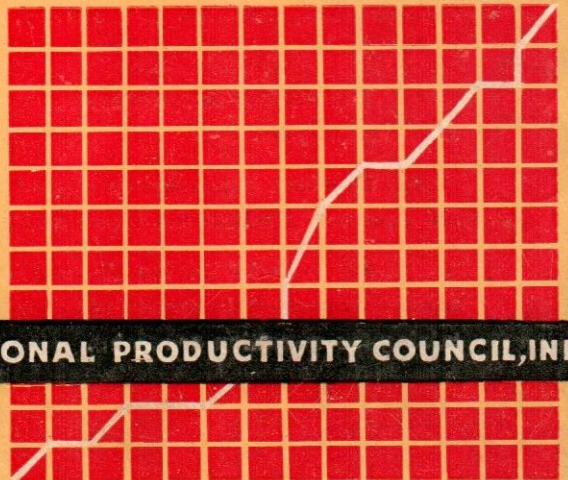
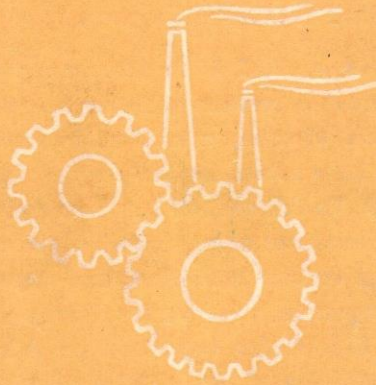


PRODUCTIVITY

VOL. 1 No. 1

OCT-NOV 1959



NATIONAL PRODUCTIVITY COUNCIL, INDIA

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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 work. Established in 1958, the Council conducts its activities in collaboration with institutions and organisations interested in the Productivity drive. Local Productivity Councils have been and are being established in industrial centres.

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.

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.

The Journal bears a nominal price of Rs. 1.50 per issue and is available at all NPC offices.

Opinions expressed in signed articles are those of the authors and do not necessarily reflect the views of NPC.

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“... What really comes in the way of achieving our objective is a certain inertia to do things, a certain looseness in our working, in our structure, in our economy. I am not in favour of putting too great a burden on anybody but this kind of looseness in work, in management and in everything, is neither refreshing nor productive...”

JAWAHARLAL NEHRU

“... Productivity is an attitude of mind. It is a mentality of progress, of the constant improvement of that which exists. It is the certainty of being able to do better today than yesterday, and continuously. It is the constant adaptation of economic and social life to changing conditions; it is the continual effort to apply new techniques and new methods; it is the faith in human progress...”

EUROPEAN PRODUCTIVITY AGENCY

Productivity and the Plan

THE Five Year Plan forms the central fulcrum of the Indian polity. It is clear that the ultimate success of the Plan depends upon the overall productivity of the economy. None is more conscious of the correctness of this position than the planners themselves, as quoted by a distinguished writer in the article with which this Journal begins. On the other hand, the quality and tempo of the productivity movement within or outside the NPC depend on the extent to which the sponsors of the movement fit themselves into the purposes of the Plan and act in loyal conformity with its objectives.

The Programme of Economic Development upon which we are currently engaged is of crucial importance in the history of this country, as it will determine, both internally in terms of standards of living, and externally in the status of India as a nation, the level at which we shall live and function. Productivity is the weapon with which alone we can fight this battle for survival and progress. It will all depend upon how productive the community becomes at all levels of its life and work.

Our need of realising higher levels of productivity is greater than normal, because we are late-comers in the race of industrialisation. Our economic problem is really tough, for we need a simultaneous and substantial increase in consumer as well as capital goods. While the community urgently needs more and better equipment, we all desire an immediate increase in the good things of life and are not prepared to wait. Productivity then is the only answer, for such a simultaneous and massive advance on the economic front can only be achieved by a massive increase in productivity. There is no other answer, for in a poor country, people will not put in their best, unless we offer them the incentive of at least some increase in the standard of living. At the same time we want resources to invest in steel, coal, power, chemicals, heavy machinery and equipment of every kind.

Higher and higher productivity is the only method of achieving these objectives. So, too, on the agricultural front, for it is a matter of life and death with us that we grow two blades of grass where one grew before. The man-land ratio is probably the most unfavourable factor that this country faces in the course of its economic development. Probably other countries of Asia are as disadvantageously placed. China, with its more than 600 million, Japan and Indonesia with tragic overcrowding on small islands, face almost identical problems.

But it is significant that of all these countries, Japan is doing remarkably well because of the high efficiency of its men and machinery. What

is known as the German Miracle by which a defeated country has risen to a position of economic superiority in the post-war period is a triumph of productivity.

Productivity, therefore, is not a matter of debate. It cannot even be a matter of debate between workers and managements. One of the most outstanding facts of economic history is that high profits, high wages, high levels of employment, high taxation, high rates of capital formation, have all gone together. On the other hand, low wages, low employment, low fiscal resources, negligible rates of capital formation, go hand in hand. The explanation again lies in Productivity. American investors make extraordinary profits, but an average industrial worker in the USA earns in one day what his compeer in India earns in half a month. High wages can only come out of high productivity. An unproductive economy can only offer an insufficient volume of employment at low wages.

The stake of the working class, therefore, in the battle for productivity is, over a long period, the highest among the factors of production. Of course, social policy needs to assure that the gains of productivity are equitably shared. In that respect, the Directive Principles of State Policy, embodied in the Indian Constitution, are probably the best safeguards that can be devised. The Constitution provides against exploitation of labour, against unfair wages, and against concentration of economic power. The Sovereign Authority has accepted socialism as the goal of State policy. Hence the best investment of the working class lies in a productive application of their resources in terms of skilled and intelligent work.

With higher levels of investment both in the private and public sectors, the danger of any unemployment resulting from the application of productivity techniques is negligible. The First Five Year Plan involved an outlay of over Rs. 2,000 crores; the Second of over Rs. 6,000 crores (inclusive of private investment) and the Third is being talked of in the region of Rs. 10,000 crores. Since it is the volume of expenditure that determines the volume of employment, the latter is likely to increase substantially; and if productivity simultaneously increases, the resulting increase in national income will lead to a general betterment of life in the country.

On the other hand, a grave danger exists: if the volume of employment increases with corresponding increase in spendable incomes and with no significant rise in the level of productivity, we face the risk of a rocketing inflation. Rationally considered, the solution of the economic problem is simple enough: full employment with full productivity, supported by an intelligent and determined application of anti-inflationary techniques.

A full employment policy, in support of the productivity movement, is essential from various points of view. The Prime Minister has repeatedly said in various contexts that productivity in the ultimate analysis is a social concept. If men are unemployed, the system is to that extent wasteful and unproductive. Unemployed men eat and live, only they do not contribute anything to the community. Unemployment therefore is a large, *minus* item in the social balance of accounts.

Further, the fear of unemployment is also a causative factor in the persistence of low levels of productivity. The working classes are somehow afraid that if they increase their productivity, there will be less of employment for them than before. With full employment, that fear will cease to exist. On the contrary, the bargaining power of the working class in a full employment economy is considerable and has, in fact, to be held in check because of the threat of inflation. Incidentally, all the economies with the highest levels of productivity are full employment economies—the USA, the UK, West Germany and the Soviet Union. It is there that the people produce more in less time.

What probably would be particularly attractive to the working class in this country is the fact that higher productivity has resulted definitely in reduction of labour's burden, in a shorter working day and more pleasant conditions of work. While all this foreign experience is inviting and instructive, we have in this country to build up our own economics. We have a large and growing population, untrained largely in the habits and processes of intensive production. We are short of capital equipment and this shortage is likely to increase as we proceed faster on the road of economic development. We, therefore, have to devise our own techniques and policies for raising productivity. In this connection we need to clear our minds of the many fads and fancies that have grown up in the course of the Industrial Revolution. A big machine is not necessarily more productive than a small machine, nor, of course, is it the other way about. We need to take the utmost advantage of modern technology, but at the same time we cannot afford to disregard the basic factors in our social economy. It is these factors, more than modern engineering methods, that would determine the type of productivity techniques that need to be employed in the Indian economy.

All things considered, the only avenue to general betterment of life and work lies in a certain direction of social change, in which productivity becomes a fruitful and acceptable idea. If we can put the idea of productivity into the current of social change, the battle is almost won; and then modern techniques and know-how will come to us as a matter of course. Thus we need to know the social techniques of making the idea of productivity acceptable to the people, an idea in which they feel a sense of well-being and fulfilment; for that we require creative thinking of a high order. We need, as the Prime Minister said, social engineers.

India And Productivity

V V GIRI*

ECONOMIC thought and development since the inception of Planning has thrown up productivity as the *determining* factor of economic progress. In fact, productivity just sums up our national objectives in economic planning: "In the final analysis," the Planning Commission remarked in its Report on the Second Five Year Plan, "the level of productivity of a country determines its national wealth and per capita income and the standard of living of the people". The problem acquires a heightened importance in the context of a general scarcity of capital, machinery, skilled and trained manpower. It has to be confessed that the progress made so far is, by comparison with well developed industrial nations, unsatisfactory, even disappointing. The situation calls for urgent measures to step up productivity in every sphere of national life. We need to think out, somewhat on a priority basis, programmes for the utmost utilisation of existing resources, and simultaneously for the avoidance of every kind of waste in resource utilisation. The problem of productivity, therefore, deserves study

* Shri V V Giri (born 1894) has had a distinguished career. In 1916 he was ex-terminated from the UK due to participation in the Irish Sinn Fien Movement. Since then he was actively associated with India's Independence Movement but his principal mission has been the organisation of the Trade Union Movement on sound lines. He rose to become Union Minister of Labour in 1952. He has embodied his lifelong experience of labour problems in his monumental work: *Labour Problems in Indian Industries*, first published in 1958. In June 1957 he took over as Governor of Uttar Pradesh, an office he still holds.

and thought in all its aspects and implications. Above all, it needs swift and well thought out action.

The Industrial Policy Resolution of 1948 and the Planning Commission's Reports on the First and Second Five Year Plans (1951-56) stressed the importance of increasing productivity as the solution of the economic problem. Raising productivity, however, is not a simple problem. It has many facets: capital investment and fuller utilisation of manpower, expansion of industrial engineering facilities, efficiency of marketing etc. A simultaneous advance in all these lines can alone enable the economy to secure a larger and larger output from even the existing resources. It would be a truism to say that there is no alternative method of securing an advance in the standard of living.

The war on poverty really resolves itself into a series of battles on the productivity front. The hurdles are many and a determined effort alone can bring success.

There has, of course, been change for the better in recent years, at least in the atmosphere and in the attitudes of parties that matter. The ILO Productivity Mission which came to this country in December 1952 reported lack of enthusiasm, if not hostility, both on the part of workers and employers. Now in 1959, there is no evidence of hostility; in fact there is some evidence of enthusiasm. The fear of retrenchment has abated and employers are keen on new investment.

The situation, however, is not without risk in a country with a low employment level and abundant surplus labour force. Naturally, there is a feeling of in-

security due to fear of what is called *technological unemployment*. There is even otherwise some resistance to change, all the world over, more so in undeveloped societies. Probably the role of the productivity expert would, for quite some time, be not so much technical, as "socially educative;" for the primary task appears to be, in the beginning, to reorientate old attitudes and develop new attitudes, favourable to the accomplishment of higher levels of productivity.

The difficulty in this country is a negative, complaining attitude about all other factors of production except one's own. Employers complain in this country of a historical decline in labour productivity. They also complain about growing indiscipline, soaring labour costs, unchecked absenteeism, constant industrial litigation and the like. Workers on the other hand have their own long list of complaints: inadequate wages, lack of incentives, excessive profits, unsatisfactory working conditions, bad and even dishonest management, poor maintenance of machinery, bad quality of raw materials, unfair treatment and the like. These negations lead nowhere. A positive attitude on the part of every individual and section of society can alone cut the Gordian Knot that strangles the Indian economy at the moment.

The problem needs analysis. Why is productivity low in this country? The ILO Team summed up the causes of low productivity, as follows:

(a) Penny-wise-pound-foolish policy, by which they meant a generally short term outlook in industrial management in this country.

(b) Lack of scientific knowledge of industry.

(c) Autocratic attitude to staff and workers.

(d) Absence of pride in one's products. The Indian producer was not particular about quality of his products.

(e) A "grass hopper" sales policy by which the Team probably meant an absence of vigorous action in sales effort, for unless sales expanded rapidly, there would be no incentive to fuller utilisation of resources.

As the productivity drive has gathered momentum, the problem of a scientific measure of productivity has come up. Can it be measured physically through time and motion study in terms of output per man? It is clear that the working classes have never accepted this method, for it implies that labour alone is responsible for variations in productivity. There appears to be some logic in the view generally held that a reorientation of managerial techniques can be an effective cause of increasing productivity, for it is the management which takes decisions and there can be no escape from the responsibilities of these decisions. But no single agent can really bear the whole responsibility of increase or decrease in productivity. Productivity is the cumulative result of the operation of a large number of factors, such as technological improvement, rate of operation, degree of efficiency achieved in different processes, availability of raw materials and components, labour relations, skills and efforts of the workers, and last but not the least, efficiency of management. It is the creative integration of these factors into a conscious attainment of high level productivity that would yield results.

Besides the factors enumerated above, there are also certain general causes operative in any economic system. Recent sociological researches have established the crucial importance of people's social and religious customs in the functioning of economic life. Even the food habits of the people play their part in productivity: the elements of nutrition in national diet, regularity or otherwise of food intake; climate can be a very harsh factor in this country; and it appears likely that a considerable rise

in productivity can be achieved by mitigation of the rigours of the Indian climate.

Once we achieve increase in productivity, the question arises as to the distribution of its benefits. An assurance of fair distribution as between the various factors of production and also with the general consumers in terms of better quality or lower prices is an imperative, if the cooperation of all has to be secured for the objective which we have in view. Such cooperation is in fact vital in the context of planned economy.

It is essential for this purpose to have a full recognition of the importance of the human element in the economic system and accordingly to give the workers a greater interest in the general operation of industrial undertakings. A welfare state has to treat every worker as a dignified human being with his own individual personality and not as a mere cog in a big complex of production.

In the contest of rival ideologies it is significant that productivity is a common factor, whether in a capitalist or in a socialist economy. In capitalism, neither high profits nor high wages can be secured without increasing productivity. The prosperity of a capitalist economy is thus conditioned by the level of its productivity. But the very survival of a socialist economy would depend upon effective resource utilization or minimization of real costs, which is the essence of the idea of "Productivity." Above all, the worker occupies a crucial position, as the citizen of a socialist state. That means special responsibilities and obligations, for socialism assures an equitable sharing of the products of industry.

In under-developed, over-populated countries, with open as also disguised unemployment on a large scale, the problem of productivity acquires an aspect of its own. While the urgency is greater than in advanced countries, the situation calls for different techniques and methods in securing increase in produc-

tivity. In this context the analysis of the ILO Productivity Team is significant: "Manpower is plentiful and capital is scarce. The application of techniques to raise productivity must, therefore, be governed by the need to make the best use of the abundant human resources, and to avoid waste of capital in all its forms—not only equipment but human skills, not only foreign exchange, but the whole physical fabric of industrial life . . . emphasis must be placed on productivity improvements requiring little or no new investment and not involving retrenchment or increase in unemployment. . . many changes can actually reduce capital requirements. . . fuller utilization of the existing capacity must necessarily be the prime consideration in policy, for where such policy exists, increase in production can usually be secured at diminishing cost per unit. The increase in productivity per unit of resources already employed can make a vital contribution to the increase in total production so urgently needed at the present time." These words of the ILO Productivity Team contain a good deal of wisdom with regard to the economics of this country.

The possibilities of increase in productivity are not discouraging. It was demonstrated by the ILO Productivity Team of 1952 that an increase in productivity from 3 to 36% could be secured in units of the textile industry and from 13 to 116% in the engineering industry. The National Productivity Council has been established to secure a wider and more systematic application of productivity techniques throughout the industrial system.

An appropriate labour policy appears essential for securing that degree of cooperation from workers, which alone can lead to higher levels of productivity. The conditions essential for securing cooperation of labour are:

- (a) Clear and genuine determination on the part of all concerned to cooperate. Constant demonstra-

tion, without mental reservation, of good faith.

- (b) Strengthening of trade union organization.
- (c) Move towards fair wages and decent working and living conditions.
- (d) Assurance that the gains of higher productivity would be shared with workers.
- (e) Dissemination to workers of all necessary information for intelligent participation in industrial affairs.
- (f) Consultation with workers in personnel policy.
- (g) Facilities and opportunities to workers for training and advancement.

Something has already been said about the role of productivity expert. He has to be, not only an industrial engineer, an expert in management and labour but also a sociologist, or probably more appropriately, a *social engineer*, to use a phrase of the Prime Minister.

In recommending any productivity scheme, he will have to keep in view the attitudes and reactions of the parties concerned and guard against adverse social consequences. His is indeed a job calling for enduring patience, far-sighted vision and human understanding.

If social democracy is to succeed in this country and the socialist pattern realised in practice, it is essential that there should be a full public realisation of the importance of a strong trade union movement and its due place in safeguarding the interests of the working class and its assistance in attaining the desired objectives of economic and social policy.

If the plans for raising productivity are to succeed, working conditions should be such as to place labour in a position to devote all its intelligence, skill and energy to the maximization of efficiency and consequently also of output both in terms of quantity and quality. In order to get labour into this mood, there is urgent need of some form of self-government in industry.



"Realise that systems of belief are as important in administrative function as are policy statements, plans, regulations and organisation charts. They can change or cancel all the rest."

**From ALEXANDER LEIGHTON'S
The Governing of Men.**

Standardization : A Tool For Higher Productivity

S K SEN*

THERE is an intimate and to some extent a unique relationship between standardization and industrial development. Standards are at once a cause and an effect of increased output.

Standardization has been historically an important factor in the ascendancy of the factory system of mechanical production and later in the development of mass production techniques and automation. But for a long time it remained an unrecognised element in production whose potentiality began receiving attention only in comparatively recent times.

It is interesting to go over briefly the history of standardization, which is really coextensive with the Industrial Revolution. The most significant change it brought about was in relation to the status of the worker *vis-a-vis* the machine. Prior to the Industrial Revolution the worker possessed the skill and his machine was only an aid in the performance of his task. After the Industrial Revolution it was the machine which possessed the skill and the worker was reduced to the position of an attendant on the machine. This transfer of skill from man to machine paved

the way for important economic and social development. To it also can be traced the beginning of industrial standardization.

This is simply explained, for the machine is a means of performing similar motions repetitively. Designed to perform a task, it performs no other. It operates under invariable conditions of service and that is important. It means that not only the products of a machine have to be standardized but the material it works upon; and the entire process must be held within pre-determined limits of variation.

Little conscious thought, however, was given, in the beginning, to this very close link between mechanised production and standardization of processes, materials and products, which inevitably went along with it. Attention was first forced upon the subject by the need of dimensional interchangeability, as for example, between plugs and sockets of different make. Lack of adjustment became a source of irritation and wastage. In the United States, the existence of many different track gauges and sizes of rolling stock in the early period of railroad development created difficulties and led to wastage due to lack of dimensional standardization.

As the mass production process gathered momentum, the need of having interchangeable parts became acute. In this context the experience of Eli Whitney is interesting. He is considered in

* Shri S K Sen (Born 1920) has had more than 10 years' experience of work in the Indian Standards Institution and at present holds the rank of Deputy Director, in-charge of the Metric Cell. He studied Standardization Movement in the USA in 1953 under the Point Four Programme.

the United States, to be the originator of mass production technique. He began his experiment when Government of the United States gave him a contract in 1793 for 10,000 stands of arms. He had to begin from scratch, as he had no plant for manufacture. Before him, arms were made by highly skilled workers, each of whom produced by himself a distinct part of a musket. Whitney's plan was to make a factory which would work like a single huge machine with each job divided so finely that it had to be done exactly but with little or no skill. Various tasks were sub-divided and a group of workers was kept busy at each of the operations. Tools for drilling, filing and milling were standardized. "From first to last a model musket was copied with precision so that every lock, for example, was exactly like every other, among thousands. When all the parts needed to form a weapon were assembled, they united much superior to a musket formed on any other plan. . . . In case of repair a new part exactly fitted the place of the old part and at a trifling cost."¹

In this way, men of determination and enterprise standardized the products and processes of industry. By the time World War I broke out, standardization had been well recognized as an industrial process, in itself capable of ensuring interchangeability either at the factory or at the national or international level. The experience of World War I revealed further potentialities of standardization. Even at the beginning of the war, belligerents realised that they would have to face acute shortages of material and technical manpower. Hence conservation in every respect was a matter of strategic necessity. In the United States, the War Industries Board—a highpowered body—achieved conspicuous results through a process of severe standardization. Enforced res-

trictions on variety brought about an enormous increase in productive capacity.

With the cessation of hostilities, industries tended to revert to the traditional freedom of variety but the trend was checked in time by the publication in 1921 of the Report of the Committee appointed by Mr. Herbert Hoover, on Elimination of Wastage in Industry. The Committee enquired into the conditions of a large number of typical industries and came to the conclusion that the overall productivity in American industry was not more than 50% of the possible maximum. This Report received wide publicity in the United States, particularly in the technical press and in the discussions in engineering societies and associations. There was a nationwide movement for simplification in industry through the good offices of the Simplified Practice Division of the United States Department of Commerce. In many cases a reduction in varieties ranging from 24 to 98% was brought about. To cite a few telling examples,² there were, before simplified practice was introduced, 33 different lengths of hospital beds and 44 different types of hospital beds of varying height! Commonsense suggested that a standardized hospital bed could be made with great economy in the cost of production. Similarly there were 49 different varieties of milk bottles, which were reduced to 4. Taking another extreme case, there were as many as 7,15,200 varieties of grinding wheels. These were reduced to 2,55,800. Many more examples could be cited of the great economies secured by variety reduction through the Simplified Practice Division.

Thus standards, which began inevitably as an aspect of the machine process and then developed into means of ensuring interchangeability, now began

1. National Industrial Conference Board, Industrial Standardization, New York, 1929.

2. Lansburgh, R. H. Industrial Management, John Wiley and Sons, Inc., New York, 1928.

to emerge as a technique of simplification or economy of resources. With this evolution in the concept of standardization, its scope broadened considerably. The only limiting factor in the application of standards now is whether the matter under consideration (product, process, material, whatever it may be) is a repetitive one. If so, there would be saving through standardization. The universe for standardization has therefore widened to almost all forms of social activity from government administration through industrial organisation to any technical activity: designing, manufacturing, selling; and anything else that has to be gone over and over again.

This movement for standardization, which originated in the United States, began to spread in Europe as a matter of economic necessity. In 1948 a Committee similar to the Hoover Committee on elimination of waste in industry was constituted in the United Kingdom under the Chairmanship of Sir Ernest Lemon. Its function was to investigate, in consultation with the British Standards Institution and other appropriate organizations, the methods by which manufacturers and users of engineering products determined whether any reduction in the variety of products manufactured was desirable in the light of technical, commercial and other considerations; and to report whether these methods were adequate and what, if any, further measures should be taken by industry or by Government to ensure that simplifications, as determined, would be put into effect.

The Committee came to the conclusion that in many branches of engineering industry, variety could be reduced with great benefit to the industry and to all other branches of industrial output. Its general reflections on economies that could be secured through standardization are worth reproducing: "There can be no question that unneces-

sary variety of product at any stage of manufacture lowers efficiency. The loss is not confined to any one stage of manufacture, but extends to the supply of raw materials and components. It also applies to all phases of distribution and to the ultimate user. The latter is not only faced with the resulting higher prices, but often with related problems of non-interchangeability, delay in obtaining non-standard spare parts, increased stocks and unnecessary design and administrative work. Because the technical and economic problems of standardization and reduction of variety are complex, it is often not realised how large are the overall savings which can be made by increasing the length of production runs as a result of eliminating or reducing the manufacture of specials or small batches."³

About the same time when the Lemon Committee investigated into the conditions of UK industries, another Group of Experts was sent to the USA by the Anglo-American council on Productivity "to secure detailed practical evidence of the benefits which American producers and consumers had derived from a policy of deliberate reduction in variety in manufactured products, whether materials, intermediate components or parts, or end products."⁴ In its report "Simplification in Industry" the Group summarized the advantages of standardization in the following terms:

"To the producer:

1. Longer runs with fewer changes on the production line.
2. Reduced tooling and set-up time.
3. Possibilities of increased mech-

3. Report of the Committee for Standardization of Engineering Products, UK Ministry of Supply, His Majesty's Stationery Office, London, 1949.

4. Simplification in Industry, Anglo-American Council on Productivity, London, October 1949.

anisation and special-purpose plant.

4. Easier training of operatives.
5. Simpler and cheaper inspection.
6. Less capital invested in idle plant, tools and space.
7. Reduction of stocks of materials, components and end-products.
8. Reduced call on drawing office and design staff for special orders, leaving them free for work on new designs or improvements.
9. Simpler clerical and administrative work.
10. Easier service and maintenance.
11. Concentration of sales and advertising effort on a narrower range.
12. And hence, increased productivity, leading to reduction in costs and prices and to increased sales.

analysis will put the whole problem in the proper perspective.

It is not uncommon to find that a manufacturer spreads his efforts too thinly over too large a variety of products. This may be due to one or more of the following reasons: (i) attempt to secure as big a share of the current trade as possible; (ii) anxiety to cater to individual taste or requirement, and (iii) sales emphasis on the speciality of the product in comparison with similar products available in the market. It is not easy to demonstrate the fallacy of such a policy unless the sales and profit data are carefully analysed for each product. Such analysis has been made for a number of industries in the USA and the UK. The Simplified Practice Division in USA revealed instances where over 70% of the products contributed to no more than 2% of the total sale proceeds. The table below relating to valve and pipe fittings industry is reproduced from "Simplification in Industry."

To the User :

1. Lower price for a given quality or performance.
2. Reduced variety and level of stocks at all distribution points.
3. Readier availability.
4. Improved service and maintenance facilities.

<i>Main Groupings</i>	<i>Percentage of Types eliminated</i>	<i>Percentage of sales income affected</i>
Brass Valves	29	0.9
Iron Valves	53	1.8
Malleable Fittings	48	1.2
Cast Iron Fittings	70	2.1
Brass Fittings	57	1.6

It would now be appropriate to examine what makes standardization an intrinsically suitable tool to secure the benefits, listed above. It is clear that the full range of benefits can only be derived from a highly developed system of standards covering end-products, materials, tools, manufacturing processes and administrative practices and procedures. It is not proposed to explore here the entire field of application, for it is not possible to arrive at a set of universal guiding factors. A general

In a recent paper published by the British Standards Institution,⁵ a case has been analysed of a firm producing 77 products, 25% of which accounted for 80% of the total sales income.

The foregoing illustrates the possible wastage attributable to a policy of marketing a variety of products. The efforts

5. Martin, Harold W., Variety Reduction—Simplification, Standardization, Specialization. British Standards Institution and Institution of Production Engineers, London, 1956.

spent to push unpopular products raise the overall cost of selling and a part of the increased cost goes to enhance the price of popular items. The possible loss of trade from refusal to satisfy marginal demand may be more than offset by the competitive advantage gained by reduced selling and stock costs, if products are limited to the more profitable items.

The paper⁵ published by BSI makes the pertinent observation that the more popular products are not necessarily the more profitable. Sometimes popularity is generated by underselling. In limiting product variety, careful consideration must be given to this aspect.

It is no gainsaying the fact that variety output increases costs. The more mechanized a factory, the more pronounced is this effect. Generally speaking, some preparatory work has to be done on each machine at the beginning of a production run. Such preparatory work may consist of removal of fixtures, adjustments etc. There is also additional paper work involved in issuing work tickets, requisitioning materials, tools and other accessories for each manufacturing order. "The cost of all this make-ready and put-away work represents a considerable fixed expense chargeable to each batch of parts processed, no matter how small the batch may be. Obviously the smaller the batch quantity, the larger the make-ready and put-away charges per unit produced."⁵

Irrespective of the size of the factory or the method of production control, down-time costs on machines (costs incurred, while machines are idle) are bound to increase with increasing variety. When a large number of parts or products has to be processed, it is practically impossible to schedule the production in a manner as to keep the machines in commission most of the time or even permit the utilization of full capacity at any point of time. The

down-time loss thus incurred is common to all factories and may be reduced to a minimum by judicious standardization of the parts of products concerned so as to permit longer production runs and a more effective planning and scheduling of production. There are other factors in standardization: the design of a product, for example, determines its degree of simplicity or complexity. The engineer's general inclination towards unique or novel design poses a problem in design simplification. Sometimes there is lack of facilities to obtain relevant data which could enable the designer to avoid complexity. However, novelty in design is not in itself to be condemned. In fact it is a desirable feature in most consumer articles. But design is ineffective if the cost of production becomes prohibitive. Here is a challenge for the designer to achieve economy with styling. An analysis of the causes of increased cost will indicate spheres of possible action to help the designer.

Most products, engineering products at any rate, constitute an assembly of parts and sub-assemblies. There is a fallacious general impression that the freezing of the parts design must lead to a freezing of the product design. The existence of a number of parts of slightly differing shape or size is largely attributable to this impression. Not only the parts differ but also the materials, tools and processes, called for to manufacture the parts and sub-assemblies, differ from those previously used. The import of this practice becomes apparent with the complexity of the product.

The above situation is often aggravated in many organizations by the absence of an effective method of co-ordination between the designing department on the one hand and the purchasing and manufacturing departments on the other. There is an element of inherent contradiction

between the immediate objectives of these departments in as much as a design which is commendable from the designer's point of view may not be economical to manufacture with available machines and tools or from readily procurable materials. A practical compromise between the apparently contradictory interests must be achieved at the design level to ensure satisfactory operation at later stages.

Standardization of materials, parts, tools and processes would go a long way to help the designer meet this challenge. The economy of such a course is obvious. But manufacturers sometimes fear the freezing of their product design. This position is really fallacious, as shown in the Report of the National Industrial Conference Board Inc. of New York. One of several examples, relating to the motor designs of Reliance Electric and Engineering Co., will suffice. As a result of parts standardization, this Company was able to reduce the number of assembly parts from 331 to 176, at the same time offering even a more diversified line of motors, rendered possible by end-combinations of the standard parts. The writer is aware of the experience of another manufacturer supplying tiny motors for novelty products. This firm standardized their design several years ago to the extent of four parts with a total of eight sizes and in spite of the wide diversity of requirements of their customers, they never experienced the need to alter the standard design. These are extreme examples of parts standardization and such a degree of simplification may not be feasible in many cases. However, in general it may be said that judicious reduction of variety at intermediate stages of production should cause no limitation on the ability of a manufacturer to offer a wide choice of end-products.

Standardization of materials, parts and tools will have an immediate effect on the purchasing department of a

manufacturing concern and on its inventory carried at any time. If the standards followed are nationally recognized standards, procurement will be relatively easy, prices and delivery time more favourable than for special items; and one could rely on quality. There is also the possibility of receiving price preference on bulk purchases of fewer items. The effect of reduced inventory will be felt not only in the release of capital held in stocks but also in possible increase in storing capacity and more effective control of stores.

As larger production quantities are generated by standardization of parts and sub-assemblies, a stage is reached to justify economically the utilization of specialized equipment. These equipments require large capital investment but are capable of paying rich dividends in terms of increased productivity and reduced unit cost when the production quantity is high.

In many manufacturing organizations, rejection and re-working of defective products present a problem of considerable magnitude, causing increased production costs. Defective production results from a complexity of cause and effect which may indicate lack of adequate supervision, inefficient production methods or indifferent quality of raw materials and tools. The chances of operatives to trip increases directly with the variety of products required to be processed. While simplification leads, on the one hand, to more and more specialization, it enables the operatives, on the other hand, to gain familiarity with the process; and the risk of making errors diminishes. This leads to easier training for acquiring skill and more effective control by supervisors.

Another advantage of standardization of manufacturing processes lies in the applicability of scientific principles of work measurement and quality control. Statistical methods

such as the SQC system are best utilized in long production runs. In conjunction with standardization of materials and tools it affords a sensitive measure of the inherent capability of the process. Thus is reached a scientific basis of co-ordination between designing and manufacturing departments in respect of certain controversial issues. Limits of manufacturing tolerances constitute a case in point. Designers in general prefer closer tolerances while for obvious reasons, people on the shop floor insist on wider limits. Standardization followed by statistical analysis of the production process serves to establish the optimum tolerances which can be held economically. National Industrial Conference Board records the following interesting case history.

"The product contained twenty component parts specified to be within a tolerance of 0.0002 inch. Machinery worth several millions of dollars was purchased, and manufacture started. Then it appeared that the tolerance specified could not be maintained and the resulting deadlock could only be solved by expert redesign of the product. Two of the major units kept their original tolerance of 0.0002 inch; on the others, the tolerance was increased to 0.0005 inch. From then on, the business became profitable, but a very heavy loss had to be overcome. This could have been avoided by proper co-ordination between engineering and production design in the early stage."⁶

Major and minor stoppages of work frequently result from failure of defective material or equipment. Not all are due to non-standardization but they indicate a general trend to disregard

standards in purchasing. If such practices arise from the intention to save, the purpose will hardly ever be served. Price is only one of several factors which determine saving in the last analysis. Quality, quantity and timely supply of materials have each a direct bearing on production and hence on manufacturing economy. Apart from the risk of possible hazards, non-standard materials may give rise to (i) higher manufacturing cost from additional work or treatment, (ii) excessive rejection and reworking, (iii) more than normal inspection to weed out defectives, and finally (iv) loss of time from above causes with corresponding increase in overhead charges.

Cost of purchasing, handling and storing is a substantial proportion of the capital held in stock. To a greater part, this cost involves invariable expenses and is, therefore, proportionately higher for smaller purchase quantities. A company estimated these expenses at about 30 per cent of the cost of material. In addition to possible saving in capital, fewer items in larger quantities simplify the work of ordering, receiving and stock keeping. The same staff is thus enabled to handle larger volume of purchases and the productivity of the purchasing department increases.

Closely associated with purchasing is the function of inspection of supplies. Variety affects the productivity of the inspection department in much the same manner as purchasing. As simplification leads to bulk orders, inspection lots assume economical proportions; cost of inspection comes down and planning on scientific principles becomes feasible. Further possibilities of simplification in inspection are seen in the use of certification marking on quality products which carries the goodwill and guarantee of a reputable organization.

In the UK, South Africa and New Zealand, there is a national standards body for issuing certification marks.

6. Industrial Standardization (Company Organization, Practices and Procedures). National Industrial Conference Board, Inc., New York, 1947.

In the USA, a number of private laboratories of repute offer similar services. The Indian Standards Institution is empowered to issue licences to selected manufacturers to use the mark of the Institution on products conforming to Indian Standards. Over a hundred licences have been issued under this scheme and more than thirty articles are now available in the market with the ISI mark.

A necessary requirement of the certification marking procedure is an in-production control of quality. This control is conceived as a part of the manufacturing process itself and performs more efficiently and economically the task of inspection of the finished product. It assumes thereby the role of a possible substitute of inspection and one which may render inspection superfluous when a certain stage of development is reached.

It is evident that standardization can make a significant contribution to productivity by systematic reduction of variety at different stages of manufacture and distribution of finished products. That is not to suggest that elimination of variety can be effected indefinitely or without adequate consi-

deration. Non-standard practices grow imperceptibly over a number of years and the economics of any remedial measure, however desirable, may seem particularly unattractive. Also such remedial measures may not lie wholly within the orbit of individual company action.

Organization for standardization, therefore, must proceed through careful planning and programming for each company and for the industry as a whole. National standardizing bodies such as the Indian Standards Institution and professional and trade associations provide the forum for inter-industry and intra-industry action. Planning for individual company must necessarily be done by the management. There is no substitute for a determined management policy to develop and foster adequate understanding of the significance of standardization at all levels of company management. Properly conceived and executed, the standards programme can ensure progressive elimination of wasteful diversity, conserve manpower and material resources and hence raise the productivity of the company and improve its competitive position within the industry.



Better Equipment

Worker-Management Cooperation for Higher Productivity

R P BILLIMORIA*

WHILE talking of worker-management collaboration and resulting increase in productivity, one is apt to theorise on the basis of gleanings from foreign journals and periodicals. This article keeps clear of theory except in so far as it emerges from facts. It is essentially a case study of joint collaboration between workers and management in the Tata Iron and Steel Company. Its 40 years' experience of this type of collaboration is probably the most convincing proof in the economic history of this country that highest rewards in terms of productivity lie decisively in this direction. Research elsewhere on a far larger scale corroborates this point of view.

This conclusion is really based on a universal fact that every man, however, humble, has in him the potentiality of contributing at every level of life and activity. Talent is not distributed by caste or class, but in the most random fashion. It has to be discovered, and an intimate worker-management collaboration is the best means of finding it.

One example, of which there are many, will suffice. The Yojana of the Planning Commission named Zahir Hussain as the man of the year. He was (or rather is) an humble mason with 20 years' experience of work in a large industry. Working away for years, ideas occurred to him; and over a period of time he evolved a new pattern for cast-

ing and bricking up a furnace door in a steel melting shop, resulting in a large increase in productivity in the line. The employers gave him an award of Rs. 5,000/-.

Toiling in the fields, working in the back-yards, straining on gigantic machines or pushing a pen, there are many such Zahir Hussains, whose observation and intelligence can spark an idea of great benefit to mankind. In the old industrial sociology, the workers were not encouraged to contribute to the improvement of life or work in the factory. The result was a sapping of the fountains of initiative and the flow of ideas. By and by, enlightened employers began to realise that this did not pay; and that the worker was the 'bread and butter' of the industry. He works, of course, for his own bread but he has brains like any other human being. These brains could be tapped but the tapping could only be done and to social advantage by a combination of intelligence coupled with humanism.

This fact is the major conclusion of the TISCO experiment in worker-management collaboration. The Tatas experimented in the line as early as 1919, when the first joint works committee was constituted. As usual in those days, due to a variety of reasons, the machinery fell into abeyance, only to be revived as late as 1946, when joint committees were reconstituted. To begin with, grievances constituted a major portion of the items of discussion at committee meetings. There was lack of

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mutual understanding resulting in a large majority of cases being referred to higher levels.

Then came the Industrial Disputes Act of 1947; and the TISCO reconstituted these joint committees in accordance with the Act, in 1948. By the time a marked change was visible in the basic approach of the parties concerned: most of the cases came to be considered on merits and facts. There was a very large measure of agreement, with unanimous decisions in many cases, few cases being referred to higher levels. In 1952 again, there was deterioration, merits of cases being disregarded. To rectify this trend, joint works committees were decentralised into five zonal committees, each committee generally covering departments with similar operation and production problems.

A formal grievance procedure was also introduced in the organisation. The procedure followed by these committees was modified to the extent that (1) reference to the zonal committee was included as a third step in the formal grievance procedure; (ii) committees were to make recommendations based on the merits of each case and not on any other consideration; and (iii) they were not to conduct *de novo* field enquiries.

The results of the changes were beneficial. There was better appreciation of problems due to intimate knowledge of departmental work. Problems were generally dispassionately considered. There was a speedy disposal of grievances and lesser number of cases were referred to higher levels.

Taking the whole decade (1946-56) the TISCO was experimenting in joint collaboration on a wide front. Not less than 24 joint committees were formed to discuss such matters as grievances, rates, minimum qualifications, employees' services etc. In 1953, Advisory Development and Production Commit-

tees, with equal representatives from management and trade union, were set up in six major departments for discussing production problems.

As the experience of collaboration with workers was encouraging, the management decided to have closer association with workers on a regular basis. The Agreement of 1956 between TISCO management and its recognised union is of historic importance and may be quoted *in extenso*: "...the company appreciates the view that an increasing measure of association of works employees with management in working of the industry is desirable and would help (a) in promoting increased productivity for the general benefit of the enterprise, the employees and the country; (b) in giving employees a better understanding of their role and importance in the working of the industry and in the process of production; and (c) in satisfying the urge for self-expression."

There was a supplementary agreement in August 1956 which laid down a detailed scheme for closer association through a three tier system of joint councils. The chart on the following page gives a picture of the network of collaboration between workers and management.

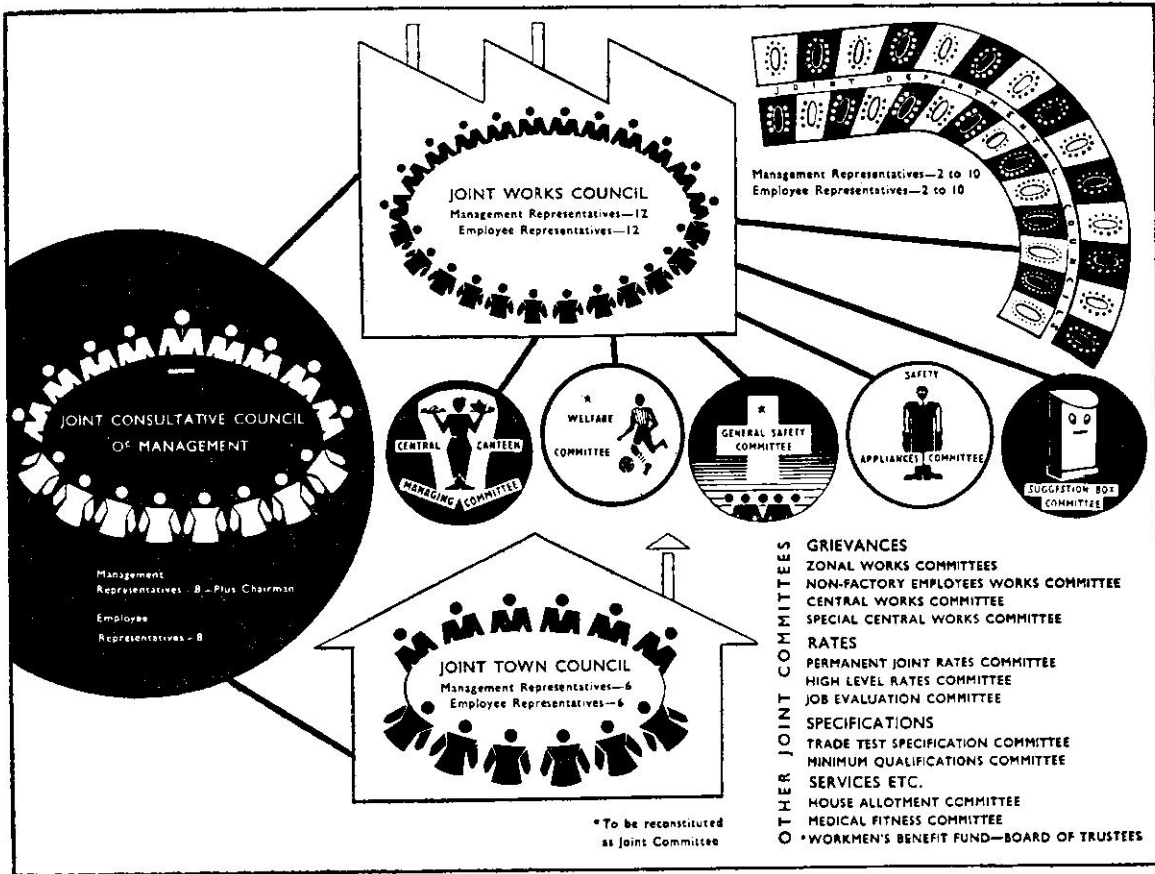
The TISCO machinery of worker-management collaboration may be divided into two broad categories:

A. Joint committees which are concerned with collective bargaining or which fall within the sphere of union relations.

B. Joint committees under the scheme of closer association of employees with management.

The first set of joint committees concerned with collective bargaining or union relations, are listed below,

EMPLOYEES' ASSOCIATION WITH MANAGEMENT*



* Courtesy—(The Tata Iron and Steel Co. Ltd., Jamshedpur).

according to functions :

Grievances

1. Zonal Works Committees (5)
2. Non-factory Employees' Works Committee.
3. Central Works Committee.
4. Special Central Works Committee.

Rates

5. Permanent Joint Rates Committee.
6. High-Level Rates Committee.
7. Job Evaluation Committee.

Specifications

8. Trade Test Specification Committee.
9. Minimum Qualifications Committee.

Services

10. House Allotment Committee.
11. Medical Fitness Committee.

Joint committees, under the scheme of closer association of employees with management, are given below :

1. Joint Departmental Councils (27).
2. Joint Works Councils.

Sub-Committees of Joint Works Council

- (a) Central Canteen Managing Committee.
 - (b) General Safety Committee.
 - (c) Safety Appliances Committee.
 - (d) Suggestion Box Committee.
 - (e) Welfare Committee.
3. Joint Town Council.
 4. Joint Consultative Council of Management.

It is, however, the functioning of these councils that is really important. What do they study? At the lowest level, the Joint Councils are meant :

(a) To study operational results and current and long term departmental production problems.

(b) To advise on steps necessary at the departmental level to promote and rationalise production; improve methods, layouts and processes; improve productivity and discipline; eliminate waste; effect economies with a view to lowering costs; eliminate defective work and improve the quality of products; improve the upkeep and care of machinery, tools and instruments; promote efficient use of safety precautions and devices; promote employees' welfare and activities like sports and picnics; encourage suggestions; improve working conditions and suggest ways and means for the better functioning of the department.

(c) To implement the recommendations or decisions of the Joint Consultative Council of Management or the Joint Works Council, approved by management.

(d) To refer any matter to the Joint Works Council for their consideration or advice.

Councils at higher levels perform more or less the same functions, at the level at which they operate. The Joint Consultative Council at the apex, in addition, advises management in regard to such economic and financial matters, as are placed by Management before the Council.

In order to coordinate and bring about uniformity in the activities of the 27 joint departmental councils, a bi-annual meeting of the Chairmen, Vice-chairmen and secretaries of all joint departmental councils is convened under the chairmanship of the General Manager. All procedural issues are discussed and finalised at these meetings. Substantial matters also come up. One such meeting, for example, discussed, in particular, the ways and means of further improving (a) a regular flow of ideas and suggestions from the shop-floor for discussion at council meetings; (b) reporting back to employees, the proceedings and achievement of each council; and (c) a speedy disposal of recom-

mendations made by councils. Some of these recommendations are being implemented with encouraging results.

The changes from time to time in the matters discussed by these joint committees are interesting from the point of view of social psychology. In the initial stages a major portion of suggestions related naturally to labour welfare. Even at present, labour welfare accounts for 1/6 of the number of items discussed. But it is significant of late that matters relating to production, cost and quality have begun to receive more attention than at the beginning. Apart from the miscellaneous category, the broad pattern of discussion is as follows.

Percentage to total items discussed	
Welfare	16.5
Safety	13.4
Improvement of methods, processes etc.	12.4
Working conditions	12.1
Economy	9.2
Upkeep of machinery etc.	4.4
Quality improvement	3.6
Discipline	3.2
Productivity	2.9

Though 'productivity' is at the margin, all other items particularly improvement of methods, are really included in it, for they equally well contribute to the increase in productivity. It is significant that discipline accounts for such a small proportion as 3%.

The TISCO experiment may now be subjected to critical evaluation.

(a) These joint councils have eight to twenty members depending on the size of the department. It has been generally found that councils, with smaller membership, function more effectively.

(b) Despite work in the factory and at home, the interest in these joint meet-

ings is very good, average attendance being over 80% and absenteeism being more or less accounted for by leave or night duty.

(c) The quality of Chairmanship determines very largely the effectiveness of each council. Those Committees whose Chairmen spent some time in general preparation before coming to a meeting and gave attention to follow-up of recommendations, have been particularly successful. Vice-Chairmen are union nominees. They experience difficulty in conducting meetings in the absence of the Chairman, because of limited technical background and limited knowledge of the affairs of the department as a whole. To bring about improvement, the chairmen and vice-chairmen and secretaries of all councils have been given a course in conducting meetings by the Staff Training Department.

Another organisational device created for efficient functioning of these councils is the agenda sub-committee. These sub-committees consisting of two to four members from each side, with the secretary of the council as the convener, were meant to serve as *liaison* groups between the councils and the men on the shop-floor and were entrusted with the responsibility of drawing up the agenda for each meeting in the light of ideas and suggestions obtained from employees of the department through personal contact. Due to lack of proper appreciation of the importance of such work and the time that this responsibility requires, some of the agenda sub-committees have not attained the desired standard of efficiency. Revitalisation of the agenda sub-committee is a matter which is receiving the attention of management.

In many cases the use of English has proved a barrier to full participation by members in the meetings. The use of *Hindi* has invariably resulted in greater participation and understanding. Unfortunately, in some of the councils, the

most effective participants cannot express themselves fluently in *Hindi*, so that the Hindi-knowing members find it difficult to understand or participate in the proceedings.

In cases, where industrial relations on the shop-floor are bad, they get reflected sometimes in council meetings. Factional rivalries are similarly projected, though very occasionally. In councils covering more than one department, there is lack of interest among members, when affairs pertaining to another department are discussed. There has been a marked tendency in some councils to criticise other departments or to pass the buck. Instead of putting their own house in order and stepping up their efforts, men are inclined to blame departments other than their own for all the difficulties experienced by them.

Secretaries occupy a crucial position in the working of committees of this character. An efficient and energetic secretary, inclined to prompt follow up, keeping members informed of developments, makes all the difference. With such a secretary, employees begin to take active interest in the working of the council. Absence of a good secretary means little of proper agenda or background material, no timely preparation or circulation of minutes and little of follow up.

It is time we summarised our conclusions: Joint consultation, as distinct from collective bargaining, is an arrangement within an undertaking for enabling the opinions and views of employees to be made known to management.

What purpose does this joint consultation serve? (a) It provides a channel of communication of views and

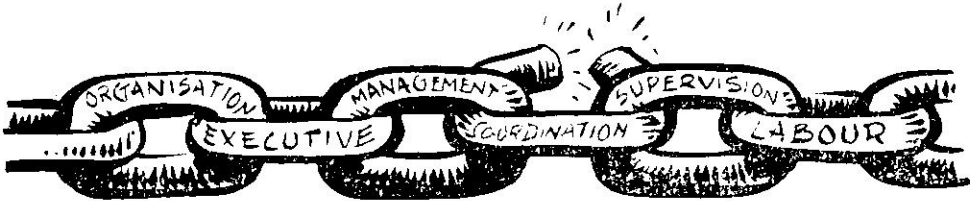
ideas between management and employees. A major cause of industrial tension is due to blocking up of these channels of communication. Some employers do not feel it worthwhile to feed information down the line. Ignorance leads to exercise of imagination in wrong directions. Workers feel that their employers are 'a high and mighty' type.

(b) Joint consultation enables workers to appreciate their role in working life. The worker feels that he is not a mere ticket number, but a man with a 'say' in affairs that concern him.

(c) Joint consultation covers a vast area of common interest between management and labour: grievances, canteens, welfare facilities, suggestions etc. If the benefits of increased productivity are equitably shared, productivity techniques may well become another large area of common interest.

(d) Joint consultation satisfies the urge for self-expression and develops the personality of the worker. In a large Indian undertaking where there are nearly 50 such committees, time and again one comes across a workers' representative on a committee, shy and restrained at first, then coming forth as a responsible and active member, pulling his full weight.

It would, however, be an exaggeration to say that joint consultation has succeeded in many undertakings in this country. There have been failures, of which lack of mutual understanding is a major cause. There are other causes, too. But considering the Tisco experience, it appears worthwhile to persist in the experiment, for there is no gainsaying the fact that all the push-buttons and gimmicks of automation will never replace the robust commonsense and acumen of man, the worker.)



Quality Control

QUALITY control is a powerful productivity technique for effective diagnosis of lack of quality (or conformity to settled standards) in any of the materials, processes, machines or end-products. Thus the connotation of quality in Quality Control is more comprehensive than the usual attributes of things, with which we are familiar, such as colour, taste, nutritional content, fashion, serviceability, comfort and the like. It is essential that the end-products possess the qualities that the consumer expects of them, for the progress of industry depends on the successful marketing of products. Quality control ensures this by insisting on quality specifications all along the line from the arrival of materials through each of their processes to the final delivery of goods.

Quality Control therefore covers all the factors and processes of production. Very broadly, the qualities required for various factors are:—

- (1) *Quality of materials*: Ease of processing. Reduction of waste and defectives. Increased output and better finish of end-products.
- (2) *Quality of manpower*: Increased efficiency. Better quality production by the application of skills. Cost reduction. Waste reduction.
- (3) *Quality of machines*: Efficient working. Avoidance of delays and break-downs. Durability. Reduction in cost and defectives.
- (4) *Quality of management*: Increase in efficiency. Harmony

in relations. Growth of business and markets.

All these qualities combined are essential for economic manufacture, the purpose of which is marketability of products. In this connection, it is necessary to emphasize that there are *three types of markets, with their own quality specifications*, which the producer must satisfy, if he wants to survive and prosper in the markets, which he serves. Each of the markets requires specified qualities, indicated below :

- | | |
|--------------------|---|
| <i>Consumers</i> : | Immediate purposiveness. Ultimate satisfaction. Economy. |
| <i>Industry</i> : | Efficiency in performance. Effect on end-products. Interchangeability. |
| <i>Traders</i> : | Marketability. Business by samples and specifications. Building reputation. |

There is, first, the general body of consumers, who require certain qualities of such things as sugar, bread, furniture and the like. Industrialists demand raw materials, semi-manufactured goods and machines of all sorts. Their quality has in turn an effect on the finished products. In an assembly plant, interchangeability of parts facilitates easy assembly, convenience in servicing and in repairs and replacement of parts. So a manufacturer has his own specifications of things he requires. Traders again have their specifications of quality. An article may be of excellence from the point of view of art or utility but the trader is primarily interested in

ready marketability. He wants to build up his reputation in certain lines of quality, appreciated by the particular market he serves. He wants to expand his business by samples and specifications.

It is the function of Quality Control to take all these factors into consideration and see that the whole business of manufacture functions from start to finish within specified limits of acceptance. The possibilities of economic expansion, therefore, through quality control, appear, specially in an undeveloped economy, almost infinite. In fact, a large scale economy cannot just operate without quality control. Quality has ceased to be a medieval idea of a beautiful specimen fashioned out by a master craftsman. *It is now a compendium of measurable attributes to be written into the manufacturing process from end to end.*

What then is Quality Control? *Essentially, it is an idea of building quality into the product rather than inspecting it.* It is called Statistical Quality Control (SQC) because quality is economically judged by sampling methods; and statistical experiments are scientifically designed to assess variations in quality, to determine limits of tolerance etc.

SQC means planned collection and effective use of data for studying causes of variations in quality either as between processes, procedures, materials, machines etc., or over periods of time. This cause-effect analysis is then fed back into the system with a view to continuous action on the processes of handling, manufacturing, packaging, transporting and delivery at end-use. An SQC department is thus an essential limb of a modern plant.

What are the functions of an SQC department? They are :—

- (i) Evaluation of quality standards of incoming materials, products in process and of finished goods.

- (ii) Judging the conformity of the process to established standards and taking suitable action when deviations are noted.
- (iii) Evaluation of optimum quality obtainable under given conditions.
- (iv) Improvement of quality and productivity by process control and experimentation.

The quality control system needs its own gadgets to determine objectively the quality of products. Equipments, tools and gauges to check and evaluate quality by means of characteristics such as length, strength, reflection of light and other physical or chemical properties have been designed for use in factories. Precision instruments are used to measure properties as accurately as possible. Apart from these things, statistical methods provide the techniques for enumeration and study of results. These statistical methods, relating to quality control may appear complicated but when they are reduced to applications on the shop floor, they simply amount to testing and recording results, for study by the quality control department.

- (1) The features to be examined are determined.
- (2) The standard quality levels are also determined.
- (3) Tolerance limits are specified.
- (4) Examining or testing instruments are provided.
- (5) Recording procedure is set up.
- (6) Statistical analysis is done and results reported.
- (7) The stage is then set for action on the shop floor.

The above analysis may now be briefly restated: Quality Control is the application of scientific principles in all spheres of industrial activity. It implies the collection of reliable and adequate data in a systematic manner. The analysis and interpretation of the data thus collected lead to the evaluation of the quality standards in various stages of manufacture as well as on the outgoing product. Finally, the deviations in quality standards noted are traced to the technical and operating conditions of the processes so that corrective action is taken as and when necessary. *The emphasis in Quality Control approach is on preventive rather than corrective thinking.* Preventing defects through SQC helps industry to build quality into the product much better than does a policy of concentrating only upon correction. The SQC approach ensures less waste and re-work, increasing machine and materials utilization, high level of quality product, less need for inspection and test expenses, and very possibly, lower manufacturing costs, increased productivity and above all, greater consumer satisfaction.

What is the specific scope of Quality Control? There are four major areas, and perhaps many minor ones, wherein Quality Control can help to save money and increase productivity. These four major areas are:

- (a) Using final quality evaluation results positively.
- (b) Reducing scrap and re-work.
- (c) Increasing machine utilization.
- (d) Evaluating incoming material quality.

USING FINAL QUALITY EVALUATION RESULTS POSITIVELY

Final quality evaluation results deal mainly with inspection of end-products.

This operation given the amount of rejected, substandard product, or seconds, wherein the manufacturing process has failed to produce at its optimum quality level. Quality control attempts to trace the departure from standard, back through the process in a cause-effect analysis. This amounts to the listing of all possible defects, the likely causes of each, and finally the corrective action that must be taken to avoid repetition of error. Action is taken for preventing tomorrow's defects on the basis of yesterday's results.

In a glass plant, for instance, the product was completely inspected for defects by two inspectors. Their rejection amounted to fourteen per cent over a period of time. The quality control methods of examining the nature of the defects, analysing these by statistical techniques, sorting out the unnecessary from the unavoidable defects, helped to bring down the rejection rate from 14 to 2 p.c.

Final inspection is not always completely reliable, specially when used to screen the product. A shoe manufacturer, for instance, demanded to know how he could use quality control, when he was doing everything he could to maintain the quality of each shoe; he was himself inspecting all the leather, all the cuttings, and finally all the shoes made by him. Yet when he measured his outgoing quality by means of quality control sampling, he found that more than ten per cent of his product was below the desired standard. Through quality control, he found the cause of the trouble and the means of correcting it.

SQC not only enables a positive use being made of the final quality evaluation results. It also helps to standardise judgment in the final quality evaluation result. In sewing machine evaluation, some checkers rejected four times as many machines as did others, causing both poor machines to go on

the market, and unnecessary re-work. Similar differences have been found in inspector judgment in shoes, aluminium, potteries etc. Quality Control methods help to establish uniform standards common to all inspectors and fixed in time. Gains in output of sewing machines alone have been estimated at from 10 to 15% from such standardization.

REDUCING WASTE AND RE-WORK

Every industrialist is bothered with his pile of rejected casting, machine scrap, card and comber waste or hard and soft waste, as in textile mills. The waste piles usually give information about the state of process at intermediate points on material that never moves to the final product stage. *Wastes are worth studying.* Waste studies invariably throw light on the machines giving unusual waste which could be eliminated by proper cause-effect study.

In a soap factory, for instance, some thirty to forty per cent of cakes of soap were rejected before stamping. The material was not wasted as such, for it went back into the kettles and returned once again as finished product. But this turn around brought down the potential output of the factory by one third. It could be nearly eliminated by proper cause-effect study.

In a water pump plant, examination of the scrap pile showed that machine castings were rejected for blow-holes, often found on the bearing surface after machining. Investigations of this recurrent defect spotted by quality control led a metallurgist to discover that the cause of the trouble was insufficient air in the cupola. Insufficiency of air not only caused defects but was also responsible for low output. Correction increased the output three-fold, making it possible to produce three hundred tons in place of hundred tons previously obtained.

Many other examples could be cited. Scrap in a glass plant was reduced from 16 to 12 per cent, and statistical study showed that it could be further reduced to about 1 per cent. Foundry scrap has been reduced to one-fourth by SQC methods; pottery and rubber tyre seconds have been more than halved. Quality Control charts, with a cause-effect analysis of scrap, and with probability methods, determine the most likely causes and seek their elimination.

INCREASING MACHINE UTILISATION

Considerable increases in productivity could be effected by making continuous efforts towards increasing machine utilization. The object here is to search out similar equipment or arrangement, giving different amounts of product of varying quality. It may be found, for example, that weavers differ in efficiency from 40 to 80% or one cigarette machine produces twice as many "loose ends" as the other five. Two rubber tyre treading machines cause nearly all of the "thin spots" in final production. Foundry contractors produce only two-thirds of good product attained by the others; one sewing machine sub-assembly line is three times poorer in assembling the same piece-parts as two other lines. Quality Control methods spot out these differences, analyse the non-common factors, and raise the poorer.

Quality control methods have been particularly useful in cotton and jute industry. Weavers are usually paid on the amount of yardage they turn out. But this data in the hands of quality control becomes the instrument for improving the lower half of wage earners. Poor weavers work as many hours, and often as hard, as good weavers, but they do not earn equally well.

Further, it is not only machines that need to be brought into balance. The fault may lie with the shift arrange-

ment. Quality control can help in bringing these shifts in balance.

EVALUATING INCOMING MATERIAL QUALITY

Under SQC, the quality of raw materials and other supplies comes in for study. Scientific sampling acceptance procedures lay down the quality specifications of supplies and help to set it at the desired point. More and more producers throughout India are finding that these acceptance procedures help them in getting better indigenous supplies and in turn help the local producers in standardizing their products at the required level.

It is obvious that there are major areas wherein Quality Control methods can help management. It is necessary at this stage to give a brief account of the techniques employed in Quality Control.

CONTROL CHART

The first essential tool in Quality Control is the Shewart Control chart. Any measured quality of manufacturing product is always subject to certain amount of variation as a result of chance. Such variation is inherent in any scheme of production and inspection, and is inevitable. But there are variations, which have assignable causes. The power of the Shewart technique lies in its ability to separate out these assignable causes of quality variation. This makes possible the diagnosis and correction of many production troubles and often brings substantial improvements in product quality and reduction of waste and re-work. Moreover, by identifying certain of the quality variations as inevitable chance variations, the control chart tells when to leave the process alone and thus prevents unnecessarily frequent adjustments that tend to increase the variability of the process rather than to decrease it.

Control Charts provide information on three matters, all of which need to be known as basis for action. These are:

- (i) Basic variability of the quality characteristics.
- (ii) Consistency of performance.
- (iii) Average level of the quality characteristic.

In textile industry, for instance, control chart technique can profitably be employed for control of lap weights, yarn breakages, unevenness of yarn and at many other points.

SAMPLING INSPECTION

Sampling inspection is a necessary part of manufacturing and may be applied to incoming materials, to partially finished products and to final product. It has now been recognised extensively that sampling inspection, if properly carried out, gives adequate protection to producer and consumer, and is much more economical in the long run. Often 100% inspection turns out to be impracticable or clearly uneconomical. Moreover, the quality of the product may actually be better with modern statistical sampling procedures than would be the case if each unit were subjected to inspection. Sampling inspection has a number of psychological advantages. Inspector's fatigue or repetitive operations may be a serious obstacle to good 100% inspection. The sampling scheme provides a better basis for diagnosis of quality trouble than is common with inspection of each unit.

EXPERIMENTAL DESIGN

Experimental design is the third important tool in quality control which assists in solving many industrial problems. This technique helps in planning an experiment in such a way that

the effects of factors extraneous to the object of investigation are either eliminated or randomized. Proper statistical analysis of the data thus obtained will help in arriving at reliable conclusions.

The position may now be summarised diagrammatically, as to how Quality Control leads to increased productivity.



It is obvious that substantial increase in productivity, basic savings in costs, and improvements in quality of products are attainable throughout Indian industry by means of the application of quality techniques. These gains can be secured with the same plant and equipment and the same labour force. These conclusions, based upon detailed surveys of about one hundred plants throughout India, are supported by the gains already made by quite a few pioneering managements throughout the country. Significant strides have been made in the application of the scientific quality control methods in the shoe, sewing machine, biscuit, jute, aluminium, steel, rubber tyre, pottery, and cotton textile machinery industries. Elsewhere in the

country, advances are reported in glass, pharmaceutical and cotton textile industries. Similar gains are possible in other industries as well as in many public and private plants.

The basic pre-requisites for successful quality control applications are an alert and progressive management; (b) competent technical staff searching for new methods and new economies; (c) competitive or social pressures for technical advancement; and (d) the training of top management staffs in new statistical methods. Where these conditions apply, both in India and in the more industrialised countries, progress in the use of these new methods has been rapid and rewarding.

Indian industry today is in some respects at about the place that American and Japanese industry was a decade ago, when quality control methods were first introduced. The statistical tools of quality control did not fulfil expectations until management and engineers learnt how to apply them economically in their own establishments. As American and Japanese managements found these new methods an excellent paying proposition, SQC virtually swept through whole industries and became part of the basic industrial framework of these countries. Scientific societies also helped to spread the SQC movement in the USA and Japan. Pioneer managements in India are showing interest in effective use of the methods. With the training of competent staff and spurred by the drive for technical advancement, it can be expected that these methods will sweep through Indian industry within the next few years. The firms now using quality control in India constitute a fairly representative sample of industry. Widespread knowledge of the success of these initial installations is essential in spreading these pioneering applications to many other plants throughout the country. The initial applications are worthwhile mentioning in a summary way:

Sewing Machines: A plant wide application has helped to save 10 to 20 per cent re-work, increased efficiency of processes and helped to raise productivity by more than 10 per cent.

Radios: Quality Control has helped to establish manufacturing and performance standards equal or superior to European standards.

Shoes: SQC detected and helped to eliminate the ten per cent substandard shoes previously sent to the market.

Jute: Industry-wide applications are in prospect for raising spinning and weaving efficiency, for reducing raw material costs, and for helping industry meet International standards. A guide to Quality Control in a Jute Mill is available through the Indian Statistical Institute.

Cotton Textiles: Many applications in SQC have been marked out by the Textile Research Associations. Some mills have reported large savings in weaving efficiency and in product improvement.

Foundries: Defective castings have been reduced in some instances from 30 to less than 10 per cent. Action has been taken to reinforce moulds for new machinery, improve cores, and control sand moisture and permeability.

Bicycles and Accessories: SQC applications in several plants have reduced painting defects from 25 to less than 5 per cent; rim rejections have been reduced from 35 to 7 per cent.

Glass: SQC methods have pointed the way for reduction in bottle scrap from an average of 16 to less than 2 p.c.

Pharmaceuticals: SQC has helped to increase assurance of standard products. It has corrected loading pro-

blems of bottles and caps and provided uniform weights for tablets and capsules.

Aluminium: Scrap has been reduced in rolling mills by stimulating technical drives for process correction.

Electric Lamps: Through statistical design of experiments, methods have been devised leading to greatly improved length of life of bulbs, reduced scrap of automatic machines etc.

Cigarettes: SQC methods have led to effective control of machines producing imperfect cigarettes. Moisture and weights have been controlled.

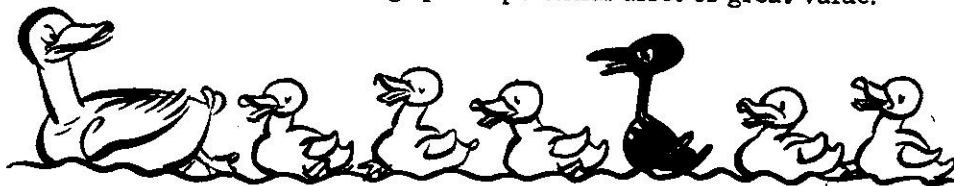
Biscuits: There is now good control of biscuit and packaging weights, and products have been improved.

Cement: Under-weighting of bags has been reduced from 75 to 6 p.c.

Textile Machinery: Statistically designed experiments have led to reduction of blade breakage and conservation of expensive imported materials.

Quality Control application in India is being stimulated through the work of the Policy Advisory Committee for Quality Control, the National Productivity Council, Indian Statistical Institute, Indian Quality Control Society, Calcutta and Quality Control Association, Bangalore. The Indian Statistical Institute has established six SQC units to serve industries throughout the country. These Units are located in Bombay, Baroda, Bangalore, Coimbatore, Calcutta and New Delhi.

It is time that we started to think of these methods as a national resource that should be available to all industries, large and small throughout the land. In a scarcity economy, SQC is a potential asset of great value.



Quality Control?

Advice To A New Manager

A DAS GUPTA*

INDUSTRY today is very much concerned about stabilised industrial peace and high productivity. Since these are universal objectives, it is worth while considering: (a) Why many of us have not achieved them and also (b) the means by which these objectives could be attained.

We all presume to know very definitely the answer to the first question. It is the other fellows who are to blame—fellows and factors beyond our control—subversive elements, lazy labour, poor supervisors, faulty Government policies, dishonest suppliers, wornout machinery and so on. There is nothing much that *we* can do about it unless the other fellows do their job properly.

This, however, does not provide an answer to the second question: how to achieve stabilised industrial peace and high productivity. If everything is beyond control, there is surely not much to be done. But, *Is Everything Beyond Control?*

If blaming the other fellow solves the problem, then there is no need for introspection. Unfortunately it does not, so the problem remains. And so remains the question: Granting every-

thing is against you, *What Can You Do About It?*

Let us try to answer this question from the standpoint of a new manager who is brought into an organisation where things are admittedly in a mess; and he is asked to put things right. What will be his approach?

Obviously, he cannot start by blaming everybody around him because that would be admitting that the job is too big for him. He therefore has to accept the challenge and start with the work.

His first duty will obviously be to know the situation and to acquire a correct understanding of the problems. For this, he needs to go through old records to know the historical background, interview a cross section of the members of the organisation and then make his own analysis of facts as he sees them. He will thus be able to form an idea of the nature and magnitude of the problems that face him, assess the needs of the situation and make out a mental list of possible solutions.

Perhaps he would find after such a rational analysis that (a) the real situation is totally different from what it has so long been assumed to be; (b) the assessment of personalities has been done incorrectly; (c) the problems have not been properly understood and (d) the solution is quite opposite to what had so long been in view. Perhaps he would find that the fault lies not so much with the men, materials or machines but with Management.

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Such a diagnosis will perhaps startle many and be not readily accepted. It may, therefore, be necessary to place facts and figures against opinions and impressions and get the new thesis accepted. If he fails in getting his programme accepted and yet remains convinced of the correctness of his own findings, the only honourable course left open for him is to quit. But if he has been entrusted with the responsibility and if the top management believes in delegation, the chances are that he will be allowed to go ahead according to his own convictions and try out his methods.

This aspect of real delegation is incidentally very important. The Manager must have the authority to go ahead as he thinks necessary and he must get the backing of the top management. To put the house in order, he will undoubtedly raise enemies—many will try to pull him down, pick holes and neutralise his efforts. If he has to succeed, such attempts must get the strongest discouragement from men at the top.

It is also equally important that the Manager takes the fullest responsibility for his decisions and actions. He must realise that he would *ultimately be judged by results* and therefore he must get results; that he cannot blame anybody else other than himself, if he fails in the task. He must therefore keep this all-important question staring at him all the time: *'Granting that everything and everybody is so bad as that, What Can I Do About It?'*

With the whole problem brought down to this simple proposition: 'I MUST DO IT OR QUIT', he will find the light to guide him through darkness. The challenge is there and it has been accepted. Therefore, Go ahead!

The next important thing, after an objective assessment of the present situation, is to fix the goal—to answer

the question 'What Do I Want To Get?' It is highly desirable that at this stage he ceases to be a realist and becomes an idealist. There is no point in keeping ambitions low. If you must aim, *Why not aim at the best of the best?* We can expect therefore that the ambitions of this man will be to make his organisation an ideal one in every respect.

This apparently utopian goal—'apparently' but not really, because it is not beyond the realm of possibility—has to be broken down into several objectives for formulation of the programme and direction of activities. For a manufacturing unit these objectives will be somewhat like this:

1. Combining the members of the organisation into a happy and disciplined working team with a high morale, giving its best willingly for the fulfilment of the objectives in view.
2. Motivating, training and developing people to increase the quality and quantity of their contribution.
3. Maintaining uninterrupted operation at peak efficiency levels.
4. Maximising output through the fullest utilisation of men, materials and machines.
5. Improving and maintaining product quality to the level of the best in the market.
6. Minimising costs of production.
7. Standardization and simplification of work methods, processes, systems and procedures to minimise all avoidable waste of time and effort.
8. Controlling inventories at an appropriate level and using them with profit without affecting operational efficiency.
9. Assurance of a steady and expanding market and maintenance of best customer relations.

10. High reputation with customers, employees, government organisations and community in general.

This list is not exhaustive but it broadly represents the principal aims towards the realisation of which our friend—the new manager—will have to work.

The first thing he must realise at start is that his success would depend on the willing co-operation of his people at all levels. He would be well advised, therefore, not to attempt to be an authoritarian leader, a "boss"; he must shake off any ego or 'superiority complex' he may happen to possess; he has to be fair and sincere in his thoughts and actions; he must be loyal and sympathetic towards his men but firm when required, not allowing personal ambitions, interests, prejudices or shortcomings to affect the best interests of the organisation.

Thus having prepared himself for action, he may proceed to frame a programme of action. This programme will naturally be an integrated programme aiming at the realisation of the totality of the objectives in view. For practical reasons the programme has necessarily to be phased and the most important things would have to be tackled first. Judicial fixing of priorities with an eye to the overall objectives is an important factor leading to success.

As already hinted, the first important thing is to pay attention to Men: to ensure that each man knows exactly what he is supposed to do and that he can apply his mind to his work freely and cheerfully. It will, therefore, be necessary to put the organisation structure in the right shape and solve the problems of Personnel Relations in the first place. Quite likely, there will be a long list of grievances pending for a long time, issues settled in a half hearted manner with no finality being

reached, a standing conflict relating to prerogatives, rights and responsibilities or to specific issues and a vast ground of misunderstanding created through callousness, poor communications, prides and prejudices or non-recognition of common interests.

In building or rebuilding of the organisation, the new manager should be guided by theoretical principles as well as practical considerations. An organisation chart may look very nice on paper but may not work in practice. It is quite an easy job to start from scratch, but to reorganise, individuals have to be taken into consideration. The aim will be to put the right man in the right place and to get the best from everybody. For this, theoretical principles sometimes may have to be sacrificed for practical gains.

To improve Personnel relations, the new manager will have to analyse the causes of conflict in the past, know the exact nature and magnitude of grievances and try to eliminate them on a long term basis. If there is a workers' union existing, the best course will be to enter into a thorough understanding with it—not only with regard to the specific issues under dispute but also on mutual rights and responsibilities, on the common objectives and on the fundamental principles which would govern industrial relations within the organisation. Apart from ethical considerations, it will be an extremely unwise step to try to weaken the union (instead of strengthening it) for two very practical reasons. First, it is much easier to deal with representatives of an organised body than with a mass of disorganised individuals, and second, *only a strong union can deliver the goods.*

Basically, every worker wants to do the work allotted to him, accepts rules of the organisation in which he works and wants to live in peace with others.

He wants to have job security, a fair wage, good working conditions, some recognition and some promotion opportunities. Basically, he wants to be treated as an individual and not just as a *token number*.

These natural needs are not difficult to meet and yet, for some reasons or other, these are not often given the importance they deserve. We can expect our new manager to take a rational view of things and do something to meet these needs. We can also expect that he will be sympathetic to human shortcomings and failures and will *not judge men too harshly*, recognising that as individuals they are perhaps no better and no worse than he himself.

Provided the right gesture has been shown from the management side and it has been *made clear through words and deeds* that for improved operational efficiency and higher productivity, the gains would be shared equitably with the employees on a rational basis, it may be reasonably assumed that the right psychological climate has been created to launch the campaign for lasting industrial peace and higher productivity.

It will be necessary at this stage to replace unilateral, unscientific and unfair systems of wage fixation, bonus payments, setting of production norms, etc., by rational methods employing the tools and techniques of Industrial Engineering, such as Job Evaluation, Merit Rating, Incentive Schemes, Work Study and so on. Laying down a systematic method for handling of grievances—grievances will be there as long as an organisation exists—will also be necessary to ensure that they are given the due and prompt attention they deserve. Setting up machinery for joint consultation in various fields such as Personnel Relations, Production, Job Evaluation, Standards fixation, Welfare measures, Safety, etc., will not only help better communication but ensure

active participation. Means of Communication will require to be widened and deepened through meetings, bulletins, house journals, group discussions, informal talks and free contacts. Since *ignorance is the source of most of our troubles*, great emphasis will have to be laid on employees' education (including campaign against illiteracy) and training programmes.

All these various measures being initiated, our friend—the new manager—will observe that the interests of the employees have merged with the interests of the employers and the field of conflict has changed into an area of agreement. It will then be a simple matter to perpetuate this state of happy relations and merging of interests through a comprehensive, long term Union-Management agreement and stabilise industrial peace and drive for higher productivity on a lasting basis.

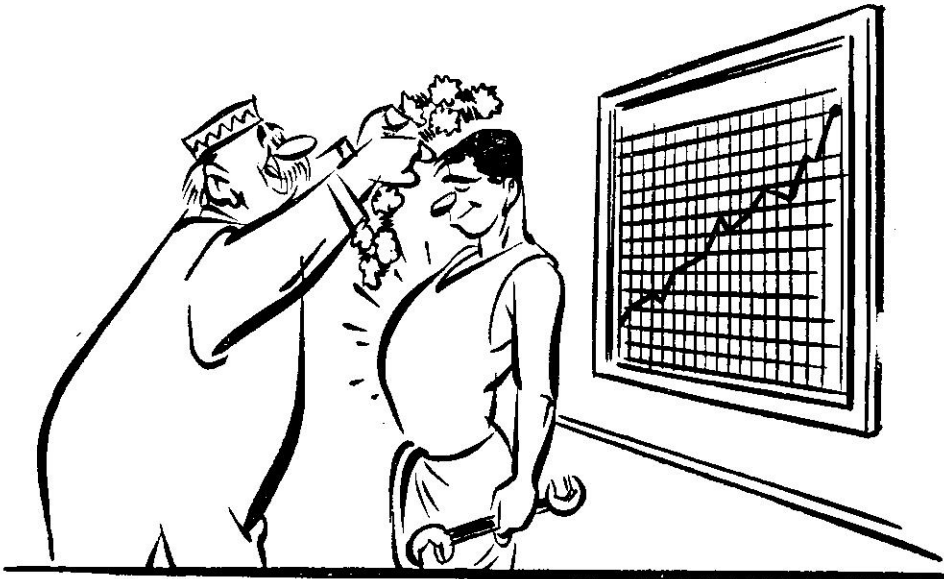
While the Agreement will stabilise industrial relations and combine the whole work-force into a team working willingly for the attainment of the objectives in view, the task of the management for providing better methods, better machines, better materials, better working conditions and higher gains through increased productivity remains—or in fact increases. Constant efforts will therefore have to be directed towards collection and analysis of facts, looking for sources of loss and evolving improved methods and techniques to improve quality, production and productivity and to reduce costs. The tools of Method Study, Work measurement, Statistical Quality Control, Inventory Control, Production Planning and Control, Plant Layout, Materials handling, Budgetary Control, Cost Control, Standardization, Simplification and Specialisation, Preventive Maintenance, Training Within Industry, Suggestion Schemes, Operational Research, etc., are therefore to be applied extensively and intensively for

maximising output of best quality material at lowest cost.

The responsibility for initiating and maintaining Productivity campaign rests with the management, and our new manager knows this. He will, therefore, not join the crowd and start blaming the workforce for bad quality, low productivity, high costs and poor discipline and morale. He, on the other hand, will blame himself first, as part of management for not creating the necessary conditions and climate and providing the necessary facilities so that the men will be happy and able to improve their performance. He knows that this is his primary task as manager, namely, to create and maintain a condition where everybody feels like

giving and gives his best and is rewarded for doing so. Having put the organisation in the right shape and having secured the employees' goodwill through just, firm and sympathetic dealing and redress of their legitimate grievances, he will set himself to the task of providing the means and methods of improving workers' performance and earnings. His approach is therefore totally different from the common approach and this will in course of time bring him success.

Towards the goal of stabilised industrial peace and higher productivity this is the practical approach of our friend, the new manager. Is it correct? Is it difficult? Is it unrealistic? Is it Utopian? Can this be—shall this be—Your approach and mine?



Acknowledge good work

NPC And The Productivity Movement

NPC will be two years old in February 1960; and it will be time to evaluate. In the meanwhile, NPC has to do its own self-appraisal, mainly to eliminate weaknesses that creep in at the incipient stages of any organisation; and simultaneously to get ready for the real task that remains: the evolution and application of productivity techniques at the plant level.

There is little doubt that productivity consciousness has been roused at various points in the economy. The pace at which Local Productivity Councils have been established in the country, the way seminars and conferences on Productivity are being organised, the enthusiasm that is being shown by various participants in discussions on Productivity, the number and quality of articles appearing in technological, commercial and economic literature, the number of economists, administrators, leaders of commerce and industry and trade unions who are evincing interest in the movement—all these and many other signs indicate that the Productivity Drive is in the process of acquiring a self-generating character.

Besides putting the productivity movement on the rails, NPC has during the last 18 months, since its birth, organised five Regional Directorates and built up contacts with Productivity Organisations abroad. Under the active guidance of NPC Headquarters, the Regional Directorates have in turn set up a whole network of Local Productivity Councils. Training Programmes have been organised both here and abroad. NPC is sending out 7 Productivity Teams during 1959 and another 15

Teams in 1960. Itineraries of the Teams so far finalised cover Italy, the USA, Japan, Switzerland, West Germany, France, Sweden, Holland and the United Kingdom. Talks are being held with the Soviet Union and Czechoslovakia for organising suitable training programmes in those countries. Three Teams sent abroad have returned and shared their experiences with us. One Team has already submitted its Report and others are finalising theirs. There has been thus a substantial gain in the knowledge of Productivity Techniques in various lines.

On the domestic front, training courses are being organised in Work Study, Production Control, Cost Control, Materials Handling etc. A basic course in Work Study has been just completed. What is encouraging is that requests for similar courses have been received from Ahmedabad, Asansol, Bangalore, Baroda, Cochin, Dalmianagar, Hyderabad, Rampur and Salem. Action is being taken to organise Work Study Courses at these centres. The fact is that the aggregate demand on NPC services far exceeds the present resources at the disposal of NPC. This is a good sign and stimulates further marshalling of resources.

To illustrate what the position concretely is, with regard to activities of NPC and associated organisations, a broad survey has been made below of recent developments in the Productivity movement and the part played therein by NPC, LPCs, Business Management Associations, industrial firms and others interested in the enhancement of Productivity.

LOCAL PRODUCTIVITY COUNCILS

The following account of Local Productivity Councils shows intense activity in industrial centres. Seminars and Conferences on Productivity and Training in Productivity Techniques are being organised, in most cases with active assistance of NPC Regional Directorates. NPC specialists are helping LPCs in the effective execution of their programmes. Care is being taken to remove bottlenecks which impede their functioning.

The map on the back page shows the places at which LPCs have been established. In all there are at present 29 LPCs in position and some more are on the cards.

Below a brief account is given of the recent activities undertaken by some of the LPCs.

A course on Statistical Method in Engineering began under the auspices of the *Bombay Productivity Council* on 12 September. The Institute of Industrial Engineers, Bombay, is associated with the programme, which covers (a) Basic Statistical Theory, (b) Process Control, (c) Acceptance Sampling, (d) Design of Experiments and (e) Case Study.

The Council has selected three candidates from Trade Unions for participating in the Workers' Education Course commencing at Calcutta this month. In collaboration with the Bombay Management Association and Sales Executive Association, an "Appreciation Course in Marketing Research" is being organised by the Bombay Productivity Council.

The Council has a plan to organise a course in Advanced Work Study in collaboration with the Institute of Production Engineers. Persons employed in industries and State Government will be trained in the organisation and functioning of a Work Study Depart-

ment. The Course will be both theoretical and practical, with an emphasis on productivity techniques.

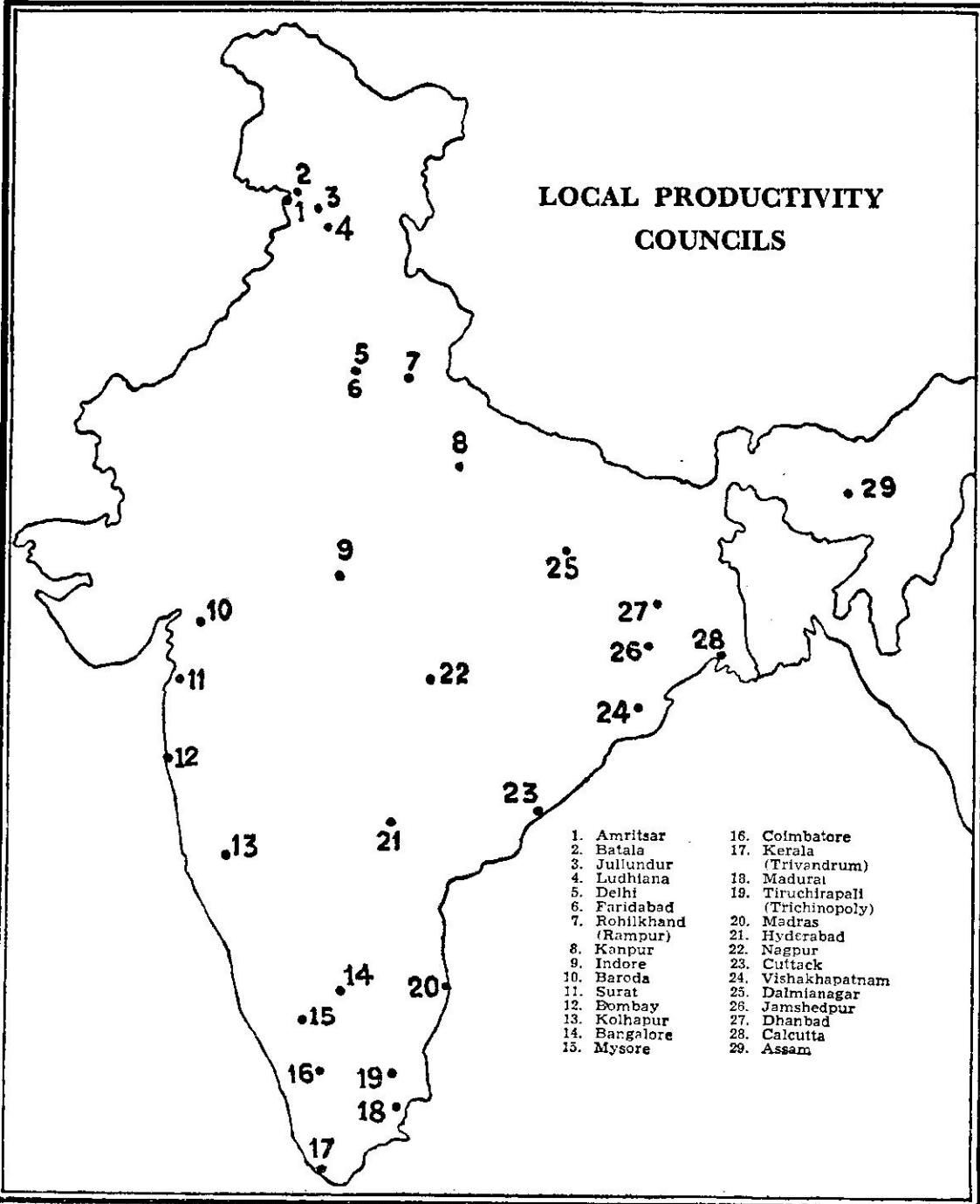
Baroda Productivity Council has been particularly active in recent months. Its managing committee met in the beginning of August to consider the holding of a Productivity Seminar and conducting a two-month training course in Work Study. It is also thinking of organising a Workers' Education Course in the near future. The Council has been arranging talks, seminars, inter-plant visits etc. Under its auspices Shri S. B. Pattani, Methods Engineer of Jyoti Ltd., gave a talk on "Work Study—An administrative Tool for Increased Productivity" on 29 July. Again, on 17 August a seminar on "Incentives for Higher Productivity" was held. NPC specialists gave a talk on the occasion, and it was well attended. An inter-plant visit to Sarabhai Chemicals was arranged by the Council. It proposes to sponsor three In-country Productivity Teams in the near future.

Madras Productivity Council proposes to organise two seminars in the near future—one on Management Accounting and the other on Materials Handling.

Under the auspices of the *Coimbatore Productivity Council*, a training course on Cost Control with special reference to the textile industry, commenced on 7 September. There was a two-day seminar on Employees Selection and Placement on 2 September. The Institute of Management, Coimbatore, collaborated with the Council in organising the seminar; and as usual, NPC assisted.

Salem Productivity Council held a seminar on Higher Management on 16 and 17 September. The Role of Management and Labour in realising Higher Productivity goals was discussed, as also Management Techniques and Statistics.

LOCAL PRODUCTIVITY COUNCILS



Andhra Pradesh Productivity Council is having a seminar on "Higher Management" at Hyderabad from 12 to 14 October. At the same place, a training course in Production Planning and Control will be conducted during the first fortnight of November.

Mysore State Productivity Council has decided to sponsor 3 special study teams (of 6 members each) under its Inter-plant Visits Programme. Their subjects are (i) Welfare, (ii) Safety and (iii) Materials Handling. These teams will visit various units in consultation with the NPC Regional Directorate, Bangalore, at fortnightly intervals.

A talk on "Training in Management in USA and Europe" was given by Prof. R. Natarajan, on 6 August which was followed by an interesting discussion.

Kerala State Productivity Council organised a course on "Work Study", in collaboration with Kerala Institute of Management, from 7 to 13 September.

A basic course in Work Study, organised by NPC specialists from 6 to 26 August, under the auspices of the *Delhi Productivity Council* has been a success, considering the response and the demand for the promotion of such courses.

Assisted by the Productivity Centre, Bombay, the *Rohilkhand Productivity Council* conducted a one-week training programme in Materials Handling in August. The Council organised, last month, a 10-day course on "Conference Leadership" under the guidance of Chief Adviser Factories, Government of India. The Council proposes to conduct a TWI Course at Muradabad. NPC Regional Directorate at Kanpur is assisting in working out the details of this course.

Ludhiana Productivity Council will shortly be sponsoring a Team of 15 members comprising employers, labour

and technicians to visit modern engineering factories at Bangalore.

Dalmianagar Productivity Council conducted a course on "Work Study" during the first week of September. The NPC Regional Directorate Calcutta assisted. There was a talk under the auspices of the Council on "Education in Industries" by Prof. R. Misra, and it was followed by an interesting discussion.

The above account shows that the primary function of rousing productivity consciousness at strategic points in industry is being fairly well performed. As more Councils are formed, the movement is likely to spread.

The formation of new Councils has been as follows: *Cuttack Productivity Council* was registered on 26 July, 1959. Its programme of activities is being finalised. The Ad Hoc Committee for the formation of *Thiruchirapalli Productivity Council* met on 8 August, and adopted its Constitution. It also elected members of the Governing Body, with Shri K. G. Krishnan of Hindustan Lever Ltd. as its President. The Council has by now been officially inaugurated. In fact, it has already begun to do some work. It organised a seminar on "Challenge of Productivity" towards the end of September.

A meeting for the formation of *Madurai Productivity Council* was convened on 19 August, when the Model Constitution was unanimously adopted with minor amendments and a provisional Governing Body elected. A specialist of NPC gave a talk on the "Productivity Movement in India" on the occasion. *Madurai Productivity Council* has also started work. In collaboration with NPC Regional Directorate, Madras, a training course in "Production Planning and Control" was held at Madurai from 21 September to 3 October.

~~Widged~~ Productivity Council was inaugurated by Shri Y B Chavan, Chief Minister, Bombay State, on 31 August.

OTHER PRODUCTIVITY PROGRAMMES

Through its Regional Directorates, NPC is in contact with such institutions and organisations as are associated directly or indirectly with the Productivity Movement. An account of their activities is essential in order to get a complete perspective of the Productivity movement in the country. It is, as in the case of NPC Regional Directorates and the LPCs associated with them, the same story of seminars and conferences and training programmes.

Bombay Management Association has been organising quite a number of talks and conferences on management problems and difficulties. Some time back a Conference was held under the auspices of the Association on "Management Problems of Small Business". This was organised to prepare the ground for the XIII International Management Conference which will be held in Australia early next year. Towards the end of August, Prof. A Zalezind of the Harvard University (USA) gave a talk, under the auspices of the Association on "Human Relations and the Role of the Manager."

Ahmedabad Management Association organised, with the help of the British Information Service, an Audio-Visual Programme on 8 August, at Ahmedabad.

There was a meeting of the *Indian Institute of Personnel Management, Kanpur* on 14 August at which an NPC specialist gave a talk on "Suggestion Scheme". NPC has also lent the services of a specialist to the Institute to assist them in the preparation of pamphlets on "Suggestion Scheme" and "Grievance Procedure".

Indian Institute of Personnel Management, Calcutta, arranged a talk on "Personnel Management vis-a-vis Trade Unionism," by Shri Jatin Chakravorty and Shri S P Ghosh. The Institute is also organising a lecture programme on Job Evaluation and Conference Leadership.

There was a discussion on "Human Relations and the Role of Manager" at the *Institute of Management, Bangalore*, on 23 August. The discussion was initiated by Prof. A Zalezind of Harvard University. Prof. R Natarajan, President, Mysore State Productivity Council, Bangalore, presided. NPC specialist also participated in the discussion.

In August there was a three-week Productivity Seminar at the office of the Indian Aluminium Co., Belur. Prominent persons from the technical and managerial fields (including specialist from NPC) participated. Mr. K S Levick of TCM gave a talk in the seminar on "Productivity from Communist Point of View".

NPC specialists delivered talks at the Workers' Education Centre Bangalore on the following subjects. (i) How Productivity is promoted? (ii) Wage Incentives, (iii) Work Study and Job Evaluation, (iv) Productivity—Effects of the productivity movement on Working Class, Impact of Wages and Progress of Movement in India and (v) Psychologists in Industry.

Indian Institute of Technology, Kharagpur, has a plan to conduct a two-week wholetime "Management Training Course for Senior Executives" (above 35) sometimes towards the end of the year.

Safety First Association of India, UP Branch, Kanpur, organised an industrial safety course towards the end of last month. NPC Regional Directorate, Kanpur, assisted the Association in finalising the details of the syllabus for this course. The Chief Adviser of

Factories delivered a talk on the occasion.

Small Industries Service Institute, Madras, conducted a Seminar on "Marketing Research and Distribution", from 2 to 16 July. Participants were drawn mostly from small industrialists. A course on "Business Management" for Government officers was conducted at the Institute from 20 to 22 August. Talks were given on Industrial Engineering, Marketing, Public Relations and Quality Control.

The Statistical Quality Control Unit of the Indian Statistical Institute organised a course on "Quality Control" at Coimbatore, beginning 25 August. There was a Conference on "Statistical Quality Control" in which NPC specialist participated.

SQC, Delhi, is organising a training course in "Statistical Quality Control" at Delhi, from 27 September to 5 October. Another such course will be conducted from 26 October to 1 November.

NPC is trying to see that Productivity is incorporated in the syllabus of students working for technical degrees. The proposal has been taken up at various levels. It is proposed to supplement lectures on Productivity in Technical Institutions by Audio-Visual Programmes.

In collaboration with NPC Regional Directorate, Kanpur, the Mazdoor Seva Sangh held a Workers' Conference on "Productivity" on 12 September. This is a follow-up of the conference on "Productivity" held at Kanpur towards the end of July.

NPC FOREIGN PROGRAMME

NPC foreign programme has attracted wide attention. It is expected that NPC will be in a position to arrange for these training facilities for a larger number of persons, likely to benefit

from foreign training. NPC may also be able to arrange to send trainees to other countries like France, the Soviet Union and Czechoslovakia. Arrangements with French Authorities are already on the cards; talking stage has been reached in negotiations with other countries.

The position with regard to Productivity Teams is as follows:

Members of two teams—Textiles and Plastics—have recently returned, and shared their experiences with the NPC. They are preparing their Reports, which the NPC will publish. The Small-Scale Industries Team is also likely to return shortly after making a study of small scale industries in Sweden, West Germany, USA and Japan. Two Teams left early last month: Coal Mining Industry and Management Organisation and Training. There has been a change in the programme of the Productivity Team which is to study Factory Building, Layout and Construction. Instead of leaving early next month it is now expected to go abroad early next year.

The first step in the one-year training programme has been taken. Practically all the 40 trainees selected under TCM aid programme for US Fiscal year 1959 left in four batches in September. The candidates selected for French Fellowships have been notified about their study course in France. It is expected that they will leave for France by the end of October. States, not hitherto represented in the list of selected candidates, have been addressed by NPC to recommend candidates.

Applications received under TCM Programme for sending 50 trainees abroad during the US Fiscal Year, 1960, are being scrutinised by the specialists of NPC.

INFORMATION ACTIVITIES

NPC has brought out one more pamphlet: PRODUCTIVITY—A CHAL-

LENGE. It contains a speech of the Prime Minister on Popular and Scientific Approach to Productivity. The Pamphlet also contains articles by Shri Lal Bahadur Shastri, Shri Gulzari Lal Nanda, Shri Manubhai Shah, Dr. P S Lokanathan and Shri H D Shourie. Practically every one of the contributors has emphasised the employment aspect of productivity. The Prime Minister has put the same idea in a wider social perspective: while the scientific method must unreservedly be followed, the idea can only prosper if it finds a place in the hearts of the working people. Science and social psychology must go together.

NPC has by now a fairly well-stocked library of productivity literature. Substantial supplies of books have been received from TCM. These have been catalogued in NPC library and also distributed to Regional Directorates, Local Productivity Councils, employers and workers' organisations and other institutions in need of such publications. A library catalogue is being printed, the idea being to make NPC library facilities freely available to all productivity experts and others interested in the productivity drive.

Tentative arrangements have been made for NPC Documentation List being published through INSDOC. NPC Documentation Committee met recently to consider the specific industrial subjects for which Documentation Service might be given in the first instance and decided that (1) Industrial Management, (2) Industrial Engineering and (3) Industrial Relations might be initially taken up for documentation work for the following industries:

Sugar, Light and Heavy Engineering, Heavy and other Chemicals, Paints and Varnishes, Ceramics and Glassware, Plastics and Rubber.

The Project, however, will take some time to materialise.

AUDIO-VISUAL PROGRAMME

In the Audio-Visual Programme, it may be a matter of pride to highlight that NPC has shot its first silent film with, of course, the assistance of TCM. The film is being processed and may well be ready by the time this Journal is published; otherwise NPC continues to rely largely on supply of films borrowed from the USIS, BIS and other local sources. NPC Regional Directorates organised during August 21 film shows at various places throughout the country. Some of the films shown may be mentioned here: Introducing the New Worker to the Job; Instructing the Worker on the Job; Maintaining Workers' Interest; Principles of Motion Economy; Introducing Work Study; Layout and Handling in Factories; Planning and Layout Works; and Productivity—Key to Plenty. NPC specialists introduced the films by short talks.

A beginning in Productivity Exhibition has been made. NPC Headquarters at New Delhi arranged at their own premises an exhibition on Cost Accounting in August 1959. These exhibition materials have been received under TCM aid and are being shown round the country. They were on display at Kanpur on the occasion of the symposium on Cost Control, Work Study and Quality Control, organised there, towards the end of August. The exhibition has also been shown at other places in Kanpur: Employers' Association of Northern India and Small Scale Services Institute.

IN-COUNTRY PRODUCTIVITY TEAMS

Among other Productivity activities of NPC, In-country Productivity Teams need particular attention. The idea of stimulating technical exchange within the country is finding enthusiastic response. NPC has addressed quite a number of institutions and industries with a view to get their point of view and also to elicit their cooperation. It is

proposed to send out teams for intensive study of different subjects, and NPC specialists will go round the country to popularise the programme. LPCs are being urged to move in the same direction. The idea is to raise the general level of Productivity by learning from the experiences of progressive managements and the techniques introduced by them. It is expected that after a few of these In-country Productivity Teams have gone round, industrialists themselves will feel the usefulness of the project judging by the experience of other countries.

CASE HISTORIES

Operative Manual on Collection of Case Histories has been prepared by NPC for guidance of its Regional Directorates. The idea is to collect a large number of case histories showing worthwhile accomplishments in the application of Productivity Techniques. A number of industrial organisations have already responded and submitted their Case Histories.

ADVISORY SERVICE

NPC has offered Advisory Service to a large number of industrial units. NPC specialists have actually visited a number of industrial units for the purpose. On the other hand certain units have themselves approached the NPC Regional Directorates for assistance in the introduction of Productivity techniques. It is worthwhile mentioning the large number of concerns which have sought the guidance of NPC in this connection. (i) Southern Railway Press, (ii) Madras State Transport, (iii) Salem Magnesite Ltd., Salem, (iv) Shri Rajendra Mills, Salem, (v) Mysore Premier Metal Factory, Madras, (vi) Madras Rubber Factory, (vii) Government Porcelain Factory, (viii) Mysore Electrical Industries, (ix) Metro Malleable Manufacturers Ltd., (x) Deva Rao Shiva Ram Co. P. Ltd., (xi) Desi Soap Works, (xii) Srinivas and Co., (xiii)

Cooper Allen, Kanpur, (xiv) Reliable Water Supply Service of India, (xv) Nagrath Paints, Kanpur, (xvi) Singh Paints, Kanpur, (xvii) S P Foundries, Kanpur, (xviii) Government Roadways Workshop, Agra, (xix) Government Precision Instruments Factory, Lucknow, (xx) Government Engineering Workshop, Roorkee, (xxi) Government Cement Factory Churk (Mirzapur), and (xxii) Government Roadways Central Workshop, Kanpur.

CIRCUIT SCHEME

Response from industrial units to the NPC plan for Circuit Scheme has been encouraging. The following firms in Calcutta have so far agreed to participate in the first Circuit. (i) Metal Box Co. Ltd., (ii) Jay Engineering Works, (iii) The Indian Aluminium Co. Ltd., (iv) Anglo-India Jute Mills Ltd., (v) The Indian Tube Co., (vi) Bengal Potteries. The first meeting of the Circuit was held early in September, when the itinerary and other particulars were decided.

DEVELOPMENT COUNCILS

Specialists and other officers of NPC have been taking interest in the working of practically every official or non-official organisation which can be an instrument for the furtherance of the Productivity drive. They have attended meetings of Development Councils held from time to time. During August, officers of NPC attended meetings of the Development Councils for Drugs, Dyes and Intermediates, Non-Ferrous Metals including Alloys, and the Scientific Instruments Panel of the Council for Bicycles, Sewing Machines and Scientific Instruments. The Development Council for Drugs, Dyes and Intermediates discussed the question of dissemination of information on productivity techniques. The Council requested NPC to consider the sponsoring of a Team during 1960-61. The Deve-

lopment Council for Non-Ferrous metals including Alloys set up a Training sub-committee with NPC representative as the convenor. The meeting of the Scientific Instruments Panel of the Development Council for Bicycles, Sewing Machines and Scientific Instruments discussed production targets, norms of efficiency for improved quality, cost reduction, and suggestions for improving the working of the industry.

PRODUCTIVITY RESEARCH

The second meeting of the Productivity Research Committee of NPC, held on 21 August, decided to sponsor the following research programmes:

(i) A pilot project, each in Bangalore and Calcutta, to study incentive schemes in operation in three or four selected industrial units. The project in Bangalore will be supervised by Dr. M C Munshi of the Indian Institute of Science, Bangalore, and that in Calcutta by Prof. Durganand Singha of the Institute of Technology, Kharagpur.

(ii) A study of grievance procedure in operation in textile mills of Coimbatore. This project will be supervised by Shri P V Raghavan of SITRA, Coimbatore.

(iii) A study of grievance procedure in two non-textile industrial units

in Bombay. The Project will be organised by Dr. M V Moorthy of the Tata Institute of Social Sciences.

A sub-committee was appointed to obtain further details for the proposed survey of quantitative results achieved as a result of Productivity techniques. The Research Committee approved in principle a project of the TWI Association, Ahmedabad, for ascertaining the training needs of Supervisors in local textile units.

PRODUCTIVITY TRAINING

The Training Committee of NPC met on 14 August and approved programmes sponsored by the following institutions:

- (i) Institute of Personnel Management.—Refresher Course for Personnel Managers; Job Relations Course for Supervisors; Conference Leadership Course for Managers.
- (ii) Ahmedabad Textile Industries Research Association.—Courses for Supervisors and Departmental Heads.
- (iii) Institute of Industrial Engineers, Bombay.—Appreciation Course for Top and Middle Management and for Employees' Representatives; Advanced Course for Industrial Engineers.

British Productivity Council

SIR MILES THOMAS*

WHEN, in the autumn of 1952, the time came to 'wind up' the Anglo-American Council on Productivity (AACP), it was considered by the British participants that a formidable task remained. The British Productivity Council was therefore formed. But as the BPC is the "successor in function" of the AACP, a background of the latter would be useful in understanding the functioning of the BPC.

The AACP was an imaginative venture set up on the joint initiative of Mr. Paul Hoffman, then ECA Administrator, and Sir Stafford Cripps, then Chancellor of the Exchequer. Under its aegis, during 1948-1952, 67 representative teams nominated by trade associations, employers' federations, trade unions, professional institutions, universities, technical colleges, and individual firms made extensive tours of American plants and teaching establishments, studying American practice in specific industries, and specialized production techniques. The tours usually lasted six weeks and on their return the teams each published a report. As some of the ablest men in British industry took part in these tours, the reports constitute an extremely valuable survey of American industrial practice which aroused great interest not only in the UK, but in America itself, and elsewhere, in Germany, Russia, Japan, Israel, and other industrial, and developing industrial countries; and many of the reports are still in demand.

One of the factors which contributed to securing such a widespread acceptance of these reports was the whole-hearted co-operation of the trade unions in the project. The Trade Union Congress was represented on the AACP. Trade unionists took a full part in the tours, and in the preparation of the reports, which in every case were unanimous. They had also taken their full share of responsibility for 'follow-up' activities, such as meetings and conferences, organized after the publication of each report, to bring their findings to the attention of industry, as strongly as possible.

Before each of the teams left for the United States, a preliminary tour was organized for them in the United Kingdom during which they were able to see examples of British practice in the particular industry or specialist technique, which they were to study. Graham Hutton calculated that the Americans were then using about twice the horsepower per worker as the United Kingdom, but these pre-departure tours confirmed a general impression that there was little real disparity between the best practice in individual firms in the United Kingdom and in the United States; and in any specific feature, leadership was as likely to be on one side of the Atlantic as on the other.

There were, however, two features of the American industrial scene about which there was broad agreement amongst the teams, supported by a feeling that more vigorous public education in the United Kingdom was urgently

* Chairman, British Productivity Council.

required. The teams generally felt that American firms tended to pay more specific attention to the efficient organization of production, and seemed to make more effective use of production techniques to assist them. One aspect of this was greater emphasis on the teaching of management subjects. The other general impression was that the American workers appeared to have a keener appreciation of what rising productivity meant to them, individually, in terms of better pay and job security.

Although the American might be no more pre-disposed to welcome change than the British counterpart, he accepted it more quickly as a necessary price for progress in which he had a personal stake. These, rather than particular production devices or methods, were felt to be the main lessons to be learnt from the American scene. This was the background against which the BPC was formed.

The project was agreed upon by the sponsoring bodies in the autumn of 1952. These sponsoring bodies were: British Employers' Confederation, Federation of British Industries, Trade Union Congress, Association of British Chambers of Commerce, National Union of Manufacturers, and the Nationalized Industries. They agreed to contribute financially to its support, with the Trades Union Congress bearing its full share. The remainder of the necessary money came initially from Counterpart Funds* and subsequently by grant from the Board of Trade.

To begin with, the Council published a 12-point preamble, the gist of which was that the BPC is a non-political body, "free of Government control and concerned only with the improvement of the economic position of the country for the betterment of all...

1. Counterpart Funds are sterling deposits created by the British Government as counterpart to the dollar aid received from the USA.

Its purpose is to stimulate the improvement of productivity in every section of the national economy by every possible means".

The BPC, as legatee of the AACP, was already committed to a considerable publishing programme. It at once decided to make a series of films on general aspects of productivity to be shown on BPC television. Possibly, however, its most significant initial decision was to set up, in as many industrial communities as possible, local productivity committees. These were planned to be largely autonomous and free to tackle local problems in the way that seemed best suited to the conditions, but with broad support from the Council. The only firm stipulation about their constitution was that, like the Council itself, they should represent both employers and trade unions, as well as educational and professional bodies and interested individuals.

These local organizations have grown steadily in numbers and influence, and there are now more than 100 of them. Their officers met at a National Rally in London at which, to stress the non-partisan nature of the whole development, both the Prime Minister, Mr. Macmillan, and the Leader of the Opposition, Mr. Gaitskell, spoke. This was the first National Rally and its success marks something of a milestone. It can now fairly be claimed that the Local Productivity Committees and Associations have become an accepted and valued part of the national industrial scene. They cherish their autonomy, and their development has been varied indeed, but over the broad picture, certain discernible patterns have emerged.

One of the first projects to attract many of the Committees was the possibility of adapting the successful AACP device of joint management-trade union teams for investigating and reporting on new ideas and techniques to something more suitable for local requirements.

The new version was called the Circuit Scheme. Under it, groups of local firms agreed to exchange visits on a regular schedule by small teams of three or six, representing management, technicians and the shop floor. These regular visits, where they are well organized, and purposefully conducted, have proved most effective in providing for the exchange of ideas and experience on production problems, and in creating and sustaining throughout the participating firms, interest in productivity as a source of security and better living standards. About half the LPCs now operate Circuit Schemes; some 600 firms participate. In Scotland, arrangements have been made for firms from one LPC to visit firms in other districts, thus giving greater variety in the choice of firms to be visited.

Practically all committees have now established some means of promoting exchange of ideas between firms in their area. The North Gloucestershire Productivity Association, in addition to its Circuit Scheme, has a Mutual Aid Directory in which firms list special purpose machinery and specialist personnel whose services are available to other firms; 80 firms participate. Hull LPC has organized an Office Mechanization Scheme which has resulted in big savings to members. Under the scheme, the LPC has catalogued some 600 items of office equipment used by 26 firms in the area. Any member firm can call on any other to see the equipment working and discuss its cost, performance and problems. The aim is not simply to encourage office mechanization, but also to improve basic office procedures. Students at the local College of Commerce are encouraged to join.

Birmingham LPA organizes regular group visits to local factories to study processes and techniques in operation as follow-up to a lecture. They also have a Technical Advisory Service which had dealt with more than 500

inquiries up to the end of last year. The service provides a link between small firms with limited technical resources and the various organizations which disseminate the results of modern research work. An industrial advisory service was formed by Warrington Productivity Committee as an adjunct to the Circuit Scheme. It is designed to meet the needs of small firms which would like to visit larger concerns, or consult with specialist technicians of the larger firms without incurring the liability of a return visit. Large firms in the area offer the services of their specialists and advice, free of charge or obligation.

Certain specific techniques for the better organization of production have been singled out for special treatment. The first was Work Study. More recently, Variety Reduction, Quality Control and Costing have been added to the list. Wherever possible, in cooperation with the appropriate professional bodies, appreciation conferences are organized and lecture courses are arranged, both independently and at technical colleges. Edinburgh Local Productivity Committee dramatized a Work Study case history and had it re-enacted by the original operatives, in the form of a play. In this enterprising way, the principles of Work Study were vividly illustrated.

Tyneside LPC has organized a Work Study Club which now has more than 150 members, who meet in groups in their own time at one another's factories, having previously decided on a job to be work-studied. Their recommendations have resulted in increase in productivity ranging from 20 to 100 per cent. on specific tasks. Each month, the club records these activities in a Gazette, and a copy is sent to the managing director of every firm represented. The full club meets quarterly to discuss the exercises of the various groups, to follow-up specially selected

topics, and to keep abreast of latest developments.

From manufacturing, the interest of the LPCs has spread to other industries. *Most Local Productivity Committees which are suitably located now have an agricultural sub-committee.* Few would think of Preston and Warrington as agricultural areas, yet both committees have agricultural sub-committees which have co-operated in, among other things, an exhibit at the Royal Lancashire Show designed to attract the attention of farmers to techniques which will help them increase productivity.

The circuit scheme idea, too, has been successfully adapted for exchanging information between farms in such subjects as silage making and dairy operations, and surprisingly fruitful visits between farms and offices and factories have been held. With the assistance of BPC Work Study Unit, one-week appreciation courses linked with a practical exercise in some farm operation have been introducing the use of work study techniques to farming.

More recently, there has been a marked growth of activity amongst the retail trades. Local Productivity Committees, frequently in co-operation with local branches of the National Chamber of Trade, the Union of Shop, Distributive and Allied Workers and other bodies, again with the help of the Work Study Unit, have organized conferences and work study five-day appreciation courses with practical exercises.

At Paisley, closed-circuit television was used in a general iron-mongery business to enable the course students to study routine retailing operations without disturbing shoppers. Glasgow Productivity Committee organized a similar appreciation course and practical exercise for the building trades.

In the field of education, LPCs provide a new meeting ground for local

industrialists and technical college teachers which help to break down barriers. Acton and Oxford Committees, among others, are helping to provide opportunities for technical college teachers to act as consultants, particularly to the smaller firms.

Spring Bank Country Secondary School in Derbyshire has introduced teaching on productivity subjects in the final year. The curriculum was worked out by teachers in collaboration with the local productivity committee. At Coventry, the education authorities, teachers, industry and trade unions are co-operating to give youngsters about to leave school a better insight into how industry functions. Pairs of speakers, representing management and trade unions give talks in the schools and answer questions put to them by youngsters. Visits by teachers to local factories are arranged; and it is expected that in the long run teachers themselves will take over the talks on industry in their own schools.

Guildford Productivity Association has organized 40 talks and film shows for local youth organizations, youth clubs, scouts, rangers and church clubs. Lectures on Work Study have been given to pupils of eight grammar schools in South Devon.

Brain trusts, film shows, public meetings and exhibitions, all come within the sphere of LPC activity. Particularly good results have been obtained, when these general activities are concentrated in a limited period, such as the organization of a productivity week or fortnight. Grimsby, Central London, in collaboration with the North London College of Technology, organized an exhibition and a week of conferences which attracted audiences totalling 8,000. A two-week drive was organised at Kidderminster in the spring last year. It included a special newspaper supplement, an exhibition, a film show, a civic lunch, and a poster

campaign, all of which proved very effective.

Co-operation with established bodies has been important in LPC and LPA success. Some initiative in providing for better *liaison* between the many bodies with interest in some aspect of productivity has usually been welcomed. The Leicester committee has established contact with 20 such local organizations, and before the start of the autumn season mutual support for each other's meetings was arranged and conflicts in dates and subject matter resolved. On Merseyside 26 organizations are co-operating in a joint programme of lectures and meetings.

At BPC Headquarters in London, activity is organized into four main branches: publicity and publications, concerned with written material of all kinds; visual aids, which deals with the film production programme, the Work Study Unit etc.; and a special projects section, dealing with specific techniques and applications.

BPC publications are selling at the rate of 40,000 a year. The Anglo-American Productivity Team Reports continue to be in demand. To them has been added a series called Action Pamphlets which deal with such topics as redundancy or the economic background and techniques, such as quality control and work study. There is another series of reviews of productivity in specific industries. Pamphlets of case histories on work study and quality control have been published and a book of case histories of variety reduction is being written. A monthly Bulletin is published which has a circulation of 18,500.

The film production programme, which began with the series produced for BPC television, has continued; 22 have been released and more are in preparation. The chief outlet for these films is the Central Film Library where 'Introducing Work Study' is in the big-

gest demand of all the 600 films in the industrial section; and of the 12 next most popular, nine were made by BPC. These films, it is estimated, are shown at the rate of 20 times every working day. They deal with general aspects of productivity and with particular production techniques like Work Study, Variety Reduction and Quality Control. A great deal of the recent growth of interest amongst farmers and retailers can be attributed to the stimulating effect of two films, one on the application of Work Study techniques in the small shops ('A Nation of Shopkeepers') and the other on the use of these techniques to improve farm operations ('Work Study Aids Farmers'). More recently a film dealing with the use of Work Study in the Building Trades has been produced. Some 500 copies of the film have been sold outright and are held permanently by schools and technical colleges, firms, and other bodies, who put them to regular use. Copies have also been bought by 20 overseas countries.

The Work Study Unit of the Council was set up in 1954, when it was decided to devote particular attention to expanding the use of this technique because it offered the best prospect of increased productivity with little or no additional capital expenditure. The Unit consists of experienced work study specialists who are prepared to organise conferences and appreciation courses, usually under arrangements made by LPCs, though their services are available to other bodies. The Unit does not attempt to train technicians, or undertake consultancy, but it has proved effective in stimulating a real appreciation of Work Study, not only more generally in manufacturing but in comparatively new fields like farming, retailing, the fish trade, printing and building. Their task is to spread an appreciation of what work study can do and the conditions under which it can most effectively be introduced. When a visit from the unit creates a demand for formal training,

LPCs have been able to arrange it with local technical colleges or other means. During 1958 the unit undertook 43 conferences, 64 lectures, and 30 five-day appreciation courses incorporating practical exercises.

With the Work Study Unit firmly established as an integral part of BPC activities, the Council has recently been turning its attention to other techniques. While nothing so elaborate as work study is being attempted, steps have been taken to give effective assistance to LPCs in spreading a more general understanding of the techniques of variety reduction and quality control. Committees of co-opted specialists have been established to advise the BPC, and with their assistance, pamphlets and films have been produced, or are in production. Practical support is provided for local productivity committees in the arrangement of conferences and seminars. For Variety Reduction during the 1959-60 season, a series of 20 conference meetings is being planned, to be followed by 20 two-day seminars and a similar number of conferences and seminars is being arranged on Quality Control. Seven seminars on Integrated Cost Control, which will be led by a European Productivity Agency (EPA) Consultant, Mr. de Marco, have been arranged.

Another recent development has been increasing stress on what is called the industry-by-industry approach, and a Committee of the Council has been set up to work with the trade associations and trade unions to develop joint activities in particular industries. A Retail Distributive Trade Liaison Committee has been formed; also an Agricultural Productivity Committee which represents all the main national organisations in the industry. There is the London Builders' Productivity Committee on which the Council is represented.

Apart from the Work Study Unit at headquarters in London, there is a small

permanent staff dealing with publications and films, and ten Regional Officers assist the LPCs and LPAs, but essentially the BPC and local organizations are run by voluntary workers. Employers, trade unionists, and other interested people in all parts of the country are carrying on the work; upwards of 4,000 of them are actively engaged. During the 1958-59 winter season, public engagements arranged with LPCs were occurring at the rate of more than 100 a month, quite apart from Circuit Team visits, Study Group meetings, and routine committee work.

This reliance on voluntary work is an essential feature of the development of the BPC and the local organisations. As Mr. E L Tuff, founder Chairman of the South London Productivity Association, and now a member of the Council itself, said when commenting on the fact that in other countries similar tasks have been committed to rather more elaborate organizations of paid officials: "This reliance on voluntary effort does a great deal more than just save money. It is an essential characteristic of *our way of doing the job. What is needed in this field right now seems to approach more closely to evangelism than engineering. But it is evangelism which can best be undertaken by an engineer; or let us say one trained and actively employed in industry.*"

An efficient economy, and one where those who work in it have an enthusiastic consciousness of its methods and purposes, are two sides of the same coin. A large number of bodies, and particularly our most forward looking firms, by their example are working towards the realization of such a system in this country. The BPC with its joint, voluntary, and community approach to these ideas has a large and continuing contribution to make.*

* Board of Trade Journal.

Health and Productivity

M N GUPTA*

THE idea of considering man in relation to his environment is not new to medicine. It follows from accepted biological principles. The industrial society of today imposes its own pattern of stress and strain and creates a large number of medical problems, directly or indirectly associated with industrial environment. Medical science, therefore, is obliged to widen its scope in order to take into consideration the complex problems which link the health of man to his working environment. Doctors of preventive and industrial medicine working under the compulsion of modern circumstances have necessarily to join hands with economists, sociologists and psychologists for the inter-disciplinary analysis of the complex industrial life in which we now live and function. These inter-disciplinary researches have helped to interpret and enlighten the experience of men and women at work in every day life. It will be agreed that among several factors operating at a particular time, industrial health is of prime importance in determining the level of productivity.

Research projects, such as those at the Western Electric Works in Chicago

have established the importance of social environment as an important etiological factor in sickness. By and large these researches on the health of workers have led to the conclusion that modern industry does not provide an environment conducive to the development of a healthy and happy mind, capable of achieving and maintaining a high level of productive efficiency.

The unhappy circumstances in industry have led to some sort of an idealistic concept of occupational health. As conceived by the specialised agencies of the United Nations—ILO|WHO—who are concerned with the subject, it has been defined:

“Occupational Health should aim at the promotion and maintenance of the highest degree of physical, mental and social well-being (happiness) of workers in all occupations; the prevention among workers of departures from health caused by their working conditions; the protection of workers in their employment from risks resulting from factors adverse to health; the placing and maintenance of the worker in an occupational environment adapted to his physiological and psychological equipment and, to summarise: the adaptation of work to man and each man to his job.”

In India this concept of occupational health is a dream. Though adequate statistics are not available, the incidence of occupational and non-occupational diseases may possibly be much greater than in other countries, as the average

* Dr. M N Gupta (born 1911) has been Deputy Chief Adviser, Factories (Medical) since 1948. He was delegate to the ILO Conference in Geneva as an expert on Occupational Safety and Health (1954). He has been Chairman of Government Technical Committees on Occupational Diseases under the Workmen's Compensation Laws. He is author of a number of papers on Industrial Health.

Indian worker has lower resistance to disease on account of under-nourishment and general deficiency in health. The following statistics regarding workers reported by the Employees State Insurance Corporation for 1958-59 throw some light on the state of health of industrial workers:—

INCIDENCE PER 1000

Common Cold	..	301.77
Bronchitis	..	240.00
Accidents etc.	..	185.82
Influenza	..	170.08
Arthritis, Rheumatism	..	161.77
Diseases of skin	..	161.57
Dysentery	..	147.68
Digestive diseases	..	146.20
Diarrhoea & Enteritis	..	127.38
Malaria	..	101.12
Avitaminosis	..	62.37
TB Lungs	..	9.28

Probably the effect of health on the productivity of the worker could be better understood if translated into financial terms in the form of benefits payable and the number of man-days lost. The amount of money spent by the Employees' State Insurance Corporation during 1958-59 on the various benefits paid was as follows:—

Medical benefits	..	Rs. 1,68,46,691
Cash benefits:		
Sickness benefits	..	Rs. 1,79,78,393
Extended sickness benefits	..	5,64,481
Other benefits:		
Artificial limbs	..	Rs. 17,922
Total	..	Rs. 3,54,07,487

Sickness benefit paid by the Employees State Insurance Corporation amounted in 1958-59 to nearly Rs. 1.8 crores in respect of over 8.7 million days. These, however, are insufficient statistics, relating only to insured industrial population. The problem really is of a magnitude and character as to require definite large scale planning for health of industrial workers. In the first instance we need statistics for planning. These statistical records

from industry depend upon a number of factors. Small factories do not usually keep any records. Further, a man may be sick but yet due to hardship of economic circumstances may not absent himself from work. Then the nature of employment is also a factor. The fracture of an arm bone will stop the hammer man from work but not a teacher from his teaching. Another factor is the administrative procedure. Short absences of a day or two on account of sickness may not be recorded. In the figures of accidents in mines, for example, incidence of serious accidents alone is shown and minor accidents involving enforced absence of less than 20 days are not shown in the annual report of Chief Inspector of Mines. Establishments differ in their recruitment and discharge policies. There are establishments which are selective in their recruitment and selective also in the discharge of workers, the major consideration being the health of the worker. Other establishments are not equally or not at all selective. Rates of sickness recorded in the various establishments therefore would vary considerably due to differences in recruitment and discharge policies.

In England and Wales, the publication of occupational mortality data was started as early as 1851 and has greatly helped in the highlighting and measurement of special occupational hazards. These statistics have served as important leads to epidemiological inquiries and other special researches. There is need in India for having an organisation to collect data relating to occupational morbidity and mortality. The Workmen's Compensation Act of 1923 & 1959 recognises occupational diseases; and the Factories Act of 1948 requires compulsory notification by attending physicians and management. Yet there is need for collecting detailed statistics to guide our policies and programmes relating to the health of industrial workers.

Promotion and maintenance of health

in industry depends on groups of persons and not on individuals within the industry. The medical profession is at present well organised but its techniques are not sufficient for tackling the problems of industrial health, for it has a wider scope and is more complex in its implications than curative medicine. It is wrongly assumed that industrial health is largely a matter of engineering methods (safety guards, ventilation, lighting, masks and goggles) or statistical study (accident or sickness rates). Because industrial health is concerned with the worker, his working environment and his work, the sphere of industrial health includes work study as a natural corollary to the clinical assessment of the health status of workers done through pre-employment and periodical examinations, which are the primary functions of physicians in industry.

These lead to another function of industrial health, namely, assistance in job analysis. The physician's knowledge of anatomy and physiology of work has to be commandeered to help other specialists.

Additionally, industrial health work can be of assistance in research investigations relating to the following:

- (a) assessment of industrial diseases to provide information on medical control measures;
- (b) use and supply of dangerous materials to prevent risks to health at the earliest possible moment;
- (c) chemical and physical hazards (effects of heat, cold, humidity, noise, vibrations, ionising radiations, radio isotopes, and other chemicals); and
- (d) clinical pathology (laboratory investigations of biological material like blood, lungs, kidney

etc.), radiological examination of workers etc.

Industrial health in the modern sense covers a variety of other functions: health education, health counselling, family planning, nutrition, maternal and child health, medico-social problems of industry etc.

In a developing country as ours we need to plan ahead. We have not yet faced the intricate and sometimes intractable problems that arose out of the industrial revolution in now-developed economies. In this country the pace of progress in industry has not been so fast and the country may not reach the stage till possibly another decade of planning. There is, therefore, yet time, while planning for industrial productivity, to examine what adjustments would be needed by the compelling necessities of a fullfledged industrial economy. The pre-requisites of a higher level of economic well-being and performance is a healthy labour force and a healthy working environment. In a limited way industrialists need to know what ill-health of workers means in terms of increasing cost.

We need, therefore, to organise an industrial health service for carrying out a plan for mental, physical and social health maintenance. The treatment of ailments caused by industrial environment would, however, be a minor function of industrial health services. The Service would be called upon to perform more productive functions relating to job performance, health counselling, reduction of time lost due to accidents and occupational hazards etc. Rise in the tempo of industrialisation is likely to be accompanied by increasing accidents, occupational diseases and ill-health among the workers. Steps, therefore, need be taken in time to tackle the problems before they rise to the status of a national menace.

Interrelations Between Large and Small Industrial Enterprises in Japan¹

Toyoroku Ando²

SINCE the beginning of the Japanese industrial revolution—almost a hundred years ago—small industries have played a major role in the structure and development of Japan's economy.

The following table gives a graphic picture of the position of small scale industry in Japan.

*Number of Enterprises and Workers by activity and scale, 1954.*³

Activity	Percentage of enterprises employing					Total number of enterprises
	4 or less	5-29	30-99	100-299	over 3000	
Manufacturing ..	59.0	35.6	4.2	0.9	0.3	527,846
Mining ..	44.4	37.4	10.6	4.1	3.5	8,329
Construction ..	80.2	16.1	2.9	1.2	0.2	185,790
Transport, communications and other public utilities ..	73.6	19.7	4.6	1.5	0.6	62,082
Wholesaling and retailing ..	87.2	12.3	0.4	0.1	—	1,604,504
Banking and insurance ..	52.1	40.1	7.0	0.6	0.2	57,398
Real estate ..	89.6	9.5	0.8	0.1	—	16,219
Services and professions ..	82.7	15.7	1.5	0.1	—	822,442
All non-agricultural activities ..	80.2	17.8	1.6	0.3	0.1	3,284,610

Activity	Percentage of workers					Total number of workers
	4 or less	5-29	30-99	100-299	over 3000	
Manufacturing ..	11.8	32.1	17.6	12.0	26.5	6,155,722
Mining ..	1.7	7.6	9.7	12.2	68.4	473,303
Construction ..	19.7	28.4	22.6	14.2	9.6	1,180,648
Transport, communications and other public utilities ..	7.7	13.7	14.9	9.7	47.7	1,010,574
Wholesaling and retailing ..	54.9	35.0	6.0	2.1	1.9	4,920,974
Banking and insurance ..	9.2	43.6	28.4	8.5	10.3	657,666
Real estate ..	46.1	31.2	11.9	4.9	5.1	46,274
Services and professions ..	37.9	39.1	17.2	2.7	2.0	3,173,018
All non-agricultural activities ..	28.6	32.7	14.7	7.9	16.1	17,618,479

1. Adapted from Industrialization and Productivity, Bulletin 2, p. 26, United Nations, New York.

2. Mr. Ando, President, Onoda Cement Company, Tokyo, is a Japanese industrialist who participated in the meeting of the panel of Experts in Industrial management in Under-developed Countries, held at United Nations Headquarters in the autumn of 1957.

3. Source: Prime Minister's Office, Bureau of Statistics, Census of Establishments, 1954.

The exceptional position of small-scale industry in Japan is explained by the widely available external economies, principally in the form of cheap electric power and a good transport network, extending to remote rural areas throughout the country. Many small industries are located in rural areas and dispose of abundant labour, working long hours

at low wages, as well as of part-time manpower. Domestic demand is highly diversified; foreign demand, more than one-half of which originates in less developed countries, is chiefly for low-priced consumer goods. As will be seen later, a system of division of labour between large and small enterprises is well established. Under the circumstances, a great many very small, highly specialized concerns find room in the Japanese industrial set-up.

These enterprises offer employment opportunities to a large part of the steadily growing population. The number of persons employed by them, together with the dependents of this group, today approximates 28,000,000—about one-third of the total population.

Part of Japanese small industry is entirely self-supporting and independent of big business. Certain enterprises in this category have an independent field of activity; others coexist with large industries in the same fields and compete with them. The other part, which is the more important, has interdependent relations with large undertakings. In the prevailing form of this relationship, small enterprises act as subcontractors to large-scale enterprises, for which they manufacture a great variety of parts and components. The relationship is complementary and works to mutual advantage; however, the degree of dependence is clearly much larger, and the extent of advantage much less for the small enterprises than for the large ones. At its limit, the relationship for many small enterprises is one of complete subordination to or affiliation with the large companies.

Government action has been taken over a long period to regulate on the one hand the "horizontal" relationships, that is, those within the small industry sector and the large industry sector, and, on the other hand, the "vertical" relationships between the two sectors. It has so far concentrated on the first type, with the aim of strengthening the small

industry sector and, to a lesser extent, of preventing monopolistic action on the part of large undertakings. A few measures have also been taken to regulate the contractual arrangements between the two sectors. The economic and social aspects inherent in both types of relationships have given rise to considerable discussion reflecting the concern with this problem on the part of both government authorities and the general public. In the advanced countries of Europe and America, small industrial enterprises owe their economic survival to specialization in the manufacturing of goods not suited to mass production. In Japan, the unique process of social and economic transformation which took place in the past century in the form of an exceptionally rapid rate of economic growth and a sharp increase in population has enabled many enterprises, large and small, to mushroom side by side in various branches of industry.

SHARE OF SMALL ENTERPRISES IN TOTAL PRODUCTION, BY INDUSTRY, 1954
(Percentage)⁴

100 per cent

Toys
Sewing needles
Metal tableware
Violins
Lacquer ware
Paving bricks

90—100 per cent

Western Clothes
Tools
Cotton processing
Underwear (Knitted)
Underwear (cloth)
Hemp netting
Knitted socks
Metal lath
Braids
Silk and rayon cloth

4. Source: Ministry of International Trade and Industry. Vital Statistics of Production, 1955. Based on United Nations, International Standard Industrial Classification of all Economic Activities, Statistical Papers, Series M, No. 4.

80—90 per cent

Parts of Communication machines
Household utensils
Grindstones
Platform scales
Valve cocks
Leather shoes
Fishing nets
Forged products.

70—80 per cent

Printing ink
Pottery
Woollen goods
Leather goods for industrial use
Laces
Bicycle parts
Fountain pens
Farm Implements
Light metal sheet products
Corrugated cardboard
Cotton textiles

60—70 per cent

Matches
Cast copper-alloy products
Preserved timber
Leather
Steel fittings Harmonicas
Asbestos products
Cast pig-iron products

50—60 per cent

Paints
Wiring parts
Dyeing and finishing of fabrics
Enamelled ironware
Sewing machines
Soap
Pencils
Optical glass
Fibre sheets

The extremely interesting chart reproduced above shows the dominant position of the small sector in the industrial life of Japan.

Small and large establishments co-exist in such industries as weaving, knitting, manufacturing motors and motorcycles, and canning food, which lend themselves to small-scale as well as to

mass production methods. Large-scale enterprises predominate in the manufacturing of iron and steel and other metals, automobiles, cement, wood pulp, caustic soda, chemical fibres, cotton yarn, beer and sugar, the demand for which is generally large, stable and uniform; however, parts and components for some of these products are manufactured by small producers. Small-scale enterprises have practically to themselves the production of such goods as clothing, leather goods, cutlery, toys, wire products, and nuts and bolts. This type of production either caters to particular tastes or fashions or requires a variety of skills and techniques; it involves relatively little mechanization and supplies relatively small markets.

The availability of external economies, the scale of operation and the supply of variously skilled labour, however, are not the only factors making for the survival and development of small enterprises in Japan. Other features of management, production methods, marketing and financing that are peculiar to Japan's economic life have also helped to sustain them. These features are due, to a large extent, to the existence of a system of industrial organization shaped with the help and guidance of the Government. The Japanese Government has enacted several laws to set up special machinery, procedures and regulations to assist small-scale industries. The pivotal organization of this machinery is the Smaller Enterprise Agency, established in 1948 as a specialized bureau of the Ministry of International Trade and Industry. The agency has extensive powers and covers the entire field of assistance to small business. It determines basic policies for fostering and developing smaller enterprises. In particular, it encourages incorporation of small industries in co-operative associations and administers and enforces the Small Enterprise Co-operative Law enacted in 1948 to regulate this type of association. Co-operative organization—which has a long history in Japan—is a

major element of strength in the small industry sector. Co-operative associations provide their members with common facilities for procurement, production, processing, marketing and shipping. Some also secure loans and procure and equip joint production units. In some of these associations members retain their identity as entrepreneurs; in others they are absorbed by the association, which itself assumes entrepreneurial functions and responsibilities. Government subsidies are made available to co-operative associations. Some 35,000 of these operate at present under the Smaller Enterprise Co-operative Law. The co-operative structure is further strengthened by federations of co-operative associations.

Among other functions of the agency is the collection, analysis and dissemination of information of interest to small industry. About 650 information bureaux operate throughout the country. 300 of which receive government subsidies to cover part of their expenses. Technical and managerial guidance is provided free of charge on production, accounting, legal, tax and labour questions. The agency organizes lectures, publishes pamphlets, holds exhibitions, and carries on similar activities.

Upon request, it also extends technical assistance. The commerce and industry bureau established in the five major cities and in the forty-six prefectures provide consultants to conduct surveys, make industrial diagnoses, recommend remedial measures and generally help to solve the many problems facing small enterprises. Consultations are free of charge, some of the cost being met by the Central Government.

Finally, the Smaller Enterprise Agency is active in the field of financing. It assists small enterprises to secure funds from private banks and public financing institutions set up especially for extending credit to them. In this connection, it helps to administer the Small Enterprise Credit Insurance Law. This law

was enacted in 1950 with the aim of facilitating grants of loans by commercial banks to small enterprises and co-operatives, a rather difficult and vexing matter in view of the generally poor credit standing of such establishments. Under the law, the Government insures up to 80 per cent of the amount of the loans granted to eligible individuals and entities. The agency is also involved in the operations of the credit guaranteeing associations which were established in the five major municipalities and the prefectures to guarantee loans to enterprises unable to offer qualified guarantors or adequate collateral; up to 60 per cent of such loans are insured by the Government. Its activities are also linked with those of a number of special banking institutions, such as the Central Bank for Commercial and Industrial Co-operatives, the National Finance Corporation, credit co-operatives and credit corporations established under the Smaller Enterprise Co-operative Law, mutual banks and mutual loan companies. It supervises operations of the Small Enterprise Financing Bank, which extends loans for the modernization of equipment, some in the form of a hire-purchase plan.

There is still much pressure for further legislation designed to achieve stronger and tighter organization of small industry and to delimit and adjust the areas of activity of large and small enterprises. In recent years, large enterprises have made strong advances in all branches of industry and trade. The question of defining and adjusting the respective spheres of activity is, of course, highly controversial and the issue has become largely political. Some Japanese political and economic circles are urging further restrictive measures which would check the inroads of large enterprises into the traditional fields of activity of small business. Others argue, on the contrary, that the government economic policies in favour of small enterprise—which operates at a low level of productivity—hamper the sound

development of the economy and are inimical to the interests of consumers.

The relations of interdependence between small and large enterprises in Japan take mainly the form of subcontracting. Subcontracting developed between the mid-twenties and the mid-thirties, when Japanese industry was being put on a war economy footing. Raw materials were channelled to small-scale and cottage industries through large establishments which received the parts and components manufactured by the former and assembled and delivered the finished goods. This integration of production in small and large establishments became a well-established procedure and expanded considerably thereafter. Today, large factories supply iron and steel to small plants and workshops manufacturing parts for such articles as sewing machines, bicycles, automobiles, optical and precision instruments, watches and appliances; others supply yarn to small weaving mills, processed clay and glazes to small ceramics factories, and so on. Many subcontractors, in turn, further subcontract part of their production to other small firms.

The main advantages to the small entrepreneur engaged in subcontracting are normally that he receives a regular flow of raw materials, has an assured outlet for his product, and obtains assistance, guidance and sometimes also financial aid from the parent company. To safeguard the high quality standards of their production, the parent firms usually impose strict inspection and quality control of the products manufactured by their subcontractors;⁵ assistance consists principally of technical advice and loan of equipment. The parent company furnishes financial assistance by extending its good offices or providing its guarantee for securing loans; occasionally also by granting loans directly to the subcontractor for such purposes

as investing in production facilities or replenishing working capital.

The help given works to the advantage of the large companies too. These benefit mainly from the low production costs of the subcontractors, who generally pay much lower wages than large concerns;⁶ the latter also benefit from being able to reduce correspondingly their own production facilities and skilled labour force and other overhead costs—which serves to isolate them from the effects of violent fluctuations in demand.

By the same token, however, small industry is exposed, in periods of market fluctuations, to the risk that the parent company, controlling the supply of raw materials, may reduce or withhold orders. This practice is by no means general, as many large companies—which, because of their economic and financial strength, are able to withstand the effect of recessionary tendencies or irregular or fluctuating markets—may consider that their own interest requires maintaining output and employment both in their own factories and among their sub-contractors. However, the very system of subcontracting favours large firms by enabling them to spread and thereby minimize risks. It also affords them protection against changes in the nature of demand—small-scale subcontracting factories being generally capable of making change-overs with relatively little difficulty—and to some extent against labour unrest. Moreover, the large enterprises, as suppliers of raw materials and buyers of the output, are apt to enjoy monopolistic advantages vis-a-vis the numerous small producers who are often strenuously competing among themselves and are thus caught in the "scissors" of high-cost raw materials against low-price output. The power of big industry to use subcontractors as a safety valve or buffer against business changes, or to impose

5. In some cases, subcontractors are allowed to use the trademarks of the large concerns.

6. Wage rates in establishments with four to nine workers are about 40 per cent of those of enterprises with 1,000 or more workers.

drastic contractual conditions, especially regarding prices, is particularly great with respect to the subcontractors who are not affiliated to small industry associations. In spite of its drawbacks, the subcontracting system plays an important and continuously increasing role in the Japanese industrial structure. The very weakness of small enterprises—their inferiority in capital and credit resources and the narrowness of markets at their command—makes them generally willing to accept subcontract assignments and enter into affiliation arrangements with large concerns.

There is a wide gap between managerial efficiency, worker productivity and levels of wages and profits in the two groups of enterprises. The imbalance in wage and profit levels appears to be, for the large companies, one of the main inducements to employ subcontractors; on the other hand, the discrepancy in productivity levels is detrimental to their own operations. The low costs in small-scale industry result not only from low wages, but also from small profit margins. Thus, little capital is available for renewal and modernization of equipment and, to that extent, low cost is a hindrance to the improvement of quality standards. By providing, at nominal cost or free of charge, equipment and technical aid, by introducing quality control and similar measures, large enterprises seek to achieve a high level of efficiency and high quality standards in their subcontractors' output, while benefiting at the same time from the low production costs obtaining in small enterprises; it appears, however, that in the small industry sector as a whole, a very large proportion of the equipment in use is worn out or obsolete and that a considerable proportion of the machinery purchased is second-hand. The gap in efficiency due to poor equipment has further widened in recent years as a result of an extensive programme of investment and modernization carried out in big industry. This situation appreciably affects also the in-

terests of large companies employing subcontractors. According to a survey conducted by the Smaller Enterprise Agency in 1956, 40 per cent of the subcontractors surveyed experienced rejection of their deliveries to the parent companies; of these subcontractors, 80 per cent admitted their responsibility for defects in the deliveries.

The low profit margins of small entrepreneurs are due not only to pricing conditions imposed by large concerns, but also to the acute competition between small enterprises which often leads to desperate price cutting. This problem cannot be solved simply by an increase in technical aid by parent companies and in financing facilities by the Government. Further governmental measures to control contractual agreements and to regulate markets will be required.

A widening gap has also been developing in the past few years within small industry itself between its organized and unorganized sectors. While this is the inevitable result of the progress made in promoting and strengthening the sector as a whole, the need to narrow down the gap will become more pressing in the future.

The small industry sector in Japan is now becoming a big economic and political force. How to adjust its internal structure and its relationships with large-scale business and what priorities to give to the development of each so as to promote the growth of the national economy as a whole, is a major economic as well as political problem. The present trend of promotion cartelization within the small industry sector and a better integration with big industry is likely to continue in the foreseeable future; the solution of these problems may involve various forms of protective regulation.

The Japanese experience in this regard has already aroused much interest, particularly in South East Asia. India has much to learn from Japanese experience and organization of small scale industry.

Management Training and Leadership

INDRA SANGHI *

A QUESTION has often been asked whether good managers and leaders are only born or can be trained and whether good management is an art or a science, a mystique or a technique. There could be no unequivocal answer to such questions but it is now generally recognised that management is, to a large extent, a complex technique which can be usefully and properly taught and learnt. But there is still some confusion and a large measure of disagreement as to what to teach, how to teach and whom to teach. In the past, managers generally used to pride themselves on having risen from the ranks and the stories of the back-room-boys having reached the Board of Directors are still not uncommon. Later on, with greater development of education and the emergence of a managerial cadre, people entered industry only after university education, which mostly consisted of history, law, economics or the classics, mainly because either professional management courses did not exist or the existing commercial courses did not have the intellectual appeal of the conventional disciplines. Throughout the industrial revolution and upto 1930 this somehow worked out well enough, but it is now becoming day by day, more and more unsatisfactory as a preparation for executive responsibility in the new age of managerial technology.

Today, the top managerial positions are not given, or rather should not be given, as a reward for long service, personal relationships or other factors, but for the positive and expert help, advice and direction that one can give to the board, in one of the various specialized fields, e.g. technology, finance or accounting, market research, sales or personnel management.

In the last few decades many new techniques have been developed and used to help management. These quasi-scientific methods such as work study, methods engineering, statistical quality control, time and motion techniques, operational research, productivity measurement, and costing etc., require organized and regular training. In addition to the above subjects, there are also some modern, sophisticated mathematical approaches to industrial problems, e.g. linear programming methods, Neumann's theory of games, theory of Queues, information and feedback control theories etc. Most of these were developed and experimented upon in America during and after the second World War. American business schools have been the pioneers in the fields of comprehensive management teaching at under-graduate and post-graduate levels; and these subjects are now being included in European Universities in spite of the conservatism of the traditional departments.

Though some of the methods of the business schools have now become traditional, the system is in a dynamic state of development and there is an energetic and widespread search for improve-

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ment. Teaching of management and business administration may best begin at the under-graduate level and may be organised on the lines of British Technical Colleges or French Commercial Schools. The aim at this level is not to produce leaders or top grade managers but to provide simply well qualified employees. Actual training may be given both through formal lectures and by means of special techniques.

There is then the Graduate School of business, leading to a second degree in management and administration after the first basic degree in arts and science.

At the top of it, there are Refresher or Advanced management training courses for more or less experienced executives.

Methods of actual instruction undoubtedly vary a lot but generally speaking they are less formal and more practical in the United States than in Europe. At the second and the third levels the primary objective is not so much to teach some particular technique as to train individuals in the habit of a correct and complete analysis of situations and in taking right decisions. Of these methods, perhaps the best known is the Harvard case study technique. Essentially, this method depends on discussing cases based on actual past situations, in giving an opportunity to the participants to analyse for themselves all the complex elements of a practical situation and then to arrive at their own conclusions and decisions. In the Harvard University, some 20,000 or more such cases are used. This method is in fact very similar to the clinical method of the medical schools or the precedent citation technique of the law schools.

This method has been found to be quite effective and useful practically for complex subjects and is superior to the teaching of isolated techniques. It is not however a complete answer and has been criticised on 3 scores. The first

drawback is that this method often degenerates into mere demonstration of museum-pieces, specially in the absence of highly gifted professors. Secondly, although it helps the students with practical examples and stimulates discussion yet it does not give them the underlying basic principles. The final objection to this method is that often students' minds become fixed with cases which they have personally liked or discussed and then later always tend to think on those very lines by analogy, rather than using critical faculty and analysing each new case.

Another technique of teaching which has been tried at the (MIT) Massachusetts Institute of Technology is known as the Incident Method. In this, the full case is not given but only outlines of the situation or a complaint are given to the students and they are either encouraged to analyse the incident and to get all the required facts and information from the professor or to dramatise the incident among themselves.

The Carnegie Institute does not believe in producing ready-made managers, trained in applying rule-of-thumb techniques. Stress is laid on cultivation of analytical approach, clear and quantitative thinking and acquisition of knowledge. The aim is not to produce men knowing all the answers to every problem but to equip them properly so that they may be able to search and find their own answers with confidence in their judgment.

Although management education is essential and very useful, yet by itself it is not enough. The intangible quality of personal leadership, sound judgment and an instinct for correct decisions are indispensable for success in top management. It is this factor of leadership and initiative which is so essential and which makes the problem of management so uncertain, for inevitably the question arises whom to train, who can most benefit by such training and who will succeed and come up to top manage-

ment. This search for indefinable qualities of in-born authority and leadership ever remain elusive.

Without this spark of leadership, mere specialisation in techniques (technocracy) would result only in narrowing human outlook. Without competent leadership, based on a broad understanding of the increasingly complex industrial economy, there can be no good management in modern times. It is, therefore, advisable to review briefly the nature, types and problems of leadership here.

Leadership has been classified in several ways: The crowd compeller, the crowd exponent and the crowd representative (W N Conway); the institutional, the dominant and the persuasive (A C Barlett); the radical, the conservative and the scientific (A B Wolfe). This categorisation, however, does not quite help, for there is general failure to distinguish between leadership as such and mere headship of an organisation. It is often found that a person tries to govern an organisation not by virtue of leadership but by sheer force of his formal position and power. It would be generally agreed that this is a very insecure position and an unsound manner of organising a concern. Sometimes it happens that a man becomes an administrator of an organisation not because of his qualities of leadership but because of his technical knowledge. The organisation really becomes rudderless because the man in supreme charge is unable to weld his subordinates into a cooperative team, working under effective leadership.

When there is inadequate or unsound leadership, there is tendency to blame the so-called agitators for lack of morale. The basic cause of industrial unrest really lies in the frustrations already established in an organisation. No agitator can organise a mass of well adjusted people into an aggressive movement.

What then are the attributes of leadership? To answer this question it must be made clear that leadership at every point where it is exercised, resides not in the individual but in the total situation and in the demands of that situation. Each different situation, therefore, demands its own attributes of leadership. It is no use blaming the workers or exhorting them for further sacrifices unless and until the administration and the management can set their own house in order and provide positive and inspiring leadership. It is no use in this connection to compile an anthology of ideal attributes considered essential for leadership. It is simply impossible to have all the desired ideals or attributes of intelligence, good judgment, insight and imagination, ability to accept responsibility, a sense of humour, a balanced personality etc. in any one person or one of the juniors, for if they could find a possessor of all these qualities he would inevitably be in demand elsewhere, not only as a manager but even as a Prime Minister. It is not even necessary for all managers to be paragons either of virtue or of normality. Often it is found that a slight abnormality in some fields may permit or even result in successful leadership. Napoleon, Ford, Cromwell, Carnegie are such examples. The only common factor appears to be that leaders in any particular field must possess the traits of human leadership in addition to superior technical competence or knowledge in a particular field.

Too much specialisation is undesirable, for in industry as well as history, only those who are not highly specialized have been found to survive over long periods, while those who achieve a high degree of specialization in a particular set of conditions, may attain dominance but their existence is short-lived because they cannot adapt to quickly changing conditions.

In the end, the author can do no better than quote from the Taoist scrip-

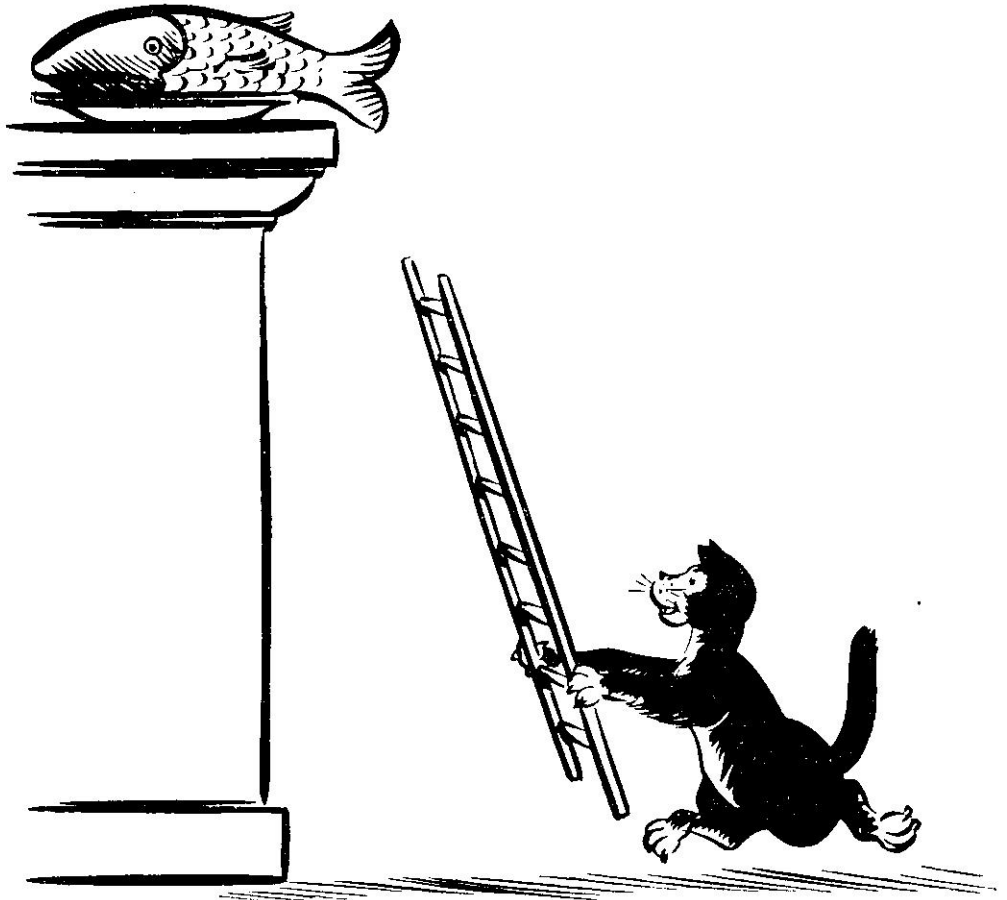
tures of China:

The best soldier is not soldierly,
The best fighter is not ferocious,
The best conqueror does not take
part in war,
The best employer of men keeps him-
self below them,
This is virtue of not contending,

This is ability of using men.
The great rulers, the people do not
notice their existence,
The lesser ones, they attach to and
praise them,
The still lesser ones, they fear them,
The still lesser ones, they despise
them.

"A good commander is a man of high character. He must know his tools of trade. He must be impartial and calm under stress. He must reward promptly and punish justly. He must be accessible, human, humble and patient. He should listen to advice, make his own decision and carry out with energy."

GENERAL JOSEPH STILLWELL.



Incentive for Initiative