of Agriculture & Fisheries for Scotland, Edinburgh; and Wilbur B Wood, Ohio State University Agricultural Education and Research Mission to India.

Illustrations

Also—cartoons, sketches, and illustrated feature on 'Working Together'

Almost any job can be done more efficiently and at lower cost; and the job of the O & M man is to find out the better way and make it work. See cartoons on pp 134-135. The story depicted in them is not true, but the moral is.

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Vol. VI, No. 1—SPRING 1965 Editor: DH Butani

PRODUCTIVITY

NATIONAL PRODUCTIVITY COUNCIL JOURNAL

FOR the last several years that *Productivity* has been in existence, it has been the main burden of our thesis that it is not so much a question of techniques, as of Human Relations, being the crux of the industrial problem: how all decisions relating even to machines and materials involve in reality, problems of interpersonal relationships; and how unless these improve, the chances of enhancing productivity through improved machine utilisation and materials handling would remain bleak indeed. The path, therefore, to higher levels of mechanical efficiency lies through the hard core of human relations.

In this context, we had published a special issue of this journal, devoted to the exposition of the theory and practice of the new techniques of Personnel Management (Vol. II, No. 6, 1961). We have here printed a section on Human Relations, drawing upon more fundamental material available from the Tavistock Institute of Human Relations and some of the recent experiences gained at the SIET Institute, Hyderabad. Some of our Indian specialists have made available for publication first-rate material on Job Satisfaction, Personality Factors, Brain-storm Sessions, The Manager as Change Agent, etc., which, we are sure, will contribute substantially to existing literature on productivity.

It is of paramount social importance that we educate our masters—to use Disraeli's famous phrase—in this Literature on Human Relations, for the future of this country depends on how harmoniously we work together. Special permission was, therefore, obtained from

the Management of the TELCO to publish, as an integral part of this journal, their beautiful pamphlet, *Working Together*.

The fact of the matter is that industrial development being contemporaneous with a social revolution in human values, we need to have mechanisms which are in accord with the needs and sanctions of industrial democracy. The old art of management—the art of making men miserable—has just lost its workability. As the American Management Association has put it simply: "... Research has proved to management that while the whip cracker gets results temporarily, the company pays a heavy price in absenteeism, turnover, grievances and a general collapse of morale which is soon reflected in production ..."

In a penetrating analysis, published in this journal (Vol. IV, No. 3, page 403), Prof Whyte had demonstrated through actual industrial case studies, how power slips through the fingers of those who wield it: "... The world of industry is full of executives who will sacrifice almost anything in order to maintain their 'power', to give orders that will not be

"Industrial psychology, my foot! Hand that to the works foreman and tell him we've got to increase production."

effectively carried out . . ." This is the real reason for actual efficiency being at 30 per cent or 40 per cent of what the Work Study experts consider as normal! It is also the reason why mere incentives are insufficient to get either a move or to attain that 100 per cent efficiency, as rated by productivity experts.

Experienced industrialists who have gone abroad in search of modern machines, uptodate techniques, as also top technicians, have come to almost this unanimous conclusion that the explanation of the high industrial productivity of developed economies lies in team-work which they are able to organise, in their attitudes of mutual helpfulness and tolerance. It is this industrial culture of mutual compromises and adjustments, of the give and take of life, that under-developed economies must evolve, if they are to attain those levels of productivity associated with modern industrial technology.

It has to be said in the clearest possible terms that productivity does not necessarily mean harder work; it may actually mean less or pleasanter work done in surroundings not only of comfort but of group solidarity and fellow-feeling. These points need to be emphasised in this country, because the peoples of Asia having passed through historical decades of grinding poverty, have come to look suspiciously upon the introduction of new techniques, as somehow designed to get more out of them than to give them. The whole task of increasing productivity needs to be viewed in a spirit of humility . . . Productivity techniques have yet to be evolved from within the Indian experience. This country has plenty of talent . . . The prospect is pleasing but we have to work hard and religiously.

from **PRODUCTIVITY**
Vol. I, No. 2

The Productivity of Small Industry

THE National Productivity Council, since its very commencement, has evinced an intimate interest in developing the Productivity of Small Industry, as being the mainstay of our economic system within the framework of Social Democracy.

In conformity with these policies of NPC—and as an integral part of the organisation—we brought out towards the end of 1962, a Special Issue of *Productivity*, devoted entirely to Small Industry, including international experience. It was, however, deficient in one material particular, namely, a world-wide conspectus, through which we could draw simultaneously from all shades and levels of experience, to push forward the Productivity of Small Industry in every possible way, leaving nothing undone either by way of policy, organisation, or finance. This lacuna is now filled up by an original contribution by a senior civil servant with whose reflections on the development of small-scale industries in India, this issue of the journal begins. It is an essay in complete involvement, so essential to the success—upon which much depends—of the almost infinite potential of Small Industry in India.

Reflections on

Developme

The position of the small-scale enterprises scattered widely throughout the country, and how they should be developed, are discussed here by Dr Merani who recently visited Japan, the USA, Puerto Rico, the UK and Sweden. "What is needed," according to him, "is selective, concentrated effort and a sustained combination of all the required critical inputs into an area in order to get worth-while results within a reasonable time."

RECOGNISING industrial development as our aim, we must regard this as total a theme, of which the small-scale industries sector constitutes an integral part. Once this is recognised all along the line, both at the policy and the action levels, the development of small-scale enterprises would be regarded as a part of the process of industrial development and, thus, this sector would receive all the necessary inputs in order that our main purpose should be fulfilled within a reasonable time.

Social, Economic Imbalances

In this context, it is essential to recognise that we have inherited certain social and economic imbalances in our country. To put these right, a variety of effort is needed. One way would be to increase the opportunity for new-comers in the field of small-scale industries.

The small-scale industries' contribution to the employment creating capacity of the social and economic system can be substantial. This aspect must also clearly be recognised and taken into account.

It is in our interest to widen the base of leadership so as to strengthen our democratic organisation. The small-scale enterprises scattered widely throughout the country would constitute points of leadership and thus strengthen our base. From this point of view also, it is in our interest as a democratic nation to do everything possible to increase such points of leadership.

Area of Involvement

Efforts should be made to enlarge the area of involvement so that there are others, besides ourselves, having wider and vital interest in the small-scale industries sector.

For the greater success of our effort in the field of small-scale industries, we must think of a △, with ourselves as an arm of it. The two other arms are the apparatus of the State Governments' Industries Departments and the set-up of the Small-scale Industries Associations. Realising this, it is essential that we work together. It is this kind of involvement that would enable us to secure higher levels of performance and achievement. We must establish and take steps continuously to strengthen our day-to-day working relations and operate in the closest possible collaboration with them.

We should introduce the concept of 'Developmental Assistance' to small-scale enterprises so that it is recognised that assistance must be rendered as an integral part of development strategy in order that the purpose for which it is offered is fulfilled.

When it is a State objective to develop small-scale industries, the attitude to the existing enterprises and to the new-comers

Small-scale Industries

DR ST MERANI
Development Commissioner
Small-scale Industries

Being excerpts from a report by the Author

must change. These must not be regarded as applicants for this or that, but as an integral part of the system which we want to promote and, therefore, the approach to their needs and problems must be from the developmental point of view.

Looking at the level of development of the existing small-scale enterprises and the new enterprises to be established, the assistance and the service facilities must be such that the various needs of enterprises at different levels of development could be fully dealt with.

Single or isolated inputs in the form of advice, service facilities, funds, machines, or, again, isolated efforts of one or the other kind, will not meet the requirements of the situation or the challenge under which we must develop new enterprises. What is needed is selective, concentrated effort and a sustained combination of all the required critical inputs into an area in order to get worth-while results within a reasonable time.

Priority Industries

We should introduce all the relevant inputs (where necessary in groups) in sufficient concentration and at the most appropriate time schedule so that expected results are obtained. This would mean that we should decide upon the inputs with which we would be concerned and then take all the necessary steps to ensure that these are introduced in accordance with the principles mentioned above. This should be ensured particularly in areas selected for intensive action.

In order that the promotional activity of the Central Small Industries Organisation should bear substantial results within a reasonable time, it is desirable to specify certain industries which should receive its priority attention. While the priorities may change from time to time, a beginning could be made with a group such as the following:

1. Industries required to service agriculture;
2. Export industries;
3. Industries based on agricultural produce (including fruit and fish);
4. Industries using indigenous raw materials, specially leather, ceramics and wood industries;
5. Import substituting industries;
6. Ancillary industries; and
7. Industries important to public sector enterprises and public services.

In planning further work, these priorities might be kept in view.

Technical assistance by the Central Small Industries Organisation must be rendered in depth. This requires appreciation of the

changing managerial and technical needs of different kinds of enterprises and periodic redeployment of resources to meet these needs.

It should be ensured that there is adequate capacity to render specialist service depending upon the nature and concentration of small-scale industries. For the large number of enterprises which would require general services, the necessary group approaches should be developed and adequate provision made.

We must gradually be able to move over from the point of providing only the simple common service facilities to making available tool-room and laboratory services, wherever required, so that the service rendered by us is increasingly of a higher order.

Tool-room and laboratory facilities (and the type of specific equipment) should be carefully related to need. There should be close consultation with the small-scale enterprises and their Associations to determine this need.

As this is a long-term and expensive investment of resources, it should be undertaken after thorough enquiry, determination of need from the long-term point of view and in the closest collaboration with all concerned.

Advisory Committees

In order to work in the closest collaboration with small-scale enterprises (and their associations), who are the customers whom we must serve, it is essential that a small representative group of about three to five persons selected from among them should be attached to each of our Extension Centres to work in an advisory capacity.

With the small-scale enterprises being in a state of 'co-existence' and 'competition' with the large enterprises, as also between themselves, it is essential that efforts should be made to assist them to achieve progressively the maximum efficiency of operation.

Enterprise counselling (in-plant studies) which requires an intensive total look at the enterprise level, is valuable for various reasons. This is necessary in respect of 'afflicted cases' (enterprises which are not so well off) as also of advantage in other cases where better ways of operation could be recommended.

Now to the areas on which the small-scale industries could themselves concentrate as a matter of priority: There are various directions in which action would yield results. Let small enterprises initially concentrate on such areas of their internal working as are completely under their control and in which every right action would be ever so rewarding.

Cost consciousness among small-scale enterprises is essential. The first two steps that go together are: (1) to emphasise the importance of cost reduction, and (2) to show that reduction in cost can be secured in a large majority of cases, provided sufficient and continuous attention is paid to all of the various relevant factors involved. There is need to provide guidance in this area of effort: on how to reduce costs generally and in any given circumstances—where to begin and on what factors to concentrate—so that there is a constant search by the small-scale enterprises for measures to reduce costs.

Small-scale enterprises need a great deal of assistance in the field of cost accounting. There is also the need continuously to make 'cost studies' and disseminate the results thereof. It is necessary to build up the capacity to undertake work in these two fields.

Book-keeping is an essential step in cost accounting. We must organise a large enough effort to run courses in Book-keeping for the benefit of small-scale enterprises.

We should also arrange for the production of simple Book-keeping Manuals with pro-forma and detailed instructions, in English, Hindi and other regional languages, for the widest possible use.

The cost aspect cannot be divorced from the concern for quality. The effort should be to make the small-scale enterprises quality

conscious and we should assist them progressively to achieve better quality performance.

The subject of marketing and assistance to small-scale enterprises in this field need serious attention. This is particularly important in the field of exports. Intensive and continuous market research is required in India and abroad. Efforts are also necessary in some cases to persuade small-scale enterprises to market their products working together as a group; that is, a group of small-scale enterprises could organise such an effort jointly. This is done even in advanced countries like Sweden. Joint advertising by groups of small-scale enterprises is also desirable.

Assistance should be made available to small-scale enterprises (and they should be encouraged to seek it) on 'Product Designing'. Most small-scale enterprises cannot afford this on their own; a large number of them is not even aware of the need in this field. Such assistance is all the more essential if we are to be successful in our export efforts.

Open House Technical Discussions

In order to encourage the further technical development of small-scale enterprises, efforts should be made by our Small Industries Service Institutes to arrange 'Open House Technical Discussions' so that technical problems of different industries and sub-groups of industries are discussed in depth with entrepreneurs and technical officers of small-scale enterprises on a regular and systematic basis. This way, a wider spread-over of technical know-how would be secured as between different enterprises and our technical officers. The emphasis should be on discussions and exchange of information. Equally, the emphasis should be on the informal nature of such discussions and the regularity of holding them. The industry (and the different sub-groups) should be picked out in such a way that each group will have the opportunity for a discussion on a regular basis, say, once in three months.

Arrangements should be made for selected entrepreneurs and their technical officers in specific, sophisticated, as also export-oriented, industries to be sent abroad. As against the general tours of the older type, the effort should be to have them stationed at one or two selected enterprises abroad for two or three months at each place so that they have the opportunity to observe the total working of the enterprise at a close enough range to be able to absorb the technical knowledge and the business approaches adopted in these enterprises. This suggestion received warm response in the USA, UK and Sweden, and when suitable approaches are made selected enterprises in these countries would be willing to respond.

. . . Increase in productivity is possible in the small-scale enterprises . . . which should be encouraged to work out productivity targets in consultation with labour, and to attempt their fulfilment within given periods. Arrangements should be made at the enterprise level for the measurement of productivity. . .

To have more is one way. But to get more out of what one has is another equally important way. There are limitations to our assisting small-scale enterprises to have more resources—materials, machines, etc.—though efforts must continue to be made. But we could certainly intensify our efforts to assist them to get more out of what they already have.

This means intensive efforts to go out to them as also to bring them to our Service Institutes and Extension Centres. This

also means giving them advice in detail and technical assistance to the maximum possible extent. It means identifying ourselves with their needs and problems and attempting to meet their requirements on a continuing basis.

Management Training

In addition to technical assistance in depth, provision should be made to provide training in the field of management to an increasingly larger number so that over a period of years a very large percentage of entrepreneurs will have had the opportunity to participate at least in one, but preferably more than one, course of training. In order that such training should be within the reach of most small-scale entrepreneurs, it would be necessary to provide training in regional languages also. This is being done at present to a very limited extent, but a much larger programme is called for. It should also be provided that, where necessary, some kind of introductory course should be run for those who have not yet become managers of enterprises but who are good material for joining the managerial cadres of small-scale enterprises.

Apart from general courses, adequate provision should be made for the different types of specialist courses as these may be needed to increase the efficiency of the total management operation.

We should persuade outsiders (industrialists, economists, marketing specialists, and others who have specialised knowledge and experience of different types) to come to our training classes and make their contribution to the management training programmes. Training courses run by officers alone are not enough. As an instance, it might be mentioned that 1,002 outside technical lecturers were involved in the training programmes in Sweden.

In collaboration with the National Productivity Council and the Local Productivity Councils, we should intensify our activities in the field of productivity and ensure that detailed and continuous attention is paid to productivity improvement in the small-scale industries sector. It must be emphasised that increase in productivity is possible so that it is regarded by small-scale enterprises as an attainable objective and efforts are directed to achieve 'higher output per man-hour'. The various types of assistance which have been referred to earlier should enable us to achieve higher levels of productivity and the enterprises must be persuaded to undertake specific action programmes directed to increasing productivity on a systematic basis. Enterprises should also be encouraged to work out productivity targets in consultation with labour and attempt their fulfilment within given periods. It would also be desirable that arrangements should be made at the enterprise level for the measurement of productivity.

The small-scale industries must be persuaded to recognise the importance of Labour-Management collaboration at the enterprise level, and encouraged to regard this as an important aspect of the total effort. Active promotion of new small-scale enterprises, particularly in priority industries, should be undertaken.

Areas for Intensive Action

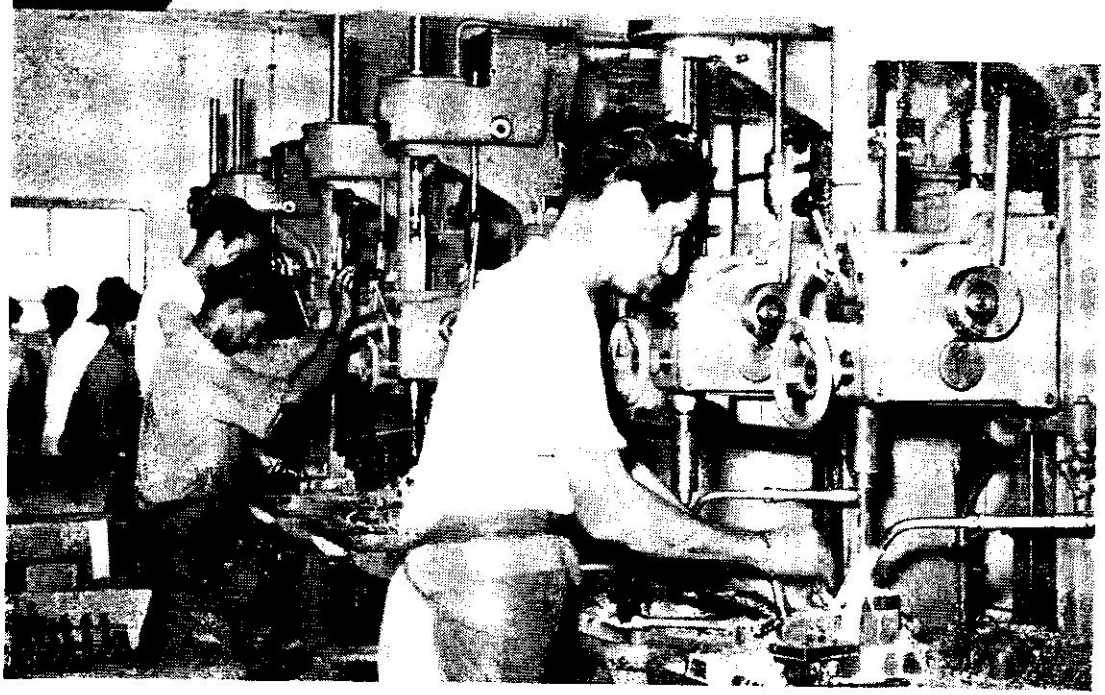
Taking into account all the relevant economic, manpower and social factors, and, on the best possible judgment, we should select certain areas for intensive action. These may be towns and their extensions, satellite areas and, in some carefully chosen cases, rural areas. In the case of these rural areas where the necessary conditions for attracting industry or developing it are not fully present, special steps would first need to be taken so that the new enterprises have the best chance to come up and to flourish. As a great deal would depend upon the selection of areas, this would need to be made on hard practical considerations.

Having selected the areas, we should then concentrate on them and try to get positive results within a reasonable time in order to achieve some snowball effect.

This calls for identification of groups and individuals from different classes and of

Some think that the small-scale industries sector is just another handicrafts field. That this is not so, is amply demonstrated by pictures appearing on this page, and the next one

Quality production in the case of small-scale industries sector is possible, and is, in fact, being achieved in many fields



different types. Apart from the types and the persons who have been approached in the past—a process which must continue—we must reach others who are most likely to be attracted to newer areas of effort: for instance, the graduates from technical colleges and universities. They could be reached through publications, lectures, special courses and individual counselling. Generally, this class has looked to paid employment for its future. A new way and a possibility could be shown to it. Again, high grade technical and managerial personnel, after some periods of paid employment, are often in a mood to think of something independent and on their own. This is a group worth making note of and identification of suitable persons in this group could be rewarding. Another group which has traditionally looked to 'civil service', for instance, as offering the most desirable future, could be shown the possibility in this area of development. Then, there are the persons who in the past have looked to trade and commerce for their future. Some members of this class could also be attracted to small-scale industries particularly the 'third sons' of those who might be engaged at present in trade and commerce.

There are also the existing importers who have excellent knowledge of markets in India and sources of supply abroad, who could be attracted to small-scale industries. This way, we should attempt to attract both talent and finance.

In the search for identifying those who might enter the field of small-scale industries, we must also realise the importance of those selected few who become the catalysts and round whom activity then grows.

In every community and place, there are always some *avant-garde* or front-rankers. It would be worth our while to interest them in the possibilities of success in the field of small-scale industries. We are familiar with the idea of 'growth centres'. Likewise, there are always some persons in a place or a community round whom it is easier to build up new ideas and to develop new enterprises. It is worth-while to locate the pace-setters.

Not to be Priced Out

We should not encourage the formation of enterprises which cannot, when developed, stand on their own. In the competition in India and abroad, we will be priced out unless adequate care is taken at the earliest possible stage to back up only those who have the best claim to growth. Hot house growth with unwise supports must be avoided. Enterprises which cannot stand on their own cannot be a support or a stimulant.

In certain selected cases, detailed feasibility studies should be undertaken so that once

Optimum Productivity

The Government of India, in November 1955, constituted a Committee on Amalgamation of Collieries, with Sri Balwantrai Mehta as Chairman, to examine the possibility of amalgamating collieries into economic units, particularly in the Raniganj, Jharia, Bokaro, and Karanpura areas.

The Committee, in its report, had recommended that the area of a colliery should be large enough to produce 10,000 tons a month for a period of 50 years, the area being in no case less than 100 acres if a colliery were to adopt scientific and efficient methods of mining and exploitation of coal without avoidable waste, and to give effect to labour legislation by granting adequate facilities and amenities to labour, etc.

this effort has been made, further promotional effort could be undertaken without delay. The feasibility reports should be such that a new-comer could safely operate on their basis.

Promoters

It seems that for the rapid development of new worth-while small-scale enterprises in priority industries, particularly in those areas where we must launch an active thrust, it would be desirable to establish the position of a 'Promoter' in each area so that there would be someone charged with the total responsibility of bringing about the establishment of such enterprises.

It is known that in the establishment of new enterprises in the small-scale industries sector, there are many impediments, delays, snags, and a series of authorities and agencies are involved. The result of the situation is that quite a lot of effort is wasted. Another result is that there is an insufferable time lag between the various stages, with the result that it takes a very long time for a small-scale enterprise to materialise. In these circumstances, it is necessary that we should establish the position of a promoter (a person or a group) who would be charged with the specific responsibility of ensuring that the prospective entrepreneur in the case of worth-while enterprises is assisted in a complete and helpful manner so that industrial enterprises do, in fact, materialise and that these come up within the shortest possible time in any given circumstances. There has to be someone who is experienced in organising enterprises and is capable of overcoming initial handicaps and ironing out all difficulties quickly and getting things moving, not in one Department, but in the various Departments and Agencies concerned. The experience of industrial promoters abroad has been very rewarding. The role of Fomento as a promoter of new enterprises in Puerto Rico has been significant. The position of a promoter should be established in each area selected for intensive action.

A very aggressive effort in the field of exports is called for. It is against the background of the total export effort that the small-scale industries sector should be expected to play its part and make its contribution, either directly or through the larger enterprises or again through Export Houses that may be in the field.

It seems that much more needs to be done to assist small-scale enterprises to obtain their financial requirements, at reasonable rates of interest, in the required measure, at the right time, and on terms and conditions which are appropriate to their situation. The existing institutions will need to extend their assistance to a far greater extent than has been the case so far.

There is also the need to assist small-scale enterprises to obtain equity capital. Keeping in view the specialised requirements of small-scale enterprises, it is for consideration whether something special should not be done so as to attract finance from abroad for their exclusive benefit. The discussions in the USA showed that this would be possible, provided something special were first done in India.

Investment Houses

This may be done by establishing Investment Houses at certain key places with a central apex point, possibly entrusted to one of the existing agencies for operation. The Investment Houses should be able to raise finance nationally up to about 50 per cent of the anticipated requirements. We could then look for international support to make up the rest.

The large enterprises have been able to secure not only technical collaboration, but also collaboration of the joint venture type from abroad. There is no reason why external collaboration should not be attempted actively in the case of small-scale enterprises also. Technical collaboration is already possible but more vigorous steps are necessary to activise this. Collaboration of the joint venture type has many advantages; through it, capital, raw materials, know-how, knowledge of markets, etc., all become available. Though some instances of this type already exist in the small-scale industries sector, this should now be tried on a larger scale. If

. . . We need a new technology, a new range of machines and equipment, even new processes, which would, on the one hand, be modern, and on the other, capital-saving and labour-intensive, capable of high productivity. The field of new technology for developing countries has not yet been opened up . . .

collaboration with single small-scale enterprises is difficult, it could be attempted, in some cases, with selected groups of enterprises in India. This could be considered specially in those cases in which we are not likely to go very far in the small-scale industries sector on our own or where foreign collaboration will have special advantages.

The discussions abroad showed that the prospects for such a development were very bright indeed. It would, however, be necessary to make up our mind, select the items, prepare some skeleton terms of collaboration (taking the large industry collaboration of the past as a guide), sound some prospective enterprises in India and then look for further discussions abroad.

It would be necessary to map out what must be done in India to achieve this objective. Without wasting time, it would be necessary, equally, to ascertain from abroad who are likely to be interested in such specific collaboration. After some preliminary work at both ends, it would be desirable to bring the two sides together—match-making both in India and abroad—so that the Indian entrepreneur could see, by a visit abroad, what he is going in for, and the outsider, by a visit to India, could see the exact conditions in which collaboration is expected to work. *Joint venture* requires joint effort. An effort of this kind requires active preparatory work here and abroad.

International Institute of Technology for Developing Countries: Is it much use in putting up new enterprises which use old techniques, no machinery or other equipment at all or old traditional tools? This will involve us in a long-term handicap. With limited resources and the need to grow fast, can we afford to have each of the new enterprises with the latest automated equipment?

With the need to create employment opportunities at a fast-enough rate—and the small-scale industries sector can make a substantial contribution to the creation of industrial employment—should we attempt in every case to have capital-intensive equipment?

When we buy from abroad, as we do in a large number of cases, what is the choice open to us but to purchase what is available for sale? A friend described this situation, the other day, as picking up Cafeteria style—the selection could be made but only from what is on the shelf.

What is available for sale has been produced almost entirely to meet the requirements of the manufacturing countries which are highly developed. When we obtain machinery and equipment, for instance, from the USA, England, Germany, Italy, Japan or USSR, it is the machinery which has been designed for the requirements of the producing countries. No one is producing specially for developing countries (there are a few exceptions of some recent machines produced mainly for export, but these, too, essentially are based on requirements as these obtain in the developed countries).

What has been designed for the need of developed countries is not what would serve the needs of developing countries in many cases.

New Technology

In developing countries, while in certain cases we must have the most modern and the latest machinery and equipment and continue

to get them wherever we can, in other cases we need a new technology, a new range of machines and equipment, even new processes, which would, on the one hand, be modern, and on the other, capital-saving and labour-intensive, capable of high productivity. The field of new technology for developing countries has not yet been opened up.

This needs a lot of research, identification of problems, designing, prototype effort and a continuous series of actions in workshops and laboratories, carried out by the most competent talent that can be excited to deal with this challenge.

One way would be to attempt to build such talent and capacity. This would take time even if the resources were available. In any case, it would not be easy to get the best under one roof. Nor is it really necessary.

The Challenge

What is required is to pose these problems to the existing talent and capacity that are available not only in the developed countries, but also in the developing countries as in India. I am sure that the scientist and the technologist would take up the challenge and find the answers.

Let, now, some determination be shown to find, adapt and create the technology that is needed. This is a challenge of such big dimension that unless a world-wide mood is created, the progress would not be of the desired order.

This calls for action at the national and the international levels, as the problems and the solutions lie widely scattered throughout the world. This should be attempted at both these points.

We must, therefore, immediately set about this business at the national level. We could attempt to identify problems. We could also look for solutions, if these exist already either in India or in some other parts of the world, and, as we go along, pose questions and raise problems for solution and discovery by reference to others in and outside India.

In the USA there would be willingness to deal with such problems as are raised at the national level. In England, and Sweden too, there would be the possibility of receiving a hand in this matter.

As answers begin to emerge, it might mean not only prototype work, but also manufacture of the new tools and machines by our own industry in India.

But the national effort will need an international counterpart as these problems concern many developing countries and the contribution of talent, experience and capacities by the developed countries would be so essential to effective work in this field. We should, therefore, try also for the establishment of an International Institute of Technology for Developing Countries, which would concern itself with these problems. The Institute would be charged with the responsibility of organising this whole effort on a wide enough scale, getting results for the different problems raised and generally functioning also as a world Clearing House of technical information on this subject.

A national arrangement in developing countries with the support of the International Institute of Technology for Developing Countries would be a distinct contribution in this field.

When I discussed this theme in the USA and at the UN, there was promise of great support. At the UN, they went so far as to request that I might prepare a paper on the subject for further consideration so that the theme of the establishment of an International Institute of Technology for Developing Countries could be pursued further.

It is once again essential to emphasise that the greatest chance lies in posing this as a challenge and as a problem to capacities and talents in existing laboratories and workshops, both in India and abroad.

Inventory of Talent

A careful Inventory of Talent within the Small-Scale Industries Organisation should be made, so that the 'right man for the job' concept, a basic principle in good personnel management, is fully practised.

At the same time, it is important to take a good look at what job is being done,

where and by whom, and what the future nature of jobs should be against the background of what the organisation must undertake to do in the context of the present priorities.

Utilisation of Resources

While advocating this to others, we must ourselves ensure continuously that there is intensive utilisation of our resources at the Small Industries Service Institutes. This should cover all aspects of our effort.

The success of our effort depends on many factors. While some may lie outside our immediate reach, there are several others which are controlled by us. We should be able to concentrate on these aspects. In view of the fact that the whole Small Industries Service Institute operation is intended to serve a dynamic changing industrial situation, arrangements need to be made for sensitive assessment of performance of each Small Industries Service Institute. The usual type of returns and stereotyped reports will not suffice. This must be done on a continuing basis.

The nature of our work is such that there could be an enormous satisfaction in working to personal targets of performance in different fields and stock-taking as we go along to determine what we have achieved.

As a service institute, or, again, as an officer-in-charge of any specific responsibility in the Central Small Industries Organisation, it must be our aim increasingly to achieve higher levels of performance. A running personal stock-taking is of high value.

'Not a gift of gods'

Happiness Depends on Inner Productiveness

"No one is born happy", according to Mr June Callwood (*Reader's Digest*, Jan. 1965). "'Happiness is not', says psychoanalyst Erich Fromm, 'a gift of the gods'. It is an achievement, brought about by inner productiveness. People succeed at being happy in the same way they succeed at loving, by building a liking for themselves, for true reasons. Hollow people, lacking any conviction of their worth and without self-respect, have nothing to give—a profoundly unhappy state. They must connive to secure love and admiration for themselves, and they cannot depend on keeping it.

Unhappy people rarely blame themselves for their condition. Their jobs are at fault, or their marriages, or the vileness of parents, or the meanness of fate. The real cause is the incoherency of their lives. Sterile and confused, they have no warmth to give, in work, play or love. They wait in apathy for a visit from the Fairy Godmother, and in the meantime try to distract their attention from the abyss of barrenness and boredom within them. The farthest notion from their minds is to improve their lot by tackling some self-reconstruction."

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Department of Field Services
Ontario Research Foundation

Information Science—Industry's Link with Technology

THERE appeared in the *Toronto Globe and Mail*, Canada (Dec. 11, 1963), an article from which the following passage may be quoted:

> "A professional engineer ought to spend up to a third of his time in study to keep in touch with the developments in his profession...It could be said that the knowledge explosion is destroying the relevance and the meaning of the university degree."

Are we witnessing a breakdown in our system of communicating information in science and technology? Is the practising engineer, with the limited time at his disposal, able to put aside one-third of his time for professional reading? Is the university professor suffering from professional obsolescence thus tending to render a university degree less attractive in industry?

It is not the purpose of this article to discuss the academic side of this question. The fact that this challenge was sounded in the Press is in itself significant, since it calls attention to a problem of world-wide interest and importance, viz., the transmittal of vital information, coupled with which is the efficiency of the engineering profession; both are of growing concern to the community at large.

To put the relationship of the State to science and engineering in its simplest form, we have what amounts to a cycle, thus:

(i) Political power derives from the State's ability to raise money by *taxation* for public services, defence, etc.

(ii) Ability to raise this money is directly related to the industrial potential of the State.

(iii) The State's industrial potential depends basically on three commodities—management, technology and the ability of the engineering profession to *apply* the results of the latter, i.e., of science and technology.

(iv) These three commodities cost money, not only to produce but to keep in operation. This money must be found indirectly from *taxation* under (i) above, or directly from industry under (ii) or from both.

From such a cycle it is possible to see at once that to promote the conditions necessary to put money in the public treasury the "fruits" of science and technology must be applied under (iii) above. Management cannot do

this alone, nor can science unaided. Both must await the creative touch of the engineer.

While engineering, science and management are essential partners in any industrial enterprise likely to prosper, it rests with the engineer to be instrumental in development.

Much emphasis is being placed now on industrial management. State aid is also being given to industrial research in one form or another, though little is heard about the engineer and his profession. We are vaguely conscious of the gaps between research and industrial production, and where these gaps are large enough we attribute it, quite rightly, to the lack of engineering staff, and of facilities to put the results of research to work. Here then is an area where much more attention might be paid, not only to numbers, but to the academic training of the engineer for tasks ahead.

While there is no intention to play down the importance of research in the natural sciences, it does seem desirable to maintain, in proper perspective, the role of the engineer in its various forms. Competence in industrial engineering is just as important as competence in research or competence in management, and possibly more so. If obsolescence in an industrial economy is to be avoided, professional engineers and those responsible for their training should be afforded the best facilities possible. This includes the rapid and effective communication of information in all fields of science and technology.

Masses of technical information are now available from different sources, and the engineer is in a favourable position to handle problems confronting him with a minimum demand for *ad hoc* research. This explains why so much importance has been given to the question of transmitting technical information to the user, and also why an increasing number of technical information services have been growing up to further this end. Although such services have been concerned chiefly with the communication of information, the so-called "information scientist" (a new term) of the future will be called upon to face other challenging problems like the control of publication media. Further, scientific, engineering, and related publications are accumulating at such a rate that even qualified librarians are finding it difficult, nay impossible, to keep pace with the documentation and storage problems.

Technical information, on an enormous scale, is now available from different sources, and the industrial engineer is in a favourable position to handle problems confronting him with a minimum demand for ad hoc research. Indications are that a new concept is growing up, namely, that of information science, to keep him abreast of current developments in his field. This article discusses how technical information services are functioning in Holland, the USA, and Canada.

Information Services

It is clear that a widening gap exists between the world's storehouses of knowledge and the user of relevant information. To bridge this gap, some form of information agency is necessary. Such services have been taking shape in different forms, and one of the problems has been to find a distinctive title. One of the terms gaining general acceptance is that of "Technical Information Service"

(TIS) which was adopted by Canada in 1946. and will be used in the following pages.

TIS in Holland: One of the first services of this kind was set up in the Netherlands in 1907, where a single engineer was appointed to act in an advisory capacity to provide assistance to industry. The idea was to combine counselling with an information service. By 1960, the "service" in that country comprised 108 people of whom 21 were civil (i.e., professional) engineers, 34 technical engineers, 22 technicians, and 31 administration staff. Field engineers, placed in important towns, or districts, are chosen on the basis of their general background, so that they may have as much insight as possible into the needs of local firms.

This "RND" service in Holland is administered and directed (1960) by two men with a mechanical engineering background. It keeps in close touch with an "NTO" service which is essentially an applied and development group; they ensure that the results of research and development are implemented successfully in production.

TIS in USA: One of the last countries to set up a national information service for science and technology is the USA. Although about 400 "specialised" information services exist in that country serving such needs, anything in the nature of an all-embracing national centre has been avoided. About two years ago, however, it was evident that informed opinion in the USA was changing. The following is quoted from an authoritative article titled "Scientific Communication" published in *International Science and Technology* (April 1963):

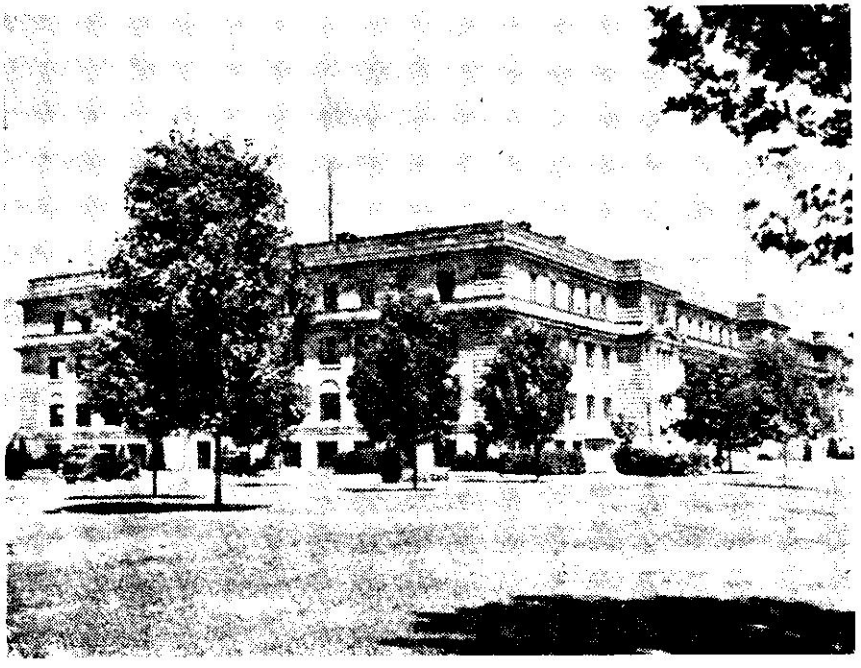
> "Traditional retrieval systems are no longer adequate to handle the ever-increasing amount of published scientific and technological information. A special panel of the President's Scientific Advisory Committee has studied this science information crisis. Mr Weinberg, Chairman of the panel, suggests that most analysts have been concerned with only half of the problem, with documentary retrieval. Any approach which ignores the other half, the problem of how to transfer the contents of the document to the user's mind, is bound to fail. He urges scientists and engineers to accept the idea that information transfer is essential, and urges them to write with more concern for ultimate retrieval. Specifically, he suggests a system of government-supported specialised information centres..."

The implementation of a national policy was announced a few months later with the setting up of a National Standard Reference Data System (NSRDS) to be administered by the National Bureau of Standards (NBS *Technical News Bulletin*, August 1963, pp. 138-40). These developments are still in their infancy.

In Canada

TIS in Canada: The Canadian 'Technical Information Service' began operations in 1945. At that time, small and medium-sized industries needed help in regard to current developments in science and technology. The service was established within the Department of Reconstruction under a Minister who, at one time, was a practising engineer (the late CD Howe), and was later taken over by the National Research Council of Canada by the then President who was also an engineer (Dr CJ MacKenzie). Although originally divided into a Field Service Section and a Research Section, the two were combined and put in the hands of a Chemical Engineer with the highest professional qualifications (the late FE Lathe). Since then the post has been filled by a civil, a chemical, and an electrical engineer. It is not surprising, therefore, that the staff of Canada's 'TIS' has been made up entirely of engineers and scientists apart from administrative requirements.

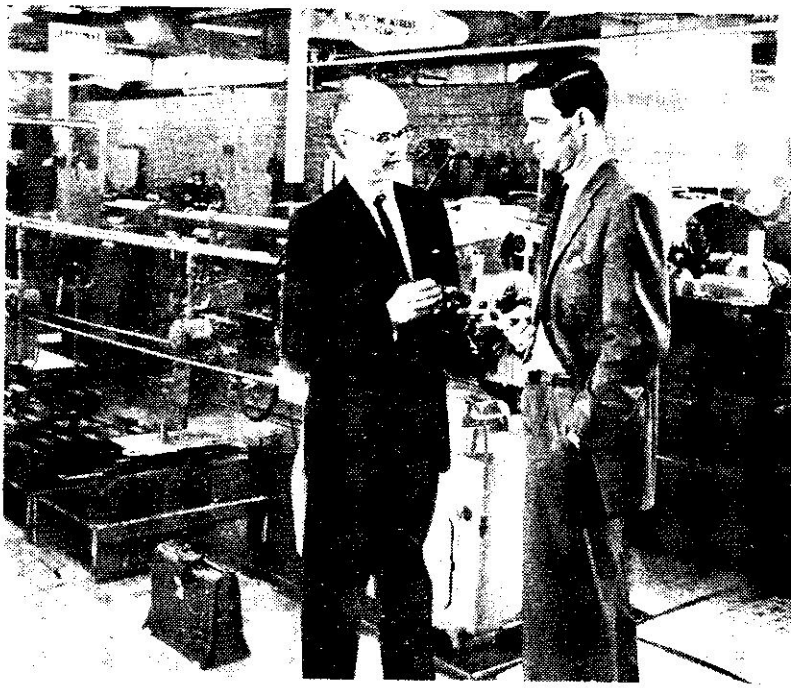
From the beginning it was decided that the most effective way of approaching a small or medium-sized firm was through a personal call, and an offer to provide "free" information on any problem confronting them. Any problem which the field officer could not handle himself was transmitted, in the most specific terms possible, to the research section at the National Research Council (Ottawa), which, in turn, studied the problem in confidence, and advised the firm accordingly. This advice would take the form of a letter supported, if necessary, by photocopy of a relevant extract from a



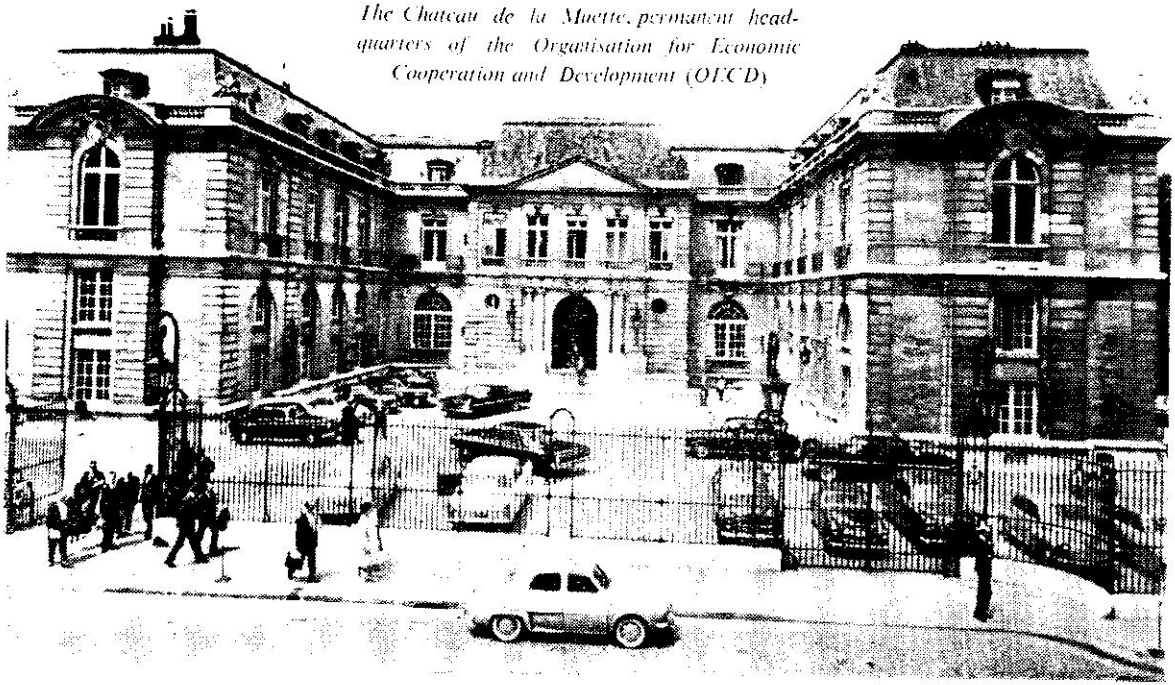
The Main Building of the National Research Council, Ottawa

An aerial view of the extensive laboratories of the National Research Council

An Engineer is assisting a manufacturer with a technical problem in his plant



The Château de la Muette, permanent headquarters of the Organisation for Economic Cooperation and Development (OECD)



report or periodical article. Besides the extensive library facilities in Ottawa, there were many scientific experts and engineers in various Federal Government departments on whom the TIS research officer could call for help. If the occasion arose, the problem could be referred to other information centres or agencies outside the country. In providing the firm with the information requested, every effort was made to transmit it in the terms and in the form that could be best understood by the recipient.

Experience soon proved that it was more difficult to provide assistance to the small firm than the large one. The former were at a serious disadvantage in being unable to afford consultant services where help was needed apart from information, i.e., in design problems, for instance. To a limited extent, this gap is being filled by industrial engineers working side by side with TIS field staff. In this new venture, Canada is following much the same course as that which grew up in Holland.

Active Sponsor

On international scene, the Organisation for Economic Cooperation and Development (OECD) has been one of the most active sponsors of the sort of service described here. Worthy of mention in this connexion is the contribution made by Dr Alexander King (now Sir Alexander) through whose efforts mainly the European Productivity Agency (EPA) was set up, and was oriented towards providing post-war Europe with vital information. OECD's activities are no longer confined to Europe. As in the past, so in the future, it may be expected that their influence will continue to set a pattern for the best use of scientific brains and technology in any country's national economy.

Perhaps one of the more recent examples of OECD's interest in information science may be mentioned here. Held in Stockholm in October 1963 was an international conference dealing with the "Communication of Scientific and Technical Information to Industry."

One of the problems which it discussed was that of increasing 'receptivity' of firms to the fruits of science and technology. The following is quoted from a preliminary report by Canada's official delegate, DR Christie, Director of Field Services, Ontario Research Council:

> "It was agreed that a new profession of Technical Innovation Officer was emerging. A scientist or engineer and also an expert in information science, he would possess special training and ability to interpret science and technology to industrial management. With ability to deal with people, his task would be to discuss and emphasise scientific methods. Adequate numbers of such specialists, backed by adequate information facilities, would significantly influence economic growth."

Epilogue: Productivity as we know the term has both a quantitative and qualitative implication. The key to both is sound industrial engineering and management. Towards this end we have seen that the role of the Technical Information Officer is becoming more and more important. Whether his role will be enlarged to include what has been described above as 'Technical Innovation Officer' only the future will tell. Certainly, the latter will need the background and experience which the former possesses.

Kipling's Dictum for WorK Study

"I keep six honest serving men,
They taught me all I know.
Their names are WHAT and
WHY and WHEN, and HOW
And WHERE and WHO."—**Kipling**

An Essay on

Measurement

The subject of Measurement of Productivity has not received adequate attention in India so far. It is an "extremely complicated business," and the issues raised by the author here provide economists and others unlimited scope for new adventures into the field of econometrics.

DURING the last six months that I worked as the Senior Economist of NPC[1], my old love of analysis revived, and it led me into a bit of adventure into the field of econometrics, known in this business of productivity as measurement. It is, I must confess, a rather crude and, at the same time, an extremely complicated business; and I am putting it down here more for my innate love of controversy—it raises issues which my fellow-economists can tackle with much greater competence and expertise than I, an outdated economist, can—rather than for the statistical value of the analysis, though I am confident that the broad order of magnitudes involved is fairly trustworthy.

While I shall not impose on the reader the enormous background tables which will give me a wholly undeserved reputation for learning and profundity, I may record here the most significant results of the analysis.

The crude (weighted for investment) index of industrial productivity worked out on the basis of man-hours required per tonne of product—involving in its construction all manner of compromises and adjustments—rose in the period 1951-1960 by 38 per cent for the 29 industries covered by what used to be called the Census of Manufacturing Industries, now the Annual Survey of Industries. There is reason to believe that the increase in productivity has continued since 1960, as industrial output has risen by 38 per cent up to 1964, whereas the increase in industrial employment has been roughly 15 per cent to 20 per cent during the period.

While sophisticated calculations for this later period are not possible on the basis of available statistics, it is reasonable to presume that what may be called the growth rate of productivity continued to advance at the compound rate of around three per cent per annum, which is our calculation for the period 1951-60.

The more interesting part of the analysis—of course, from a purely tactical standpoint in the Productivity Movement—was the overall increase of 38 per cent in the productivity of India's Industrial Economy, associated with over 50 per cent increase in the volume of factory employment. As I have said, this figure serves a purely tactical purpose in the service of the Productivity Movement in India, for productivity, wholly wrongly equated with rationalisation, was supposed to cause unemployment, whereas the whole of economic history shows, powerfully and conclusively, that massive increases in productivity and employment are really obverse sides of the same process of economic development.

The most significant result of the analysis, however, arose from our attempt to carry forward our adventure in measurement into the field of Capital Productivity. Our techniques, of course, were as crude as those

[1] While the responsibility for the analysis is mine (not the NPC's), the credit for the statistical calculations must go to Sri RK Goswamy, Assistant-in-charge of the Economic Section of NPC.

Productivity

DH BUTANI

used in the Measurement of Labour Productivity (man-hours per tonne). In fact, all that we did was to calculate the man-hours required per rupee of what has been called in the Survey of Industries as Productive Capital. This probably is a line of research that could be pursued, with great profit and advantage, for to state a fundamental proposition, productivity lies not in economising an abundant resource such as labour power in India, but capital resources, which are, next to the immeasurable factor of managerial talent, the most scarce.

The most significant part of the economic process is capital investment; and in this, the rate of growth in productivity has been negligible: an aggregate of 11 per cent in 10 years! And what is disturbing, in certain sectors, such as iron and steel, an industry of such paramount importance to the national economy, and absorbing as much as 20 per cent of the investment in the entire range of 29 industries covered in this analysis, Capital Productivity as we have defined it here, actually declined by 56 per cent !

It is, however, no use drawing any very alarming conclusions from this figure (as from other statistics), as this is a normal phenomenon in a period of gestation, for it was during the Second Five-year Plan that the large investments in steel began to be made; and while the account books registered abnormal increases in capital investments, it took some considerable time to commission the plants and to bring them to their rated capacities. The fall in capital productivity in the iron and steel industry is only a reflection of the necessary, but passing, historical phase through which all heavy investments have to go through. Nevertheless, in the national interest, attention may be drawn to two facts of the situation: (a) By the time this is published, over Rs. 800 crores would have been invested in public steel plants, reputedly based on modern techniques. Special efforts have to be put in to see that they deliver the goods in quantities, qualities, and at costs commensurate with the investments and the techniques. (b) The TISCO has been able to accomplish a doubling of its plant capacity without increase in the volume of employment.

It is not possible within the compass of this analysis to discuss the serious issues involved in the facts stated in the preceding paragraph.

To the economist, however, certain results of this Capital Productivity Analysis would be extremely interesting, though probably, somewhat trite. In industries, where little additional investment has taken place, investors—or whatever they may be—have begun to earn a substantial quasi-rent. In cotton textiles, where investment remained static during the period under consideration, capital productivity increased by 59 per cent; Jute textiles, in which capital investment went down, did still better at 63 per cent increase in capital productivity! Rice mills, whose owners of outdated equipment thought it profitable to run it down, and productive capital was reduced to half, experienced an increase in capital productivity of 38 per cent! The most massive increases in Capital Productivity took place in certain consumer goods industries (fans, sewing machines,

electric lamps) on account of the extremely large turnover in these lines on a rather slender capital base!

For a deeper analysis of productivity trends, indices have also been constructed for investment, employment, output, the total wage bill of the industry concerned, the daily wage rate, etc. These are at the moment under scrutiny; when published, they would throw light on the operative elements that have caused the changes in productivity: whether employment has been favourably or adversely affected, whether increase in productivity is in proportion to changes in the volume of investment or the volume of employment. Some partial light may also be thrown on the vexed problem of sharing the gains of productivity and this may open up future areas of profitable research.

At the moment, the analysis of data is being carried forward on the basis of such provisional data as have been made available in the subsequent issues of the Annual Survey of Industries, but since these do not contain the physical data on the basis of which earlier calculations have been made, the available data with regard to overall output and the overall volume of factory employment have been used to construct a further projection of the productivity indices.

Further correctives are being applied through the use of such statistics, as, for example, those of productivity in coal mining for which official calculations have been made. As coal mining is an industry which combines medieval and modern techniques in an almost optimum degree, it may be taken as broadly representative of the technology of the Indian industries. This index has, therefore, a representative significance as a fair indication of the productivity trends in Indian industries. The productivity of coal industry, as calculated by the Labour Bureau of the Ministry of Labour (physical output per man-shift), has increased between 1960 and 1964 by 13 per cent. This is confirmed by the fact that while coal production has, in the same period, gone up by 20 per cent, employment in the coal industry has gone up by only seven per cent. In the cotton textile industry while the physical output index has gone up by 24 per cent, employment has risen by only nine per cent.

These are factors, however, which require long-term, patient research, for very obviously the statistics are a mix-up of several factors simultaneously operating in the social economy. To give a rather telling example, we may reproduce here our calculations for a small but rapidly developing industry, such as starch. Its productive capital in 1951 was about Rs. one crore, and in 1960, about Rs. 3 crores. Physical output went up by over 400 per cent. but employment declined by nearly 16 per cent, the resultant being a net increase of over 250 per cent in the physical output per man-hour. It is these relationships between investment, employment and productivity that offer an almost infinite scope for research by young econometricians.

Rise in Productivity

The statistics, however, have to be interpreted with considerable care because of the extreme complexity and variety of the factors that enter into the determination of each statistic. Physical output per man-day is the same as what is statistically known as labour Productivity. As given, it is independent of the variations in capital investment. It is also independent of variations in the price level, though, where necessary, physical data not being available or readily computable, the value figure has been deflated by the relevant price index. For a correct understanding of the whole complex of factors involved, as far as statistically possible, we have worked out percentage changes in the aggregate of physical output, employment and productive capital as a check on the conclusions to be drawn from the variations in physical productivity.

Though for space reasons, we have not reproduced here the massive statistics worked

. . .In certain industries, like Iron and Steel and Chemicals, where abnormally large investments have taken place in recent years, the physical output per rupee of invested capital has, in fact, declined—a lot more in Iron and Steel than in Chemicals—because the new capital equipment did not reach its full productive possibilities . . .

out in the NPC, the apparent conclusion may be recorded here that in the upper ranges where massive increases in productivity have taken place, it has, in certain cases, been associated with a fall in the volume of employment. Yet, by and large, the increases in productivity have been associated in most cases with increases in the volume of employment, and again, in most cases, the increases in employment are very substantial.

The more intractable factor, however, is that of the association of increase in productive capital with increase in productivity. No adjustment has been made in the value of capital for changes in the price level. Capital investment has been taken as reported in the Annual Survey of Industries under the term 'productive capital'. By and large, the increases in productive capital have been greater and in some cases far greater than the increases in the volume of employment; and it would, therefore, be reasonable to conclude that the increases in the physical output per man-day may be, due to a large extent, on account of association of a larger volume of capital with labour. Simultaneously, it would be reasonable to assume that worker skills have gone up substantially on account of association with capital equipment of higher levels of performance. In certain industries, like Iron and Steel and Chemicals, where abnormally large investments have taken place in recent years, the physical output per rupee of invested capital has, in fact, declined—a lot more in Iron and Steel than in Chemicals—because the new capital equipment did not reach its full productive possibilities.

In certain cases, already referred to, like Jute, Textiles, and Rice Mills, the variations in productivity have to be carefully interpreted. In Jute, for example, physical output both per man-day as also per rupee of productive capital has increased fairly substantially. But this is associated with a 20 per cent fall in the volume of employment, and a 12 per cent decline in the value of productive capital, yet the output during the same period has gone up by 43 per cent. Probably, this is the only 'pure' case of an increase in what may theoretically be called productivity: because the management with 80 per cent of the labour force and 88 per cent of the capital has been able to produce 44 per cent more in 1960 than in 1951; whether this is a desirable state of affairs is a value judgment, but it is sufficiently important for policy considerations.

Loss to Social Economy

The case of Rice Mills is still more significant from the social standpoint. The output, of course, has gone down because of reasons extraneous to the rice mill industry, namely, the quantum of rice harvested in the country in a particular year. What is significant is that both the volume of employment as also the value of productive capital in the industry have gone down, employment by 40 per cent and value of productive capital by 43 per cent. Obviously the outdated mills—our rice mills are for the most part outdated—are allowing their equipment just to run down without replacement, because of the uncertainties of policy. Statistically, it is only the productivity of capital as

measured by physical output per rupee of productive capital that has gone up by 38 per cent from 1951 to 1960.

This, of course, conceals a loss to the social economy through increasing wastage of rice being processed with growing inefficiency. It is reasonable to assume that the wastage of rice has risen from 10 per cent to 15 per cent of the harvest. It means an additional loss of nearly two million tons of rice: a cost which ought to enter our productivity calculations, for our ultimate objective is to measure the productivity of the overall Social Economy. Of course, we should not frighten the young econometrician about the number of known and unknown quantities involved in this rather tricky business of measuring productivity, but intellectual honesty demands a straight account of the issues involved.

The greatest caution that one may sound here is that with regard to the dynamics of economic change. Statistics are, by nature, static, and it is the sign of a good economist to read them not only across, but with a certain depth. In 1951, the investment in these industries was only Rs. 713 crores, while factory employment was well under three million. Though later figures are not comparable, they do indicate broadly the order of magnitudes involved. By 1960, while investment in these industries increased to nearly Rs. 2,000 crores, factory employment went up only to a little over three million. By 1962, investment had risen to over Rs. 3,000 crores and employment to about four million. By the time this is published, these statistics would be themselves outdated. In any case, under Indian conditions, it would be difficult to swear as to the accuracy or identity of these statistics, but nevertheless these do tell a real story.

. . . It is in the social interest to ensure that the new investments which consume a large part of new capital are most productively deployed . . . The measurement of Productivity in the case of projects which have come into being in the recent past, would necessarily have to be tailor-made, but, nevertheless, would be extremely significant from the national standpoint . . .

From the point of view of the overall growth of the economy, the most significant factor, to repeat, is the scale of investment in productive capital. It is, therefore, a moot point whether the increase in productivity, what may appropriately be called as increase in the physical output per man-day, is pure productivity. Whether it is real productivity in the sense of a better and fuller utilisation of human and capital resources, it is difficult to say from this statistical analysis. Even the statistics are difficult to put together, extremely difficult to harmonise; and it is quite a mental strain to check on their internal economic consistencies. Nevertheless, we may risk certain broad calculations:

Approximate percentage increases in vital industrial statistics 1951-64

Output	143
Employment	80
Investment	260
Labour productivity	53
Capital productivity	15

The productivity calculations up to 1964 being simple projections of the weighted indices for the period 1951-60 and for the listed 29 industries only, while the increases

in output, employment and investment relate to the broad calculations of the overall industrial economy, it is vain to look for purely arithmetical harmony.

Now for the argument: it is possible to argue, as some have argued, that increases in output both in the aggregate as well as per man-day, are largely due to additional investment, not due to increased productivity, as theoretically defined. These statistics may also lend themselves to a hypothesis that productivity has, in fact, gone down because the increase in overall output is associated with a much larger increase in the volume of investment *plus* a substantial increase in the volume of employment, at least in the aggregate. The young econometrician would be well advised to guard against any such hasty conclusions.

Factory Employment

If we are concerned, not with the long-term historical trend, but the immediate past from 1960 to 1964, there has been roughly an increase in factory employment of around 15-20 per cent between 1960 and 1964, whereas, in the same period, the index of industrial production has gone up by 38 per cent. Thus, in a crude sense, this would mean an increase in labour productivity, but in the same period there has been a marked increase in industrial investment. If the trend of investment between 1960 and 1962 were projected for the next two years, there has been roughly a doubling of the productive capital at the disposal of industry between 1960 and 1964. By and large, therefore, the conclusion would be that the increases in output that are taking place are very largely due to increased investments, and, to some extent, also to a larger volume of employment. The increase in the output per man-day may, therefore, be due almost entirely to the larger capital per unit of labour, superior managerial capacity, and also, of course, due to the upgrading of the skills of labour due to improvement in educational backgrounds and association with capital equipment of a much higher grade of efficiency.

There are certain additional facts essential to a correct appraisal of the productivity position which must be taken into account: these are the extent of unutilised capacity in Indian industry and the new areas of capital formation, such as, for example, petroleum refineries, atomic energy, and plastics, for which long period historical data are not available. Since the investments are new and the organisation is also new, it is difficult to make statistical estimates of productivity in the new lines. Nevertheless, it is in the social interest to ensure that the new investments which consume a large part of new capital are most productively deployed. As has been stated by productivity experts, work study pays best, if it is done at the planning stage. In the case of projects which have come into being in the recent past, probably it would be significant to have empirical studies made in some of the new industries on a sample basis, beginning, say, with petroleum refineries at one end and plastics at the other. The measurement of productivity in these lines would necessarily have to be tailor-made, but, nevertheless, would be extremely significant from the national standpoint.

An important assumption underlying the calculations of productivity indices is the identity in the range and quality of products, manufactured by industry at two different points of time. In this analysis, for example, we are trying to estimate the increase in productivity that has taken place in various industries between 1951 and 1960, with projection up to 1964. It is very obvious that the initial assumption of the identity of the quality and range of products does not simply hold good, because in this period, practically a revolution has taken place in the industrial economy of India. The very nature and range of industrial statistics indicate the magnitude of this revolution. For example, the sewing machines industry manufactured hand-operated, foot-operated, and power-operated sewing machines in 1951. In 1960, besides these types of sewing machines,

the industry produced circular hand-driven knitting machines, circular plain rib machines, circular jacquered machines, circular plain round machines, circular machines power-driven, inter-lock machines, hosiery knitting machines, needles, other components and accessories. While we are comparing the productivity of sewing machines industry in 1951 and 1960, we are really comparing two different industries as it were; for the change in the magnitude and range of operations and products, is really so great that, practically, a new industry has come into being. It is more so in the case of general engineering, iron and steel industries, where completely transforming techniques have come into operation in the last 10 years.

Significance of Change

There has thus been an almost revolutionary change in the character of industry as shown by the emergence of new categories of articles that have come up within the manufacturing range of the same industry; taking another example, the manufacture of electric lamps in 1951 included mainly incandescent filament lamps; now it includes general lighting service lamps, train lighting lamps, auto lamps, and flashlight bulbs. In the appraising of the significance of change in industry, biscuit manufacture is a good example. It was known as such in 1951. In 1960, it became bakery products, biscuits remaining one category, though still a major one, but such things as rolls and coffee cakes and other signs of a more sophisticated standard of living have come up in later years. How an old industry becomes an entirely new industry through significant changes in the products may be illustrated, once again, from the soap industry. The Census of Manufactures up to 1958 gave a broad break-up between soaps and other products. By 1960, the break-up became rather elaborate as between household and laundry soap, toilet soap, industrial soap, soft soap, soap powder, soap flakes, shaving soap, liquid soap, glycerine, crude and refined, talcum and toilet products. Obviously, these were also there in 'other products' in 1951, but they were there in small and relatively insignificant quantities. Some of them still are. Nevertheless, toilet soap and glycerine have come up in terms of value in a fairly substantial way; and other qualities of soap are also coming up. In another five years, it is quite probable that industrial soap and liquid soap might become dominant in the industry. It would still continue to be called the soap industry. Sometimes, even the terminology begins to change under the pressure of dominant types. Up to 1958, the industry was called the soap industry. Now the name has been changed to Soaps and Glycerine.

It should by now be clear how fascinating, if also complex and rather tricky, is this new field in econometrics. It is also probably a matter for philosophical reflection—we economists now need it rather badly—how, as we have shown, the substance undergoes a sea change, while the names (terminology) and our scales of measurement (Productivity per man-hour, etc.) remain the same. The author hopes and prays that this little acquisition by way of philosophy will teach us a bit of humility essential to intellectual integrity under blackmarket conditions.

Bang Spells Growth

Farms are fertilised with a bang in Crimea.

The Crimean blasting organisation, according to a report, has evolved a new technique of "blasting" fertiliser into the fields. The explosion spreads the soil nutrients much faster than the conventional method.

The factors to be considered in the setting up of a new works, or, for that matter, of expanding an existing one, are analysed here by an expert who points out that avoidance of problems "is not the important outcome of research into institution-building." The kind of model outlined allows prediction of "the kinds of problems that can be expected if a setting up system is organised in particular ways."

*Social Factors in Setting up a New Works

ERIC J MILLER *Tavistock Institute of Human Relations, London*

WHEREAS the pace of technological development is accelerating rapidly, the pace of development of appropriate social institutions is lagging behind. This is obvious in the international sphere, where the development of new weapons systems has not been accompanied by the development of correspondingly advanced systems of international control. It is apparent too, on a much smaller scale, when we see, for example, a factory in which a highly complex technical process has been mastered, and yet the whole elaborate apparatus of plant and equipment is brought to a standstill by an industrial dispute. And, less glaringly obvious than strikes, but probably more important, is our failure in industry to make full use of people's skills and capacities. Consequently, there is a wide gap between potential and actual performance.

There are many reasons for this lag. The social sciences were, for one thing, relatively late starters. Another factor has been the low investment rate in social sciences research compared with the physical sciences. Again, many social scientists themselves have colluded with a view (with which I profoundly disagree) that the major break-throughs in the social sciences have first to be made in the laboratories, and only then can new concepts be applied to practical human affairs. The position taken up by my colleagues and myself at the Tavistock Institute is rather the opposite: if the social sciences are to develop rapidly enough to

* This paper has been reproduced from the proceedings of the Joint Conference on Human Factors and Productivity organised by the Association of British Chemical Manufacturers and the Association of Chemical and Allied Employers at Brighton in April 1964.

make any useful contribution to the affairs of our time, then it is necessary to learn from being practitioners—to be prepared, in other words, as medical practitioners are, to take responsibility for giving advice and for the outcome of that advice. When the Tavistock Institute was first set up, just after the war, the notion that social scientists could be practitioners, that research and practice in this field could proceed hand in hand, was still somewhat new and strange. Now it is much more widely accepted.

One fruitful approach, developed first by Trist at the Tavistock Institute, was the analysis of production systems—not merely as technical systems, but as *socio-technical* systems. In one respect this does not seem to be a particularly radical concept. It is quite plain that the functioning of a production system depends not only on the technological characteristics of the process and the plant, but on the organisation—i.e., on the way plant and people are related to each other, and on the relations between the people who are concerned in operating and maintaining the plant. What was more radical, however, was the recognition that organisation—the relationship between machine and man, and man and man —was not uniquely determined by technology. Different organisations, in similar technological settings, can produce socio-technical systems that differ markedly in their effectiveness.

A Framework for Analysis

We have also learned to analyse production systems as "open systems", taking into account their constant transaction with their environment. Environmental changes—for example, a shift from a sellers' to a buyers' market—have internal consequences. They make it necessary to re-examine hitherto unquestioned assumptions about the constraints imposed by the technology, and to develop new forms of organisation.

What I want to explore in more detail in this paper are the factors that have to be taken into account if one is trying to set up a new works that, in terms of technology and organisational effectiveness, is to be more advanced than its predecessors. Because of the organic nature of social systems, I shall only be indicating ways in which certain unanticipated consequences may be avoided.

Within the overall task of setting up a new works, or for that matter of expanding an existing one, one can identify four component tasks. Whether they are recognised or not, these must be carried out:

(a) *Plant Design:* Starting from an outline 'brief', which will, for example, state the type and capacity of plant required, and the limiting conditions—notably time and money—which will prevail, the task is to translate the brief into detailed specifications and blueprints;

(b) *Plant Building or Construction:* On the basis of these designs to prepare a site, to procure materials equipment, machinery, etc., and to convert all these into an operating plant;

(c) *Organisation Design:* To design work roles and the relations between them in the future works. Included within this task would be the formulation of all policies and procedures that govern or affect such relationships; and

(d) *Organisation Building:* On the basis of the organisation design to import the people who will occupy roles in the operating organisation, to train them and to develop the required inter-relations between them.

Performance of each one of these four tasks covers a multitude of activities. The activities that cluster around each task, and gain their coherence from it, may be thought of as having the characteristics of a *system.* This system provides *roles* for people who are engaged in that task. Such roles may or may not be formally defined. Fig. 1 depicts the *setting-up process* in terms of systems of activities. The four systems outlined above converge into a fifth—the *operating* system, whose primary task is production[1]. Within

[1] I use the term *system* here in a technical sense. The activities that comprise a system are interdependent on each other so that a change in activities in one sector of the system is likely to have consequences for activities elsewhere in it. In this sense the setting-up process as a whole also has the characteristics of a system. In other words, the outcome, the operating system, is affected not only by the work done within the designing and building systems, but by the way these systems are related to each other.

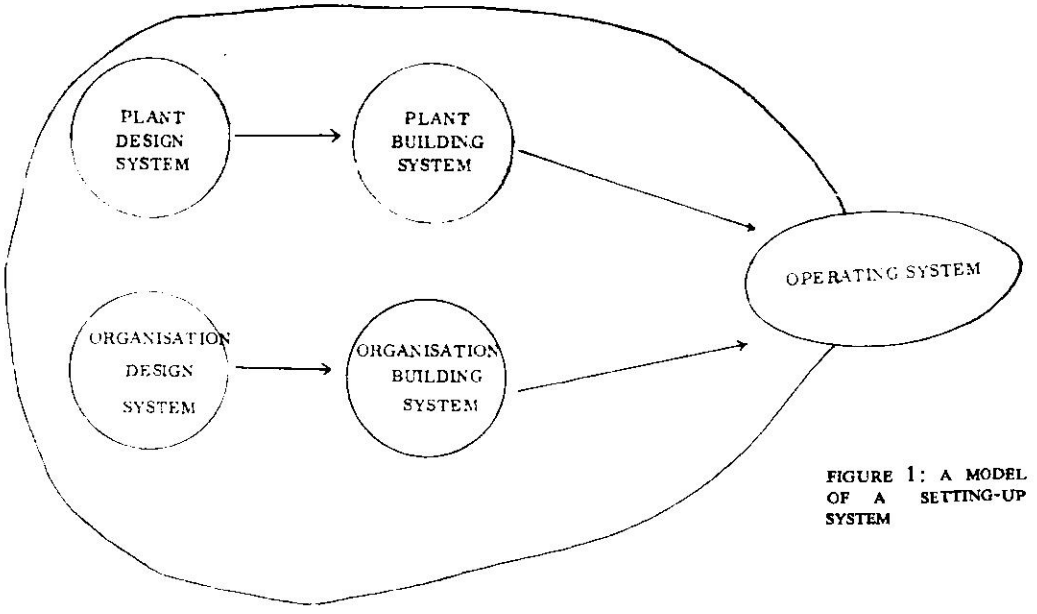


FIGURE 1: A MODEL OF A SETTING-UP SYSTEM

this framework a number of other factors have to be considered. I shall briefly discuss four types of variables, having to do with definition of goals, personnel, relations with the environment, and organisation.

1. *Definition of Goals:* Although the operating system is in one sense the end-product of the setting-up process, it is in another sense present from the very beginning, first as a vision or objective, and then as a progressively more concrete reality. Unless the overall project is extremely small, however, no one person will have a complete and detailed grasp of the whole. Each specialist—be he engineer, cost accountant, or personnel manager—will view the goal from a different perspective. His own field will be sharp and detailed, the rest somewhat out of focus. In one way, one might regard the setting-up process as an exercise in reconciling different perceptions of the final goal. But the amount of difference, of course, can vary immensely. At one extreme, the goal may be simply to reproduce a plant and an organisation already in operation elsewhere: here, the scope for different perceptions is less. At the other extreme, both technology and organisation may be new and unfamiliar.

2. *Personnel Variables:* If most of those people who take up roles in the setting-up system have experienced the design, construction, and operation of a precisely similar works in the past, then again the opportunity for differences of perception is diminished.

3. *Environmental Variables:* No two situations, however, are ever precisely the same. Industrial enterprises have constantly to adapt to, and to anticipate changes in, their environments—technological, social, and economic. Although there can clearly be considerable variation in the types and amounts of change occurring during the setting-up phase, and variation too in the perception of changes and readiness to respond to them, few setting-up systems can be completely insulated from their environments.

4. *Organisational Variables:* An abstract model of systems of activity, such as that shown in Fig. 1, is independent of the particular organisational form that may

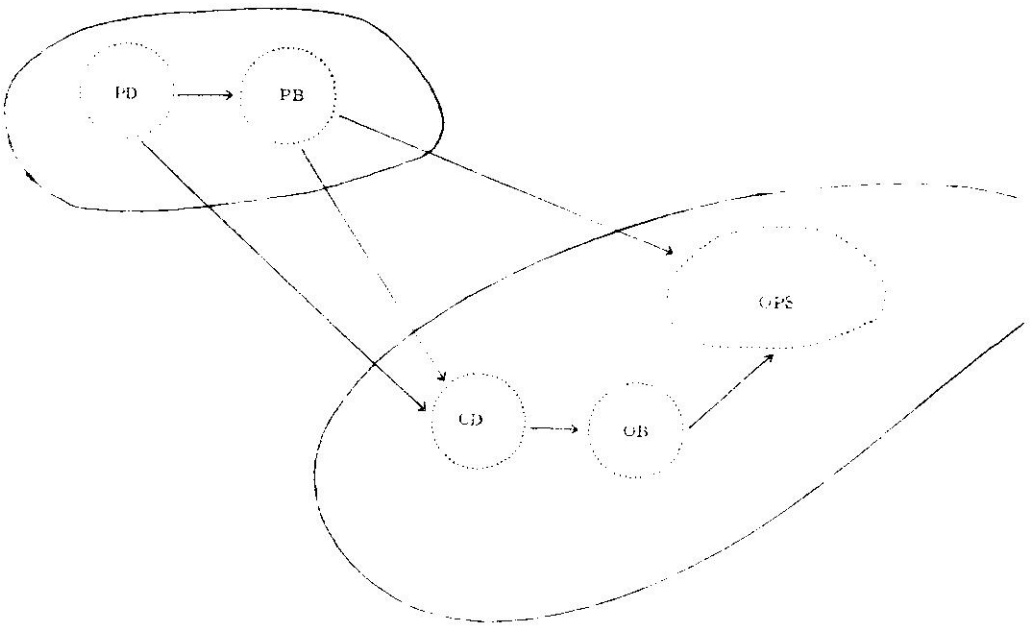


FIGURE 2: A CONVENTIONAL SETTING-UP SYSTEM

embody the setting-up process. One can, therefore, use such a model to analyse and compare different possible organisational solutions. Substantial differences are in fact possible. One obvious variable is time. Clearly a system such as this implies some kind of chronological dependence—for example, insofar as the design of a particular part of plant must precede the building of it. The extent to which, however, these systems may be separated in time or overlap is considerable. At one extreme, for example, the entire plant may be designed in detail before building begins, and at the other extreme construction may press very closely on the heels of design throughout the building of the plant. If an enterprise uses outside specialists, there can be large differences in the type and amount of control exercised over them. A third source of variation is in the allocation of personnel to roles in the setting-up system.

Fig. 2 depicts an organisational solution which is perhaps the most frequent in industry. Here, plant design and plant building have priority. Organisation design, which is usually the responsibility of the managers who are going to be responsible for the operation of the plant, does not begin until plant design is nearly complete, or entirely complete. It is perceived as contingent on plant design. Organisation design, in fact, in the constructive sense of devising means through which the needs and capacities of people can be married to the requirements of the enterprise, is minimal. It tends rather to consist of adapting already familiar organisational forms and practices to the specific technological constraints that have already been designed into the new situation.

There are several reasons for such emphasis on plant design, and the relegation of organisation design and organisation building to a secondary and dependent position. First, the initial decisions involved in building a new plant are mainly technological and economic. The questions of organisation,

management methods, or personnel do not usually arise at such an early stage. Secondly, the costs of a new works are largely costs of plant, and of construction. Thirdly, particularly if the works is a large one, the logistic problems of bringing together the materials, the equipment, and the variety of construction workers, are very considerable, and again, because of the expenses involved, these tend to overshadow the problems of designing the organisation and recruiting and training personnel. If plant design has priority while organisation, in the sense of man-machine and man-man relations, is assumed to be uniquely pre-determined by the technology or else inherited, so to speak, from previous works, then any 'goodness of fit' between organisation, the social and psychological needs of its members, and the technology will be largely a matter of chance.

Processes of accommodation inevitably will take place between the formal organisation and the needs of the members occupying roles in it. What we call the social system is the outcome of this kind of accommodation. Accommodation will also occur between the social and the technical systems. Such processes of accommodation are, in fact, never complete because of the organic nature of the enterprise, which is constantly changing, growing, adapting, and regenerating itself. But if organisation design is treated as the dependent variable, or neglected, then the amount of accommodation in the early operating stages will be correspondingly greater, and this is likely to lead to lowered standards of performance, not only while the plant is running in, but also later.

Spencer Works

If one accepts that the operating system he is trying to create needs to be conceived as a socio-technical system, then it would seem to follow that this can be taken into account in the initial designing process: in other words, by integrating plant design and organisation design it becomes possible to anticipate and work out many of the problems of accommodation at this early drawing-board stage. I believe that this is possible and desirable, but it also creates new problems. The nature of some of these problems may become clearer if what happened in one particular case where a new works was put down on a green-field site is outlined. The works was the Spencer Works, a new integrated iron and steel works with strip mill, which was built outside Newport by Richard Thomas and Baldwins (RTB). It is not often that a works of this scale is erected, and the company felt that the occasion justified its sponsoring some social science research into the processes involved. The lessons can be applied far beyond the steel industry.

Richard Thomas and Baldwins' lead in the sheet and tinplate sector of the steel industry dated from 1938, when it completed the first continuous strip mill in Britain at Ebbw Vale. The company consolidated this lead after the war, when it had a controlling interest in the formation of the Steel Company of Wales. The steel industry was nationalised under the Labour Government in 1951, but the Conservative Government's decision to denationalise followed shortly after, and it was not expected that RTB's position would materially change as a result. It was anticipated that the company would continue to retain its interest in the Steel Company of Wales.

In the summer of 1955, however, the position changed radically as a result of a decision that the Steel Company of Wales would be financially separated from RTB and denationalised as a separate entity. This put RTB in a vulnerable position. Its own works were ageing: the Steel Company of Wales had been its stake in the future. At this point, therefore, the Managing Director of RTB conceived the idea of putting down a completely new works on a green-field site. This was, in his view, a vital growing point for the future: without it, RTB might not even survive as a separate enterprise.

The company's 'investment' in the new works thus needs to be considered from two

points of view: (a) not only was an immense financial investment involved—the completed works cost about £150 million—but also an emotional investment; (b) since the new works on a green-field site would be the means of regenerating the company, the process of building it became the repository for most of RTB's hopes for the future. To quote the Managing Director:

> "Newport is the one and only place where we can build unrestricted and unhampered by site, existing plant, outmoded ideas, tradition and unmovable staff and operatives. It is the one place where no concessions need to be made to costly, worn-out equipment, techniques, technology, or organisation."

Thus the Spencer Works was to be not merely new, but novel. Two goals—not simply building a works, but re-building a company—were involved and both these factors had an important influence on the setting-up process.

Meanwhile, the decision to build the new works was not one that RTB could make unilaterally. It was still a nationalised company. In any case, the issues of location, scale of investment, and timing were felt to be matters of such national interest that ultimately the decision was made at Cabinet level. This took time—in fact, three years elapsed before the Prime Minister, in November 1958, finally announced outline approval for a new works, somewhat smaller than what the Managing Director had first envisaged.

During this period the company's Central Engineering Department had been heavily involved in the formulation of various plans for the new works: it became, in our terminology, the nucleus of the plant design system. But there was no clearing-house through which relevant ideas on organisation for a new works could be distilled, corresponding to the clearing-house for plant design that was represented by the Central Engineering Department. In fact, the first major 'input' into the task of organisation design came from the Organisation and Methods (O and M) Department. This department prepared, in November 1958, a conventional organisation chart for the new works—conventional in the sense that it leant heavily on the organisational structure of the company's existing strip mill at Ebbw Vale—and this was accepted as a basis for recruitment of management, i.e., for the first phase of organisation building.

In Fig. 3, the activities in November 1958 are located on the model of the setting-up process.

In March 1959, a detailed scheme for the new works was formally approved by the Government. At the same time a first major attempt was made to define the structure of management for the setting-up process. The overall responsibility was to be vested in a Committee of Management, consisting of the Managing Director, the Company Secretary, the Chief Accountant, and the Production Controller. This was supported by a Major Contracts Committee. Three main advisory committees were also constituted—a Technical Committee, a Staffing and Manning Committee, and an Administration Committee. Each of these was supported by a number of sub-committees —working parties which were to concentrate on particular aspects of the design and operation of the new works—and these were to be composed of the best available practitioners and specialists in the company. The first technical sub-committees were set up in the spring of 1959.

Plant Design

At the same time, responsible to the Committee of Management, the head of the Central Engineering Department was appointed General Manager (Engineering), with overall responsibility for plant design and plant building.

This position is illustrated in Fig. 4.

It was also decided at this time that the future General Manager (Operations) should be appointed at an early date. It was not then contemplated that he would sit on the Main Technical Advisory Committee (though when he was actually appointed in June

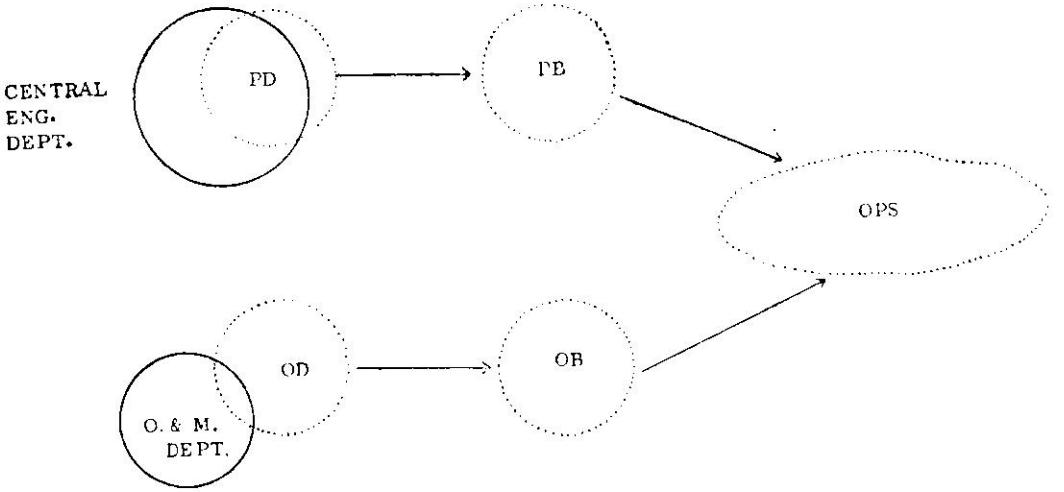


FIGURE 3: SPENCER WORKS, DECEMBER 1958

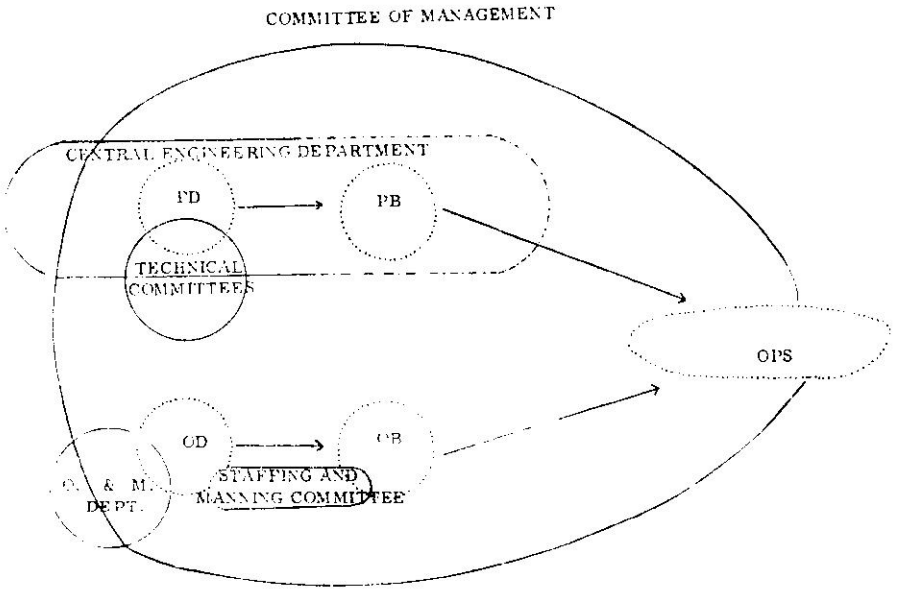


FIGURE 4: SPENCER WORKS, APRIL 1959

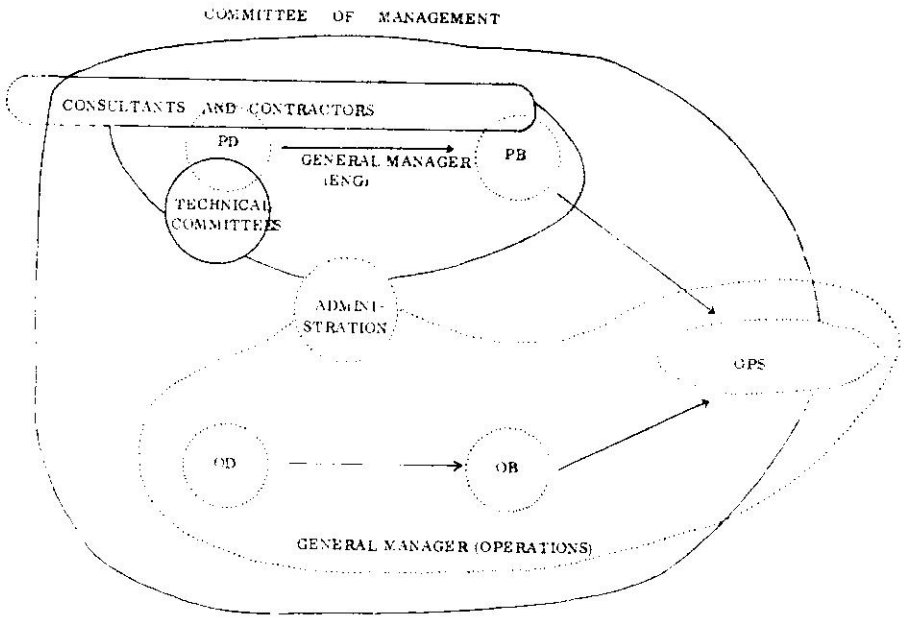


FIGURE 5: SPENCER WORKS, OCTOBER 1959

he did so). In other words, he was not seen as part of the plant design system; he was seen rather as being concerned only with organisation design, organisation building, and operations.

Meantime, however, a little organisation building was already in progress. The Staffing and Manning Committee was revising and approving the O and M Department's proposed organisation chart, and the first appointments to the new operating organisation were made also in the spring of 1959. These included a Chief Accountant for the new works, a Commercial Manager, and a Traffic Manager. All three appointments were seen as relevant to activities during the setting-up phase as well as during operations.

The general position, therefore, at this time was that plant design and plant building were being invested with a homogeneous and tightly-knit organisation, serviced and advised by the Technical Committees. Organisation design and organisation building, on the other hand, still remained dispersed.

Although serious construction work did not begin until early 1960, work started on the approach road to the site in August 1959, and in the following months a good deal of site clearance was carried out. Engineering consultants and the first contractors had already been appointed. Thus the roles in the plant building system, as well as in plant design, were beginning to be activated (see Fig. 5).

Meantime, the appointment of the General Manager (Operations) in June 1959 (though he was not to become full-time General Manager at the Spencer Works until March 1960) had a twofold effect: it displaced the Staffing and Manning Committee and the Organisation and Methods

Department from the organisation design and organisation building systems; and it also provided leadership for the nucleus of administrative managers who had been appointed in the spring.

The new General Manager (Operations) held the view that if the Spencer Works was to have a well-equipped, integrated management group in the future, then managers had to be brought in at an early stage. He believed that the teething troubles almost always encountered in a new works were not entirely caused by problems of plant; they could also be caused by problems of management. Accordingly, it was agreed that managers should be brought in early and plans began to be formulated in the autumn of 1959 for a series of events, using the company's newly-opened Staff College, through which managers would be prepared for their jobs and developed into an integrated team. Such a notion was obviously a constructive departure from the conventional practice of bringing in the operating managers at the last moment, when construction of the plant is nearly complete. It should be noticed, however, that there was also a paradox inherent in this proposal. It was not foreseen that in carrying out the task of organisation design the managers might well

Fifty Years Ago

Irishman Knew Techniques of Productivity

That an Irishman, named Mr O'Shaughnessy, knew the various techniques of productivity, and adopted them with remarkable success in South India, over 50 years ago, has recently come to light.

With hardly any degrees to his credit, this gentleman, a thoroughly practical engineer, boldly came forward to put up the urgently-needed Mandapam-Pamban rail bridge, which was ruined by a recent cyclone. The most remarkable thing about this bridge was that when highly qualified British and other foreign engineers and experts hesitated to undertake the designing and construction of a bridge across a mile of sea, this Irishman undertook the work and accomplished it with remarkable rapidity, though adopting rather unconventional construction methods. In the context of the imminence of World War I, the British rulers wanted a bridge brought into being without loss of time to link India and Ceylon for transportation of troops.

Recounting the productivity techniques adopted by the Irishman, Mr G Nagaratnam Aiyar, former Principal of the College of Engineering, Madras — who was consulted by Mr O'Shaughnessy on the methods used by him in the bridge construction—said Mr O'Shaughnessy had rejected the proposal of experts for a masonry arch bridge, and, instead, opted for a girder work. He noticed cracks in the coral reefs occurring four feet below the water surface in a narrow sea lane between Mandapam and Pamban, except for a width of 200 feet of reefless ocean in the middle, and hit upon the idea of sinking huge hexagonal shaped steel boxes, open at the top and bottom, into the cracks and pouring cement and concrete inside. He built piers that way with cut-stones over these boxes, and spanned 126 of them to make a mile-long bridge.

call into question the conventional assumptions that underlay the chart by which they had been appointed. In other words, there was a risk that either the organisation for operations would act as a constraint on organisational design, or, alternatively, the organisation design activities would threaten the operating organisation.

Two major decisions between August and December 1959—when work had already started on site clearance—served further to consolidate the position of the engineers in plant design and plant building. The first decision was that the construction programme should be greatly accelerated, the proposed construction period being reduced from nearly four years to just over two. The second decision was that the capacity of the plant being built should be increased by more than a third, thus bringing it back to the size that the Managing Director had originally contemplated. Both decisions reflected changes in the external environment...and towards the end of the year the Managing Director himself assumed overall responsibility for the setting-up process. Operating managers began to be recruited in larger numbers in late 1959 and early 1960. These included the Staff and Labour Relations Manager and the Education and Training Manager, both of whom would have major roles in organisation building, as well as the first few production managers...

Departmental Policies

Among the more important of the original proposals for using the company's Staff College for running in the new management was the notion that study groups of future operating managers should be set up on such topics as costing, budgeting, quality control, production planning and wages policy, and that when these had done their work they would report back to a policy-making conference, consisting of the overall management group. Departmental policies would be formulated subsequently and would be contingent on this overall policy-making activity. In the event, partly perhaps because of time pressure, these study groups were not established. As a result, although the General Manager (Operations) tried to create an informal working climate that would encourage free interchange of ideas, each manager on joining inevitably began to think about methods of operation in his own department or sphere of responsibility...

Some of these managers came from other parts of RTB, but many came from other steel companies, and even from outside the steel industry. Few of them had known each other before. All were moving into new jobs, and most of them were at critical phases in their careers. They were also transplanting themselves and their families into a new locality. This was, to some extent, therefore, a period of disorientation in their lives. The new works contained many technological innovations, and was of a scale with which few were familiar. At the same time they began to experience the stress inherent in the challenge of the green-field opportunity, particularly in view of RTB's immense "investment" in the success of this new works.

In this situation managers naturally gravitated towards those tasks and positions that seemed relatively familiar, and moved away from those where they felt less competent and more strange. To most of them organisation design itself was a strange activity, and the somewhat unstructured egalitarian culture associated with it generated anxiety. Many of them, therefore, tended to retreat to their operating roles, and to form relationships with each other as if they were in an operating situation. Plainly, however, such a retreat was not really possible...The operating relationships, to which managers were endeavouring in effect to retreat, depended on a task that had not yet started. The difficulty was most acute for production managers, for they found that organisation design provided the most intensive and interesting activities for managers of the control and service departments. These were engaged, for example, in formulating systems of costing, developing personnel policies,

wages policies, etc. When the specialist managers were planning the future activities of their departments, their plans were affecting the whole works. Departmental plans of the production managers did not. The specialist managers were, therefore, much more powerful than in a conventional operating situation, and, in fact, the customary relationship between the specialist manager and the production manager was, in some ways, reversed.

Signs of Tension

This particular problem, and its consequences, did not become fully revealed for some time. Another problem, however, rapidly emerged soon after the first production managers arrived in 1960. It had been assumed that organisation design was dependent on plant design. Such an assumption is natural and inevitable in a situation where operating managers arrive only after plant design is complete and plant building far advanced. Such dependence, however, is not so readily acceptable if the organisation designers are already at work when plant design is still incomplete. Organisation designers, for example, begin to discover aspects of plant design that could be modified in order to make future operations more economic or easier to control. The engineers engaged in plant design had foreseen this as a possible problem, but had built a fairly high organisational wall around themselves. In any case, so busy were they with the problems of expansion and acceleration, and with the intensification of construction work at this stage, that production managers found it difficult even to get plant lay-outs and designs to study, let alone feed back criticisms. At the same time, the abolition of the technical committees diminished the contact between the 'engineering' group and the 'operations' group. In the latter group, signs of tension and frustration started to appear.

In addition, during the spring of 1960, the tasks of expansion and acceleration began to present problems of control. Communications between the administrative organisation of the General Manager (Engineering), located in the Central Engineering Department, and the administrative organisation for the setting-up process as a whole, under the General Manager (Operations), showed signs of deterioration.

The position at this stage is illustrated in Fig. 6 (Page 44).

At this stage the General Manager (Engineering) fell ill, and had to be relieved. There followed the first major revision of the organisation of the setting-up process. The Central Engineering Department was reconstituted, and although most of the engineers who had been engaged on design work remained on site, the department as such no longer had a role in the setting-up system. At the same time, the General Manager (Operations) was assigned responsibility for the overall setting-up process. Though a new Chief Engineer was appointed under him, it was decided that he would also be the future Chief Engineer in the operating organisation. The changes are illustrated in Fig. 7 (Page 44).

Two questions may be asked: First, how far did the reorganisation bring about some accommodation between the activities of plant design and plant building on the one hand, and organisation design and organisation building on the other, which hitherto had been separated from each other? Secondly, how far did the changes help to clarify the tasks and roles of members of the setting-up organisation, and the relations between these and the operating tasks and roles?

Ostensibly it now became possible for organisation design to affect plant design; in other words, for design to become a 'socio-technical' activity. It also became possible for the whole setting-up process to become a single integrated system.

There were, however, difficulties. Some changes in plant design were in fact made, based on the recommendations of production managers, but they were made rather late in the day, and the constraints of time and

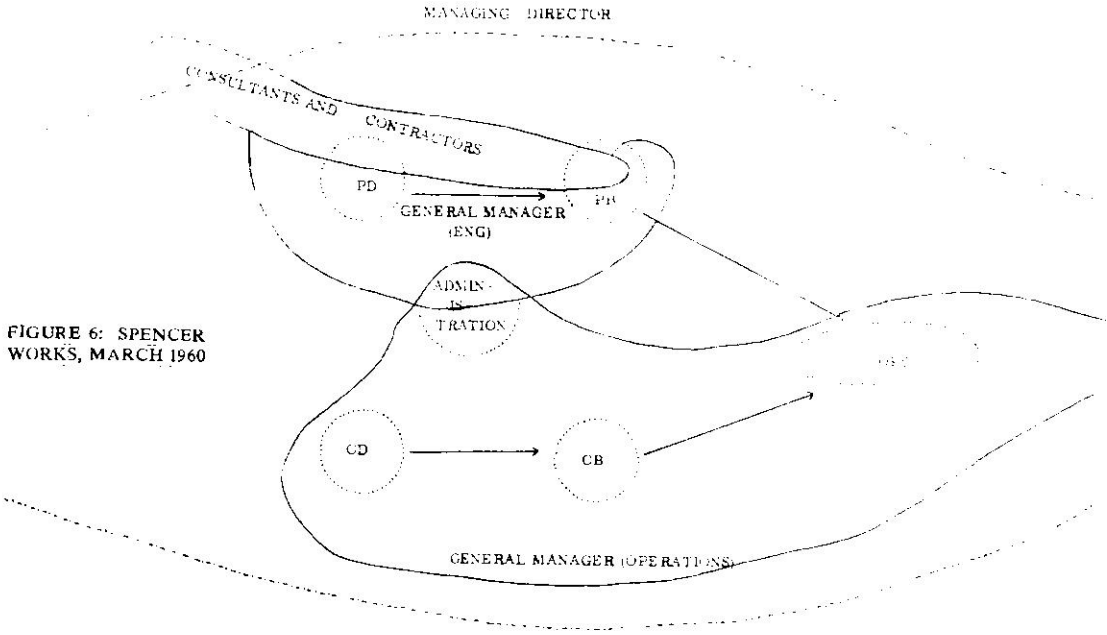


FIGURE 6: SPENCER WORKS, MARCH 1960

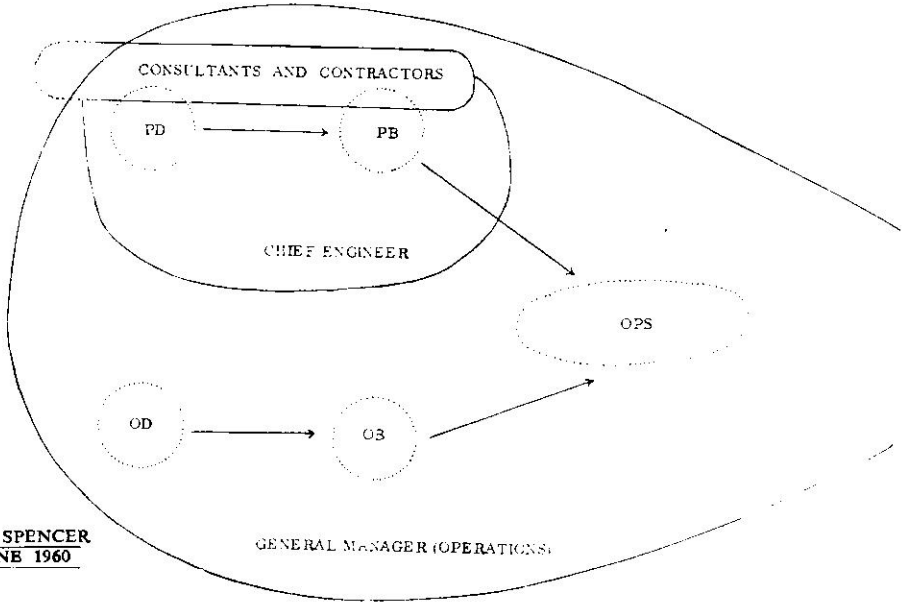


FIGURE 7: SPENCER WORKS JUNE 1960

money, and also the inevitably close articulation of plant design with plant building, prevented such modifications from being very far-reaching. There continued to be an imbalance between the closely-knit plant design/plant building set-up on the one side, with well-defined tasks and a coherent management structure, and organisation design/organisation building on the other, whose only structure was inferred from the future organisation for operations. Moreover, the organisation design and organisation building activities at once lost much of the leadership that they had just begun to receive from the General Manager (Operations), for he was now increasingly involved in the overall management of the total setting-up process.

New Groups

The organisation design and building systems were also incomplete in that the operating organisation from which they derived their own organisation lacked engineers. The newly-appointed Chief Engineer was the only exception. In fact, only two other engineers were appointed to operating roles before the late autumn of 1960, though by the year-end a number of engineers in plant design and building were designated for positions in the future operating organisation.

In September and December 1960, two conferences, each a fortnight long, held at the company's Staff College, brought together the 25 senior managers in the future operating organisation. Their main task was to begin to formulate the policies according to which the works would be operated in the future. These conferences inaugurated a series of planning and training events, which culminated in the starting-up of the works. Such a systematic scheme for 'running in' management was a novel, valuable, and successful experiment. There were, however, certain features built into the situation at this stage that prevented these first conferences from being wholly successful. In fact, in some respects, the conferences actually helped to crystallise conflicts of task and role that were inherent in the situation which had developed...

By 1960 end it was possible to see the emergence of three differentiated groups, all of them linked by a common membership of the future operating system, but each with different aspirations in terms of the ongoing tasks in the setting-up process. These were: (i) A specialist (service and control) group of managers, committed to tasks of organisation design and organisation building; (ii) An engineering group committed to plant design and plant building; and (iii) A production group committed to future operating activities. When members of these groupings communicated with each other, they tended to use rather different frames of reference. The production managers, for example, were, in effect, trying to impose a future pattern of relationships on to the present; for they, as we have seen, were likely to feel particularly insecure during the setting-up phase. Similarly, there was a tendency for both engineers and managers of the specialist departments, who were experiencing for once the feeling of being executive rather than advisory, to try to prolong the power they had during setting-up, and to extend it into the future operating phase.

From 1961 top management gained some understanding of the forces in the situation and, in particular, of the difficulties that were implicit in trying to design an organisation with people already occupying defined roles in it. They were also aware increasingly of the existence of these "dominant roles" that I have described in the different systems of activity. While the production managers used their dominant roles in the future operating system to try to escape from the current pressure of activities in the setting-up phase, so the engineers, who were to occupy future maintenance roles, tended to keep out of the organisation design and building systems, and to cling to their dominant roles in plant design and plant building. Ultimately, however, engineers and production managers had

to work together. Top management, therefore, took some steps to rectify the situation, attempting, among other things, for example, to modify the proposed operating organisation so as to produce some workable accommodation between these engineers and production managers.

It would be wrong to over-emphasise the negative aspects. Although the company, for example, did not meet its extremely tight construction targets, both the completion of the works and the build-up of production to full capacity were fast by any standards except the company's own. Similarly, the results of the experiment of bringing in managers early did not eliminate all teething troubles, but was certainly more beneficial than otherwise. Many innovations were attempted, and succeeded, in management methods and techniques. Moreover, the setting-up of the Spencer Works was accompanied by a resurgence in the other works of the company. Some innovations, however, failed, and the operating management was less identified and committed to these innovations than might have been hoped. Three factors appear to have been particularly important:

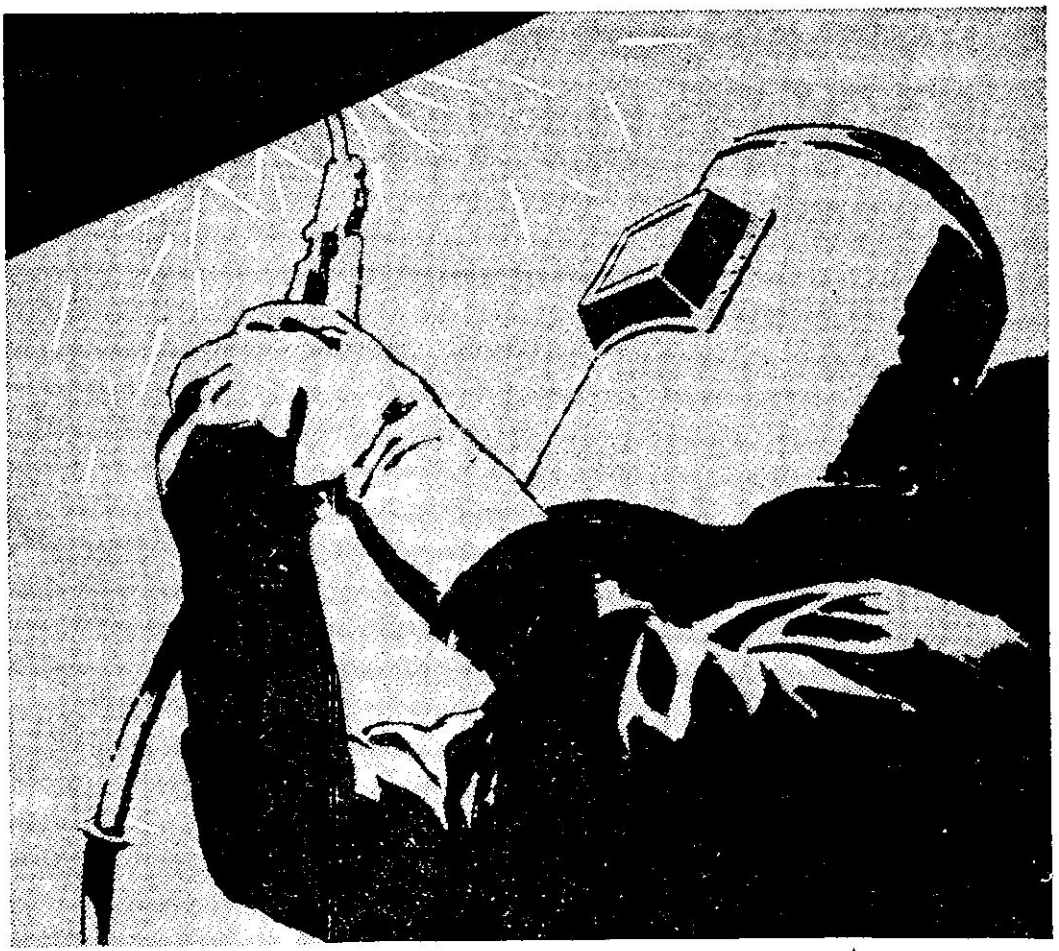
1. The task of organisation design did not have an organisation of its own, but was carried out, instead, through operating roles;
2. Innovations inevitably threatened the relative status and power of these operating roles, so that assumptions about power and status in the future operating system constrained innovation in organisation design; and
3. Those managing the setting-up process did not have available to them a framework, of the kind outlined here, which might have helped them to diagnose and treat, or even to prevent, many of the problems that arose.

In this connexion, however, I should refer to another danger. In my introductory remarks I had pointed out some of the negative consequences of *not* bringing in operating managers early, and of giving belated consideration to organisation design. Subsequently I have tried to show the consequences, in one situation, of bringing managers in early. Many of these consequences were negative, too. Previously I also put forward the notion of conceiving design itself in socio-technical terms—in other words, providing the possibility for accommodation to take place between the social and technical dimensions at an early stage of the setting-up process, instead of after operations had already begun. It would be a mistake, however, to conclude that this would be a solution to all problems.

Outcome of Research

No matter how it is organised, there are problems inherent in a setting-up process, above all in a green-field situation. What one is creating is a system with organic properties. The more one desires to create an institution that is novel as well as new, and to build into it a capacity for future growth and adaptive development—adaptation in the face of future environmental changes that cannot even be foreseen—the less control is either possible, or indeed desirable, during the setting-up process. Conflicting perceptions of goals, and the consequent fluidity and uncertainty, are inevitable. The heightened expectations of a green-field situation add to anxiety and add, too, to the feeling of let-down when all one's visions have not been fully realised. If anything, the concept of socio-technical design, whilst it may produce a more effective end-result, is likely to be accompanied by even greater fluidity and uncertainty during the setting-up process itself.

The important outcome of research into institution-building is not the avoidance of problems. The kind of model outlined here, however, does allow us to predict the kinds of problems that can be expected if a setting-up system is organised in particular ways. The painful destructive aspects inherent in the creative process are perhaps easier to bear if one is aware of them, and can, to some extent, even plan for them in advance. One can then use the building of a new works as an opportunity for introducing more radical changes than would otherwise be possible, and to produce an operating system that is more effective and makes fuller use of its members' capacities.



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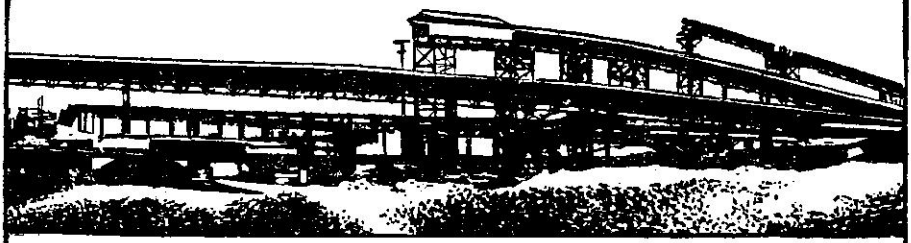

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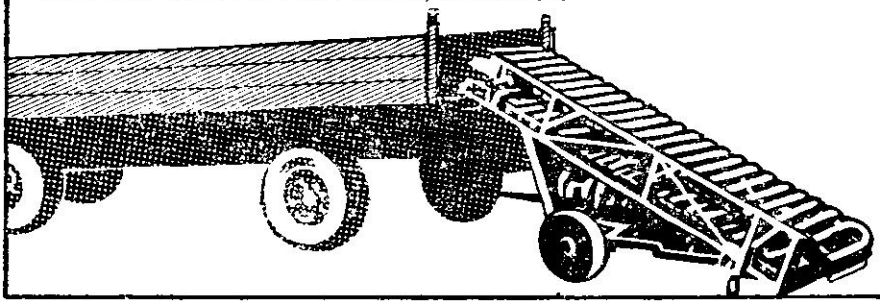

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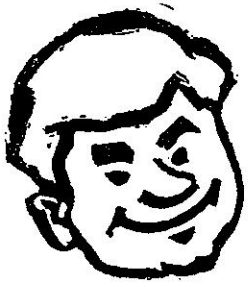

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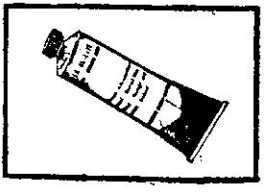

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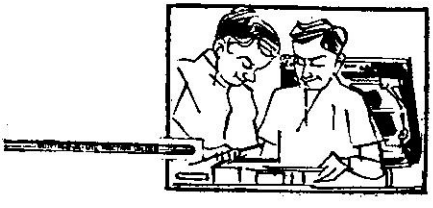

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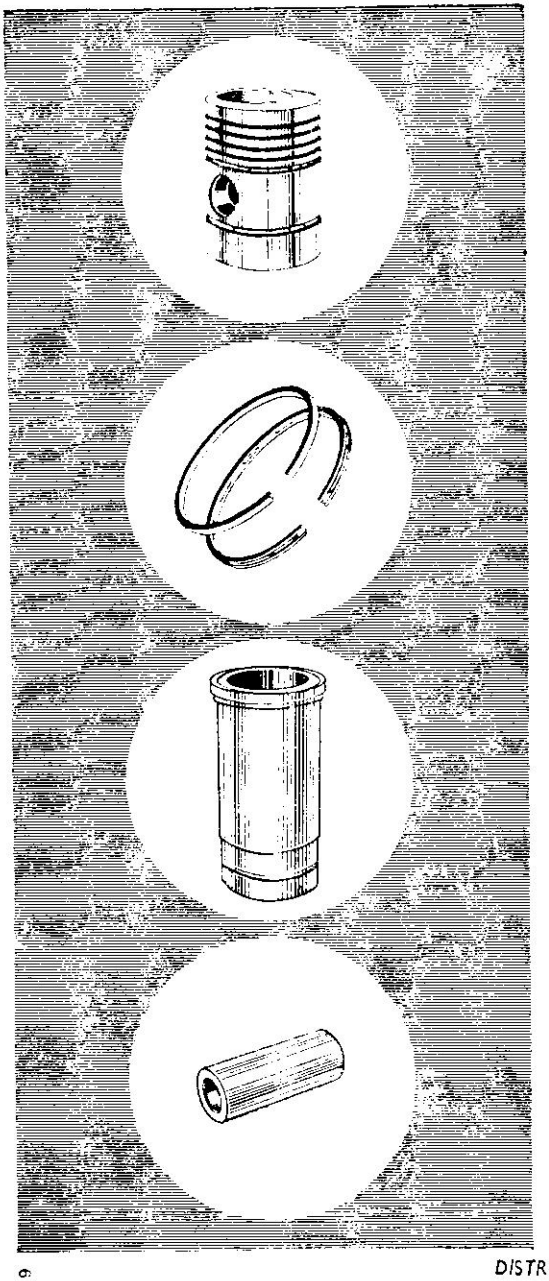

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RP LYNTON
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Developing Leadership Skill Through Sensitivity Training

THE traditional processes for selecting and developing leaders are inadequate in a rapidly developing country—both in scope and in speed. For highly industrialised countries a similar problem comes up in a different way and is now very much in the forefront: there the need is for more and more leaders who are capable of profiting quickly from new technologies and of adapting organisations rapidly to ever changing conditions. These tasks call for exceptionally capable men not only at the very top but also for diffusion of leadership skills through many levels of an organisation. Efforts are therefore, mounting to intensify the search for existing "talent" and to learn more about suitable organisational structures in which this "talent" can work most effectively. The same need for more people with leadership skills has also led to systematic attempts to work out more effective ways of developing these skills through training.

In North America, this work is associated most of all with the National Training Laboratories of the National Education Association, Washington. NTL started in 1947, and is now linked up with eight regional centres in the USA alone. It has also organised programmes in Europe and in Africa. In the United Kingdom, new training with the same purpose has been pioneered by the Tavistock Institute of Human Relations. In India, such training is now a part of every regular three-month residential course that the Small Industry Extension Training Institute, Hyderabad, offers three times a year for training consultants, officers and managers in industrial development and management. In December 1964, SIET Institute ran its first Special Programme in Personal and Organisational Development.

The core of these new programmes consists of small group sessions in which participants study their interactions with each other "here and now", their individual feelings and actions, and the effects of their behaviour on others. The most common names for these groups are "T-group" (T for training), interpretive groups, or, generically, sensitivity training groups. SIET Institute

How to help multiply competent leaders in a rapidly developing country is a problem which has been engaging attention in recent years. The traditional processes are "inadequate", says the author, who outlines here the programme as organised at the Small Industry Extension Training Institute, Hyderabad, and the series of stages through which managers and officers in a training group pass in their endeavour to develop new leadership skills.

uses "L-group" (L for learning). The essence in all cases is that these sessions do not aim at increased knowledge and understanding *about* leadership and other roles, but at providing intensive, personal opportunities for actually practising leadership skills.

This realistic practice is achieved most of all through the explicit refusal of the traditional "leader"—the trainer—to perform the traditional functions of leadership. He does not decide on a task for the group of 15 or so managers and officers in training; he does not evaluate their performance; he does not exercise power. This leaves the group to develop "a new society" for themselves, involving new leadership and other roles, greater sensitivity to other people and also to their own individual needs, and generally more effective and satisfying behaviour. The trainer helps by clarifying the processes by which the group works away at this difficult task and by ensuring that members understand as far as possible the wide significance of this personal experience, e.g., to organisational structures. At SIET Institute, this kind of training occupies a minimum of 15 sessions early in each 12 weeks' course, and is followed up by additional skill-practice sessions.

Each sensitivity training group seems to pass through a defined sequence of stages, each open to illustration from the day-to-day life of working organisations.

Personal Processes of Development

The First Stage is characterised by sheer incredulity followed by anger. However explicit the trainer has been about his not playing the traditional leader's role, the members seem unable to believe him. Probably they do not want to believe him even. For the trainer's "abdication" sets the stage for leadership struggles among a group of equals which threaten to become highly personal, that is, risky and uncomfortable. It is important to emphasise this initial reaction: however strongly they cherish significant development, etc., in principle, they are not emotionally prepared for the opportunity.

At this first stage, the members spend much time trying to force the trainer back into the traditional role. This is what they expect of him; this is what they are comfortably used to. They express this urge in various ways, first "nice" ways, then with increasingly open anger. They suggest that this training group is not real, a game; that this is a temporary stage and that the trainer will surely "take over" soon; that the trainer is conducting an experiment—this makes them angrier because an experiment would make guinea-pigs of the members instead of treating them as managers (these very words occur); and, later, that the trainer is obviously incompetent to lead. This last kind of statement comes only with the greatest difficulty, it openly provokes the very situation that the members are trying to avoid: the need to take stock of their own competences and sort out and then build an organisation and perform agreed tasks on that realistic basis.

These are the same kinds of feelings that well up around attempts to delegate in organisations. The manager who says that his

subordinates "don't want responsibility" is partly right: not used to it, their taking responsibility effectively requires practice, some willingness to take risks, etc.—all difficult. And when the disheartened manager feels discouraged and gives up even a part of his plan to delegate, his subordinates are only too likely to say, "See! He never meant it—we knew it." The end of this road is that the manager concludes that the task of leadership is inalienably his only, that others are unable to assume it, or are simply irresponsible. They need him, he concludes—another nice feeling.

The Second Stage comes about in the training group because the trainer does not wilt in the face of the group's insistence to reinstate him in his traditional role. He carries on as before and the group eventually decides that it will have to manage without his leadership. What then happens is not the introduction of a new, freer system of relationships. On the contrary, the members then characteristically proceed to re-establish the traditional system by discovering some old-style leader among themselves. They always find more than one. The result is increasingly bitter competition for this leadership role among two or three participants. It shows in anger, in fighting, attempts at controlling some members, and at instituting impersonal procedures like taking turns or voting. None of this satisfies for long as the trainer continues his function of calling to the group's attention the realities of what they seem to be doing and what they seem to be avoiding. So, more and more people fall silent. If someone asks why, they respond that they are "not interested", that the whole thing is "a waste of time", or—very honestly—that it is all "too personal".

In a sequence of this sort, perhaps, are the seeds of submission to the control of a strong man, the tendency in developing societies to political dictatorship. As Walter Lippman once said of the basis for dictatorship elsewhere, the "people preferred their hands manacled to prevent them from shaking." So extreme can be the strains and tensions from developing new leadership. There are many minor examples of the same tendency also in other spheres of activity.

The Third Stage is the extreme along this progression of discouragement and unrealities. Members break into sub-groups. Sometimes the group seems about to break up altogether as members are extremely irritable and impatient with each other and with the trainer. Some insist on doing "something useful" but nobody seems able to get any project whatsoever off the ground. There may be long periods of silence.

In the work-a-day world this stage of flight into unrealities is well-known. It takes many forms. Only they are more subtle and hidden. One chairman bangs the table at a meeting to "stop all this nonsense and get on with the job" only to find that the silence that greets him or even verbal agreement, leads to no action in fact. Others substitute for needed action the appointment of a committee and requests for further investigations and reports. These all have in common the basic refusal to act in relation to real situation.

The New Leadership

Even while the group carries on its search for ever new ways of avoiding the painful tasks of developing its new society, aspects of this new society in fact peep through from time to time. They are hardly welcomed at first, anything but that! A member who ventures a new approach may well find himself in head-on collision with those who continue to try to achieve prominence and control along traditional lines. The strains of the development process lie partly on this isolation of new-style leaders who have entered the scene before enough power has drained out of the traditional system. These new "leaders" are not only pained by their colleagues' hostility, but also full of doubt about whether they themselves are at all right and, if they continue to feel right, about how to proceed. The control of the traditional-style leaders seems unbreakable; they destroy when they cannot construct. The new-style leaders feel even more discouraged when they see the comments of the trainer

himself (!) greeted with open attack. It is as if the member said to himself: "If the group so attacks *him*, how much more rough will they be with *me*!" To most members, beset by anxieties, the incipient sign of a new system of relationships appears first of all as a most painful reminder that its avoidance of the central task of developing new leadership behaviour has not passed unnoticed and that it may not be able to hold the group back from applying itself to this task.

As the series of sessions moves into its second half an increasing number of members usually begins to see that, contrary to their earlier assessment, the trainer's behaviour has in fact been pretty consistent right through and seems, sometimes at least, to be obviously effective. After an intervention by him, a silent member suddenly speaks and has lots to say. In the wake of another intervention, a second member expresses his pent-up resentment at the way a few noisy members have been monopolising the discussion. This time he may be silenced, but many members know that he was right. An increasing number of members realise that the trainer has all along been pointing to real issues in the group, however painful. Moreover the trainer does not seem to get ruffled by people's anger, even against himself, but seems continuously busy trying to understand what is really going on. He cares. He seems to insist that the members do not feel each other and themselves, do not cover up. In repeatedly pointing to these sore areas and accepting the group's anger, he is also expressing his confidence that the group is able to handle the painful processes, involved in its own development.

The Fourth Stage has this very mixed atmosphere. Nobody can say with certainty where people's attention is. Suddenly someone may start reminiscing very personally about people and events which have been important in his life. Another follows. For many participants that is the first time they have talked so frankly to colleagues, perhaps to anybody. They are surprised at hearing themselves talk so personally and also at the warm response which almost invariably greets such personal statements. As one statement leads to another, often surprisingly similar in essence to its predecessor, a new kind of sharing becomes the order of the day. The group establishes a new level of frankness and closeness.

Members may now recall and begin to describe the behaviour of other "different" leaders they have known: people who consult, check, keep in touch, create numerous informal occasions to talk with colleagues; who do not seem to need to dominate or to submit and who succeed in eliciting other people's opinions and comments, including unpleasant ones. With this, the group is busy putting the trainer sitting with them back into the group. They do not need him any more to depend on or to fight against. They need him as a person taking part, like everyone else in the room. There is a new concern to draw silent members into the discussion.

Diffusion of Roles

The Fifth Stage may not be reached in a short series of sessions, at least with any consistency. But to some extent at least participants now perceive some key aspects of the new pattern of relationships which they can transfer in their minds to other settings. One prominent aspect is the diffusion of roles in the new system. There is not one sole leader for all time and purposes, but a number of people to whom the group looks for leadership in different situations. One initiates a topic for discussion, another encourages a reticent member; a third summarises and checks how far people are in agreement. In the factory or office, similarly, one turns out to have special capacities involved in planning a project, another in implementation; one seems to lead "from behind", the man whose advice people seek quietly and then follow and so on. It becomes clear, too, that some people excel in times of stress whatever its origin; they encourage, harmonise, reassure. And they seem very important at those frequent times.

This series of stages through which managers and officers in a training group

pass in their endeavour to develop new leadership skills and patterns is an example in miniature not only of the strains of leadership in a developing society, but also of the sequence in which the strains may be overcome and a new society born.

From them three lines of action seem to emerge as particularly important and appropriate.

Firstly, there is always room for development in that part of our systems of relationships over which we each have control: that is, in our own behaviour. As the trainer behaves differently, as the manager or officer behaves differently, he enables others to change their behaviour in turn; and so on—a chain reaction. In this way, we each have the task of "freeing others to change". The result, in the words of John Gardiner, President of the Carnegie Corporation, exceeds a society that achieves a change. The result is an "ever-renewing society".

A second line of action is to pay particular attention to those leadership functions which are of extra importance during times of development and the severe strains significant development entails. One function is planning: the clear vision and precise goals. As things are, this function often receives more attention than another that has to be adequately taken care of before development occurs: that of reassuring, encouraging, harmonising and simply of keeping in close personal touch with people while major changes are starting up. This kind of activity may look like delay when action is called for. But experience shows that the delay need not be long, and that once the personal preoccupations have received attention, action will then be both quicker and sounder. In any case, experience also shows that *in the absence of this leadership function, the likelihood is that development may not take place at all.*

The third important action is to provide in all organisations maximum opportunities for the practice of leadership skills by more and more people. New people, whole new classes of new people, need to get involved in this practice, need to be nurtured into playing leadership roles. Perhaps herein lies the basic wisdom of Panchayats and other attempts to popularise government, whatever their present short-comings. Certainly, this is the right approach to the next generation, including most immediately to the children in our own homes. They can, with due care, patience and guidance, develop into effective leaders for tomorrow. And we of today will then have the satisfaction of having carried out the key leadership task in a developing society: to help multiply competent leaders and to fade ourselves from untimely and now damaging personal prominence.

Superior Productivity Claimed

In an interesting conference held aboard the Soviet ship, *Frederic Joliot-Curie*, says a report, Mr VN Polianov, representative of Sovfracht (ship chartering organisation of the Soviet Union), claimed that Russian ships could offer better service and more favourable terms than many foreign lines which were currently being patronised by Indian trade.

At present, Russia possessed a very large merchant fleet of about six million tons, to which additions were being made at the rate of one vessel a week, the report added.

The Manager As Change Agent

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In this paper is handled briefly a theme associated with the main issue of the management of change, namely, the internal change agent, and his training needs for the role performance. The main theme concerning change patterns, and the causes of resistance to change, besides an overview of the processes involving accommodation to change, has been discussed elsewhere[1] by the author.

THE change agent is a person or group of persons consciously working for a change in a social system such as an industrial organisation. Usually he is an outside agency, like AK Rice associated with the Calico Mills and the Sarabhai group of industries, or AJM Sykes who did excellent work in a Scottish engineering firm[2]. He or the group may as well be insiders, and yet work effectively, provided that outside consultants prepare him or the group for the role performance. There are some notable examples[3]. Recently RR Blake, JS Moutor, LB Barnes, and LE Greiner have shown that managers are capable of performing this role[4].

The consultant (change agent), who is outside of the client system, enjoys certain advantages in carrying out his assignment which are, on the face of it, denied to an insider. As an outsider he is free from the influence of the organisation, is unlikely to develop any bias, and has the freedom in offering or continuing his services, and is not looked on as a competitor by the client system. We shall, however, argue that an insider can be effective for which, however, he has to cultivate some basic attitude and skills which are characteristics of a professional consultant[5].

In this paper we shall be primarily concerned with the internal change agents, who, as employees in an organisation, seek to

effect organisational change. The reason for emphasising the purposeful role of internal change agents is that it is a common enough experience that innovative and creative ideas, small or big, originating with some employees, often register opposition at various levels inside the organisation. This results in frustration for the innovators. However high placed a person may be, he will suffer frustration as was occasionally the case with Charles Kettering, the great scientific brain of General Motors[6]. We are going to argue that it need not necessarily be so, that some key employees may act as change agents so as to infuse a spirit of dynamism, experimentation, and problem-solving in an organisation.

Guiding Factor

It will be useful to discuss briefly, at this stage, why formal organisations somehow fail to respond to innovative ideas, generate feelings which stand in the way of accepting change, create interpersonal barriers and interdepartmental rivalries, and lead to management by crisis.

A formal organisation, as we know, is characterised by (a) task specialisation, (b) a chain of command, (c) unity of direction, and (d) a limited span of control. Behind this formal framework lie certain basic assumptions and beliefs which are that rationality should be the guiding factor in the working of an organisation justifying detailed policy and practice statements, job titles and descriptions, statement of responsibilities, and so on, that feelings and emotions have no place in a rational structure, and so these should be discouraged, suppressed or ignored, that jobs will be best performed if these are broken into parts and sub-parts for better mechanical performance, and that employees perform better if they are directed, guided, and controlled by men in superior positions who wield power of extrinsic rewards and punishments[7].

As against this picture of organisational philosophy, we find that human needs and growth are basically in friction with the typical organisational structure. Briefly stated,

(i) born as passive infants, men as they grow old, start taking an interest in their own affairs;

(ii) born dependent, they seek independence in thought and action as they grow;

(iii) born with general response, as they grow old, men start making specific responses to different stimuli;

(iv) as infants their behaviour is erratical and casual, as grown-ups their behaviour becomes more specific, goal-directed, and casual;

(v) as infants they have a shorter perspective of events, whereas as grown-ups they develop longer perspective;

(vi) as children they are subordinates, but when grown up, men aspire for equality and seek to develop super-ordinate relationship with others;

(vii) born with a lack of self-awareness but as they grow old men develop a "self" concept with self-awareness [8].

Personality growth (maturity, independence, and so on) is thus the natural pattern of human behaviour.

It can be seen then, that personality growth and traditional organisational philosophy are in conflict, a problem so massive that it is important to recognise it[9]. Organisational philosophy tends to create submissiveness, dependency, conformity, and suppression of feelings and emotions amongst the employees who, as indicated above, tend to grow in thought, action, and stature. The resultant maladaptiveness creates an atmosphere where mistrust among employees is rampant, informal groups grow up to set their own goals and tasks which are often aimed at beating the organisation's objectives, where feelings and emotions are at a discount even though employees of superior status "raise hell" at times to get things moving.

True Picture

We have perhaps painted a somewhat "pessimistic" picture of employees in relation to an organisation; our intention is not to spread "scare" or "pessimism", but rather to construct a true picture in the light of the

findings of behavioural scientists studying organisational behaviour[10]. It should be mentioned that analysis of the characteristics of a formal, tradition-bound organisation is not to pass a value judgment or to decry it, but to show that in the context of personality needs or group development, the organisational philosophy is patently inadequate ultimately reducing the organisational effectiveness[11]. We should, however, add that the two are not irreconcilable entities, and their integration is an achievable goal[9].

Bureaucratic Ideals

We consider it rather vital for the manager to understand as to what happens, almost in the manner of a chemical process, to the individual employees or human groups, in a formal organisation. The values that an organisation subscribes to are, that human relationships are relevant to the extent they further the organisational objective, that personal feelings, attitudes and values are not legitimate to the extent they are irrational, illogical, and not easily communicable and that human behaviour can be manipulated by organisational controls. These bureaucratic ideals working for "behaviour-change" set in motion certain restraining forces amongst the employees who seek to protect their needs and values by setting up "defence mechanism". Whatever be the form and content of this defensive behaviour, a basic incongruence develops inside an organisation, the "whole" which is the organisation and the "parts" which are the employees remain maladjusted. We do not get an "organic-adaptive" system. Individuals, as a consequence, receive and give evaluative feedbacks, project or deny one's own attitudes, values of feelings upon others, expect others to accept one's own attitudes, values and feelings, close the shutters to new attitudes, values and feelings, and require others to do the same.

The manifestation of such non-authentic behaviour in an organisation decreases interpersonal competence, brings about interpersonal conformity, mistrust and dependence on authority-hierarchy. As a result, effective decision-making suffers, organisational defences increase, and inter-departmental conflicts develop. Thus, the very objectives which are sought to be achieved by a bureaucratic ideology remain unachieved[11].

In the light of our analysis, we observe that the managers are faced with a dilemma, caught between the arms of a pincer, and are not likely to be happy with this state of affairs. So, unless they are put in a "here-and-now" situation where to examine these values, find their worth, and then consciously and willingly accept a new set of values (attitudes, beliefs, skills, and knowledge), their role as change agents will continue to remain ineffective. We shall outline later as to how to accomplish this objective.

It may be useful to discuss here the role-pattern of the change agent. To start with, he need acquire a basic understanding of the complex variables and their inter-relationship that enter into the world of human relations in an organisation. In the words of Douglas McGregor, "... the performance (P) of an individual at work in an industrial organisation is a function of certain characteristics of the individual (including his knowledge, skills, motivation, attitudes), and certain aspects of the environmental situation (including the nature of his job, the rewards associated with his performance, the leadership provided by him). $P = f(I_{a, b, c, d} \ldots\ldots\ldots E_{m, n, o, p} \ldots\ldots\ldots)$".

Diagnostic Attitude

"The relationship between these variables are many, and complex. It is important to recognise, however, that what is involved is always a *relationship* between E variables and I variables."[10]

In other words, what is involved is a sense of perspective to comprehend cause-effect relationship. It is not enough to say that "Business is People", but to know how to correlate "People" and "Business" in a casual relationship. Secondly, and following in the

. . . Since organisational problems are basically human problems, they can be resolved only by human solutions. We live on hope and the effort it generates...

cause-effect relationship, there is a need to develop a diagnostic attitude to reduce the forces at work to their elemental dimensions. As Howard Baumgartel remarks:

> "What the human relations approach asks of the persons with the problem is that he include in his role definition behaviour that has diagnostic value. Why is this person deviating from what I think he ought to be doing? What concepts and ideas are useful in this instance? What new alternatives of action are opened up by this diagnostic understanding of the problem?"[12]

The diagnostic insight is thus a support to understanding, as in the case of a physician attending to a patient. The seed of healing lies in diagnosis, and to that extent it is neutral to ethical considerations (good vs. bad). It is, however, necessary to caution against putting a high premium on "insight" skill. Warren Bennis is sceptical about the role of "insight" strategy in the dynamics of planned change[13]. Thirdly, the essence of the Rogerian philosophy, though developed in the context of the treatment of neurotic behaviour, is of some significance to the change agent working in an organisation. Carl Rogers has demonstrated that a client possesses latent capacity to redeem himself and become adaptive if the therapist can establish with him a relationship sufficiently warm, acceptable and understandable[14]. For this to happen, the consultant (i.e., the change agent) has to achieve a state of "congruence" whereby he gives up the garb of a facade, and openly owns his feelings and attitudes at the moment of contact with the client. Genuineness is a restorative[15]. Closely allied are the findings that authentic interpersonal relationship can be set up in an organisation in an atmosphere of trust[16]. The change agent in his role relationship cannot get away from this. Authentic relationship as an interpersonal phenomenon is that which enhances the change agent's sense of self-awareness as also of other awareness, and the acceptance of these in such a way as to facilitate acceptance by others.

Lastly, it will be a travesty of reality if the change agent is to concern himself only with such interpersonal entities as feelings, beliefs, and attitudes, important though they are as determinants of behaviour. Short of destroying a formal organisation, the element of "rationality" is a variable worthy of attention. Thus, the change agent has a dilemma. As Warren Bennis, Kenneth Benne, and Robert Chin put it,

> "This dilemma of the change agent cannot be brushed away lightly. He must acknowledge the polarisation of 'feeling' and 'rationality' that operates in many situations, he must recognise the limitations of present attempts to bridge the gulf between 'knowledge' and 'emotion', and he must supplement his diagnostic orientations with acknowledgment of the reality of his own personal feelings and those of others."[17]

Didactic Methods

We shall indicate later that the gap between emotionality and rationality can be narrowed down under the scheme of training we shall recommend for the managers. In any case, it should be emphasised that too great an emphasis on interpersonal and group factors in "behaviour change" may militate against the cognitive factors associated with

task-performance, and economic and technological aspects[13].

The change agent, we have suggested, is required to acquire a new set of values before he becomes effective in his role function. The limitations of didactic methods prevalent in academic circle are so obvious that it will be unsafe to rely on them. The case methods, whether in the classical form or incident-process or role-playing, have great merits in that they seek to broaden the repertoire of the trainee's diagnostic skill and sharpen the problem-solving abilities. But in a real life, back home situation, these experiences are not sufficient to handle interpersonal and organisational situations[18]. Alexander Winn has substantiated this observation with recent findings[19].

T-Group Technique

In the light of our analysis, what is needed is a programme for personal and group growth, and the basic assumptions are that the training seeks to (1) help the trainee in being responsible for his self-development; (2) create an environment of re-education where the trainee will first become aware of his attitudes and behaviour and then unfreeze them on his own before he decides whether to change them or not; (3) help learning in interpersonal, small-group and intergroup relationships; (4) help emotional learning; (5) help development (of individual and organisation) by making the trainee "authentic" in his relationship; (6) develop better understanding of others and a greater esteem for them; and (7) achieve change in basic values rather than acquisition of skills[20]. This is sought in Laboratory Training Method as developed over the years by the National Training Laboratories, Washington, in what is specifically known as the T-Group technique (T for Training).

The T-Group session provides a setting of unstructured, small group where there are no rules of procedure or agenda. Members are exposed to a vacuum where there is no formal leader for guidance or to depend upon, and in a situation of dilemma they start interacting exposing their behaviour, receiving and giving feedback. This helps create analysing and diagnosing one's own feelings, emotion, briefs and attitude which will, in all likelihood, impress on a member the relevance of their worth in inter-personal relationship. He may, for example, discover on his own that face-to-face communication is full of pitfalls if the basic relationship of mutual trust and confidence is lacking, that what is often thought of as democratic problem-solving session in a leader-directed group is in reality a "win or lose" situation where deviant views get censored or receive no attention, that when people talk of "rationality", "objectivity", and "logic" they, in their own behaviour, express feelings and beliefs which create an entirely different picture from what they try to convey with the rational talk. In this process, admittedly painful, members learn to unfreeze their values and accept a new set of values which enhance the interpersonal competence.

The ramifying effect of the T-Group experience goes further. Through the alchemy of authentic interpersonal relationship a spirit of congruence develops which helps understanding and fostering of group processes for productive task. The members get an insight into distributive and supportive leadership, and the spirit of "win or lose" gives way to "consensus" in problem-solving. An understanding of relationship among environmental, individual and group variables develops resulting in an integrative inter-group and inter-departmental relations. Members are thus more prone to look upon rationality and emotionality less as "riddles" than as expressions of human behaviour which are neither "good" nor "bad" but authentic, and, as such, capable of being understood and appreciated. The group, by developing the spirit of consensus, evolves norms by which extrinsic direction and control are minimised, and rewards and punishments are evolved internally and intrinsically.

We suggest that the T-Group experience is most likely to provide the support to

potential change agents in their role performance. There are some recent findings which indicate the effective role of T-Group techniques in motivating managers in their contribution to the change processes[4 11 19].

There are a few words of caution. The T-Group is not a Therapy group. A person who has developed neuroses or some deep prejudices, regression, or illness of similar variety may or may not respond to therapy, but he is not the type who will derive any benefit from the T-Group. In fact, by his failure to achieve authentic relationship, he will most certainly hinder the progress of the group[21].

It is not our prediction that all those managers, who go through the laboratory experience, will be successful change agents severally or collectively in their organisations. The accumulated effect of the traditional environmental variables may far outweigh the efforts put in by the internal change agents. But there is still the lingering hope that since the organisational problems are basically human problems, they can be resolved only by human solutions. We live on hope, and the effort it generates.

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Man for Industry or Industry for Man

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MODERN research has shown that the orthodox view of work, still accepted by many managers and industrial psychologists, is incorrect. We should base our approach to industrial problems on assumptions which are nearer to the truth. These assumptions are:

1. Work is a social activity. It is an essential part of a man's life, and it gives him status and binds him to society. Ordinarily people like their work, and at most periods of history this has been true. When they do not like it, the fault lies in the psychological and social conditions of the job.

2. The morale of the worker has no direct relationship to the material conditions of the job.

3. There are many incentives, and money is just one of those, under normal conditions. Unemployment is a powerful negative incentive, precisely because it cuts man off from his society.

4. The average human being learns not only to accept but to seek responsibility, under normal conditions. Lack of ambition, avoidance of responsibility, and emphasis on security are not inherent human characteristics, but consequences of experience.

It is a futile task to define what exactly 'work' is. If we define it in terms of pay, the hard-working housewife will have to be excluded; in terms of pleasure, it can easily be shown that for many people work and play are virtually the same thing. Fundamentally, work is a social activity with two main functions—1. producing the goods required by the society, and 2. binding the individual into the pattern of interrelationships from which the society is built up. According to Dr May Smith, "The final end of work is to live. Therefore, those who exchange their activities of body or mind for the means to live are working."

It is known that status and function are of crucial importance for the psychological well-being of the individual, and these are imparted to him, to a large extent, by the working environment. Professors Miller and Form conclude that the motives for working cannot be assigned only to economic needs, for people may continue to work even though they have no need for material goods. They may work, even when their security, and that of their family, is assured, because the rewards they get from work are social, such as respect

and admiration from their fellowmen. Thus, there are several non-material social rewards which industry has in its power.

Hence, the fundamental problem of the manager and the industrial psychologist is to find the answer to the question: what has changed this necessary, important, and potentially pleasurable social activity capable of satisfying both material and psychological needs, into a source of boredom, resentment and strife?

Psychological Analysis

Psychological analysis of the present job situation will unfold the reasons for this changed attitude towards the job.

On an assembly line, the job is highly repetitive, is fixed at a mechanical rhythm set by the conveyor, and it is extremely difficult for the worker to see the significance of his contribution. Even without the assembly line, modern technology has tended to divide jobs into small elements, so that no worker can be personally proud of his own contribution. The worker does not produce the finished product, and if anyone is praised for the quality of the product, it is the manager who never laid a hand on the physical materials involved. Thus, the intrinsic satisfactions of the job itself have been seized from the worker. Management has attempted to compensate for the loss of intrinsic satisfaction in work by providing extrinsic satisfactions, e.g., higher pay, fringe benefits, and recreation centres. However, the essential inadequacy of these devices can be readily demonstrated by psychological analysis.

Fig. 1 represents the situation in which satisfaction is intrinsic in the work. In this case, the reward is experienced in the process of working; it is immediate, not delayed; and it is perceived as independent of other arbitrary, external conditions.

Fig. 2 represents the condition which prevails in many job situations. Here work is perceived as a negative region, like punishment which one must pass through, to reach the goal. Here the reward is delayed, is not associated immediately with work, and is perceived as dependent upon various external circumstances. The individual goes through work rather reluctantly, his interest being merely in the extrinsic reward and not in the work itself. In this situation, he will use all his intelligence to reach the reward without going through the work, or doing the minimum possible, since his real goal is the extrinsic reward and not the task in itself. He may come late to work, jam the machine, and loaf when he can. This worker tendency was reflected in a survey in a factory in London where they found that most of the workers were sick for the exact number of days for which they were entitled to the sickness pay without work. The worker then perceives the situation as in Fig. 3, and tries to find ways to avoid the negative features of the job.

It is clear from this analysis that the extrinsic rewards can never motivate efficient and attentive effort in a manner comparable to the intrinsic satisfactions. The complete mobilisation of the energy cannot occur unless the reward is perceived as being implicit in the completion of the task itself.

Modern researches have tried to prove that job satisfaction and productivity are inversely related to each other. As a matter of fact, what they were measuring as job satisfaction or social satisfaction of job was not job satisfaction at all. Rather it could have been more suitably called as "job dissatisfaction", which means that their finding is exactly opposite to what they have stated.

Job Satisfaction

In a recent study of the relationship of job satisfaction and productivity in a shoe factory, job satisfaction was measured in terms of the contacts made with the colleagues. It is difficult to see how it can measure job satisfaction. In fact, the more an individual is satisfied "in" his job, the less he will divert his attention to the colleagues, and he will have less contacts with the colleagues. In many other cases, the tendency has been to measure "satisfaction around the job" and

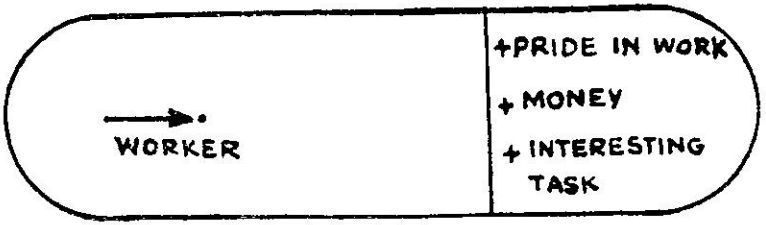

Fig. 1 Perceived situation when job is satisfying in itself.

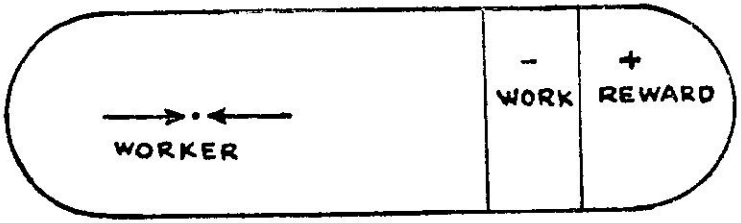

Fig. 2 Perceived situation when work is not liked and reward, not associated with work, is delayed.

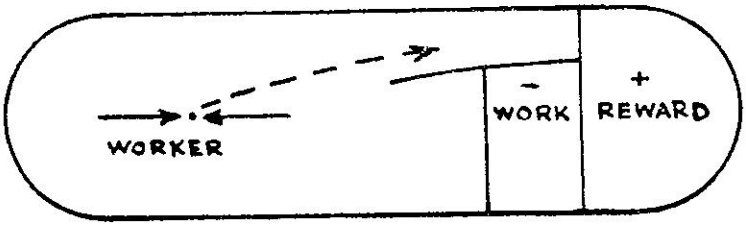

Fig. 3 Perceived situation when worker finds way to avoid negative features of job.

call it as "job satisfaction". Really "job satisfaction" should mean the intrinsic satisfaction or satisfaction in doing the job. The more interest an individual has within his job, the more enthusiastically he will do the job, and his productivity is bound to increase.

With this wrong concept of job satisfaction, many managers are attempting to strike a "balance" between productivity and the so-called job satisfaction, which is nothing else but "social welfare" of the kind of long-service pin, recreation centre, etc. But if we define job satisfaction as "satisfaction intrinsic with the job" then the problem of bargaining and striking the balance between productivity and satisfaction does not arise. Instead, by using the principle of integration both job satisfaction and productivity can be

. . . Welfare is an excellent thing when it is kept within reasonable limit, and is rightly conceived, but becomes unreasonable when used for ulterior motives particularly as a stimulus to work . . . Welfare should be regarded as a social act, not as an incentive to increase production . . .

increased, thereby eliminating the conflicts of interests between management and workers. Managers should, therefore, direct their effort towards proper job design, instead of searching ways to motivate workers to do the jobs which are not properly designed.

In recent days, we try to make any job to be "as simple as possible" to eliminate the human problems. But does this really eliminate the human problems? By using the principles of motion economy we find the "best" method for doing a job, and force it on the workers. But does this really increase their productivity? In nearly all the companies management tries to keep "optimum working conditions" to save as much human energy as possible. Many companies have proper temperature and humidity, and music in the plants to keep the workers in a nice rhythm (!), so that they may be in a good mental tempo and work efficiently. There are coffee breaks every two hours, so that they may not be fatigued.

But if we look around and see, we will note that, however good working conditions in the material sense may be, they have little or no direct relationship to good morale. Bad conditions of work in themselves have practically no bearing on the morale of workers, and their attitude towards job. For example, the troops in Korea during the war worked under the most appalling conditions, yet their morale was very high. There should be no doubt that good physical conditions may co-exist with bad morale, and bad conditions with good morale. Good physical conditions of work may make good morale better, but these will not, in themselves create it. Obvious, though it seems, there are many psychologists and managers who still hold, or at least appear to hold, the opposite view.

Rest pauses are supposed to increase productivity by compensating for fatigue, and they do indeed. But why does fatigue arise? According to Stagner, workers' efficiency is affected by certain physical conditions, but these conditions are not very often encountered in ordinary work in industry. Fatigue is not merely a physical phenomenon, but is really a psychological or mental phenomenon. A man gets fatigue in a comfortable air-conditioned place within two hours of moderate work, but the same man works tirelessly in his yard for more than four hours on Sunday in the hot sun. Biologically he has spent more amount of sweat and more amount of calories without getting fatigued. This shows the futility of the modern researches directed at finding out the so-called optimum environmental conditions such as temperature, and humidity.

Energy Potential

A human being is a big reservoir of energy. Under modern industrial life conditions, potentials of an average human being are only partially utilised, the fraction utilised being very small. The Indian farmer is an example of this tremendous supply of energy.

Those who recognise this energy potential will agree that, instead of directing our efforts to find out how we can save our energy, it would be more fruitful, if we find out how we

can tap this big reservoir of energy, and channelise this energy to achieve the desired goal.

The productive capacities of an average human being are far greater than we have recognised. We have yet to learn a lot about managing and utilising human resources. Unfortunately, management practice and even most of the work in industrial psychology have been based on invalid and limiting assumptions about human behaviour. Starting with the efficiency engineers Taylor and Gilbreth, and the early industrial psychologists Munsterberg and Myers, the approach was thoroughly atomistic, which gave no consideration to the psychological or social factors.

Welfare

The manager and the industrial psychologist have passed from the stages of ruthless exploitation and a mechanistic approach to work to a new stage of perverted "welfare" and the same old mechanistic attitude. Welfare is an excellent thing when it is kept within reasonable limits, and is rightly conceived, but becomes unreasonable when used for ulterior motives, particularly as a stimulus to work. Hence, welfare should be regarded as a social act, not as an incentive to increase production.

The individual's need for status and function is the most significant of his traits, and if this need remains dissatisfied, nothing else can compensate for its lack. A person is judged by what he does. Work is the source of his most basic satisfactions; it is his social catalyst. By working, he derives his social status and prestige among his fellows.

Hence, in respect of the role of mental health, managers should base their policies on a more complete comprehension of the manageable conditions of health and happiness. By setting industry's own house in good mental order, by recognising the dignity of labour, by designing jobs so that workers will have interest "in" their work rather than "around" it, by increasing participation in decision-making and responsibility, and by rendering jobs authentically a central interest in people's lives, they can contribute to the total health of the nation.

Finally, we must bear in mind that at all the stages of industrial development, man is not meant for the industry, but the industry is meant for man.

Prospects for Atomic Productivity

The Prime Minister, Mr Lal Bahadur Shastri, told the Rajya Sabha that, besides Singhbhum district, Bihar, "significant" uranium occurrences had been found in Kulu (Punjab), Chamoli (Uttar Pradesh), and Mahasu (Himachal Pradesh).

One thousand tons of uranium ore per day would be produced by developing the uranium mines in Singhbhum district. A uranium ore mill was being constructed in Kaduguda, Bihar, for concentrating the ore. Steps would be taken to look after the uranium deposits, and continue further surveys. Further work on the deposits occurring in Uttar Pradesh would also be taken up.

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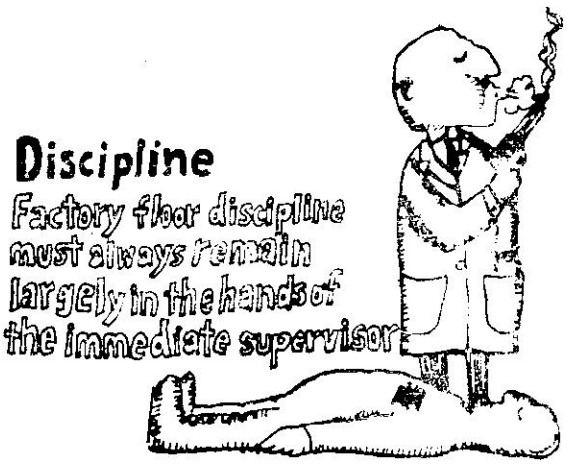

Human Relations in Man Management

Man is the most important factor of production, and unless the supervisors use the techniques of human relations in supervision, they will not be able to achieve the desired results.

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MAN being the key to the success of any productive activity, the effective utilisation of manpower is a fundamental problem today.

Getting the best out of the man depends not only upon the methods and equipment that the management provides him, but also, and largely, upon his own willingness to work, which, in turn, depends upon his attitude, satisfaction, and morale. Of all the techniques and methods of increasing work satisfaction, and improving morale, the techniques of human relations in supervision are the most effective. It is the skill of supervisors in dealing with human nature that matters most in building high morale, and in motivating people to work willingly. The quality of supervision, therefore, plays a significant role in inspiring the willingness of workers.

Apart from basic needs, such as food, clothing and shelter, man wants affiliation, achievement, recognition, status, etc. It is

these needs the satisfaction of which builds higher morale, and consequently makes the man more productive. When a child is born, it has a set of basic physical needs, for the satisfaction of which it depends upon adults. Adults can make this dependency of the child predominantly satisfying, or predominantly frustrating. Satisfaction builds security, independence, and social needs; frustration creates insecurity and hostility. Similarly, a worker is chiefly dependent on his superior for the satisfaction of his needs. The dependency of a man on his superior gives, therefore, greater opportunity to the superior in controlling and shaping the attitudes and morale of his men. Since the success of a superior in accomplishing his job depends primarily on his ability to obtain help from his men in getting the job done, he needs to create a situation under which they will help him in achieving his objective by contributing their best effort.

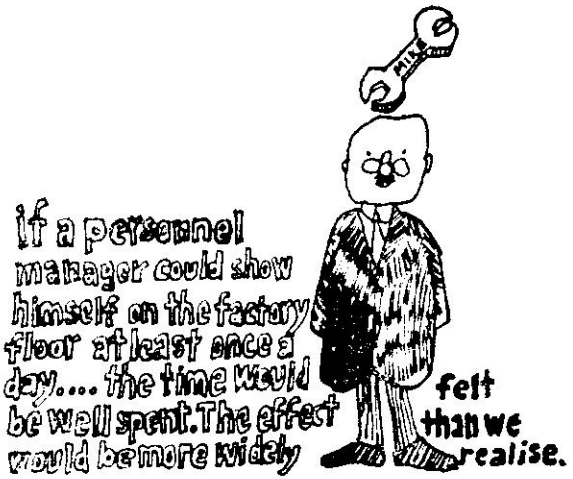
Effective Communication

The superior must first provide his men opportunities for the development of their active independence at their jobs, so that they may show their initiative, self-directed effort, and growth of which they are capable. Some men may have unusual abilities, which may not be revealed unless given a chance. Therefore, in order to utilise the skills and abilities of the man fully, it is essential to make him feel independent to the maximum extent at his work. The superior has also to impart certain kinds of knowledge to his men, such as broad policies, rules, and regulations of the organisation they belong to, especially in relation to their specific duties, what is expected of them, how well they are doing, and so on. All this information is important to the workers, so as to feel that personal attention is being given to them, and that they are being treated as members of the group. Again, the superior must explain facts to them on the level of their understanding, as the words that communicate a thing to one man may confuse the other. For effective communication, the superior has continuously to place himself mentally in the other man's world, as, otherwise, there will be little chance of establishing a common ground of understanding between them.

Kindness and Courtesy

Kindness and courtesy are also important. The superior should show himself kind and friendly to his men, and listen to them sympathetically, and with full consideration and courtesy for building confidence in them. Talking too much and saying too little is very common, and superiors often give the impression of listening, but actually they are not. It is the active listening which brings the desired cooperation of others, and the courteous superior suggests courtesy to his men.

Active independence on the job can further be developed by encouraging participation of workers in all possible aspects of the job. Encouraging participation among the workers gives them an opportunity to develop their initiative, helps to improve their attitudes



and morale, and results into an effective utilisation of their skills and abilities.

Another important technique for the development of independence is the maintenance of an atmosphere of approval at work. The atmosphere of approval does not suggest that the lower standards of quality at work and indiscipline on the part of the workers will be tolerated. It simply means that an honest mistake will be recognised. A superior can maintain a high quality of work performance, as well as strict discipline, and can still give the man a feeling of having freedom to make mistakes: mistakes can be pointed out to him and corrected with an atmosphere of approval. This increases the effectiveness of the man as he feels differently about himself, his job, and his superior.

Powerful Technique

Yet another important and powerful technique for building confidence at work is the appreciation for a contribution well made. People want to be appreciated. The technique of appreciation encourages the person for advancement, and thus meets the human need. If this weapon of appreciation has to be at all effective, the superior has to have faith in his men. He must believe that they have the potential to be good, they can achieve their goals, and will respond to positive treatment. He has also to ensure that appreciation is not cheap praise which will have no meaning.

Similarly, when a superior uses the technique of criticism to train a man to do a better job, he must use it gently. Criticising a man publicly lowers the stature of the superior among his men, and criticism in private enhances his growth and yields the desired results. Again, the language which the superior may use in criticising his men should be within the range of their understanding, as otherwise it will prove to be ineffective.

Close supervision, which means frequent checking upon workers, giving them frequent and detailed instructions, and in general limiting their freedom to do the work in their own way, discourages their initiative, willingness to work, and consequently their growth in independence. Conversely, supervision which encourages workers to have freedom to discuss their problems with superiors not only helps in the growth of their independence, but also motivates them to turn out more than those who do not have such freedom.

Secondly, the superior must provide opportunities for growth and expansion of social need satisfaction of his men at work. Unless the man feels that he is somebody, that he can do something, that he is a member of the group, and that he is important to the task and the group, he cannot be useful to himself and to the organisation. People have feelings and aspirations and, therefore, wish to be treated as persons. Every man wants to maintain and to enlarge his own feeling of self-worth. The more a worker possesses such feelings, the higher is his morale. It is, therefore, essential for the superior to be on the look out for opportunities for the development of such feelings in his men. These opportunities include not only the opportunities for actual advancement in pay, position, and responsibility, but also other important opportunities like learning of new skills, a feeling of the importance of one's role in the total productive effort, and a feeling of being identified with his work as a person, and not merely as a routine worker waiting for his pay, and so on.

Quality of Supervision

When a worker has the kind of superior who affords him such opportunities to develop his feelings, he sets his sights higher, he expects more out of himself, and he gets more done as a consequence. The relationship between a worker and his superior is the most important human relation in a work place from the standpoint of the worker. Workers, therefore, want superiors, who treat them as human beings, who understand their problems, and give consideration to their aspirations and social needs.

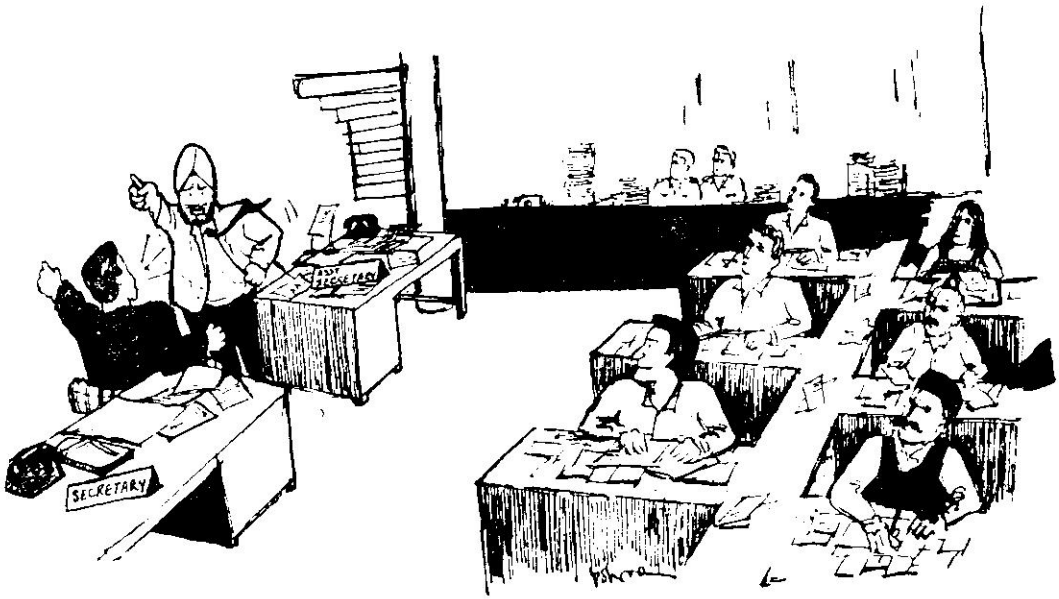
The quality of supervision is thus a major factor in influencing attitudes, building

morale, satisfying the needs of workers, and in stimulating their productivity. Supervision which is employee-oriented results in higher productivity than where supervision is production-oriented.

Training of Supervisors

The human relations in supervision are, therefore, important for the success of supervisors in obtaining the desired productive effort from their men. It means that management must give more consideration to the selection of supervisory personnel, and to the development of leadership qualities in them for dealing effectively with human relations on the job. This requires constant training of supervisors in the field of human relations, which means application of methods of science to the study of people at work in order to influence and change their behaviour and attitudes so as to make them more productive, and effective.

Man is the most important factor of production, and unless the supervisors use the techniques of human relations in supervision, they will not be able to achieve the desired results. By making their men better and more useful as a result of sound and proper guidance and supervision through the skills of human relations, the supervisors will not only make the organisation a more effective operating unit, but also will themselves grow in the art of man management.



Such quarrels will certainly affect organisational morale

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Human Relations Approach:

A Policy for Sound Management

A CRITICAL analysis of labour unrest ranging from simple on-the-job griping to crippling or plant-wide strikes, will reveal that it is not necessarily due to low wages, but is because of the management's failure in understanding the behaviour and reactions of the labourers. The relations between workers and management and among fellow-workers are becoming more and more complex.

Management of an industry has two aspects: one is machines and materials, and the other, which is more important, is man, the labourer upon whom depends, to a great extent, the success of an industry. Managing people at work is a function that must be performed in every type of employment—for every occupation and industry, and every type of employee manpower. Nearly 80 per cent of the time of all managers is spent in interpersonal dealings. Thus, four-fifths of the problem of low production can be tackled through the human relations approach. Research has proved to management that though the whip cracker gets results temporarily, the company pays a heavy price in absenteeism, turnover, grievance and a general collapse of morale, which is soon reflected in productivity.

Physical scientists and technologists who have helped industry in machine designing, material handling, production processing and product designing, are not able to assist the management in understanding the causes of conflict between workers and management, i.e., understanding of human relations. Several business executives do not hesitate to admit that they are encumbered by blind spots or personal faults that hinder their effectiveness in human relations. They also admit that they know how to handle things, but are yet to learn how to handle people.

The basic purpose of all management is to secure maximum productive efficiency of the manpower involved. This goal of management cannot be fulfilled in conflict with that of labour, since worker satisfaction implies adequate wages, recognition, security,

mutual understanding, and interesting work under good conditions. Social scientists have been focussing their attention on management, more and more, since World War II, with correspondingly less emphasis on organisation and motivation of hourly workers. If we go through the annals of development of man-management relationship, we find that there has always been a stress on understanding the behaviour of the workers, their limitations and reactions in order to obtain the ultimate aim of the management, i.e., maximum utilisation of labour force.

It is believed that labour problems are due to the inherent nature of people. On the contrary, these are due to misunderstandings, and the management can seek to discover their sources. As soon as the management recognises that there is something it can do to prevent or remove misunderstandings, solution to many problems becomes easy. Management can do something to change itself, so that it is not misunderstood and is not inclined to misunderstand its people, employees, and labourers even if it cannot change their nature.

Only Solution

True, individuals differ, but difference is more in their mental make-up, temperaments, and overall behaviour patterns than in their physical characteristics and requirements, and as such no single formula can be worked out to solve human relations problems.

Change in the attitude of management is the only solution. The management has to consider the labourers as human beings, as social beings, and has to consider and evaluate their problems in that light only. This approach has been termed as *human relations approach.*

Many a time the human relations approach is identified with being nice to people, and being nice to people is seen leading to a neglect of getting the job done. But it is a misunderstanding on the part of those who criticise the human relations approach. Human relations is development of joint purpose and motivation in a group. Applied to industry, it is the integration of people into work situation in a way that motivates them to work together productively, cooperatively and with economic, psychological and social satisfaction. The three important goals in human relations are to get people (i) to cooperate, (ii) to produce, and (iii) to gain satisfaction from their work. These goals are oriented towards developing a deeper understanding of how human factors are involved in creating situations where people can achieve optimum productivity, and a sense of personal fulfilment. When these goals are achieved, the result is a successful group effort.

The three important goals in human relations are to get people to cooperate, to produce, and to gain satisfaction from their work . . .

The practice of human relations leads to better attitude amongst employees, and, consequently, to better morale. Morale is the pre-condition for the implementation of any productivity drive in an industrial unit. When employees have good morale or good *esprit de corps* the tone of the whole organisation is on a higher plane, true goodwill prevails, and both management and workers will go even out of their way to take care of emergencies and keep operations moving on schedule. Workers will usually produce at a higher rate of output, and hence have higher earnings. Thus, human relations is the

medium through which both employees and management mutually cooperate to achieve more production through higher morale which after all, is the main economic purpose of all business and industry. Management may be reminded of the fact that it can buy a man's time, it can buy a man's physical presence at a given place, but it cannot buy the devotion of heart, mind, and soul. These things have to be earned, and this can be done only through the human relations approach.

Guiding Principle

"Treating others as we would like to be treated" is the guiding principle, and a basic philosophy, in all successful human relationships, whether they be in family, in society, in industry, or in international sphere. In advocating or practising the human relations approach the following factors should be considered:

(i) Consider the employees as a part of the organisation, and that they can work in harmony with the management.

(ii) Consider good employer-employee relations as the most important management's responsibility.

(iii) Give due regard to the dignity and individuality of the employees, and respect their feelings and sentiments.

(iv) Always keep in mind that the human being is not a machine designed for one purpose only. Believe in the development of their skills.

(v) Follow the truism that people are basically honest, sincere, and loyal.

Besides, the management should have in mind that the human relations approach is firmly wedded to the findings of empirical research. This necessitates the need for research in human relations. There should be no orthodoxy on the basis of experience of the management man, and the beliefs based on experience may not hold good in all the situations especially when the situations are changing so rapidly. No doubt, experience is the best guide, but it should be subordinated to research, as the research findings in human relations are based on the actual responses and reactions of the people.

Says Gordon Allport: "If we want to know how people feel, what they experience, what they remember, and what their emotions and motives are...why not ask them?" Secondly, the competitive conditions through which our industrial units are passing necessitate the need for training in human relations. Although, after the change in the attitude of the management has been brought or rather, so to say, that management has been made human relations oriented, there remains hardly any need for training in human relations. Just as we all believe in the training of our technicians, although they may be possessing the requisite qualifications to do the job, in the advanced technology, so also we need to train our management people in human relations. Basic methodology of training remaining the same, different courses for different levels of people—top management, middle management, and the supervisory staff—could be organised where the people are given training in batches, and a follow-up may be necessary to see the effects of training. The follow-up may also warrant the need for refresher courses (short ones) in human relations for those who have undergone intensive training at the first stage. To cope with the speed and expansion it becomes necessary that the different industrial units organise training courses to suit their personnel and their convenience.

Brain-storm Sessions and Methods Improvement

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METHODS improvement programmes are vital in the present context of India's industrial development. Even the most well-organised companies will, one day or the other, find their business in any one of their competitors' hands, unless they give top priority to methods improvement. "Brain-storm" session is one of those gadgets in wide use in industrially advanced countries, like the USA, for the development of creative ability which, apart from improving efficiency in their routine work, plays a vital role in decision-taking problems from day to day.

In a country like India, where resources by way of raw materials, modern machinery, and highly skilled technicians, are limited, we should look into our problems in a creative way. Brain-storm sessions enable us to extract the maximum efficiency from the limited resources at our disposal. Each and every participant in such sessions gets an opportunity to display his potentiality in full, unlike in group discussions usually held in our country. In a Brain-storm session, even ideas which cannot be implemented are welcomed and encouraged, because they may give a clue to some other participants to present them in an acceptable form, with minor modifications. In my opinion, this is a tool which, without imposing much strain on industrialists, will give them an opportunity to witness that "spontaneous outflow" of ideas, with so far unrecognised materials, designs, methods, uses, etc., just like what they call a "chain-reaction" in chemical industry.

Creative Thinking

Creative thinking is the main essence of such sessions. Two main obstructions for such thinking are: (1) *our own eyes*, which are accustomed to seeing quite often certain materials, designs, methods, etc., used only in a particular way, and which suppress our broader thinking, and lead us to immediate conclusions; (2) *some kind of psychological arresters* within us which restrict our thinking, and give us certain imaginary boundaries to wander about. As simple examples of the

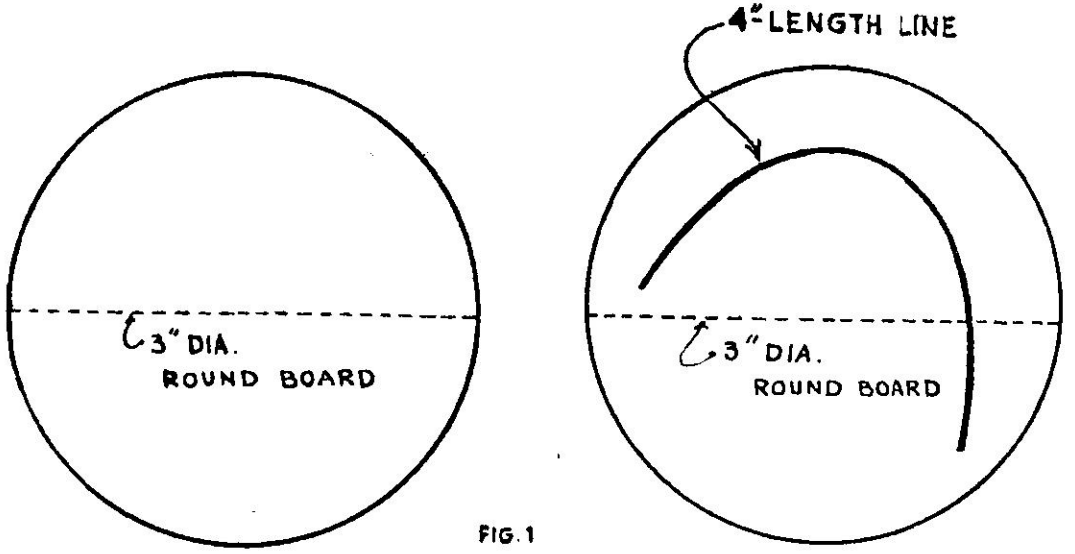

FIG. 1

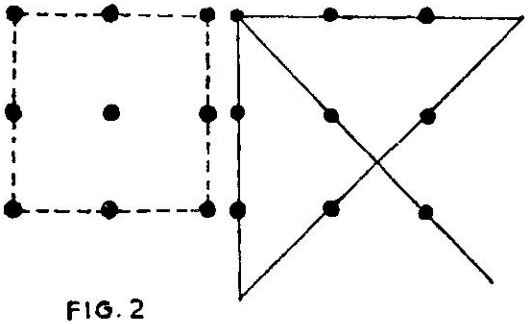

FIG. 2

FIG. 3

above statements, suppose if you are asked to draw a line of about four inches long on a round board which is only about three inches in diameter (Fig. 1). To this, your immediate reply is, "Is it possible?" This is just because your eyes are accustomed to seeing more often straight lines, straight edges, straight figures, etc., than curved ones. There is nothing in the question to prevent you to draw a four-inch-long curved line!

Similarly, the so-called "psychological arresters" play their role in the following example. The problem is to cut all the nine dots, by four continuous straight lines. "Self-imposed restrictions" give you an imaginary boundary, as shown in Fig. 2 by dotted lines, to confine yourself, before even attempting to solve the problem. You can see how easy is the solution (Fig. 3) once you come out of that boundary. Such is the type of thinking which our industrial India needs at present to climb up the "productivity ladder" at a faster pace.

Simple Procedure

A simple procedure to conduct such sessions is as follows: Apart from your own technical personnel associated with the problem, you can try and get the cooperation of the engineering institutions nearby, to bring in selected students for such sessions. By doing so, not only does the industry get benefited by coming into contact with the latest technical developments, but, at the same time, it also helps the students in acquiring a better confidence before entering their technical fields, apart from being rewarded if their ideas are accepted for implementation. In the first phase of the session, which is (1) *data-presentation and clarification of doubts*, explain thoroughly to the participants the

problem in question, and provide them with all the available information pertaining to it. If possible, allow the participants to make a spot-study, while the method is being performed. Then clarify all the doubts which they may have. (2) The second part is the important "*Brain-storm*" *session*. After allowing a sufficient break of time for their mental nerves to work on, try and compel each of them to put forth as many ideas as possible. The success of this depends on the ability of the chairman of such sessions. Lastly (3) *it is the critique session* which analyses each idea, and selects the best for immediate implementation.

Problems as such are not essential to conduct such sessions. You can take any of the existing methods, whether inventory control, elimination of waste, handling processes, standardisation, lay-out of machinery, tooling or designs, and try to improve on them. In my opinion, in all the industries such periodical sessions should be a "must" for better survival in this competitive world.

Why Productivity is Low

". . . Sir Alexander McRobert put the efficiency of an average Indian worker at roughly 25 per cent of that of an English worker, but it is interesting to note the findings of the Grady Commission from America which visited India during World War II. It found that Indian workers earning 56 cents a day in poorly-lighted factories were turning out machine-tools as good as the ones in the Firestone Plant in Detroit (USA), and that productivity per man in the Tata Steel Works at Jamshedpur was as high as the productivity of American workers in similar mills in Pittsburg (USA).

While considering the low productivity of the Indian worker, it is necessary to study the other factors in America and other highly industrialised and developed countries where manpower is smaller, more machines are used, and machinery is therefore cheaper than manpower, which is expensive. Workers in these countries are provided with modern tools and machinery, thus helping to bring down the cost of production.

Wages also play an important role in deciding a worker's productivity. Wages determine the standard of living, and low wages paid to labour is partly responsible for low efficiency. Moreover, the conditions in which the Indian workers work are not satisfactory. Factories are often dark and ill-ventilated. There is no regulation of temperature in summer and winter. There is also a lack of adequate facilities for pure drinking water, absence of dining sheds, facilities for bath, rest-rooms, suitable rooms for women employees, paid holidays, ignorance, illiteracy, exploitation by the employers. . .

If the working conditions of foreign workers differ from those of Indian workers, there is bound to be low productivity. Inefficient and traditional types of management are also responsible for the workers' low productivity. Unless a management creates a healthy atmosphere among its workers, adopts the principle of workers' participation in management, and gives a proper share of the profits to the workers, it will be a difficult job to raise productivity—From a letter to the *Economic Times*, Bombay.

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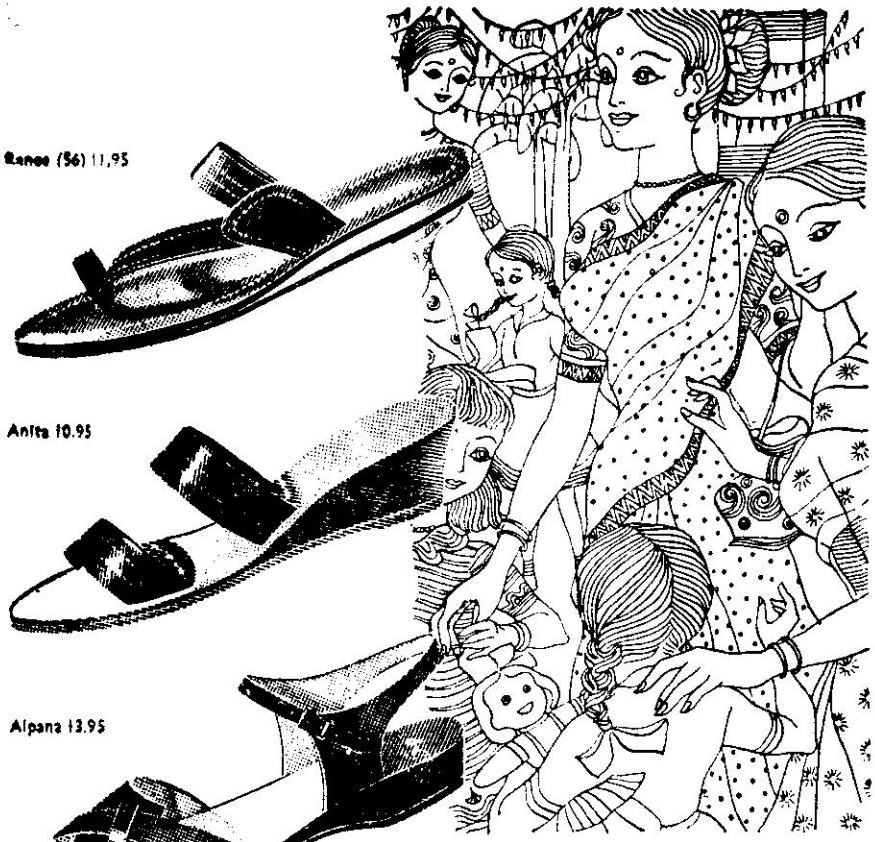

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This study, conducted in a shoe company, throws new light on the relationship between job satisfaction and introversion-extroversion in addition to the relationship between neuroticism and job satisfaction, and with two of the biographical factors, viz., age and marital status.

Job Satisfaction Among Shoe Factory Workers

TN GUHA

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THE importance of personality factors in industry—specially in the fields of selection, industrial tension, attitude change, and human relations—is becoming increasingly recognised (Hoppock, 1935; Blum, 1949; Smith, 1954; Smith, 1956). Gellman (1939) observes that personality expresses itself in work through the meaning of work to the individual, his motivation to work, his mobilisation of energy in work, his capacity to adjust to the interpersonal relationships, his positive and negative work identifications, and his ability to adjust to work pressures.

Similarly, quantitative relationship between work and personality factors has also been pointed out by Roe (1956). Since jobs serve implement self-concepts of the worker, dissatisfaction ensues when the self-concept and the job role do not match. The psychoanalytic and phenomenological approaches are different in that they suggest that vocational satisfaction occurs when the dominant needs find outlets and when the individual can play the desired role in his work. It has been shown by surveys of employment records that personality problems are the most common cause of discharge from employment (Hoppock, 1935).

The meaning of job satisfaction is "...any combination of psychological, physiological, and environmental circumstances that causes a person truthfully to say 'I am satisfied with my job' " (Hoppock, 1935). Job satisfaction, therefore, is a complex of employee attitudes (Blum, 1949). Again, it can be viewed as basically a problem of

adjustment. It has been measured in various ways. It is known that a large part of vocational maladjustment and industrial unrest are secondary to, but a reflection of, emotional maladjustment as determined by Rorschach responses (Kates, 1950). Inlow (1951) remarked that job satisfaction seemed to be a part of the general pattern of the personality, interest, and experiences of the individual. Neurotic disturbance has been found to be directly related to dissatisfaction with relationships with the immediate superior (Remitz, 1960).

These are a few of the innumerable researches being conducted on personality variables associated with job satisfaction. In India, however, such attempts are only few and far between.

The present study aims at exploring the relationship between job satisfaction and introversion-extroversion in addition to the relationship between neuroticism and job satisfaction, and with two of the biographical factors, viz., age and marital status. The purpose of the study is: (a) To find out the relation between an individual's place in the continuum of neuroticism-non-neuroticism and the extent of job satisfaction that he might have had; and (b) To find the relation between an individual's place in the continuum of introversion-extroversion, and the extent of job satisfaction that he might have had. Besides, as a side issue, this paper points out the relationship between workers' job satisfaction and such biographical information as their age and marital status.

The present study was conducted in the Patna branch of the Bata Shoe Company. Two hundred literate workers selected at random, out of a total of 750, were informally interviewed during their leisure time in their canteen. The interview, which lasted an hour per individual, was conducted by the author.

Of the two questionnaires used in this study, one was prepared by the author to assess the degree of job satisfaction. The other was extracted and translated into Hindi from MMPI (1943), and Eysenck's original scale (1952). In the former, there were 20 items covering areas like salary, social status of the job, security in the job, advancement opportunities, opportunities for self-expression, hours of work, facilities available for workers, best utilisation of abilities, future prospects, and steadiness of employment. In this, individual's score was calculated by counting and adding up all the positive responses (i.e., items indicating satisfaction with the job) endorsed by him. A numerical score of 1 was assigned to each positive item checked by 'S'. An individual's satisfaction score is thus the total number of positive responses checked by him on the job satisfaction questionnaire. Its reliability was .41 by the split-half method.

Correlation

In the latter questionnaire, there were 50 items out of which some items had been taken from MMPI, and a few others from Eysenck's questionnaire. The items were translated into Hindi (Muhar, 1960). A numerical score of 2 was given for indicative responses, 0 for non-indicative responses, and 1 for doubtful responses. The test-re-test reliability of the questionnaire, previously applied by Muhar (1960) is .93 for neuroticism, and .92 for introversion-extroversion. These figures are taken to be fairly applicable because of the comparable nature of the present sample with that of Muhar's study (1960).

TABLE I

Correlation between the scores of job satisfaction and the scores of neuroticism and introversion-extroversion

	Neuroticism	Introversion-Extroversion
Job satisfaction	.63	.18
Significant level	.01	.05

It is clear from this table that there is an inverse relationship between the scores of job satisfaction and the scores of neuroticism. On the other hand, there existed significant

positive relationship between the scores of job satisfaction and the scores of introversion-extroversion as is clear from Table II.

TABLE II

't' ratio between the scores of job satisfaction among the 25 high and 25 low scores on introversion-extroversion

Group	Number	Mean	't'	Significant level
Introvert	25	9.5	=3.06	=.01
Extrovert	25	12.8		

The 't' ratio was used (Table II) to explore deeper the relationship shown in Table I. It was found that the extroverts are more satisfied with the job compared to the introverts. Further data were treated for exploring more thoroughly the relationship between the scores of job satisfaction and the scores of neuroticism. Table III shows that the high scorers were less satisfied with the job than the low scorers on "neuroticism" scale.

... Industrialists should sort out the neurotic workers while making recruitment of new workers ... Neurosis can be viewed both as a cause as well as effect of low job satisfaction, and extroversion either a cause or an effect of high satisfaction ...

TABLE III

't' ratio between the scores of job satisfaction among the 25 high and 25 low scores on neuroticism

Group	Number	Mean	't'	Significant level
High scorers	25	6.8	=4.84	=.01
Low scorers	25	13.0		

The result of exploration of the relationship of job satisfaction with age is worth noting. Table IV shows that the highest score of job satisfaction occurs in the third decade of life.

TABLE IV

Relationship between different age-groups and the scores of job satisfaction

Age-groups	Number	Total scores of job satisfaction	Average
Fifties	9	97	10.67
Forties	37	340	9.18
Thirties	111	1,076	9.69
Twenties	37	367	9.11
Below twenties	6	49	8.16

TABLE V

Difference between job satisfaction scores of married and unmarried workers

Group	Number	Total scores of job satisfaction	Mean	't'	Significant level
Married	178	1,714	9.62		
Unmarried	22	191	8.68	=1.39	N.S.

Table V shows that married workers are more satisfied than the unmarried, though the difference is not statistically significant. It may, however, be noted that there are only 11 per cent unmarried compared to 89 per cent married workers.

The main finding of the present investigation is the significant negative relationship between job satisfaction and neuroticism. This finding is also supported by McMurry (1932), and Hoppock (1935).

The implications of this finding are that the industrialists should sort out the neurotic workers while making recruitment of new workers. They should also make arrangements to screen out the neurotic and the potentially neurotic workers from the existing lot of the workers. Neurotic workers should be given adequate psychological assistance in order to overcome their difficulties.

There is a significant relationship between job satisfaction and introversion-extroversion. The introverts are slightly less satisfied than the extroverts.

A similar conclusion can be drawn in the area of introversion-extroversion, with the fact that extroversion leads to more satisfaction. On the other hand, introvert workers should be given adequate psychological assistance in order to overcome their difficulties.

For the industrialists, the findings of this study can be useful in terms of selection

as well as of treatment. The workers with proneness of neurosis can be weeded out from the beginning by psychological selection methods, or once in, the worker with that proneness in him can be helped therapeutically to overcome his difficulties. A similar conclusion also holds good in terms of extroversion-introversion. As the present finding suggests, extroversion should be encouraged both in selection and in psychological assistance to the worker, since it is conducive for better job satisfaction.

Academically, the trends suggested by this study can have important implications since the sample has been drawn from the existing workers of a company. Neurosis can be viewed both as a cause as well as effect of low job satisfaction, and extroversion can be either a cause or an effect of high satisfaction. Only a deeper and more extensive inquiry into this problem can yield any answer to these questions. At present it is indicated that neurosis and extroversion are associated with job satisfaction in industry in the manner shown.

It is possible that due to repressed desires, which are usually associated with neurosis, adjustment (and consequently job satisfaction) becomes lower in the worker. On the other hand, it is also possible that a dissatisfied worker develops symptoms suggesting neurosis. Similarly, it is possible that due to inherent extroversion temperament, a worker releases his tension easily, and, therefore, becomes more well-adjusted and satisfied. It can also be the other way round.

Theoretical Justification

As to the other secondary findings of this study, there seems to exist some relationship between two biographical factors, viz., age and marital status, with job satisfaction. The relationship is not strong, that is to say, the findings are not statistically significant as shown in Tables IV and V, but the trend shows itself that the middle-aged workers seem to be more satisfied than the teenagers.

Even if the finding is crude, it has at least a theoretical justification in the sense that the teenagers, by definition, are bound to be comparatively more restless and unsettled in job, and could be looking for better opportunities elsewhere, and could be less satisfied with status quo, whereas the middle-aged

he's finished 60, or develop an ulcer because he can't hit 300.

But reassurance alone is not enough. You should also try to figure out ahead of time just what kinds of mistakes employees are most likely to make on their new jobs.

Written instructions, however, are only one method of communicating with employees during a change-over. Group meetings, talks with individual employees, demonstrations, exhibits, films, and guided tours are some other ways that can be effectively used.

Even when managers realise the importance of communicating with employees, they tend to neglect it amidst the pressures and confusions of a system's change—much to their ultimate regret, because it's probably more vital at that time than at ony other. In many cases, when employees are asked why they were dissatisfied with the way a system's change was handled, their answer is very simple: Nobody told them anything.

The most fruitful kind of communication for the supervisor is probably a face-to-face talk with an individual employee—because it's two-way communication. From the employee's questions, the supervisor can find out what aspects of the change need to be explained more clearly, and why instructions aren't being followed—whether it's resistance, misunderstanding, indifference, or inadequate training.

men could have come to compromise with life and, therefore, are more satisfied.

The fact of married workers being more satisfied than unmarried workers can be similarly interpreted, but since the difference is not statistically significant, it is not of any consequence. Further research in these areas may reveal important facts about job satisfaction.

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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."

Is the level of job satisfaction greater in high-productivity textile mills than in low-productivity units? A Study Group, formed by South India Textile Research Association, investigated this question, and the findings, presented here, are useful to the extent they help managements to take action to ensure that greater attention is paid to those aspects of work where dissatisfaction exists.

Productivity & Job Satisfaction in Textile Mills

K RAJAGOPAL

M/s Lakshmi Mills Co. Ltd., Coimbatore

THE annual productivity surveys conducted by the South India Textile Research Association (SITRA) revealed the consistent ranking of some mills as high producers, and some as low producers. The reasons attributed to such variations included machinery condition, raw materials, and maintenance.

Variations in productivity among textile mills can also be accounted for in terms of the attitude of workers towards their job and working conditions. Specifically, workers in high-producing units may be having a more favourable attitude towards work life, and consequently may be more satisfied than workers in low-producing units.

To investigate the hypothesis that the level of job satisfaction in high-productivity mills will be greater than job satisfaction in low-productivity mills, a study group[1] was formed by SITRA in 1964. Only a cross-section of mills situated in and around Coimbatore was included in the study. Men workers, contributing directly to productivity, i.e., workers of preparatory and spinning departments, were studied.

The study covered seven major areas pertaining to job satisfaction—salary, job,

[1]The study group consisted of 13 members representing management, labour and research interests. Two members from the non-textile interests—steel and engineering industries—were also included. For purposes of the study, job satisfaction was defined as a sort of a ratio between what a man expects from the job and what he actually gets from it. The objectives were: 1. To assess the level and extent of job satisfaction among workers in high and low productivity textile mills, and 2. To ascertain the relationship, if any, between the personal background of the worker and his job satisfaction.

management, working conditions, welfare facilities, co-workers and union management relations. Under each there were several sub-areas—e.g., attitude towards salary consisted of items relating to monthly salary, annual bonus, production bonus, etc.; attitude towards welfare consisted of items relating to leave, canteen, rest room, co-operative stores, credit facilities, housing, provident fund, Employees' State Insurance and retirement benefits, etc. Thirty items in all representing various aspects of work life, which have considerable influence on the nature and extent of job satisfaction. were included in the study.

Intensive Study

Six textile mills—three representing mills having high productivity index, and three having low productivity index—were selected for intensive study. All the units were members of SITRA, and their productivity index in terms of OHP (Operative Hours per unit of Production) and production per spindle had been carefully worked out for the past three years. The mills were matched for the year of establishment, spindleage, and number of workers employed, and number of shifts worked.

Based on a random sample, 150 workers —75 from high productivity mills and 75 from low productivity mills—were selected giving due weightage to the number of workers employed in the units. Data were collected from them by trained interviewers, with the help of a questionnaire, and a rating scale. In addition, members of the study group interviewed representatives of management in the selected units, and elicited their views regarding workers' satisfaction towards the various areas.

The extent of satisfaction was measured on a five-point rating scale, ranging from extreme satisfaction to extreme dissatisfaction. Workers' response to each item was evaluated by the interviewer, and responses indicating maximum satisfaction were rated as +2, moderate satisfaction as +1, and neutral response as 0, and those indicating moderate and extreme dissatisfaction as —1 and —2 respectively.

To enable comparison between high and low productivity groups, an "index of job satisfaction" was developed. This was arrived at by multiplying the frequency of people mentioning extreme satisfaction, moderate satisfaction, etc., for each area with the corresponding weightage +2, +1, 0, —1 and —2, summing up the figures obtained thus, and dividing it by the total frequency. Such an index enables comparison between different areas of job satisfaction and also within an area, it enables comparison between different groups.

An effort was also made to assess the importance which a worker attaches to various aspects of his working life. To do this, workers were asked to rank the seven major areas of job satisfaction in the order of importance, giving rank one for what they consider as most important, rank two to the one next in importance, and so on. These ranks were compared with the index of satisfaction. Finally, an effort was made to correlate the index of satisfaction obtained by interviewing workers with those obtained by interviewing management.

Employees of high and low productivity mills differed consistently in their attitude to various aspects of their work life. Specifically, employees of high group tended to express more satisfaction towards all the seven areas of job satisfaction than employees of low productivity mills. However, the difference was found to be significant only in five areas, viz., salary, management, working conditions, welfare facilities, and union-management relations. Such a finding lends support to our main hypothesis that the level of employee satisfaction in high productivity mills is greater than in low productivity mills.

It is exactly over these five areas that the management can exercise some control. In other words, it is most likely that management policies with regard to these areas can directly influence the formation of employee

attitude. Therefore, it is most probable that the managements of the high-producing units have been quite successful in fostering among their employees the right kind of attitude in these areas.

The high and low groups did not differ in their evaluation of their attitude towards co-workers and job. Both of them expressed more than moderate satisfaction towards their co-workers, and low satisfaction towards job.

Irrespective of whether one is employed in high or low productivity mills, workers were found to differ in regard to the amount of satisfaction expressed towards various areas. Maximum satisfaction was expressed in regard to attitude to co-workers (1.24), and minimum satisfaction in regard to salary (—0.20).

Although employees of both the groups are paid more or less the same pay, the employees of low group were more dissatisfied than employees of high group. But a closer examination of their attitude to other items related to income showed that while employees of high group tended to express satisfaction towards bonus, employees of low group indicated dissatisfaction. Maybe,

" . . . Today everyone uses the word 'conference'. It is a stall by the Executive's Secretary when the boss doesn't want to answer the phone — 'I'm sorry but Mr Big is in conference,' " —DR H LEROY MARLOW in *Training Directors' Journal*

negative satisfaction associated with bonus tends to generalise to other areas relating to income. The quantum of bonus paid to these employees over the past three years lends support to the above conclusion.

There is considerable evidence from other attitude surveys to support the view that factors relating to income constitute a basic need of the worker, and satisfaction or dissatisfaction associated with income will affect the attitude in other areas also.

Employees of low productivity group had unfavourable attitude towards mill management (—0.41), and were not very much satisfied with the existing grievance machinery of the mills (+0.24). Further, they were found to be less favourably disposed to the departmental supervisor (+0.96) than to jobbers (+1.14). In other words, employee satisfaction decreased as the distance between worker and management personnel in the hierarchy increased. On the other hand, no such trend was observed in the case of employees of high productivity group—i.e., employees of high group expressed more than moderate but equal satisfaction towards their immediate superior (+1.27), departmental supervisor (+1.32), and management (+1.25).

Areas of Dissatisfaction

There is ample evidence from previous studies to support the view that sound employee-employer relations are a pre-requisite for the creation of attitude which will lead workers to evaluate other areas related to their work life realistically. In other words, satisfaction or dissatisfaction associated with management tends to generalise to other areas. Perhaps this may be a reason for the low level of satisfaction experienced by workers of low group in other areas also.

The beneficial effects of good working conditions can hardly be overstressed since they facilitate physical well-being, and promote productivity. While employees of high productivity group indicated more than moderate satisfaction (+1.18) towards working conditions, those of low productivity group were not much satisfied (+0.42). The only two items for which they uniformly indicated satisfaction were lighting and safety conditions. Noise, ventilation, and fluff and dust were the areas of dissatisfaction in low productivity mills. Cleanliness was the keynote in high productivity units.

Welfare Facilities

Welfare facilities constitute the most potent area of dissatisfaction for employees of low productivity units in that they evaluated unfavourably almost all items considered under this area. The specific sub-areas of dissatisfaction were: leave, canteen, rest room, cooperative stores, credit facilities, and retirement benefits. On the contrary, the employees of high productivity group expressed satisfaction with all the items constituting welfare. The index of satisfaction obtained for separate items revealed that employees in high group expressed more than moderate satisfaction towards leave, credit facilities, housing, provident fund, and ESI, and about moderate satisfaction towards canteen, rest room, and cooperative stores, and low satisfaction towards retirement benefits. However, the provision of welfare facilities by themselves cannot bring about the desired result either by way of creating better attitude or increasing productivity. It can only be effective when it reflects the management's concern for the well-being of its workers.

The high and low groups did not differ very much in their evaluation of their attitude towards their labour union (High +1.13, Low +1.22). As regards their attitude towards union-management relationship, they differed considerably (High +0.90, Low +0.21). In other words, the employees of high group expressed more satisfaction than the employees of low group. The difference between the two groups was found to be highly significant.

Both groups of employees consider salary, job and management as the first, second, and third most important aspects of their

work life, and co-workers as the least important aspect. After the third preference, a slight shift occurs in their rating. While employees of high group consider working condition, welfare, and union as the fourth, fifth, and sixth important aspects, employees of low group rate them as the fifth, fourth, and sixth.

Rank Order Preference

A high positive correlation was noticed between the level of satisfaction in various areas and the rank order preference of the worker. The coefficient of correlation was +0.96 in the case of high group, and +0.99 in the case of low group. In other words, if a worker experienced maximum dissatisfaction in a specific area he rated that area as the most important aspect of his work life. Conversely, if he experienced maximum satisfaction in a specific area, he considered it as the least important aspect.

In high productivity mills wide discrepancy seems to exist between managements' perception of workers' satisfaction towards various areas, and workers' evaluation of the same. But in low units considerable agreement seems to exist between managements' estimate of workers' satisfaction in various areas and such estimate by workers themselves. The coefficient of agreement in the case of high productivity group is —0.42, and in the case of low productivity group +0.86.

Personal Background

The age of workers interviewed for the study ranged from 19 to 53, the average being 36. Approximately a third of the workers was under 30, about 45 per cent between 31 and 40, and the remaining 22 per cent over 40. A relationship was noticed between age and level of satisfaction. Satisfaction towards working conditions, welfare facilities, and management was found to increase with age, and satisfaction towards co-worker and union-management relations was found to decrease with age. In other words, the older the worker the more favourable was his attitude towards working conditions, welfare facilities and management, but less favourable towards co-worker and union-management relations.

It is generally true that employees grow old with service. On this basis it is to be expected that the same trend will appear between the length of service and level of satisfaction as in the case of age. In fact, an analysis of the index of satisfaction between the length of service and level of satisfaction lends support to the above assumption, the only exception being attitude to welfare facilities. Specifically, while satisfaction towards welfare facilities was found to increase with age, it was found to decrease with service. Further, as in the case of age, satisfaction towards working conditions and management was found to increase with service, but satisfaction towards co-worker and union-management relations was found to decrease with service.

Role of Research

The work of the Human Relations Division of the Ahmedabad Textile Industry Research Association has mainly been to bring into the industry an application of sophisticated modern concepts in the social sciences to the day-to-day working of the industry: For example, evaluation of jobs prior to negotiation of wages which are acceptable both to labour and management, and inplant training of operatives by the use of group discussion methods.

In the field of continuous service function, new methods of training for middle management and first line supervisors, development of cases and utilisation of such cases for training purposes have been attempted successfully for the benefit of the industry—From the *Financial Express*.

Satisfaction towards job and salary was found to decrease with increase in the amount of schooling. Further, workers having higher elementary and high school education expressed mild dissatisfaction towards salary. It is probable that a person's aspiration as to what he should get from his job by way of salary is, to a large extent, determined by the amount of education he has. The more the amount of formal schooling, the more likely he expects a higher pay. But opportunity for higher pay is extremely limited at worker level. Obviously, this has led to a certain amount of dissatisfaction among the better educated workers.

Income

Satisfaction towards job, management, welfare facilities, and union-management relations was found to increase with rise in income. This trend, however, was more pronounced in the case of attitude towards management and union-management relations. On the other hand, satisfaction towards co-workers was found to decrease as income increased. Further, while workers having less than Rs. 150 as income had an unfavourable attitude towards monthly salary, workers getting more than Rs. 150 had a favourable attitude. Among the personal factors considered in this study, "income" had indicated a definite trend with a large number of areas of job satisfaction.

Employees, in general, expressed maximum satisfaction towards co-workers, and minimum satisfaction towards salary. In high productivity units, they tended to evaluate all the seven areas more favourably than those in low productivity units. However, the difference between high and low groups was found to be significant only in five areas, viz., salary, management, working conditions, welfare facilities, and labour union. This finding lends support to our main hypothesis that employee satisfaction is greater in high productivity mills than in low productivity mills. In respect of the latter, the negative attitude associated with bonus tended to generalise to other areas relating to income. It was also noticed that in these units, as the distance between worker and the management personnel in the hierarchy increased, employee satisfaction decreased.

Lack of proper communication between top management and workers was also noticed in these units. The low level of satisfaction associated with management probably reflects a failure on the part of management to make effective use of its supervisory personnel in maintaining the lines of communication between management and worker. Supervisory and middle management training tailored to suit specific needs can be organised as a remedial measure.

As regards working conditions, noise, ventilation, and fluff and dust constitute the specific sub-areas of dissatisfaction for workers of low productivity units. There is wide scope for improvement in the working conditions in these units.

Loyalty

Welfare facilities are another important area of dissatisfaction for workers of low productivity units, not because that such facilities did not exist, but because they were not well-managed.

The study revealed a relationship between the amount of satisfaction in various areas and rank order preference by the workers. If a worker experienced maximum dissatisfaction in a specific area, he rated that area as the most important aspect of his work life. Conversely, if he experienced maximum satisfaction in a specific area, he considered it as the least important aspect.

Education was also found to influence job satisfaction. Those with higher elementary or high school education were found to be invariably dissatisfied with pay and promotional opportunities. The nature of jobs in the textile industry also does not demand much of formal education. Therefore, it may not be beneficial to take in people who have had much of formal education.

PRODUCTIVITY

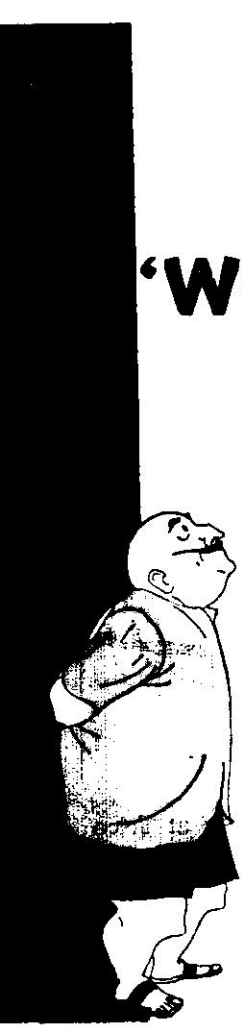
presents

in collaboration with

TELCO

an exclusive feature

'WORKING TOGETHER'



Planned and written by Mr MK Rustomji, Chief Controller of Accounts of Telco, with illustrations by Rama Chakravarty, the booklet *Working Together*, from which extracts have been printed here, was recently brought out by Telco as a private publication for internal circulation only. This is the first public edition of *Working Together*, published by the courtesy of Telco for which we are grateful.—*Editor*

Please Turn Over

WORKING TOGETHER

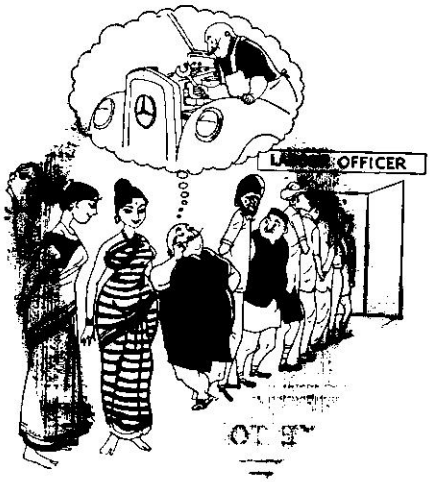
HOW MUCH DO YOU KNOW ABOUT YOUR COMPANY?

MAYBE not much. Well, that's the reason for writing this. It's to tell you about the Company: its aims and objects and its various Rules and Regulations. There is also the other point that the more you know about your Company and your job, the more interesting will the work become, and if the work is interesting we shall produce more and earn more.

The main lines of manufacture at Telco are diesel truck and bus chassis; earth-moving equipment; industrial shunters; steel and alloy iron castings; forgings; machinery for making paper and pulp; and steam locomotives. Our Company has made rapid progress since it commenced operations in 1945, and the production figures have been mounting from year to year. Many crores of rupees

worth of foreign exchange have already been saved to the country.

We, of the Tata family of Companies, like to feel that in addition to turning out tangible things that are the sinews of the nation, our finest achievements lie in intangible fields—in the confidence shown by the people in Indian enterprise; in the security and better standards of living that have come to many thousands of families; in the welding together of Management and workers into one happy band; and in the full development of personality where every individual is respected and given an opportunity to express himself. No one likes making Rules and Regulations: telling people what should be done and what should not be done. But if we reflect a little, we will realise that Rules and Regulations are made for us. We have over 18,000 people working in Telco—and unless we have rules, all these people would get in one another's way, and organised work would become impossible. And that's why it is important that we obey our rules implicitly. Unless rules are properly obeyed, we cannot work as a team, and if we do not work as a team, production in our Company is bound to suffer. If production suffers, we also suffer because our own welfare is very closely linked with that of the Company.



GETTING A JOB WITH TELCO

THIS is a matter which touches most of us. Telco's policy regarding jobs is clear. In offering employment the Company gives special attention to the claims of the people of the region as well as of near relatives of employees. Perhaps, the proudest achievement of the Tata Organisation is that everyone in it is treated as an Indian first; and promotions, etc., are made on consideration of merit and merit only.

Please Turn Over

WORKING TOGETHER

METHOD OF SELECTION

OUR procedure for recruitment in Telco is designed with the twofold object of giving a fair chance to all who seek employment with the Company, and to secure for the organisation the services of the best of the men available. Weightage on a scientific basis is given for educational qualifications, experience, seniority, aptitude, personality and physical fitness by each member of the Recruitment Committee, and the candidate who gets the highest marks is selected for the post.

WE ALL LIKE TO HAVE THIS

TELCO men and women are paid well. Emoluments in Telco consist of :

Basic wages (basic wage rates for each employee are fixed on a scientific system of job evaluation); Dearness allowance; Incentive bonus and Annual bonus.

The wages of Telco employees have been mounting rapidly from year to year with increase in production, and they compare favourably with those of any Company in

India. But we do not intend to rest there. We firmly believe that if more work is turned out, more pay should be given. We are hopeful that in the years to come when our workers become more experienced and skilled, and production increases, the money earned will also go up still further.

ATTA BOY

RAM sure is tired; but we don't normally like people to work overtime. We are happy if a man does a good eight hours' job, goes home, and spends the rest of his time with his family. But, inevitably, in a big Works such as ours, an emergency arises and we are compelled to ask an employee to work additional hours. And when this happens an employee is given extra wages as per rules. If an employee works for more than 48 hours a week, or for more than 9 hours a day, for every hour of such overtime worked, he earns wages at double rates.

LEARNING WHILE WORKING

THE way to get on is to acquire more knowledge. There are facilities in Jamshedpur by which we can acquire more knowledge and thus increase our chances of

WORKING TOGETHER

Please Turn Over

WORKING TOGETHER

betterment. There are examinations which one can study for—there are a large number of employees in Telco already doing this. And the Company is willing to help you by making advances to buy books and pay examination fees. Then there are the evening classes held by the Telco Technical Society, and also evening classes in the Tisco Technical Institute. We hope that, in time to come, we will be able to make it easier and more convenient for our employees to acquire more knowledge and skill by starting evening classes in Telco itself.

We have a well-equipped Library in Telco, and we also take a large number of first class foreign and Indian technical journals in addition to books.

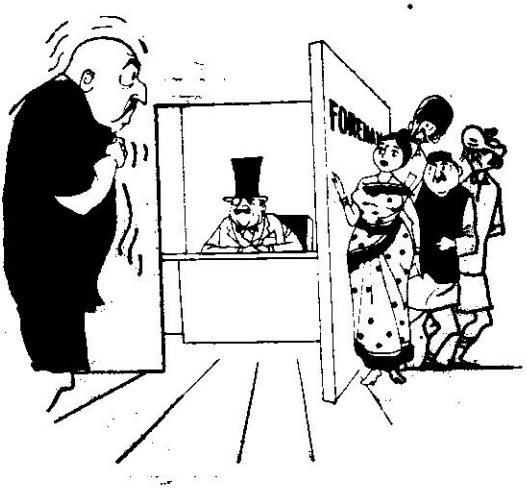
WHAT'S IN YOUR KNAPSACK?

You will remember that Napoleon once said that every Corporal has a Field Marshal's baton in his knapsack, and so it is with us in Telco. There are opportunities for every one in Telco to rise to the top. But once we rise to the level of supervisors, it's not enough for us to be good engineers, good accountants, good draughtsmen, good metallurgists, etc. We must also be good leaders. The management of men is far more difficult, and just as important as the management of machines. And this is fully realised at Telco. It is for this reason that we have started a series of Courses for training our supervisors in job relations, labour-management relations, and so on.

WAY TO THE STARS

You naturally want to know what your chances are for advancement in the Company. The best answer to this question is just to look around and notice that a large number of our present supervisors and men started at the bottom or nearly at the bottom —and look where they are now. And this is not all, because, as you know, Telco is still a very young Company as far as Companies go. But despite this, as far as possible, the Company has always tried to fill up vacancies from among its existing staff.

THE DOORS ARE OPEN



There are no top hat or stiff collar wearers in our Company. You will find your foreman and other supervisors ready to receive you when you have a problem or when you need any help. About questions, don't be afraid to ask them in plenty. Your supervisors will be only too glad to give you any information you want. They know that the more knowledge you have about the Company, and the more you know about what you yourself actually do in the Company, the better will you do your job.

WORKING TOGETHER

Please Turn Over

WORKING TOGETHER

NOT BY BREAD ALONE

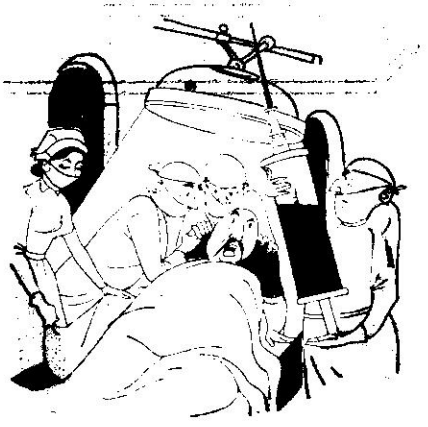
ALL Works Staff, that is to say, persons who have an hourly rate, have 15 days' leave with pay once a year. Monthly-rated staff have a month's leave with pay, and in addition to this, they have seven days' casual leave every year. Besides, all employees, whose total emoluments do not exceed Rs. 400 per month, are entitled to sick leave on half pay for 56 days. Those employees earning over Rs. 400 per month are entitled to sick leave on full pay for 10 days. The Works are shut on the following important days: Republic Day, Id, Holi, Independence Day, Viswakarma Puja, and Durga Puja.

GRANNY'S FUNERAL

WATCH out for this. You are an important man in the Works, and if you take leave without notice it inevitably upsets work, and your supervisors and your fellow workers have a very difficult job trying to get the work done without you.

In our Works we have very costly plant and the entire production is organised on a flow system. The absence without prior notice of any employee might jeopardise the proper working of our expensive plant.

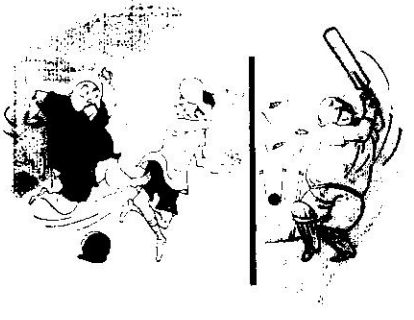
MEDICAL DEPARTMENT



WE hope this department does not concern you and that you are always well. But unfortunately with most of us, some time or other, something goes wrong: the tummy doesn't tick properly; we feel feverish; we have a pain in our legs. That's where our Medical Department comes in. We have two dispensaries manned by qualified doctors, and it is their job to give you and your family free medical advice. So, if you, your wife or your children are not feeling well, take them to our dispensary. If, however, you cannot go to the dispensary, the Mountain will come to Mohammed—the doctor will come to your own house. In such cases also it will be free if it is for you, your wife, your children, and a dependent father and mother. If the case requires hospitalisation or specialised treatment, our Telco doctor will send you to the Tata Iron & Steel Company's hospital—until our own hospital is ready—here again treatment is free except for dental, X-ray treatment and cabins.

The paramount need of our country is to keep our families, and for this purpose we have a well-staffed and fully-equipped Family Planning Clinic, where you can get all advice and help in confidence.

ARE YOU GAME?



OF COURSE, you want to play. At Telco, we have excellent Sports Clubs. All you have to do is to contact the Sports Officer, and he will tell you what has been organised by way of cricket, hockey, football, etc. We have magnificent playing fields, tennis courts, badminton courts—indoor badminton as well. To those of us who are not too energetic, there are carrom, cards, and billiards. There are also plenty of newspapers in our Clubs and good Libraries. To those of us who are interested in films, there are also free cinema shows in our Open Air Theatre.

Please Turn Over

WORKING TOGETHER

NO NEED FOR IT REALLY

WHY go to the handsome, burly gentlemen from Afghanistan? They will charge you an exorbitant rate of interest, and once you are in their clutches, you will find it most difficult to extricate yourself. Occasions, of course, arise when you suddenly find that you must have some money; there's illness in the family, your daughter is going to get married, there are floods in your home village, and so on. When such cases arise, borrow from our Telco Cooperative Credit Society. Here, everything is fair and above board. You can borrow up to ten times your monthly basic salary or eight times of the value of the shares which you hold—whichever is less, subject to an overall maximum of Rs. 2,000, and the rate of interest is also reasonable. So, become a member of the Telco Cooperative Credit Society. However, we often get cases where people borrow from the Cooperative Society even though there is no real need. This should never be done. It is a terrible thing to be in debt. You'll remember the famous words of Mr Micawber: "Annual income £20, Annual expenses £19. Sh.19.6—result Happiness; Annual income £20, Annual expenses £20.10—result Misery." Well, and so it is.

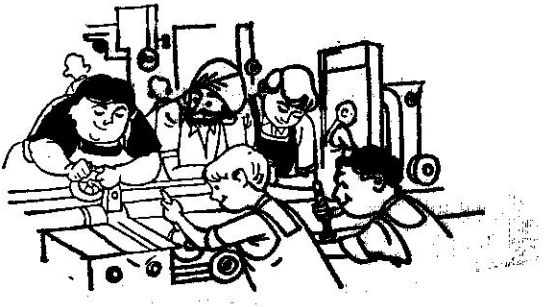
ROOF OVER YOUR HEAD

THAT we must all have—and our Company has certainly not lagged behind. In fact, our Company has built more houses in proportion to the number of its employees than most other concerns in India. House building is going on at a very rapid pace, and the housing shortage will be considerably eased in the near future.

BUST UP

INCIDENTALLY, if your wife sometimes gets tired of the daily grind and you all feel like a bust up, you can always go to our well-equipped Telco canteens and have a really good feed. We do not like boasting—but we can safely say that our canteens are probably the cleanest and the most modern in India. The cooking in our canteens is done electrically and under the most hygienic conditions, and you can be sure that anything eaten in the canteens is entirely pure and wholesome. The canteen hours are from 9 in the morning to 9 in the night.

TRAINED NUCLEUS



TELCO'S organisation for training its apprentices is unique in India. Our apprentices are taught by the very latest methods of training followed in Western countries. This is as it should be, because we are most anxious that everything in our Works should be in accordance with the most up-to-date practices anywhere in the world. The future of our company partly depends on our apprentices, and so we have made sure that our apprentices have the latest types of machine tools.

WORKING TOGETHER

Please Turn Over

WORKING TOGETHER

GET IT OFF YOUR CHEST

You have a grievance, have you? We hope you haven't because we try as hard as possible to make our Company a happy and just place to work in. But we are human and we have human failings also. Mistakes are sometimes made, and mistakes naturally lead to grievances. If you have any grievance, the first person you appeal to, according to our grievance procedure, is your supervisor. If you find that you do not get satisfaction from your supervisor, you can appeal to your departmental head, and you can be sure that your departmental head will treat your grievance as fairly and justly as he can. If, however, you feel for some reason that your grievance has not been properly treated by your departmental head, you can take it up with the Labour Officer. By this time, in all probability, your grievance will have been treated satisfactorily. If, however, in spite of the steps described above you still feel that you have not had a fair deal, then you can make an application to the General Manager through the proper channels. The General Manager will review your case, and his decision will be final.

"THE TIME HAS COME", THE WALRUS SAID

Years add up until we are sixty, and that's the time when all Telco employees have to retire. To enable us to pass our retirement in comfort, the Company has made good provision.

Firstly, we have our Provident Fund. For all of us employees who are confirmed in service, a deduction equal to eight per cent of our salary, including dearness allowance, is made every month, and this deduction is made automatically from the payroll. The Company also contributes to the Provident Fund a sum equivalent to the amount contributed by the employee.

At the time of retirement, the Company also makes a gratuity payment. This gratuity payment is normally made to those employees who have put in more than 15 years of service. Gratuity payment is half a month's salary for every completed year of service, subject to a maximum of 15 months' salary.

THINGS YOU SHOULD KNOW

ONE of the most difficult tasks of a Company —and this applies to any Company, be it in London or in Timbuctoo—is to see that the lines of communication are kept open, and that information passes down to all employees. There are many ways in which this can be done. The best and most effective way is for the supervisors themselves to pass down information, and this should be done in such a manner that every worker knows what is happening.

We also have a house magazine, *Telco News*, which is brought out both in Hindi and in English, and gives plenty of information about the Company.

LET'S HAVE YOUR IDEAS

THERE'S a simpler and easier way for each one of the thousands of operations of work done in our factory every day. It may be a slight change in a fixture, an alteration in a jig, or the elimination of an unnecessary routine, or the simplification of a procedure. There are a hundred and one improvements you can suggest to simplify our work so as to enable us to increase production and reduce our costs. Make your suggestions and put them in the Suggestion Box. If your suggestions are accepted, the Company will make a suitable cash reward to you. Full details of the Suggestion Box Scheme are published separately.

Please Turn Over

WORKING TOGETHER

ALL TOGETHER

You may be inclined to say: "It's all very well talking about 'team spirit' and the Company, but where do I come in." Yours might be a not-very-spectacular job—say in the Forge Shop, the General Machine Shop, or the Automobile Division. You may think that all that really matters is for you to put in a number of hours of work for a recognised amount of money, and that then everyone will be satisfied. But you are wrong. Everyone has his importance in the Company—from the Directors, the Heads of Departments, right down to the youngest mazdoor—each one of us is important, because without any one of us the Company just cannot function effectively.

The Company has very clear ideas that, as far as possible, it should be a good place to work in. And this is of paramount importance to us. After all, almost half of the wakeful hours of our day and a big proportion of our energy and attention are occupied at work: for this reason it is surely important that the place of our work should be congenial, and among friendly people, and that our work should be something really worth-while. And worth-while our work certainly is.

With the combined efforts of all of us, we shall turn out more and more products, in greater and greater quantities, which will tend not only to increase the greatness of our country, but will also contribute to the betterment of all of us in Telco.

Promotion of Human Welfare at Simpsons

When Prof Alfred Marshall, famous economist, appeared as a distinguished witness before the UK Royal Commission on Factory Legislation, he characterised all this legislation as a disgrace, because, according to him, it implied that even in respect of such elementary obligations as safety of the worker against dangerous mechanical contrivances and chemicals, the owners of factories did not recognise common human obligations.

He was of the view that Factory Legislation requirements should have been complied with by owners of factories without compulsion of law. It, however, took considerable time even in the UK for this Marshallian philosophy to get into the minds of the owners of industries.

As we, in India, are at the early stages of our Industrial Revolution, it is essential to remind ourselves of the advice offered by men of such enormous goodwill and knowledge as the late Prof Marshall. It is in this context that this article—Promotion of Human Welfare at Simpsons—based on a report of Dr A Devasagayam, Chief Medical Officer, Simpson Group of Companies, Madras, is published, as being indicative that there are employers in India who are conscious of their human obligations and have the Marshallian philosophy at least in their sub-conscious minds.

SIMPSON GROUP employee service conditions are well above those prevailing in industries in most parts of the country. The minimum daily wage for a new unskilled worker is Rs. 1.25, which rises steadily for service and proficiency in skills, to a maximum of Rs. 6.25 for a skilled worker. The employee receives a monthly group incentive bonus of Rs. 75 average and a monthly dearness allowance of over Rs. 100 and a yearly bonus, varying in different concerns, from three to six months' basic pay. The Group Companies, besides contributing to

the Employees State Insurance Scheme (ESIS) and Provident Fund, provide free out-patient medical service to all employees' families and to employees not covered by ESIS. Employees are entitled to the cash value of unutilised leave up to 25 out of 35 days' leave in a year.

Social Status

A job in Simpson Group gives an employee social status. Few ever leave it, except for extreme ill-health, until retirement at 60. The number of persons who resign in any one year is below two per cent.

Simpson & Co. Ltd., Madras, the parent firm of the Group Companies, was established in 1840. The old workshop, a structure of steel frames and corrugated zinc sheets, had, in 1940, a plinth area of 24,000 sq. ft.: renovated and rebuilt since Independence to cover an area of 300.000 sq. ft. At present 400 Diesel Engine components are manufactured, and about 1,000 Perkins Diesel Engines are assembled monthly...

Six new factories have been built at Sembiam on the northern outskirts of Madras. A Rest Centre and a Dining Hall for employees of Mount Road firms have been completed. Two such halls are under construction at Sembiam. The number of people employed by the Group concerns in the city has increased from less than 5,000 in 1948 to over 10,000, besides nearly another 4,000 employed in numerous branches and allied concerns in and outside Madras. There are in and outside the Madras State numerous branches employing over 3,000 and at the Amco Battery factory, Bangalore, 700, besides a large number in the Stanes Amalgamated Ltd., a group of tea estates and coffee processing factories.

Rise in Income

There has been a considerable rise in the employees' monthly income since Independence. Unfortunately the increase has not markedly raised their standard of living, partly because of the rise in prices and, among many, mostly as a result of unplanned spending, lack of thrift and poor housing conditions. Some are addicted to alcohol and some take pride in keeping concubines. Generally speaking, they do not go hungry, as many did in 1948. They clothe themselves better and wear shoes or sandals, and most of them have wrist watches, which have become a necessity as they have to be time-conscious. The number riding a bicycle to work increases monthly.

Many earning less than Rs. 200 live in one-room tenements or huts under primitive and insanitary conditions while working in modern factories, operating 20th century machinery and precision instruments. Our recent survey of their dwellings and living conditions shows that good housing is needed

It's all a matter of trust

"The trust that the late Chairman of Simpson & Group Companies (Mr S Anantharamakrishnan) reposed on men, inspired one to do one's best," writes Dr A Devasagayam, Chief Medical Officer, Simpson Medical Centre, Madras, in a publication brought out on the occasion of the 16th anniversary of the Centre.

Dr Devasagayam adds: "As a measure of his thoughtfulness I wish to record that before he left for the United Kingdom for treatment in August 1963, foremost in his mind was his concern for a rural medical service to be started at his birth place. I was sent for in this connexion, and when I took leave of him, he gave his benediction 'God bless you', and it was obvious that he used the word in a collective sense meaning all of us fellow workers."

to raise the standard of behaviour, improve morals, foster self-respect, and refine the mode of living and thinking of the workers.

The changes taking place as a result of rapid industrialisation and urbanisation expose the employees to stresses and strains that require understanding. It is necessary for industrial medical officers to be aware of workers' traditional behaviour patterns and superstitions, particularly in relation to sickness. The employees may be literate, but their strength against ignorance and superstition is limited. Their womenfolk are mostly illiterate. Whatever their beliefs, all are anxiously concerned with quick cure when sick, and have developed confidence in modern medicine. The industrial medical officer has, therefore, the opportunity to understand, educate, and wean the working class from erroneous beliefs. Belief in God's grace is a powerful aid for cure, but fear of evil spirits and sorcery will disappear only when knowledge gives courage.

The Employees' Cooperative Credit Society started in 1951 with financial assistance from the management has today a membership of nearly 8,000 employees, with a paid-up share capital of Rs. 6 lakhs. A dividend of six per cent was declared last year. The value of monthly provision sales is Rs. 2 lakhs. Bicycles, cloth and electric fans are supplied under a hire purchase system.

Indebtedness

The Employees' Union has built, with the aid of Government subsidy, 45 houses for Society members and under a Cooperative Building Society 25 houses to members on a monthly deduction basis. The Society encourages thrift, its members having last year deposited Rs. 2 lakhs. Loans issued to them amounted to Rs. 45.5 lakhs in 1963.

Indebtedness continues to be a social problem though to a lesser degree than in 1950...There are workers who, when in need of money, sell their hire purchased articles and canteen coupons at a loss, while some buy rice and dhal on loan from the cooperative stores and sell them for less than cost price.

Vanishing Books

The disappearance of circuit diagrams, charts, etc., from the abodes in many of the libraries, specially industrial libraries, is still not an uncommon feature.

But does this mean that libraries too should employ detectives, though actually a New York Library, we are told, employs detectives now and then who are trained in criminal psychology and preventive methods, and who do not belong to the library profession.

The eminent library expert, Dr SR Ranganathan, in his book *Library Development Plan for Allahabad University*, had said "I had recommended open access with the warning that the University should be prepared to write off about one volume for every thousand used by readers, and that they should not perpetrate the Victorian method of penalising the librarian for that risk."

Perhaps good public relations alone can reduce the loss, or damages, to documents in public libraries rather than any measure of legislation.

Compared to the traditional piece-rate method, wage-fixation by the time-study method has been found to be advantageous. This paper, based on time and motion study in a small cooperative unit engaged in footwear production in India, attempts to establish a fair wage plan by adopting the statistical method.

Time and Operation Study in Footwear Production

B Das
Central Leather Research Institute
Madras

In a normal course of business life, wages are set up by the push and pull of dozens of forces in an apparently haphazard fashion. In fact, wage determination in major industries has been left to the process of collective bargaining, conciliation, arbitration, and adjudication. Besides, a man may well change his customary method and rate of working once he is being observed. A whole activity, a complex of men and machine may also react to investigations by change of rate, method, and even structure.

The workmanship and efficiency of a wage-earner varies from morning till evening[1, 2]; from the beginning to the tail-end of the week[3]; influenced enormously by favourable incentives[3]; affected by the climatic conditions, working atmosphere, and mental condition of operator[4]; thereby representing the overall situation all the more complicated. The statistical method of approaching such a problem helps to draw inferences resulting in an objective, precise, and conclusive outcome. In the present study, an attempt has been made to establish a fair wage plan on such a basis.

To define a fair day's wage absolutely, is yet a goal unaccomplished. A wage plan varies according to the nature of industry, and the performances of its management and workers. Of the various methods developed by several investigators[5], piece-rate method of wage payment, though popular traditionally, being itself dependent on market, fails to throw much light when a new type or quality is to be designed or any machine is to be introduced to achieve progress and productivity in the system. On the contrary, wage fixation by the time-study method has, for several reasons, been found to be advantageous, compared to the traditional piece-rate method, and this fact has been recognised in most of the engineering industries.

A time-study assumes that each job consists of a number of elements, or group of elements, and that a worker uses elements of movement in performing a job. An element is the aggregation of one or more motions

regularly combined in the same sequence to accomplish a definite result. The study may be concentrated on observing individual operations and machines in their charge for continuous periods with a stop-watch timing and recording of all events. For day work operatives, such as sorting and assembling, records may be made of the time taken to carry out each operation over a given period.

In 1946, the British experiments on time and motion study in the boot and shoe industry[6] led to lower costs, increased productivity, and higher earnings, while it has been reported[7] that the time-study technique is the basic approach for wage payment plans of the footwear industry in the USA. In the absence of record of any investigation on similar lines in India, a study has been organised in a small cooperative unit engaged in the production of leather chappals. The entire job, which has been isolated, is characterised by four elements of major operations, viz., upper making, bottom making, sole stitching, and fittings. The unit operation, based on the nature of handling raw materials with tools and machines in the possession of an operator, has been assumed as the completion of one dozen pairs. A stop-watch has been used to record the time against each operator after the completion of unit operation. Several data have been recorded in succession to get a sufficient number of studies over the entire range of work variable so as to include the standard element time for all the operations that could be performed within the range.

The data so obtained have been processed statistically through a 3×3-Factorial arrangement with replications[8]. The factors which have been considered for analysis are between days in a week and between operators, while observations are considered as replications. The advantage of coding[9] has been adopted by deducting a common figure from observed values for convenience of numerical calculations.

TABLE 1.1

Time (in mins.) spent for upper making of one dozen pairs (160 mins. deducted from each observation)

Observations	Operator 'A'			Operator 'B'			Operator 'C'		
Days	I	II	III	I	II	III	I	II	III
MON.	9	5	6	4	5	8	7	8	10
WED.	8	11	9	9	13	10	9	6	13
FRI.	11	13	14	13	14	16	13	10	12

TABLE 1.2

ANOVA

Source of Variation	Sum of Squares (S. S.)	Degree of Freedom (D. F.)	Mean Square (M. S.)	F.
Between days	162.1	2	81.05	19.72 •••
Between operators	2.1	2	1.05	0.02
Interaction:				
Day X Oper.	23.2	4	5.80	1.41
Residual	74.0	18	4.11	—
Total	261.4	26	—	—

TABLE 2.1

Time (in mins.) spent for bottom making of one dozen pairs (275 mins. deducted from each observation)

Observations	Operator 'D'			Operator 'E'			Operator 'F'		
Days	**I**	**II**	**III**	**I**	**II**	**III**	**I**	**II**	**III**
MON.	5	1	0	7	5	3	1	3	4
WED.	8	7	9	6	8	11	9	10	7
FRI.	12	15	19	10	14	16	16	19	18

TABLE 2.2

ANOVA

Source of Variation	Sum of Squares (S. S.)	Degree of Freedom (D. F.)	Mean Square (M. S.)	F.
Between days	678.2	2	336.06	64.38 ***
Between operators	6.9	2	3.45	0.66
Interaction:				
Day X Oper.	36.9	4	9.22	1.76
Residual	94.0	18	5.22	—
Total	816.0	26	—	—

TABLE 3.1

Time (in mins.) spent for sole stitching of one dozen pairs (125 mins. deducted from each observation)

Observations	Operator 'P'			Operator 'Q'			Operator 'R'		
Days	**I**	**II**	**III**	**I**	**II**	**III**	**I**	**II**	**III**
MON.	2	4	6	5	4	6	4	3	6
WED.	5	7	5	5	7	7	7	8	5
FRI.	9	10	8	7	9	10	9	11	10

TABLE 3.2

ANOVA

Source of Variation	Sum of Squares (S. S.)	Degree of Freedom (D. F.)	Mean Square (M. S.)	F.
Between days	105.0	2	52.50	28.38 ***
Between operators	2.7	2	1.35	0.73
Interaction:				
Day X Oper.	3.3	4	0.82	0.44
Residual	33.3	18	1.85	—
Total	144.3	26	—	—

TABLE 4.1

Time (in mins.) spent for fittings of one dozen pairs (95 mins. deducted from each observation)

Observations	Operator 'X'			Operator 'Y'			Operator 'Z'		
Days	**I**	**II**	**III**	**I**	**II**	**III**	**I**	**II**	**III**
MON.	2	1	3	3	2	3	4	2	3
WED.	4	3	5	5	5	4	5	6	4
FRI.	7	8	6	6	8	8	7	6	6

TABLE 4.2

A N O V A

Source of Variation	Sum of Squares (S. S.)	Degree of Freedom (D. F.)	Mean Square (M. S.)	F.
Between days	93.9	2	46.95	52.75 ***
Between operators	2.3	2	1.15	1.29
Interaction:				
Day X Oper.	1.0	4	0.25	0.28
Residual	16.0	18	0.89	—
Total	113.2	26	—	—

TABLE 5

Standard time (in mins.) for operations

Elements of Operation (1)	Code Value (a) (2)	Mean Value (d) (3)	True Mean (a $\bar{d}$) = $\bar{X}$ (4)	(6)* (5)	Standard Time ($\bar{X}\pm1.96\sigma$) = (T) (6)
Upper making	160	9.85	169.85	4.14	169.85±3.98
Bottom making	275	9.00	284.00	5.74	284.00±4.68
Sole stitching	125	6.63	131.63	1.64	131.63±2.41
Fittings	95	4.74	99.74	0.80	99.74±1.74
Grand Total			685.22		685.22±12.18

The tables for analysis of variance have been constructed and the F-test has been conducted against residual mean squares as per routine statistical procedure. The study reveals that only the variation of time spent in the job work between days is significant pointing out that, while adopting time-study as a means of wage determination, adequate allowances should be provided for the variation of time spent in the job work from Mondays to Fridays. Towards the end of the week, a workman is quite likely to think about resting up, and, consequently, may pull down the rate of output.

Again, since the effect of variation between days is significant, while that of the interactions is not so (vide Tables 1.2, 2.2, 3.2 and 4.2), the remaining sum of squares are pooled[8] with the residuals to obtain a better estimate of variance (vide Table 5, Col. 2). Moreover, while deducting the standard time (T), (vide Table 5, Col. 6), a limit of 1.96σ has been chosen to cover about 95 per cent of the cases in confidence out of a large number of occurrences as has been allowed from the conception of probability theory. It has been assumed, at the very outset, that the distribution of the occurrence of elemental time should behave normally—an assumption which is usually valid for a large sample size.

The wage determination in the present case may be worked out as—

The standard wage Rate (R)=A+B.r

where (r) is the standard rate per unit time, defined by: (Total production in pairs)× (Cost of Labour per pair)/(Standard time spent to attain the production); and (A), and (B) are constants so chosen as to allow for personal and fatigue factors respectively. The former is an independent variable, the value of which comes round about five per cent as observed by other investigators[4,10] while the latter is a functional dependent of (r) and ranges from 10 per cent to 30 per cent according to the physical labour, i.e., effort involved within the work[11,12].

Further, the wage of a workman should be proportional to the Average Workman's

Efficiency (E) usually expressed in per cent to recognise continuity of speed, effort expected, and consistency of movement. Because of its direct bearing with the individual workman, the factor (E) should be determined at least once in a month[13].

As all the factors had since been covered, the rest of the job is rather mechanical. Thus—

Wages to be paid (W)=E.t.R. (t.x+X) where (t) is the recorded time against individual workman for the job under consideration; (x) and (X) are the other factors and other work done including some allowances based on cost of living index[6, 14].

The statistical approach of fixing standard time has the special advantage of determining average time. The constant fear of the wage-earner, that an average time includes only that of a most efficient worker of the fastest record under the most propitious circumstances, is being eliminated. From the part of the employer also he may think of productivity on the basis of the time spent, and may try to locate the means for improvement. For instance, a study revealed elsewhere[15] that a rest period of five per cent of the working day resulted in a production increase of nine per cent.

It has been recorded in another finding[16] that apparently, muscular efficiency is highest about an hour after eating. Consequently, a morning break, like coffee time, has become a routine in several progressive organisations. It has also been found[17] to pay if the worker be given individual control on works including materials and machineries on which he has been assigned and accepted responsibility. These are but a few of the directive measures the management may consider to increase productivity, and to improve on labour-management relations.

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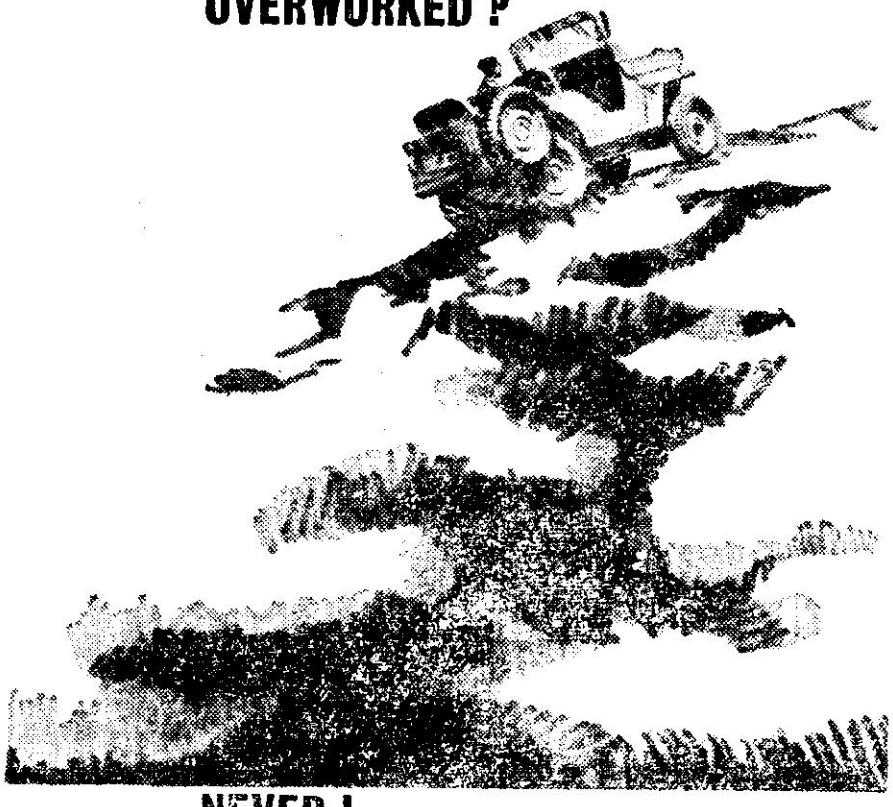

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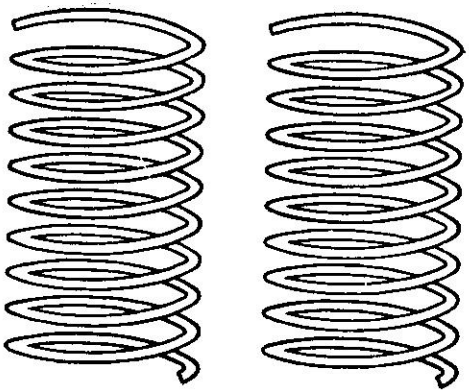

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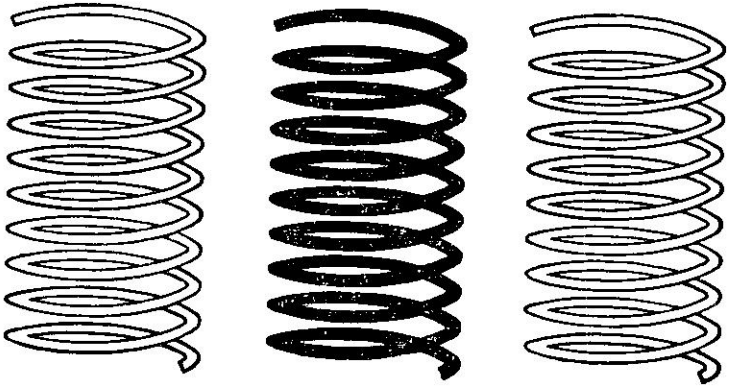

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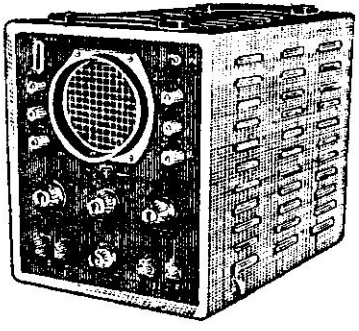

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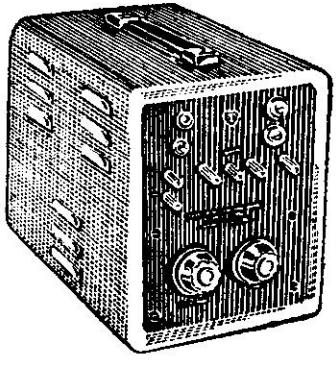

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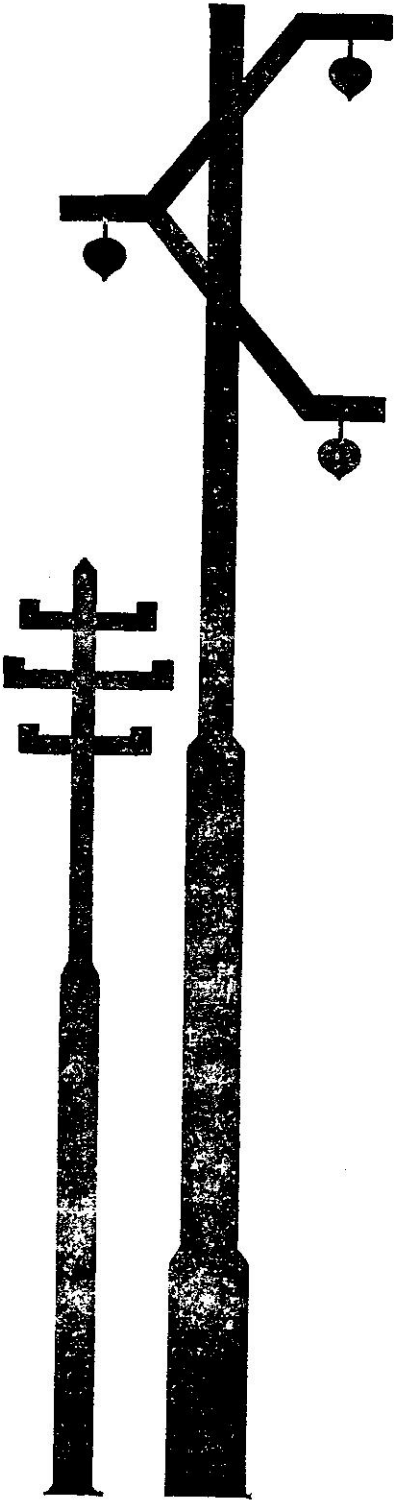

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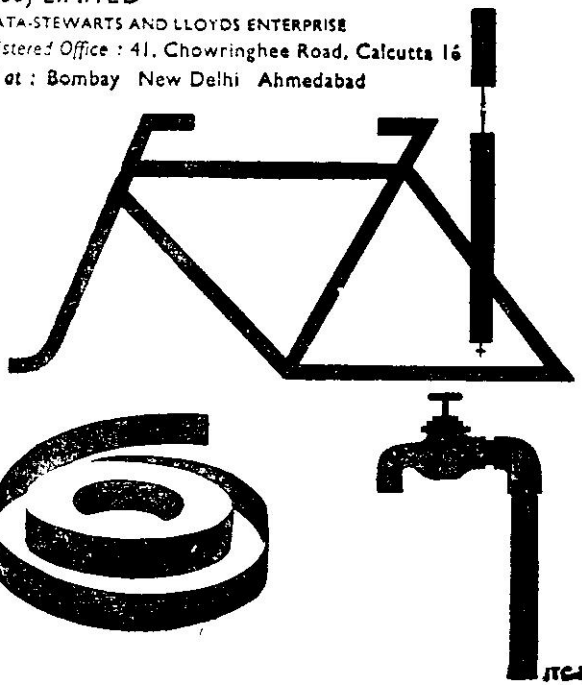


Discussed in this paper are the important factors in regard to the attainment of higher productivity in jute industry. Any adverse effect on this industry will affect the nation's economy, as jute goods are India's largest foreign exchange earner.

Technology and Productivity in Jute Industry

GOPAL RUKHANA

Jute Technologist
Birla Jute Manufacturing Co. Ltd.
Birlapur

IN SPITE OF advances in the manufacture of packing materials, and the availability of paper bags, plastic bags, etc., jute goods continue to be popular because they are economical to use due to comparative cheapness, and because they can be reused. Jute goods are the largest foreign exchange earner for India, and any bad effect on the jute industry will adversely affect the country's economy.

In recent years, however, competition has become the keyword of this industry. We are losing our traditional market because of a stiff competition from Pakistan. The facing of this competition depends on a stable and economic cost factor. For this, changes in the modes and methods of our production structure and manufacturing processes are imperative. To effect economy in production cost, it is essential to increase the productivity of individual labour to the extent feasible, and to improve and maintain the quality of the products.

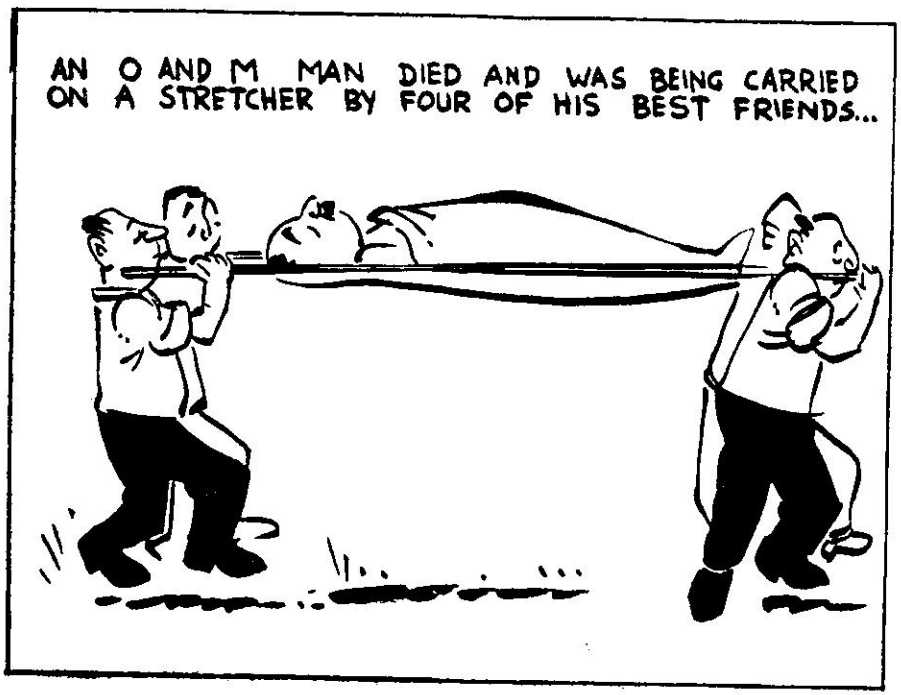
Various factors collectively combine and affect the productivity of the working force. Time-motion study and work study are two scientific ways to detect and analyse the possible impediments to the attainment of higher productivity. Time is the most important factor, and its better utilisation will result in improved productivity.

By these studies, we can eliminate the factors responsible for low productivity. To improve quality of product and productivity

per man-day, more mechanisation of processing has to be resorted to. For the introduction of modernisation, the cost and reaction of labour should be considered. Apart from the scrapping off of the old and inefficient types of machinery, modernisation includes better planning, introduction of improved methods of mechanical and electrical power transmission, most scientific and glare-free arrangement of illumination, better ventilation on a scientific basis, a definite control over the prevailing humidity and temperature at the working place, proper cleanliness by removal of fly and dust by suction device, more automation by introduction of mechanical handling of products at different stages of production, and a rigid quality control at every manufacturing stage of processing of the material.

Till now, jute mills in India have concentrated on modernisation in preparing and spinning sections up to the manufacture of yarn. Now the focus of modernisation activity is shifting gradually to the weaving department, that is from the winding of yarn to the baling of finished product. To run these modern and high-speed machines, the demand for skilled labour is gradually on the increase. But to guide them in acquiring the desired skill to operate and maintain these modern machines, it is necessary to have technical personnel. If this is lacking, full utilisation of machinery and higher productivity cannot be ensured. Also, the watchful eye of a person technically qualified is essential so as to observe constantly and eliminate the causes which hamper the attainment of the most effective use of manpower.

Jute fibre is hard, and for its efficient processing without much of wastage, it has to be softened. Jute bales issued from godowns to the batching department contain a certain amount of moisture, and depending



on the amount of moisture present, an extra amount of moisture is added on the softening machines along with oil in the form of an emulsion. Though oil is added to reduce the friction between fibre and fibre, and fibre and machine, the real purpose of softening the jute is carried out by moisture. The quantity of addition of moisture and oil has a specific technical importance, and the addition of more, or less, than the actual requirement has also a specific bearing in efficient processing of the fibre.

Relative Humidity is one of the most important and guiding factors in regard to the addition of an extra amount of moisture at different stages of the manufacturing process, to softening machines, sizing machines, damping machines, etc. The desired optimum limits of moisture in the atmosphere at different stages of jute processing for attaining good spinnability of yarn and better weaving performance are given in Table I:

TABLE I

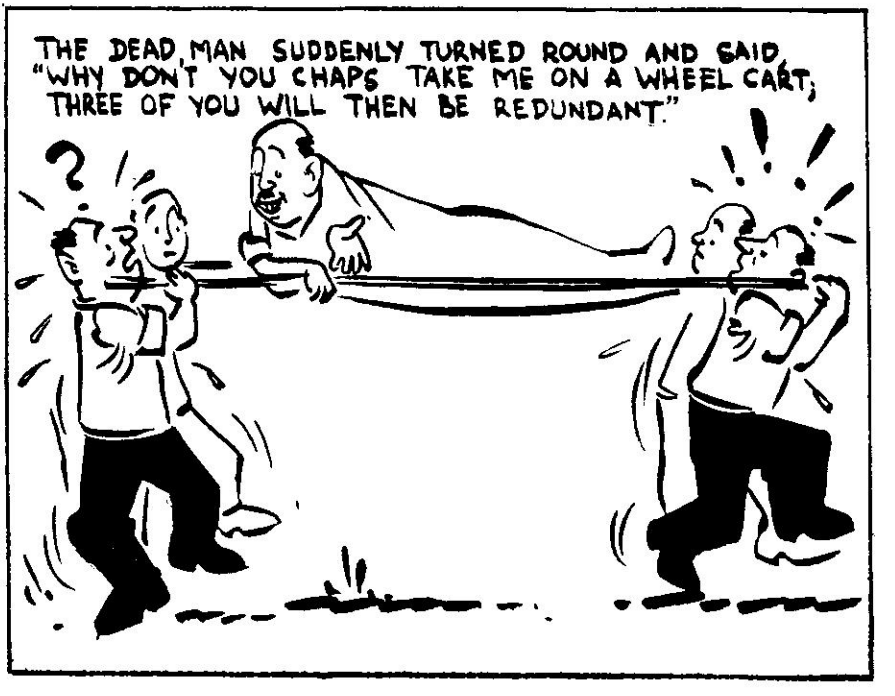
1.	Carding shed	... 60 % R.H.
2.	Preparing shed	... 85 % R.H.
3.	Spinning shed	... 75 % R.H.
4.	Weaving shed	... 85 % R.H.

The fibres at different processing stages contain different moisture regain percentage. In Table II are given the approximate average moisture regain percentage at different manufacturing stages:

TABLE II

1.	Breaker card	... 34 to 36 %
2.	Finisher card	... 30 to 32 %
3.	Drawing frames	... 26 to 29 %
4.	Spinning	... 17 to 18 %
5.	Weaving	... 20 to 25 %
6.	Finishing	... 17 to 19 %

To maintain the best results of efficiency and higher productivity at the spinning and weaving stages, the mentioned moisture



regain percentage have to be more or less maintained, and for this constant observation of relative humidity is essential as it affects moisture regain of fibres. Spinning at the same grist of yarn with lower moisture content means loss of fibres and vice versa.

Addition of oil to jute fibres along with moisture in the form of an emulsion has also its own specific problems. It is a general tendency to add a higher quantity of oil because of its comparative cheapness to jute fibres, but then there are certain limitations in the matter of addition. Apart from reducing the friction between fibre and fibre, and fibre and machine, oil checks the evaporation of moisture from jute fibres when added as an emulsion. A less amount of addition than the minimum required will cause a higher consumption of fibres, and as the friction between fibre and fibre, and fibre and machine is not reduced, there will be breakages of fibres while processing, resulting in irregular and hairy yarn. This may also cause a higher percentage of wastage of material during processing. If the addition of oil is in excess of the maximum allowable, it reduces the cohesiveness of fibres which have the tendency to slip past each other. This will produce yarn of lower quality ratio, which, when processed during cloth fabrication in the weaving department, will yield cloth of reduced strength apart from lowering the weaving efficiency and the weaver's productivity.

Quality Control

The deterioration of quality will have a great impact on efficiency and productivity at every stage of its processing. Irregularity is introduced at different manufacturing stages owing to various reasons. Rigid and vigilant quality control will definitely check the factors responsible for irregularity to the sliver, yarn, and quality at every processing. Irregularity to the sliver may be introduced due to bad feeding of the material on breaker cards, bad piecing of slivers, and passing out of missing slivers on finisher cards and drawing machines, overloading of machines, and improper and poor maintenance of machinery. Irregular slivers during spinning will produce irregular yarn with thick or thin places, which, in turn, apart from affecting spinning efficiency and productivity, will result in poor weaving performance. Technical guidance regarding proper methods of quality control will help in detecting, analysing, and rectifying the reasons revealed responsible for imparting irregularity.

The application of rules of motion economy is essential to avoid unnecessary and undesirable physical movements, so that the energy consumed due to unnecessary physical motions can be beneficially utilised to ensure maximum and effective manpower utilisation. This is equally desirable by both employers as well as employees, in the sense that higher productivity would economise the cost of production and hence will ensure better competitive power as well as better return to the management, whereas in the case of employees they will be able to earn higher wages by utilising their extra capabilities. The analysis and the application of rules of motion economy will need a competent and technically trained eye.

A watchful eye on the trend of Quality Ratio (QR) is important for maintaining and ensuring a better spinnability of the yarn, and its better weaving performance. Quality Ratio means average single threaded yarn breaking—load in pounds, divided by grist (weight in pounds of 14,400 yards of yarn) and multiplied by 100. It is obvious that any reduction of strength, and any increase of grist for yarn of the same count, affects QR adversely.

Technology helps to detect, on analysis, the possible reasons of lowering the QR and to rectify them. The various reasons which collectively combine to affect the strength of the yarn, and hence its QR, are:

1. Strength may be lowered if yarn is made out of inferior grade of raw material.
2. Use of inferior raw material necessitates the spinning of yarn heavier than specified. This lowers the QR of the yarn.

3. As mentioned before, regularity of the yarn is vital. Irregular yarn has many weak places which break repeatedly during spinning and weaving. Moreover, thick places caused due to irregularity cause a great deal of trouble by repeatedly breaking during winding and weaving by catching eyelets, thread-guides, reed spaces, etc.

4. Insertion of adequate amount of twist to the fibres to render maximum strength to the resulting yarn is essential. If the twist inserted is less, the fibres slip past each other, whereas if the twist is more, it ruptures the fibres. Twist has to be adjusted very scrupulously in accordance with the grist of the yarn. By experiments and researches, a relation between twist and grist is established, and the constant derived is known as Twist Factor, which is defined as the square root of the grist multiplied by the turns per inch inserted in the yarn. As Twist Factor is increased from a very low value, the strength of the yarn gradually increases until a maximum value is reached. With a still higher Twist Factor by increasing the turns per inch, the strength gradually reduces.

   Increasing twist increases production cost, extensibility, and resistance to wear, whereas it decreases diameter, compressibility, covering power, ease of penetration of dyes, and sizes. Lowering of twist during the spinning of yarn will increase the production per spindle hour, and hence the productivity per man-day, but this reduction below the desired limits will affect strength, and hence the QR of the yarn.

   The desired Twist Factor must depend on the use for which the yarn is intended, and often a compromise is necessary. Warp yarn is subjected to greater wear by rubbing especially in closely woven cloth and double-warp cloth which need greater twist to give better wear resistance. For ordinary weft yarn, twist giving maximum strength is generally suitable, especially as high twist reduces the 'cover' obtained in the cloth after finishing. High quality jute requires slightly more twist than low quality jute for maximum strength.

5. Oil content of fibres affects the strength of the yarn.

6. Amount of moisture affects the strength of the yarn.

The above-mentioned factors have to be observed constantly, and rectified when any of the factors falls short of the requirement. Any factor falling below its minimum requirement will lower the quality ratio, and the resulting yarn produced will be weaker. When this yarn will be worked on weaving looms, it will affect efficiency and productivity of the whole department. To control, check, and rectify their fluctuations, and variations of factors beyond minimum requirement, a sound knowledge of technology of the factors governing efficient processing during all its manufacturing stages is essential.

Sizing of Yarn

Sizing of the warp yarn has to be adjusted in accordance with the changing requirement due to variations in R.H. Lack of proper sizing of the yarn has a well-pronounced effect on weaving performance of the yarn during its fabrication. Sizing is applied to jute warp yarns with the main object of laying the surface hairs by means of an adhesive coating, and thus enable the yarn to withstand better the abrasion effects of the weaving operation.

The productivity of the weavers depends primarily on the weaving performance of the yarn. If yarn with good raw material and of better quality ratio with proper sizing is supplied, and if the machines are properly maintained, then the weaving performance is expected to be satisfactory.

Apart from the few important factors discussed above in regard to the attainment of better productivity in jute mills, there are various other factors which also demand technical skill to tackle them—such as proper and thorough maintenance of machinery, proper distribution of work-load, and maintenance of cordial relations between supervisors and workers. Technology does not confine itself to the attainment of the technical background of the raw material and its processing, but is also coupled with and includes a training of industrial management.

Besides contributing directly to Cost Reduction, the technique of Value Analysis has many indirect economies inherent in it. If in an advanced country like UK the savings that accrue to the manufacturing industry on account of Value Anylysis can be in the region of over £ 630 million a year, the scope of Value Analysis in a country like India can well be imagined.

More about Value Analysis

JP CHAR

District Controller of Stores
Southern Railway, Madras

VALUE ANALYSIS, according to an author, is an extension of method study. Others, however, identify it as a part of standardisation, because the value of the item must go a long way in deciding its standardisation. A design engineer is also concerned with it, and since the value of the material he stocks is the concern of the materials management man, he, too, is equally anxious to include it in his sphere of work. Similarly, the purchase man, because he purchases, and the finance man, because of the investment involved, want to look at it each from his own point of view. If the whole thing sounds like the survey in the fable of an elephant by six blind men, it only speaks of the paradox of the times in which we live. With the splitting up of management duties, following the growth in size and shape of industries and enterprises, scenes of departmental patriotism rising high to the detriment of an organisation as a whole are not unfamiliar.

Each subject, when it grows beyond recognition in course of time, steps into the territories of other subjects, if only briefly each time, desirous of acquiring and adapting the benefits of research in these fields to its own needs. When such boundary-crossings attain a stage of saturation and the field is fertile enough to yield fruit, a new subject is born, bearing the characteristics of each of the parent subjects, and resembling each one of them and yet different. Value Analysis is just one such example. Seniors in this line are Industrial Engineering, Operations Research, Materials Management, etc.

Devoid of sophistication, Value Analysis simply means picking out each product or item of stores that an organisation has to handle, and deciding, with the help of available resources, how best it can be modified or replaced so as to benefit the organisation financially. Hence efficient Value Analysis not only helps to keep the direct cost of the product low, but also leads to a number of other indirect economies inherent in it.

One such latent benefit accrues through the system of inventories. A reduced value

of the items stocked brings down their annual usage value, and hence the expenditure on the purchase and maintenance of the inventory. The latter consists of the following two costs—

(i) Buying or set-up cost, and

(ii) Inventory carrying cost

—and is directly proportional to the square root of annual usage under optimum conditions.

The buying cost is equal to $\frac{A}{Q}S$

and the inventory carrying cost $\frac{Q}{2}I$

(where 'A' represents the annual usage value, 'Q' the order quantity or lot size, 'S' buying or set-up cost per order or lot, and 'I' unit inventory carrying cost). Under optimum conditions, these two costs (i) and (ii) are equal, and

Q=EOQ (Economic Order Quantity)

$$= \sqrt{\frac{2AS}{I}}$$

Substituting this value for Q

Total expenditure $= \sqrt{2IAS} = K\sqrt{A}$

In actual practice, this figure will be much more because, besides the average working inventory, sufficient safety stocks have got to be carried to prevent uneconomic stock-outs.

Since reduced inventory also represents reduced locked-up capital (working capital), besides reduced cost of materials, the percentage of profits made by the company is doubly obtained through increase in the numerator and decrease in the denominator in the following formula:

$$\text{Rate of returns} = \frac{\text{profits}}{\text{capital investment}}$$

The additional capital so released will also be available for alternative use.

Where it is a manufactured one, the Value Analysis of the finished product might bring, besides the aforesaid savings in its own inventory costs, similar savings in its raw material, and in process stages. Case histories have shown improvement in the quality and reliability of the material, besides cost reduction. Needless to say, the quality and popularity of the material do contribute in the promotion of sales and rise in profits. Another important by-product of Value Analysis could be—strangely though—productivity, because the savings in time and improvements in method as a result of Value Analysis could release additional machine capacity and manpower, besides effecting reduction in the direct cost of the product concerned.

Committee Effort

Efficient Value Analysis demands a thorough knowledge of all the subjects, viz., production, methods, design, materials management, purchase, cost accountancy, etc. No one person can obviously master all these subjects as expertly as individuals from each of these departments put together.

Hence it is that Value Analysis is a committee effort. The commonsense approach of a production engineer is extended to an exchange of ideas by a team, consisting of people from various departments of the organisation, who must, however, during the deliberations rise above petty departmental interests for the overall good of the organisation. Otherwise, the very purpose will be defeated. Then the proceedings start with the product chosen for analysis being examined piece by piece, posing questions about it as they go along. It would seem as though the product is personified, made to sit in a witness box, and subjected to severe cross-questioning by several lawyers, who are experts in their own line, and hurl such inconvenient and incessant questions at it that under their strain it cracks and yields the clues! The subtle difference in this method is, however, that the answers are also provided by one amongst the questioners on behalf of the product! The typical

questions that are usually asked have already been published in many papers.[1] Where there are more than one workshop or factory in an organisation, like the Railways, it is better to appoint a central committee which would take the nomenclature lists of different products and go through them, item by item, before starting on another cycle. When items of particular interest only to one factory or company are discussed, a member from the zone may be co-opted if necessary. There is also no hard and fast rule that only one committee should be appointed. Different committees may investigate different types of products simultaneously, and their constitution may also vary depending upon the departments which are concerned with the product. For example, where electrical items are concerned, a representative from the Electrical Department may be included, and where security items are involved, a Security Officer may be called upon to serve on the committee. Seniority does not count in such deliberations, and any member is free to make suggestions affecting the working of another department.

Cost Reduction

When we are dealing with factories concentrating on a few products for sale, it is possible to give a frequent turnover to all the items irrespective of their annual usage. But when it comes to organisations which have got to maintain a variety of items, especially in the case of those whose customer service is in kind (e.g., railways, airlines), it will be unwise to adopt such a course. In such cases, ABC Analysis of the items must precede Value Analysis. The 'A' items may be value analysed with maximum frequency, commensurate with the degree of usefulness of results obtained, 'B' items less, and 'C' the least, so as to gain maximum control with least effort. Since, in the initial stages of development, case studies give one of the best clues for Value Analysis, and some of the industries form large networks with units (zones) far flung and semi-independent, as in the case of railways, steel, cement industries, etc., it is worth-while to conduct an annual seminar to exchange ideas, vis-a-vis the items of 'A' class at least.

It is good to remember that no item should be replaced by the immediate benefits that accrue to the company. The advantages must be "sustained", and not "flashy". Any new plant or machinery needs little attendance or maintenance in the first year. Hence one should look into all aspects of cost reduction over a long period, taking into consideration the products' life and all expenditures connected with them.

Real Value Analysis does not end with the committee's report. The important part of it is in the follow-up. The reasons for the non-achievement of targets must be investigated, discussed, and remedial action taken. Mere paper-economy leads us to nowhere.

It is worth-while sending those chosen for Value Analysis, and those who might be chosen in the future, on a week-long residential course on the subject. These team meetings produce one more important direct benefit, viz., effective transfer of knowledge of each other's department amongst men who form important tiers in the management. For example, the finance man gets an opportunity to familiarise himself with the practical aspects of the problems confronting the executive. More and more such meetings open new vistas of knowledge, and prepare him to shed his pessimistic attitude. Similarly, the executive, instead of talking vaguely, learns to speak quantitatively. The designers become aware of the cost of materials they specify, the capabilities and limitations of suppliers, the amount of foreign currency that goes into the product, etc. While the production engineer gets trained to reckon production cost, and not rely on labour cost alone, the purchase man can get, if only, a glimpse into the technical know-how associated with the product, and also start thinking in terms of obtaining best value for money.

The savings that can accrue to the British manufacturing industry on account of Value

[1]See, for instance, 'Techniques of Value Analysis' in *The Eastern Purchasing Journal* (Vol. V, No. 4, pp. 193-8), New Delhi.

Analysis has been estimated at over £630 million a year. If it is so in regard to an advanced country like Britain, the scope of Value Analysis in a country like ours can well be imagined. On account of the vast ground he covers by purchase and stocking of both purchasable and shop-manufactured items, it is reasonable to expect that the initiative in this direction will be taken by a stores man.

Hawthorne Experiments on Human Relations

THE best studies on human relations are those which relate to the famous Hawthorne experiments. These experiments, though they relate to the industrial society of the USA, have an interest for us, in India, because the underlying assumption in the hypothesis relating to human relations is that the solution of industrial problems lies along the lines of developing an ethics adequate for a large-scale society of the sort that is developing in the wake of rapid industrial development. Some of the progressive people in the USA, mainly intellectuals and academicians—Prof Elton Mayo, Prof Whyte, and others—wanted to know what the truth was, and accordingly they set up a series of simple experiments, one of which is described below:

This experiment took place at a place called Hawthorne near Chicago at the plant of the Western Electric Company. The Professors selected a group of women workers whose reactions they wanted to observe regarding certain elementary phenomena, like lighting. They frequently changed the bulbs, sometimes increasing the illumination, sometimes diminishing it, sometimes only pretending to increase or decrease it through change of bulbs, while their candle power remained the same. They found that irrespective of the increase or decrease in illumination, irrespective of the fact whether such increase or decrease was real or imaginary, productivity increased.

The Professors were naturally puzzled in the first instance, because they expected the answer that productivity would increase up to a limit, with better illumination, and thereafter remain steady, and productivity would decrease with reduced illumination till a point of blank resistance was reached, because workers would refuse to work on the ground that they could hardly see. Actual experience led to a straight rejection of this hypothesis, and the emergence of another hypothesis which has played a powerful part in the progressive development of the industrial economy of the USA, namely that no matter what you do on the physical front—within broad limits—people work better and are even prepared for sacrifices and adjustments, provided they are conscious that the people in authority are paying attention to them.

This paper deals with a new concept in the field of management in India. No business, in the present complex corporate structure, can be run successfully for any length of time without the technique of management accounting. A progressive management must be fully management accounting conscious, if it wants its concern to survive amidst competition.

Management Accounting: A New Technique of Pointer to Business Success

N SEN
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THE large industrial undertakings, in the public and private sectors, have brought in their wake many a complex problem, some of which are finance for re-equipment and replacement of plant and machinery, resources for working capital, increasing cost of operations, increasingly keen competition among the industries, growing labour unrest and disputes, training and placement of labour, and human relations in administration. Success of any undertaking depends more on management than on any other factor. Efficient functioning is the direct result of good management.

While the entire responsibility of running a concern efficiently rests on management, the main objective being to earn a reasonable return on investment keeping in view the stability and growth of a concern in the long run, all managerial problems and shortcomings will have to be tackled judiciously and at the appropriate time. But to tackle them is not an easy task. It requires not only an all-out effort on the part of both the labour and management, but also the application of modern tools and techniques available to management.

Much attention has, therefore, been paid, of late, to the development of various accounting techniques and operation research, designed to provide management with such information and data as may enable them to tackle the problems on the one hand, and conduct the efficient running of the business on the other. In fact, the various modern techniques which aim at higher appropriate control, are now brought within the purview of Management Accounting. This is the latest development in the field of management in this country. The fact that it has, for the present, little application in India's industrial structure, is an indication not of our backwardness, but of the lack of competition among the industries, both in the public and private sectors.

Management Accounting, in its widest sense, includes all the accounting and statistical techniques which assist an organisation in sound management, greater efficiency,

higher productivity, better quality, and lesser costs. It plans for future, compares the achievements and the plans, finds out the deviations between performance and schedule, ascertains the correct facts—maybe financial, costing, marketing, or production—translates them into figures, points out the inefficiencies and weaknesses, makes a close analysis and scrutiny of all the statements and returns, and submits the figures and reports of particular significance to all levels of management for their guidance and decision. In its process, it has to make use of all the figures and information available, in all branches of operations, and submits reports—either periodically or at regular intervals—to the various levels of management according to their requirements, for, the information required at each level, may differ qualitatively and quantitatively.

Several Techniques

Although several techniques are followed in Management Accounting, the following deserve consideration:

(a) *Cash Flow Analysis:* A well-managed organisation must have a proper control over the cash resources. Since payments are made in cash for goods and services, a Cash Budget (Cash Flow Statement or Cash Forecast) is of importance to the management. It should, in the first instance, be prepared for the whole year to get an overall financial position of the concern, and then broken down into monthly forecast and reviewed from time to time. The difference between the receipts and payments may be either surplus or deficit. If this result is known well in advance, suitable action can be taken by the management vis-a-vis the Financial Controller/Manager/Adviser to adjust their financial position accordingly. If the forecast, for example, reveals a temporary shortage of working capital at a particular period, necessary arrangements can be made for bank overdrafts, pressure can be exerted on the debtors to settle their accounts early, the size of the stock-in-trade can be reduced, or development of future business so adjusted as to avoid overtrading, which is a real source of danger to a business. If, however, there is a long-term shortage, management can raise further capital or float a long-term loan from financial agencies or cut the capital expenditure, which can wait, to match the incoming and outgoing cash.

Trading Accounts

(b) *Inter-firm Comparison:* It is considered as one of the main techniques of Management Accounting, and is now widely used in modern industrial organisations for higher managerial control. Progressive management the world over always asks itself the question: "How is my unit performing in comparison to that of others?" The published trading and profit and loss accounts and the balance-sheets, along with the annual reports, provide inadequate data for an objective and realistic assessment of the performance of a company. It is the IFC that provides the management with a vivid comparative picture showing how its operating performance, financial results, and product-cost structure compare with those of other firms of similar size, nature, industry or trade.[1]

(c) *Financial Ratio Analysis:* A ratio is the relation of one amount to another expressed as a simple fraction, integer, decimal, or percentage. It is generally found by dividing one number, the base, into the other. A good management will always ask itself the questions: Are we operating as efficiently as we might? Are there areas of our business where improvements might be made? If we are successful, what are the strong points on which success depends? How can we increase the profitability of our concern?

A firm can, to a great extent, answer these questions only by looking at its own internal performance records comparing this period's results with those of the previous periods or comparing actuals with standard performance, as also by comparing its own performance

[1] A special issue of *Productivity* (Vol. V, No. 3) devoted to Inter-firm Comparison was published in 1964.

with that of similar other units. But the whole basis of comparison rests fully on ratio analysis of key figures.

(d) *Computation of Return on Capital Employed:* A business organisation has a number of motives, the overall objective being to earn an adequate profit margin on sales in relation to an acceptable rate of return on capital employed, consistent with the maintaining of a healthy and sound financial position. It is the best possible yardstick to measure the comparative efficiency of an undertaking.

The term "Capital Employed" has never been specifically defined. Strictly speaking, it means, fixed assets and working capital (current assets minus current liabilities). There are, however, several pertinent questions which require to be considered for determination of the capital employed. It is the Management Accountant, who has to deal with all these problems, and work out the actual return on invested money for information of the top-management.

(e) *Budgeting Technique:* Budgeting or planning the future activities of an organisation is one of the many techniques of Management Accounting. To achieve the desired objectives of an organisation, management must plan everything much ahead. Plans should be made for sales, production, materials, labour and finance, with a reasonable degree of accuracy taking into account all the relevant operating factors. Budgets are used for planning, control, and co-ordination. They can be prepared for one year, six months, three months, or in some cases, for every month. To be more effective, both long-term and short-term budgets should be prepared, the former giving out the long-term plans, while the latter a more detailed picture of the various activities in the short period, which is the ultimate basis of day-to-day control.

(f) *Financial Statements Analysis and Interpretation:* To keep the efficiency of an organisation at a high performance level, each and every item of assets and liabilities in the balance-sheet, is required to be closely analysed, some relationships with one and the other are established, and reports submitted to the management, so that they may serve them as pointers for future course of action.

Assets and Liabilities Variation Statements are also prepared from the current and past yearly and monthly balance-sheets to show at a glance from which sources money has come, and how it has been used during a particular financial period, and also to show a comparative picture of the trend of increase or decrease of assets and liabilities in a particular year over the previous year. It is the same as a Funds Flow Statement. The orthodox Profit and Loss Account is arranged and presented to management in the form of a vertical statement, which is split up under different heads of significance, and showing the comparative picture of the current year and previous year's performance.

(g) *Executive Control Charts:* Graphs, charts, and diagrams are the modern techniques for presentation of data, facts, information and figures particularly relative to production, sales, and finance to the management for their guidance, quick business decision, and higher managerial control.

Besides the above main techniques, there are a number of other supporting and supplementary tools and techniques followed in Management Accounting for an efficient planning and control.

PRODUCTIVITY IN THE NEWS

*** Secret of Productivity * Hurdle to Rise in Output * Multiplicity of Controls * Success in Productivity * Productivity Through Collaboration * Economic Incentives * Productivity in IAC * Productivity in Collieries * Education and Productivity * Indo-Swiss Farm Project * Pre-Fab Productivity**

What is the secret of productivity?

Men or machinery?

"It is men in supervisory cadre, not sophisticated machinery, that really matter in our technological undertakings, big or small", according to Mr TR Gupta, Chairman, Heavy Engineering Corporation.

Speaking at the Jamshedpur Sub-centre of the Institution of Engineers of India, Mr Gupta said: "If this aspect of the industrialisation programme is forgotten, there will not be any future for our country in the world market..."

* Hurdle to Rise in Output

One of the factors impeding rise in production is the delay in the process of issuing licences for starting of industries. Speaking at Bhandup, near Bombay, Prime Minister Lal Bahadur Shastri conceded that "things are not moving as they should", and that the delay was "due to the process involved in scrutinising a particular project", and that "no individual Ministry could be blamed as the responsibility was a collective one."

Vigorous steps are being taken by the Central Government to put an end to the "leisurely and lackadaisical functioning" of the administrative machinery. Sri Shastri is reported to have sent a circular to all Ministries to accelerate the pace of governmental activity. He has specifically sought factual statements on the progress of negotiations for foreign collaboration. "Most negotiations are said to have suffered on account of heavy delays; in some cases these have dragged on

for years until potential investors have lost interest or patience or both . . ."

Speaking on this subject at the Durgapur Session of the Congress, Sri Shastri called upon officials to dispose of official papers with speed and confidence. "One reason why there is delay in the disposal of papers in Government offices is that officials are afraid of taking decisions lest they should commit mistakes. I want them to own responsibility and dispose of cases with confidence." He assured the officials that bona fide mistakes, if any, would be condoned.

* Multiplicity of Controls

The view that a multiplicity of controls and restrictions would impede industrial productivity was recently expressed by Mr HRV Iengar, former NPC Chairman.

Delivering the Sir Vithal N Chandavarkar Memorial Lecture at the Indian Institute of Science—his theme was "The impact of Government on business management"—he said that while he agreed that it was necessary to have a reasonable control over private enterprise to check any unhealthy trends, the controls should not be so rigid as to strike at the very root of the enterprise.

* Success in Productivity

There are certain essential requisites for success in productivity.

Writing on engineers' role in accelerating national progress, in the *Economic Times*, Mr RB Seshadri expresses the view that the management aspect of productivity must come first, as results may very well depend on the efficacy of management.

Mr Seshadri adds: It is still necessary in India to emphasise that scientific training in the management context is of special advantage. If engineers are placed in management, which they are not at present, it will lead to more efficacious handling of the manifold problems of productivity. In the USSR, for example, engineering is considered as the one essential qualification for management. A similar situation exists in Sweden also, where industry is very highly organised and efficient.

One aspect of industrial productivity, which is completely neglected in this country, is machinery for production and procurement, and organisation of correct and up-to-date information. Planning for productivity must be based on sound facts. There are a whole range of subjects on which such information is necessary—work study, costing, pre-investment feasibility studies, market research, control and data processing systems, planning expenditure, operational research techniques, machine tool age, and so on.

Other important productivity problems concern the effectiveness of wage incentive schemes, marketing and the study of market trends, and design for increased productivity. The manufacture, utility, and saleability of the product are all dependent on correct design. Design could be the most important factor controlling the ultimate success of an enterprise.

* Productivity Through Collaboration

A contract was signed recently between the Oil and Natural Gas Commission and Nuovo Pignone, a subsidiary of ENI of Italy, for the establishment of an udex extraction unit at Koyali, which will be the first unit in the petro-chemical complex. Mr R Bahl and Mr Razzolini signed the contract. The patent process for this unit will be bought from Universal Oil Products Co. of the USA at a cost of $ 2.5 million. Nuovo Pignone will do the detailed engineering for the plant, supply main process equipment, and supervise the construction of the unit. The foreign exchange expenditure, an equivalent of $ 1.2 million, will be financed out of $ 100 million credit to the Government of India. The total erected cost of the plant has been estimated at about Rs. 1.42 crores...The unit, when it goes into operation some time in early 1967, will extract about 33,000 tons benzene and about 14,000 tons toluene per annum from

the catalytic reformate emanating from the Gujarat Refinery now under construction at Koyali.

The key feature in the Raymon Engineering report for the year ended March 1965 is that, with the actual initiation of the expansion scheme with foreign technical know-how and management in various fields of production, the company hopes to be able to meet an appreciable portion of the country's requirements of heavy engineering products.

* Economic Incentives

The system of economic incentives for workers has been a success in many institutions.

The Madras Port Trust has introduced a scheme of giving cash awards to certain categories of operatives as incentive for good attendance.

It will benefit about 400 workers belonging to the categories of loco, truck and crane drivers, shunting masters, and coupling porters working in the Engineering and Traffic Departments. The cash awards are to be paid at flat rates of Rs. 10, Rs. 15, and Rs. 20 respectively for employees belonging to pay brackets below Rs. 100 per mensem, between Rs. 100 and Rs. 150, and Rs. 150 and above. A condition for the award is that the employee concerned should work for at least 21 days in a calendar month.

Incentives for tea industry have been recommended by the Tea Finance Committee in its report to the Government. The incentives suggested are in the form of development allowances to undertake extensive plantation and replantation. Incentives should be related to performance of the industry—both in development and actual exports. The rate of incentive recommended for planting in the new areas is 50 per cent of the expenditure incurred on this account, and 40 per cent of the cost in cases of replantation.

* Productivity in IAC

Productivity has come to the Indian Airlines Corporation. Its General Manager, Mr JS Parakh, told a Press conference that the Corporation had made a surplus of Rs. one crore in the financial year 1963-64. He claimed that it was for the first time after nationalisation of the airways in the country that the Corporation had made Rs. 70 lakhs as operative profit. During the same year, the Corporation had also carried a record number of over one million passengers... Though the flying hours were less in the year, the passenger load had been the heaviest.

* Productivity in Collieries

Thanks to the steep and steady fall in demand for coal since the beginning of 1963, a large number of collieries in the private sector who have invested a huge amount for purchasing machinery and equipment from abroad under the terms of the World Bank loan, find themselves in the position of a gambler who has played for high stakes and lost nearly everything.

That the Government is now alive to this danger of incorrect assessment of the coal requirements will be evident from the fact that the coal production target for the Fourth Plan, which was initially set by the Working Group of the Planning Commission at 180 million tonnes about a year ago, has already undergone several modifications. The same Working Group, a few months ago, fixed the target of coal production at 156.5 million tonnes. But the latest figure made available by the Ministry of Steel and Mines is 136 million tonnes. Confusion, however, still reigns over the fixation of targets, as according to the National Coal Development Corporation, coal requirements for the Fourth Plan should not be more than 115 million tonnes, whereas the World Bank

team suggests that the target should not exceed 110 million tonnes.

* Education and Productivity

Should education in India be linked with productivity?

Answering in affirmative, Dr DS Kothari, Chairman, University Grants Commission, told an Educational Conference that education today was divorced from realities. "We must bring our education close to our community. India can survive only through proper education. More than 350 million people are illiterate, and when other countries have made tremendous advance in science and technology, the picture in India is dismal."

Dr Kothari indicated that it was possible to link education with productivity only when farmers were made to appreciate the achievement of science and technology in increasing productivity.

* Indo-Swiss Farm Project

An yield of 5,000 kilograms of maize per acre is the proud achievement of the Indo-Swiss Farm Project at Madupatti in the High Ranges of Kerala.

The Swiss Director of the Project, Mr R Kunzi, claims, according to a news report, that the per acre yield at Madupatti was close to the European standard. The successful results showed that maize could be grown extensively on the vast grasslands in the Munnar region not only as fodder, but for augmenting food production in Kerala. Mixed farming has been tried there on an extent of 511 acres. About 50 varieties of exotic grasses and cereals, including oats, and vegetables like cabbage, cauliflower, potatoes and beans have been grown. This has been accomplished with the help of local workers numbering 400 under the supervision of four Swiss technicians and their Indian counterparts.

* Pre-Fab Productivity

Will increased use of pre-fabricated elements result in substantial economy in operation and costs? The answer given by a Russian expert team, headed by Mr Zaparen, which toured India is in the affirmative.

The team, which made a detailed study of irrigation projects, has expressed the view that India could make greater use of pre-fabricated elements in the construction of irrigation projects.

Mirror-Screen

Mirror-Screen is a new and optical invention to help increase the seating capacity in a cinema theatre. It is really an additional screen reflected in a mirror placed ahead of the main screen—thus providing two screens in a theatre with only one projection arrangement.

The inventor is Mr CR Marathe, a professor of mathematics in the Indian Institute of Technology, Bombay. According to him the new device could be introduced in existing theatres without structural changes. The primary objectives, according to him, are: (i) to avoid the present waste of space in front of the screen (ii) to eliminate the discomfort to viewers in the front rows and (iii) to save the "back illumination" (the image on the reverse of the screen) from being wasted.

productivity abroad

1. Treaty on Productivity in Britain

THE Labour Government in the United Kingdom, headed by Mr Harold Wilson, has signed a new Treaty on Productivity. The old enemies of labour and capital have set down their names, along with four Ministers —Messrs George Brown, James Callaghan, Douglas Jay and Ray Gunter—to a "Statement of intent on Productivity, Prices and Incomes," which both looks like and reads like a peace treaty.

Writing on this subject, the *New Statesman* commented: "The spirit of triumph in Mr George Brown's Ministry in UK was perfectly justifiable; this Minister had made it: the Treaty was signed."

Both sides have agreed, under the Treaty, to cooperate with the Government when it establishes the machinery "to keep under review the general movement of prices and of money incomes of all kinds."

The following are the objectives, terms, etc. of the Treaty:

"The Government's economic objective is to achieve and maintain a rapid increase

in output and real incomes combined with full employment. Their social objective is to ensure that the benefits of faster growth are distributed in a way that satisfies the claims of social need and justice. In this way, general confidence will be created in the purpose of the national plan and individuals will be willing to make their utmost contribution towards its implementation.

2. Essential conditions for the achievement of these objectives are a strong currency and a healthy balance of payments.

Economic

3. The economic situation, while potentially strong, is at present extremely unsatisfactory. Drastic temporary measures have been taken to meet a situation in which the balance of payments was in serious deficit, with exports falling behind imports. But these measures can provide only a breathing space.

4. To achieve a more permanent solution, we must improve the balance of payments, encourage exports and sharpen our competitive ability. Our longer-term interests lie in reducing the barriers to international trade. We must take urgent and vigorous action to raise productivity throughout industry and commerce, to keep increases in total money incomes in line with increases in real national output and to maintain a stable general price level. Unless we do this we shall have a slower rate of growth and a lower level of employment.

5. We—Government, management, and unions—are resolved to take the following action in our respective spheres of responsibility.

6. The Government will prepare and implement a general plan for economic development, in consultation with both sides of industry through the National Economic Development Council. This will provide for higher investment; for improving our industrial skills; for modernisation of industry; for balanced regional development; for higher exports; and for the largest possible sustained expansion of production and real incomes.

7. Much greater emphasis will be given to increasing productivity. The Government will encourage and develop policies designed to promote technological advance in industry, and to get rid of restrictive practices and prevent the abuse of monopoly power, and so improve efficiency, cut out waste, and reduce excessive prices. More vigorous policies will be pursued designed to facilitate mobility of labour and generally to make more effective use of scarce manpower resources, and to give workers a greater sense of security in the face of economic change. The Government also intend to introduce essential social improvements such as a system of earnings-related benefits, in addition to the improvements in national insurance benefits already announced.

8. The Government will set up machinery to keep a continuous watch on the general movement of prices and of money incomes of all kinds and to carry out the other functions described in paragraph 10 below. They will also use their fiscal powers or other appropriate means to correct any excessive growth in aggregate profits as compared with the growth of total wages and salaries, after allowing for short-term fluctuations.

Major Objectives

9. We, the representatives of the Trades Union Congress, the Federation of British Industries, the British Employers' Confederation, the National Association of British Manufacturers, and the Association of British Chambers of Commerce accept that major objectives of national policy must be:

to ensure that British industry is dynamic and that its prices are competitive;

to raise productivity and efficiency so that real national output can increase; to keep increases in wages, salaries and other forms of incomes in line with this increase; and

to keep the general level of prices stable.

10. We, therefore, undertake. on behalf of our members:

to encourage and lead a sustained attack on the obstacles to efficiency, whether on the part of management or of workers, and to strive for the adoption of more rigorous standards of performance at all levels;

to cooperate with Government in endeavouring, in the face of practical problems, to give effective shape to the machinery that the Government intend to establish for the following purposes:

(i) to keep under review the general movement of prices and of money incomes of all kinds; and

(ii) to examine particular cases in order to advise whether or not the behaviour of prices or of wages, salaries or other money incomes is in the national interest as defined by the Government after consultation with management and unions.

11. We stress that close attention must be paid to easing the difficulties of those affected by changed circumstances in their employment. We, therefore, support, in principle, the Government's proposals for earnings-related benefits and will examine sympathetically proposals for severance payments.

12. We—Government, management, and unions—are confident that by cooperating in a spirit of mutual confidence to give effect to the principles and policies described above, we and those whom we represent will be able to achieve a faster growth of real incomes and generally to promote the economic and social well-being of the country."

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2. Productivity in Education in USSR

ARE there privileged classes in the USSR?

When this question was put to Dr Hewlett Johnson after his tour of the Soviet Union, he replied: "Yes, there are. They are the children."

Writing on this subject in *The Hindu*, a correspondent says: As is known, privileged sections of the population usually have important material advantages. This is true of children in the USSR. Everything that is best is given to them. The State spends lavishly on children's institutions: the 1964 budget envisages an expenditure of 4,300 million roubles for schools and boarding schools, and 1,700 million roubles for creches and kindergartens now accommodating seven million children.

Soviet children possess. as a rule, their own palaces and mansions. parks and estates for rest and recreation...Besides the large libraries existing in every school, children have 5,000 special libraries and reading rooms. Children have their own theatres, cinema halls, and stadia. The greatest number of children's books in the world are published for them in 57 languages of the peoples of the USSR. Incidentally, half a century ago, 20 of these peoples did not have even their own written language.

Children in the USSR have their own doctors. There is a pediatrist in each creche, kindergarten. and school. He not only treats sick children. but also looks after the health of his charges. Special sanatorial and holiday homes have been established for children. who spend their summer in the most beautiful and healthiest spots of the country. In 1963, six million children spent their summer in Young Pioneer camps, with the bulk

of expenses paid by the State and the trade unions, and the parents paying only a small part.

Children also have their own railway lines served and used only by citizens under 15 or 16. On the ordinary railways children are assigned special carriages, and rooms at the railway stations. Numerous research institutes, special scientific institutions, and a whole Academy of Pedagogical Sciences study the problems of education and training of children.

3. Revolution in Inventory Control

BUSINESS inventories have risen very sharply to a new record high since the most recent cyclical low point, in early 1961. At latest accounts, total business inventories were $ 106.6 billion, seasonally adjusted, as compared with $ 93.5 billion at end-March 1961, an increase of over $ 13 billion, according to a report in the *Economic Times* which quotes *The Journal of Commerce*, New York.

"However", the report adds, "since business sales have risen more rapidly than inventories, with a resultant decline in inventory-sales ratios, this big increase in the stocks held by manufacturers, wholesalers, and retailers generally is considered as 'small' rather than 'large.' At latest accounts, total business inventories were equal to 1.46 months' sales. This compares with an inventory-sales ratio of 1.57 at end-March 1961.

This decline in the business inventory-sales ratio is widely considered as proof that there have been no 'extremes' in inventory accumulation during the current cyclical business upturn. However, it is impossible at this time either to prove or disprove anything with inventory-sales ratios...

This is the result of what amounts to a revolution in inventory control through the use of electronic computers. And, the revolution is continuing, with more and more business organisations adopting the new methods of inventory control.

Consequently, a secular or long-term downtrend—that still may have considerable distance to go—has developed in the business inventory-sales ratio.

Unless allowance is made for this long-term downtrend, comparisons of present inventory-sales ratios with those for earlier periods—even for as short a time as six months or a year ago—are meaningless."

recent literature on productivity

INDUSTRIAL PSYCHOLOGY

BUSINESS IS PEOPLE: An NPC Publication. National Productivity Council, 38 Golf Links, New Delhi 3, 1964, pp. 133, Rs. 3.50.

This is a very attractive book which deals with the very complex subject of Human Relations and Industrial Psychology in an impressively simple, and yet most effective, manner. Unlike the traditional fat volumes written on the subject, it makes its message direct and personal to each reader, through several cartoons and illustrations, and with the utmost economy of words. High flouting words and technical jargons have been scrupulously avoided. This book is 'down to earth' and comes to grips with life's problems.

The book makes very interesting reading. No matter how busy a person may be, he can afford the time to study this book—while waiting for a bus, travelling in a train, or merely cumulating to work. In an easy and pulsating style, it conveys some very important Do's and Don'ts in dealing with daily situations arising in business in any sphere where human beings are concerned.—**Brig. K Pennathur**

Industrial Relations

EXPERIMENTS IN INDUSTRIAL DEMOCRACY: Nabagopal Das, Asia Publishing House, Bombay,1964, pp. 158, Rs. 16.00.

Dr Nabagopal Das's book fills a part of the gap in industrial relations literature dealing with the association of workers with the management of enterprises they work in. He takes a global view of industrial democracy, and presents significant experiments

in a condensed form. There are separate chapters, each dealing with the system in the UK, the USA, France, Germany, Sweden, Yugoslavia, and, of course, India. These chapters are preceded by two chapters that attempt to discuss the basic philosophies which contribute or have contributed in shaping the systems as they exist. In the concluding chapter, the author doubts whether the experiment on workers' participation in management in India has met with any success, and brings out the apparent reasons for them. The book also contains useful appendices, and an exhaustive bibliography.

However, it is a difficult book to evaluate. The author has put in intensive effort to bring a mass of diverse material into a scheme intelligible as a whole. The information has been compiled from official records and proceedings of seminars and conferences. He has no definition of 'industrial democracy' to offer, and this has resulted in a vagueness which is also seen in his treatment of works committees or production committees, and organic structures such as workers' councils of Yugoslavia and joint management councils of India. The first two chapters, dealing with the basic philosophies, socio-economic conditions, political framework, traditional values, and climate for industrial relations that influence the patterning of systems, are sketchy.

The author is an established scholar having long associations with the field of labour, and this fact naturally raises a reader's expectations high. Stereotype arguments, supported by facts and figures, have been advanced to support his point of view in the concluding chapter. He is not sure whether joint consultation can receive the acceptance of labour in capitalist economies. By omitting Soviet Russia from his discussion, it seems, he considers, equally improbable that it has any merit under totalitarian regimes. These are interesting hypotheses that need to be tested. Can joint committees without having powers to regulate wages and conditions of work succeed in developing economies? What chances do these committees have in enterprises with patrimonial managements or in multi-union plants? What should be the relationship between the trade union and the joint committee in a factory? These and a number of other questions arising from this book need empirical investigation.

On the whole, the book is useful, and timely. Students of industrial relations will find it a particular MUST for examination work.—**Arun Joshi.**

Books Received

THE INDIAN PETROLEUM HANDBOOK: AK Madan, published by the Author, New Delhi, 1964, pages 121, Re. 1.00

LABOUR AND AUTOMATION: International Labour Office, Geneva, 1964, pages 276, $3 ; 21s.

THRUSTERS AND SLEEPERS: Anthony Gater, David Insull, Harold Lind, and Peter Seglow, published by George Allen and Unwin Ltd., London, 1965, pages 295, 35s.

THE QUALITY OF LABOUR AND ECONOMIC DEVELOPMENT IN CERTAIN COUNTRIES: Walter Galenson and Graham Pyatt, published by International Labour Office, Geneva, 1964, pages 116, Rs. 6.75.

REPORT OF THE PLEXCONCIL'S BANGLES COMMODITY TEAM: Published by the Plastics and Linoleums Export Promotion Council, Bombay-34, 1964, pages 84, Price not mentioned.

Work Study

MANAGEMENT AND WORK STUDY: K. Pennathur and HD Selby, POPAMS K-3, South Extension Part I, New Delhi-3. 1964, pp. 99, Rs. 18.00.

This publication has at long last carried out the wishes of our beloved late Prime Minister. Mr Nehru. Its author, Brig K Pennathur, has really seen to it that it is compact not exceeding 100 pages. For

the first time in India, he has, in a masterly way, brought out a vivid picture of this new productivity technique—Work Study.

Not only does the book stress the need for higher productivity in realistic terms—as "with productivity we prosper"—but it also brings to focus how Work Study is an efficacious service at the disposal of today's management to act in this direction. Like any other service, Work Study would also require proper organisation and control for its use. All these facts have been dealt with in a succinct, clear, simple, and yet very effective, way. The author makes use of a variety of impressive schematic models to make his points.—**Major Manmohan Singh.**

Productivity even in Game of Bridge

Writing under the title **Making the Maximum**, *the famous Bridge expert, Mr Ewart Kempson, writes: "...The object of the game of Bridge is to make as many tricks as possible, compatible with safety, but this only applies in rubber, in aggregate, and in international match-point scoring.*

"In duplicate pair events, it is sometimes correct to risk defeat in an effort to make one extra trick, for there is little point in scoring 600 for three no-trumps when it seems apparent that all the other pairs will be scoring 620 for four hearts. Your 600 might as well be minus 100; therefore, it is correct to strive for an extra trick."

Book News

Optical Tooling in Industry

What is Optical Tooling? What can it accomplish in modern industry?

A new US publication, *Optical Tooling in Industry*, dwells on how highly accurate optical methods permit entirely new standards of production. It describes the potentialities of the field of optical measurement, and indicates the time and cost savings that can be effected by the use of optical tooling methods.

The actual development of optical methods for industrial measurement began before World War II. Since then great strides have been made in industrial standardisation and precision tooling using optics.

New Guide to Better Production

Until recently, good cost estimating was regarded as something of a talent, or an art, rather than a science. The modern estimator must be able to figure consistently an extremely accurate price quotation based on available facts and figures, while envisioning every phase of product development.

A new US publication, *Project Estimating by Engineering Methods*, provides proven, practical methods of estimating for any type of quantity production operation. In it, the author, Paul F Gallagher, assists the estimator who must often work with limited information, by providing him with five methods of estimating that are applicable to any level of estimating, or state of engineering. The first four are preliminary to the fifth which combines the two most important scientific developments in estimating standard hours and the learning curve—into a practical estimating method.

NPC Question-Answer Service

Q You ask... We answer... A

1. What is the amount of capital locked up in the form of inventories, in different fertiliser units of India? What is its percentage to the working capital?

2. What should be the optimum inventory for a fertiliser unit with a manufacturing capacity of 1,200 tons of Calcium Ammonium Nitrate per day?

3. The main reasons calling for high inventory of spare parts are:

   (*i*) Imported machinery;

   (*ii*) Long lead time with import licence formalities;

   (*iii*) Foreign suppliers, quite often, change design of their equipment with the result that when we require a replacement part after a period of three to five years, they may not be in a position to supply.

With these handicaps, what is usually the percentage of inventory of spare parts to the amount spent on the machinery?

Readers of *Productivity* are welcome to offer their comments

Editor's Correspondence

"New Way to Protect Books"

...An item on page 561 of *Productivity* (Vol. V, No. 3), titled "New Way to Protect Books", recalled an experience in Ranchi. We had trouble with mildews on books on open shelves in our bungalow. When visiting the Lac Research Institute near Ranchi, we discovered that their books were in excellent condition, although on open shelves. Their books had been treated with a solution of stick lac, alcohol, and carbolic acid. We used the formula on our books, the books which were given to the library at Ranchi Agricultural College, and also started the treatment of all books in the library.

We also contacted the Librarian at the ICAR in New Delhi who passed the formula on to all of the agricultural and veterinary colleges. We did not have an opportunity of checking the results.

We found a wide difference in reaction to mildews and molds of books in libraries in different sections of India, and of books with different types of covers. We did not find the opportunity of preparing a paper with the following suggestions:

1. Investigations should be made or experiments conducted to determine formulae which would give books maximum protection from mildews, molds, and bugs, probably under different climatic conditions.

2. The publishers in India should be encouraged to treat all books they publish.

3. The importers of books should be encouraged to treat books obtained from abroad.

4. Foreign publishers who publish for markets in the tropics should be encouraged to treat books sent to such areas.

5. Libraries in India should be encouraged

to treat their books, at least in some areas.

We have visited libraries in heavy rainfall areas where many of the books were in poor condition, and probably would not remain in usable condition for many years. The system of closed shelves tends to give some protection to books; however, the trend in Indian libraries is to shift to the open shelf system.

Perhaps, publishers and libraries in India are giving attention to these problems. If not, perhaps the NPC could encourage action. The plastic compound suggested in the note may be one of the answers...—ORION ULREY, Agricultural Economist, Michigan State University.

Michigan, Jan. 8, 1965

Inter-firm Comparison

...I agree with the words in your editorial (*Productivity*, Vol. V, No. 3, p. 423): 'what we require is an indigenous, simplified form of IFC, which industrial managements in India can understand in the context of their own values, which will click in their minds and for which the data are readily available'. It is a matter of course in industry that, for practical application, the results of economical investigation must be of a simple manner and full of clearness.

IFC based on ratio analysis, as described by H Ingham, corresponds to this idea of simplicity. Therefore, inter-firm ratio analysis seems to be regarded as a very promising method in your country. We conclude so from reading the contributions by N Sen, and by SN Cooper.

However, we should add that the results of ratio analysis are restricted to giving a rather general survey of the economical situation of a firm, and some hints on weak points in organisation, production process, etc. If we try to find out all deficiencies and want to eliminate them systematically, we need more detailed investigations. For the use of the comparison technique, the most favourable methods are productivity comparison and cost comparison. In these comparisons, the economic analysis is based, for example, upon productivities of several production facilities or the cost structure of single departments of the firms.

I think highly of the contribution by F Posse, 'Psychological & Technical Obstacles to IFC', because the author deals thoroughly with the difficulties in carrying out an IFC. Here, I consider the section on the so-called technical problems most important. The degree of coping with these problems before preparing and utilising the comparison data determines the success of the investigation.

Seen as a whole, we judge your special issue on Inter-firm Comparison as an excellent contribution to the subject. However, we must also say that it refers only to a fraction of the many possibilities in IFC. Therefore, it would be very useful if you continue the work achieved so far.—HR HIPPENSTIEL.

West Germany, Feb. 24, 1965

Production Planning

...Regarding planning and control of production...let me add an experience which gives an idea of the grade of applicability of this technique in one sector of the Chilean Industrial economy, i.e., the textiles.

It is not my object to induce a generalisation for other sectors of the industrial economy, on the basis of the experience of one case, textiles. There are many factors which explain at a given moment the success or failure of a structure and/or a system. However, the Chilean textile industry, in general, possesses from the beginning particularities of formation, market and development, which present certain parallelism among the various companies which form the sector. Further, this case illustrates the type of

problem encountered by the Chilean Engineer at the time of introducing a good number of systems which could not take form owing to the character of the difficulties experienced while launching the same.

Finally, this case permits one to appreciate the type of work which is being done with this technique, and the methodology which is being employed, in order to find a solution to the problem in terms of different aspects of the technique. . .—ENRIQUE SANCHEZ OCAMPO JEFE SUBROGANTE DPTO, Chilean Productivity Centre.

Santiago, Dec. 3, 1964

Common Language

. . . I have received a copy of *Productivity* devoted to "Preventive Maintenance", in which my article (Control of Progress in a Developing Country) appears. . . .

I appreciate your having used the paper, and continue to congratulate you on the continued good appearance of the Journal. Apparently NPC is continuing its good work, although by this time I have lost track of who is who, and what is going on. This is inevitable, no doubt.

I read that language difficulties continue to disturb India and that serious reactions are experienced in the South. Perhaps some more productivity is needed in adapting to a common language!. . . — RF BRUCKART, AID/American Embassy.

Amman, Jordan, Feb. 26, 1965

Special Issues

...To make the NPC quarterly journal more useful, a few suggestions are given below:

(a) The journal should be published every month.

(b) Each special issue should contain for reference studies a list of books which are considered the best on the subject with which the special issue deals.

(c) Special issues on Cost Reduction, Cost Control, Office Management, Materials Handling, Management Accounting, Business Forecasting, Marginal Costing, Capital Expenditure Control, Return on Capital Employed, Management Development, Purchase Management, Control of Wastage, Electronic Data Processing, should be brought out as early as possible.

(d) In every issue, a discussion on industry-wise problems of increasing productivity may be useful (one industry at a time).

There are so many topics to be discussed that, at the present rate of publication, it will take several years to complete the list. This is quite irritating. —SN DATTA, Cost Assistant, Kurasia Colliery.

Surguja (M.P.), Jan. 25, 1965

Editor's Reply

...Regarding publishing the journal every month, you probably do not know that we are bringing out two journals, one Quarterly and the other Monthly...

We do review books as they are received in the editorial office. Your suggestion would involve a considerable strengthening of the academic side of NPC: that will take time and it is a little beyond my resources. Why not make a beginning yourself: take your own field of specialisation and review the recent literature in the line. We shall publish it with due acknowledgment.

A special issue on Cost and Budgetary Control was published, and it did cover most of the subjects suggested by you. You will realise that NPC is a general productivity organisation. It has, therefore, to distribute its resources over a wide variety of techniques. There are quite a number of specialised institutions such as the Institute of Cost & Works Accountants of India, which deal with these subjects in the manner and at the level you desire. We should not overlap their field.

To a certain extent, we have covered industry-wise problems in *Productivity* (in the 15 special issues, published so far). We are now establishing Industry Productivity Councils, and maybe, with their collaboration, we may do something in the line, but it will take time. Why not again yourself make a beginning, taking any particular industry (say coal-raising) in which you are an expert.

It is true that it will take years to cover the entire range of industry, but that's in the nature of things. We have neither the resources nor the ambition to exhaust the universe, at a single run, assuming that it is either possible or desirable . . .

New Delhi, Apr. 30, 1965

"...Authority today is trying to accomplish things without utilising human incentives. This kind of substituting the State authority for human incentive cannot be described as a real plan..."—C RAJAGOPALACHARI.

"...**We have learned the hard way that deflation and contraction, so far from making us more efficient and competitive, have the opposite effect—costs rise, essential investment is discouraged, restrictive attitudes on both sides of industry are encouraged, and a policy which relates incomes to expanding production is made infinitely harder to achieve...**" —HAROLD WILSON, British Prime Minister (In House of Commons).

"...Man's administration has completely failed...30 per cent of the Cabinet posts should be reserved for women...they would do better in administration..."—VV GIRI, Governor of Mysore (Inaugurating the Kerala Secretariat Association).

"...**Damage to agricultural produce owing to insects, pests, diseases, and weeds is of the order of 20 per cent per year, and the estimated loss is approximately Rs. 1,000 crores at current prices...**"—C SUBRAMANIAM, Union Food Minister (In Lok Sabha).

"...Absence of professors and teachers entitled to respect by reason of their erudition and idealism, and too much leisure in the form of long vacations are some of the contributory factors of student indiscipline..."—MC CHAGLA, Union Education Minister (In Lok Sabha).

"...**The State Government (Andhra) has only book knowledge of industries, and has no efficient staff to run public sector industries well...It is the responsibility of the public to tell the Government what it should do and what it should not do...**"—P THIMMA REDDI, APCC President (At a public meeting at Kakinada).

"...As much as 20 per cent of India's national income will have to be spent on the maintenance of 20,000,000 children in 1971, if the country's population increases at the present rate..."—DR SN AGGARWALA of the Institute of Economic Growth.

"...**The working of the Auditor-General's Office is like calculating the depth of the river and trying to cross it simultaneously. The method of auditing is strange and faulty...**" —R VENKATARAMAN, Industries Minister, Government of Madras.

"...We seem to have reached a stage when we are unable to think about anything but outside help..." —MRS VIJAY LAKSHMI PANDIT, MP (In a recent speech).

..."**Jeeps are difficult to get and repairs to the old ones are costly and take a long time. Supply of bullock-carts to every Panchayat Union might solve these difficulties...A double bullock-cart might be supplied for the use of the Chairman of the Panchayat Union, and a single bullock-cart for the Commissioner...**" —M BHAKTAVATSALAM, Chief Minister of Madras (In Legislative Assembly).

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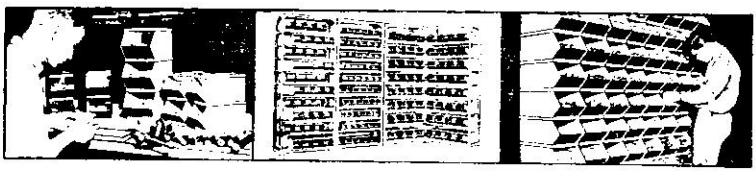

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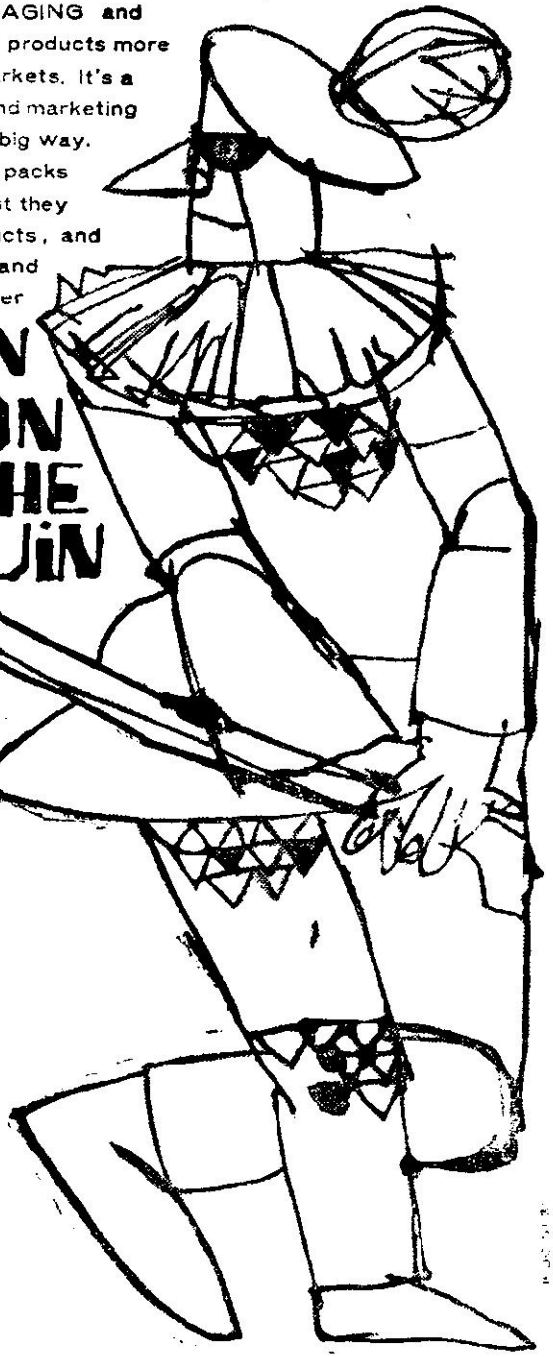

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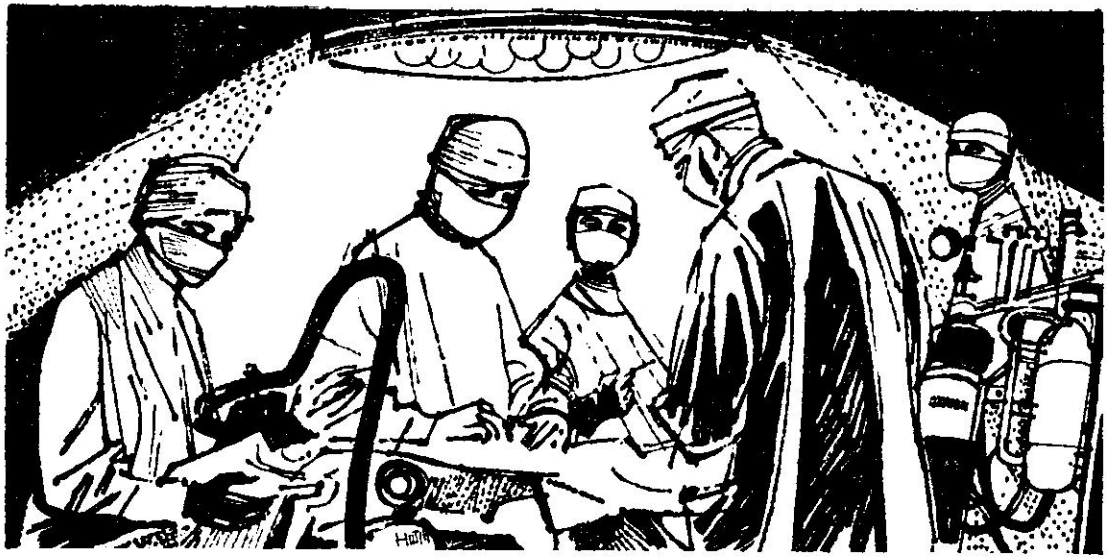

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