XIII No. 1

April - June 1972

PRODUCTIVITY

Special Report

National Seminar on Productivity

PRODUCTIVITY MOVEMENT
MIDDLE MANAGEMENT PERSONALITY
WAGES & PRODUCTIVITY
PRODUCTIVITY OF ORGANISATION
PREVENTIVE MAINTENANCE
QUALITY STRATEGY

INDUSTRIAL RELATIONS
MANAGEMENT BY OBJECTIVES
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SCHEDULING MAINTENANCE JOBS
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Quarterly Journal
of
National Productivity Council of 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 working. Established in 1958, the Council conducts its activities in collaboration with institutions and organisations interested in the Productivity Drive. Forty-seven Local Productivity Councils have been established all over the country and they work as the spearhead of the productivity movement.

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

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

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

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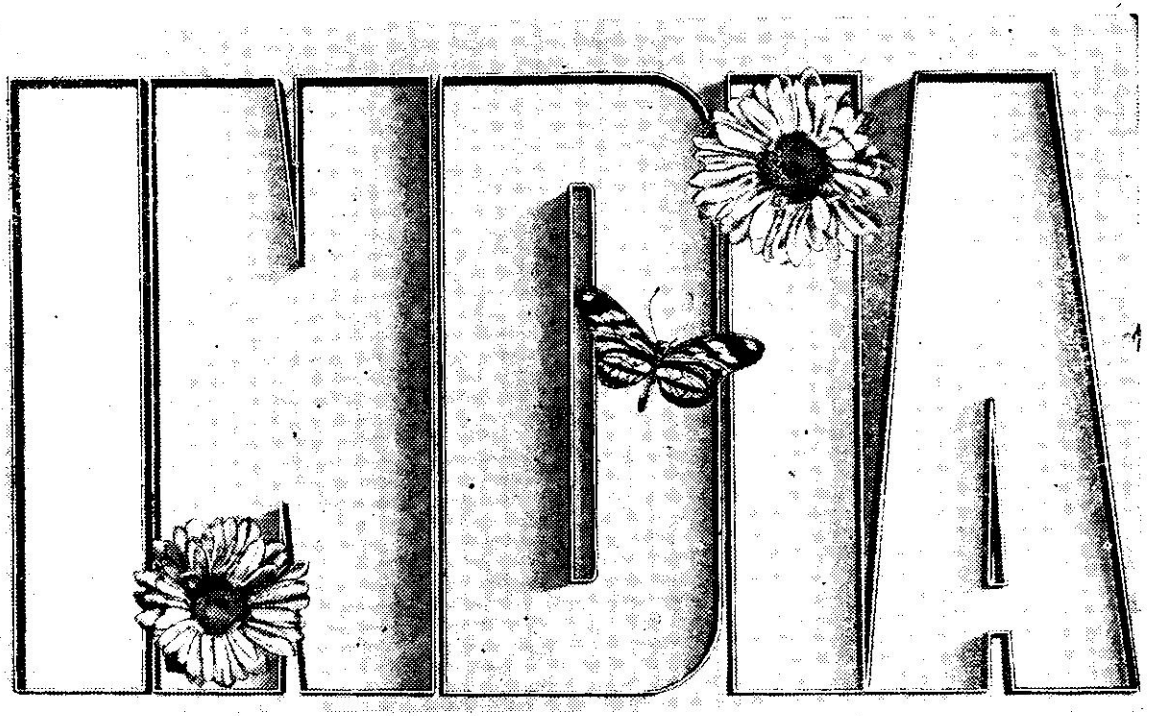

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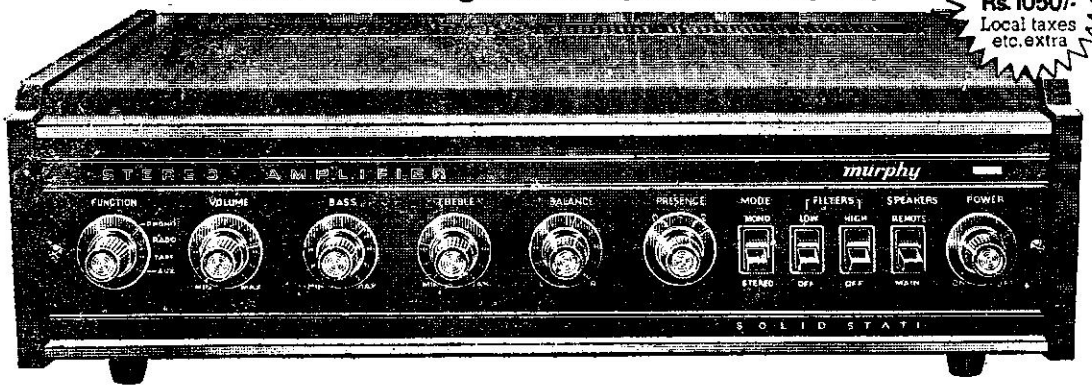

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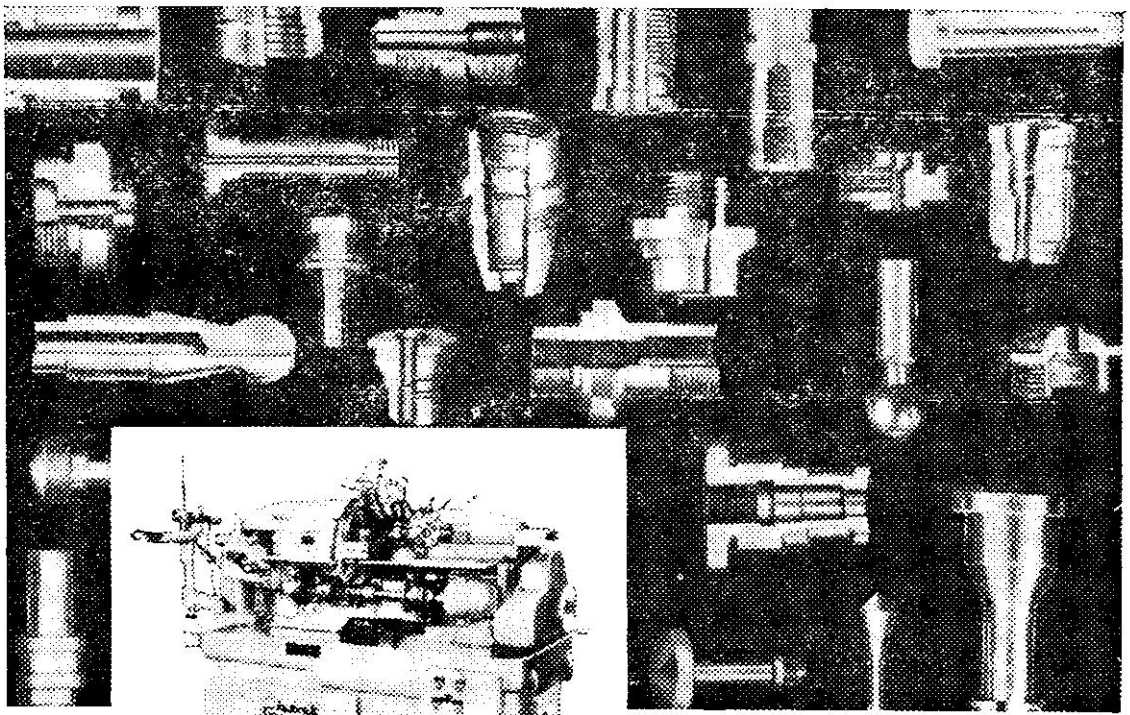

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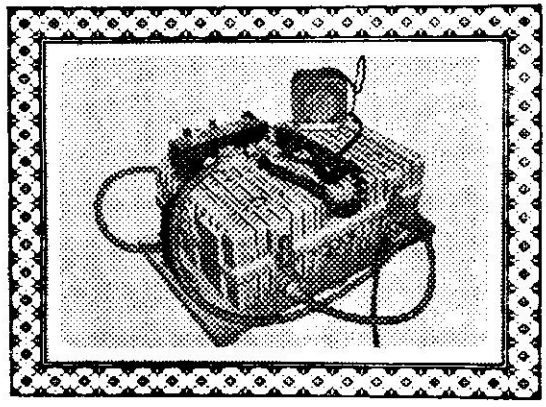

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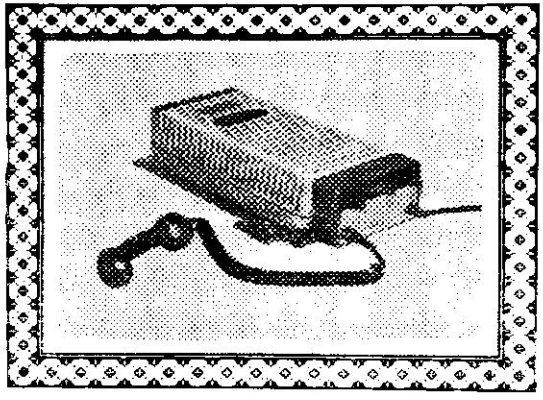

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CONTENTS

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Reviews of Books : Latest books on technology, economics, social sciences, and on all other subjects having a bearing on Productivity will be reviewed in the Journal. Books should be addressed to the Editor, 38 Golf Links, New Delhi 3.

Special Report

National Seminar on Productivity

(March 24-25, 1972)

The National Seminar on Productivity convened by the Government of India at New Delhi, on March 24-25, 1972, marked yet another landmark in the nation's economic history in that it laid down suitable guidelines for the further strengthening of the Productivity Movement. As many as 300 delegates, including top leaders of industry and trade unions, educationists, technologists' and experts from international organisations such as ILO, UNIDO and APO participated in the Seminar.

Mr Moinul Haque Choudhury, Union Minister of Industrial Development, and President of the National Productivity Council, inaugurated the Seminar. Among the distinguished persons who addressed the Seminar or presented papers were Messrs RK Khadilkar, Union Minister of Labour; Siddeshwar Prasad, Union Deputy Minister of Industrial Development; Naval H Tata, President, Employers' Federation of India; B Bhagavati, President, Indian National Trade Union Congress; Takeo Tamarushima, Managing Director and Secretary-General, Japan Productivity Centre; AN Haksar, Chairman, Associated Chambers of Commerce & Industry, and Chairman, Indian Tobacco Co.; SS Mirajkar, President, All India Trade Union Congress; AD Granger, Director, ILO Area Office; Sanjoy Sen, President, Indian Engineering Association; K Sreenivasan, Director, South India Textile Research Association; MV Arunachalam, President, Indian National Committee of the International Chamber of Commerce; Jatin Chakravorty, Secretary, United Trade Union Congress; S Bhoothalingam, Director-General, National Council of Applied Economic Research; Parkash Tandon, Chairman, State Trading Corporation; JH Lascelles, Senior Industrial Development Field

President's Message

RASHTRAPATI BHAVAN
NEW DELHI

I am glad to know that with a view to exploring ways and means to accelerate productivity in the country, the National Productivity Council is organising a seminar in New Delhi in March 1972. National interest demands that we must strive to achieve economic self-reliance in all spheres, agricultural and industrial. I hope the seminar will provide useful guidelines for achieving this objective at the earliest possible time. My best wishes for the success of the seminar.

—VV GIRI

Adviser, UNIDO and BN Bhattasali, Senior Adviser, APO.

A salient feature of the Seminar was the remarkable appreciation of the potential of productivity as an instrument for accelerating the pace of economic growth. The Seminar provided a forum for free and frank expression of views by the delegates on the promotion and growth of Productivity, and also to arrive at a consensus on the methodology to be adopted for achieving increased productivity in all economic endeavours.

The very useful recommendations emerging from the deliberations of the Seminar hold out promise of paving the way for concerted efforts for giving new direction to the productivity movemet in India.

Welcome Address

—NN Wanchoo

Welcoming the distinguished gathering, Mr NN Wanchoo, Chairman, National Productivity Council said that the Seminar had been convened to seek the guidance of all concerned on the new drive and dimensions necessary for giving a new boost to the productivity movement in the coming years, so as to help in the eradication of poverty in the country, and in accelerating its economic growth and development. None could underestimate the importance of productivity in national development and growth. There were two aspects of productivity—one, the technical aspect, covering techniques of better organisation, better management, and better inventories, better handling of resources, avoidance of waste, etc., and the second, far more important, pertaining to the psychological and human aspects, and involving better motivation, better attitudes, and better industrial relations. In all this work, the Government had to play a major role. The National Productivity Council and the Local Productivity Councils concerned, had not been able to pay any serious attention to productivity in the agricultural sector so far; on the other hand, they had confined themselves to industry mainly because of lack of resources.

Inaugural Address

—Moinul Haque Choudhury

Inaugurating the Seminar, Mr Moinul Haque Choudhury, Union Minister of Industrial Development and President of the National Productivity Council pointed out that, "despite the commendable work done by the NPC, a lot more remains to be done to ensure active involvement of all sections of society in raising the productivity levels, and thereby contributing towards achieving a faster rate of economic growth, providing better standards of living for the working classes, giving to the people at large a better and richer life. Such an effort, looking to the economic challenges and opportunities before the nation, must receive top priority from all of us."

Planning for Productivity

The Minister emphasised the need for integrating planning for productivity with the Five-Year Plans of economic development; constitution of industry-wise productivity cells for creating an appropriate atmosphere for the productivity movement at the enterprise level, on a continuing basis; and intensification of the application of productivity techniques in specific areas of national endeavour.

He called upon the representatives of the industrial associations to consider the desirability of establishing industrywise productivity Cells, so that they could work in close colla-

boration with the Planning Commission, the National Productivity Council, and other professional organisations. The main functions of the Cells should be initiating studies in inter-firm comparison, locating factors which impede productivity, providing feedback information and updating the plans for productivity and economic growth.

Mr Choudhury also commended the suggestion for public recognition of productivity performance of individual enterprises "so that they are motivated to sustain the dynamism of a drive for productivity, and of making adequate investments for generating productivity movement in all spheres of economic activity."

Transfer of Technology

Refering to the tremendous progress made the world over in the fields of science and technology, and the need to avail of the advantages of advanced technology from the developed countries by the process of transfer of technology, on a selective basis, the Minister observed that it was both difficult and expensive to develop independent technology from the very scratch in different sectors of the national economy. It was necessary for both management and trade unions to accept the challenge of technological innovations.

Mr Choudhury stressed the need for intensification of application of productivity techniques in specific areas of national endeavour and said that enormous scope for it existed both in the public services as well as in the public utilities.

Sharing Gains of Productivity

Touching upon the problem of Sharing the Gains of higher productivity, the Minister observed that there was a genuine need to develop a national approach on the same. The problem needed to be accorded high priority by the Government, industry and labour. The NPC had come to the conclusion after protracted deliberations in various committees that apart from difficulties in arriving at an overall formula, it would be difficult even to make any such formula universally applicable in practical work situations.

He added: "The NPC accordingly felt that it would be best to suggest, at the national level, broad guidelines, duly supported by such illustrative 'Models' or 'Schemes' of sharing the gains as have been successfully tried by Indian Enterprises under Indian conditions. These guidelines and supporting illustrative 'Models' are ready, and in recommending them, I suggest that both industry and labour should take advantage of the services of NPC/LPCs in formulating enterprise-level incentive schemes and productivity agreements."

Industrial Relations

Referring to the need for cordial industrial relations, the Minister said: "A factor that often hinders cordial industrial relations is the existence of multiplicity of unions at the enterprise level. We should seriously consider the need to evolve a healthy convention for establishing a single bargaining agent for each industrial unit." He commended the efforts of the three major trade unions—the Indian National Trade Union Congress, the All India Trade Union Congress, and the Hind Mazdoor Sabha—towards finalising a common approach to various important issues relating to labour and trade unions, and expressed the hope that the efforts of these three national unions "would go a long way in bringing about cordial industrial relations and thereby higher national productivity."

The Minister also urged all the national trade union organisations "to go beyond their existing functions and take deeper interest in socio-educational endeavour for educating and otherwise preparing the workers for the purpose of participative management. Training of workers to upgrade their skills and developmental programmes for workers and trade union officials for a proper understanding of techno-managerial aspects of economic activities should form an integral part of their functions in the task of raising the levels of productivity."

The Minister expressed the hope that the conclusions emerging from the Seminar would help "make another landmark in the economic history of the country by laying down guidelines for making productivity a way of life in all economic activities of the nation..."

Concluding Remarks

— Siddheshwar Prasad

Mr Siddheshwar Prasad, Union Deputy Minister for Industrial Development, winding up the proceedings, stated that it had to be recognised that the age of miracles had gone, and that, in the present age of science, everybody had to adopt and develop the scientific attitude of mind for dealing with the problems confronting them. The cooperation of everyone was necessary for developing the country, and also for attaining self-reliance in all sectors of the economy. They had to remember that no country had been built with the efforts of only a few individuals.

He referred to the high growth rate in countries like the USA, Germany, and Japan, and went on to point out the position in India where in some States like Haryana and Punjab the growth rate was good, while in others, as in Bengal and Bihar, it was very low. He called for efforts to step up the growth rate in all the States.

The Minister said that there was a growing awareness about the usefulness of productivity. He hoped that in the years to come the productivity concept would embrace all fields of activities. Changes were taking place all around, and they had also to adjust themselves to the changing situation. If they were determined to increase production and productivity, they were bound to succeed.

Recommendations

Following are the recommendations of the Seminar to the Government, Mangement, Trade Unions and the National Productivity Council.

I. RECOMMENDATIONS TO GOVERNMENT

1. The economic development of India can be considerably accelerated by raising the existing levels of productivity in all sectors of the national economy. The Government may, therefore—

(i) Adopt a total approach to economic development and productivity; and integrate planning for productivity with National Five-Year Plans. The National Plan for Productivity may clearly lay down the objectives, tasks, and priorities so that the economy achieves a self-sustaining growth rate;

(ii) Evolve a productivity-oriented industrial policy and prepare industrywise productivity plans for achieving pre-determined rates of productivity and economic growth; and

(iii) Give representation to the National Productivity Council/Local Productivity Councils in the National and State Planning Bodies.

2. The Government may establish a Productivity Cell in every Ministry and Government Department for bringing about efficiency and cost reduction in the administrative machinery.

A Central Productivity Services Division may be constituted under the Cabinet Secretariat to coordinate the productivity activities in all Ministries/Government Departments. At the State level, a Productivity Services Department, under the Chief Secretary, may be set up to coordinate the productivity activities of all the State Departments, each of which again may have a Productivity Cell to implement productivity programmes for improving the level of efficiency.

3. Investment in the productivity movement and productivity agencies needs to be given high priority in the National Five-Year Plans. The Government may, therefore—

(i) Strengthen the NPC both organisationally and financially, to enable it to expand its productivity services, and launch an intensive productivity drive in public and private sectors, and other important areas of national endeavour; and

(ii) Subsidise the NPC Consultancy Service for improving the working performance of public sector enterprises, so that they may act as pace-setters in establishing sound management policies, improved industrial relations, effective workers' participation in management, sharing of the gains of productivity, and, above all, making them as model organisations of productivity for others to follow.

4. In order to create a favourable atmosphere for productivity, the Government may—

(i) Examine the proposal for the setting up of industry-wise Productivity Boards instead of Wage Boards;

(ii) Fix time-limits for concerned Departments for grant of licences for raw materials, machinery, spares and components, etc., so as to avoid complaints of inordinate delays;

(iii) Take adequate measures so that existing industries do not suffer for lack of scope for full utilisation of their capacity. An appraisal may be made of the available excess production capacity in enterprises; and

(v) Provide suitable motivaton to the Government employees by amending the Service Rules suitably, so as to develop among them a feeling of involvement and commitment in the tasks to be accomplished.

5. The Government may encourage enterprises to achieve higher productivity and higher earnings for the working class with the application of productivity techniques and by entering into long-term Productivity Agreements. This encouragement may be by instituting a scheme of public recognition, or awards; providing suitable fiscal concessions; and restructuring of the taxation policy with a view to promoting investment and expenditure on productivity.

6. The feasibility of evolving a taxation plan for a five-year period coinciding with the Five-Year Economic Plan, may also be explored, so that enterprises may have an idea of the extent of tax burden to be borne by them during a particular Plan period.

7. There is a need for massive training and consultancy service for improving productivity in the small scale industries, and State Governments may, therefore—

(i) Subsidise the establishment of a Productivity Cell in each Industrial Estate on the lines of those in Tamil Nadu, Punjab and Mysore; and

(ii) Help develop a suitable maketing organisation for the small industries sector.

8. Since the future of the productivity movement is closely linked with the entrepreneurial development programme, the Central and State Governments may provide facilities for speedier development of small entrepreneurs, and particularly in identifying investment opportunities for them, and advise the financial institutions to play a progressive role in making the entrepreneurial development programme a success.

9. Even though there has been some realisation in regard to having "One-Unit—One

Union" for collective bargaining in the industry, and some spade work also has been done in this direction, the Government may expedite the process, either through mutual discussions with the Trade Unions at the national level or, if necessary, through legislation, in order to encourage a single bargaining agent for each industrial unit. The Government may also scrutinise and revise the various labour laws to eliminate overlapping, if any, and make these laws more productive and productivity-oriented.

10. The Government may ensure that no employer resorts to retrenchment as a result of any productivity improvement. In fact fear of retrenchment was inhibiting the growth of productivity movement in the country.

11. The Government may encourage the managements and trade unions to settle mutually the important issues concerning manpower requirements, production norms, incentives, wage structure, etc., and if need be, they may seek the assistance of NPC/LPCs experts to provide a scientific approach for settling these issues amicably.

12 The Government may introduce productivity as a subject in schools and colleges, so that the coming generation may have the benefit of being conversant with the concepts of productivity, its contribution to economic development, and better standards of living for the society. Efforts may be directed towards inculcating proper values and attitudes among the young generation.

II. RECOMMENDATIONS TO MANAGEMENT

1. The task of promoting productivity in industry is essentially a function of management. The management may, therefore—

(i) Make every possible endeavour to increase production and improve quality by adopting improved techniques which aim at efficient and proper utilisation of the available resources.

(ii) Establish a productivity department in each enterprise both for achieving higher enterprise-level productivity and increased efficiency at all levels—managerial, supervisory, and worker.

(iii) Give assurance that no retrenchment will result as a sequel to increase in productivity, so that it may lead to a greater commitment towards productivity from among the workers.

(iv) Ensure that enterprise-level improvement in productivity is achieved through efficient utilisation of all resources and not merely through maximisation of labour productivity. Improvement in enterprise-level productivity should also bring about higher standards of living, improved working conditions, and welfare of the working class; and

(v) Avoid initial pitfalls arising from wrong choice of plant layout, technology and equipment, as these have an adverse bearing on productivity.

2. Management may introduce a judicious process of democratisation of organisation structure through increased consultation, cooperation and eventually through participation at all levels—workers, supervisors and middle management personnel — in decision-making, particularly in those areas which directly concern them, so that everyone in the organisation develops a common involvement in its objectives and goals.

3. Management has certain important responsibilities towards the working class, and in order to ensure continuous improvement in productvity, it may—

(i) Adopt progressive personnel policies leading to sound industrial relations;

(ii) Recognise the human aspect, and provide proper motivation to employees so as to create an environment under which they may feel enthusiastic to contribute their best apart from developing a feeling that they belong to the enterprise and that the enterprise belongs to them; and

(iii) Try to replace conventional wage agreements by productivity-based rewards agreements, for bringing about higher standards of living for the working class and improved enterprise-level productivity.

4. To ensure cordial labour-management relations, Management and Trade Unions may give a fair trial to sharing the gains of productivity on the basis of the Guidelines and Illustrative "Models" or "Schemes" worked out by the NPC.

5. Training and development of employees at all levels, play a sigrificant role in bringing about sustained improvement in enterprise-level productivity, and, in their own interests, management may—

(i) Set apart a certain percentage of their income for training and development of their employees at all levels;

(ii) Lay greater emphasis in the training and development of workers to enhance their job knowledge and skills;

(iii) Encourage Supervisors to qualify for the NPC Certificate Examination in Supervision, as in the long run it will provide adequately skilled and motivated Supervisors; and

(iv) Introduce the NPC Certificate in Supervision as a desirable qualification for future promotion and development of Supervisors. If properly trained, Supervisors can bring about favourable changes in the attitudes of workers towards productivity improvement plans.

6. Management may gradually adopt improved methods of Planning, Programming, and Budgeting System by combining the concepts of management by objectives, costs and budgets and by substituting expenditure budgeting by performance budgeting with due emphasis on cost norms, and cost and efficiency audits. This will contribute to substantial improvement in managerial productivity.

7. In view of the magnitude of work to be done in the field of industrial productivity, industry-wise productivity cells may be developed for preparing and implementing productivity plans. Such cells should maintain close contacts with the Governmental agencies and the NPC in the implementation of these plans.

III. RECOMMENDATIONS TO TRADE UNIONS

1. Trade Unions may lend wholehearted cooperation to Government and Management in their endeavours to raise enterprise-level productivity in the country. They may, therefore—

(i) Support techniques which lead to productivity rise without causing any retrenchment or unemployment, or intensification of labour's burden;

(ii) Enter into long-term productivity-based rewards agreement with management as a means of contributing towards national economic growth. Such agreements should keep in view the socio-economic needs, and not the point of view of exercising pressure on profit-sharing alone;

(iii) Endeavour to establish their own Productivity Departments or Cells with the assistance of NPC/LPCs, and utilise their services in adopting a scientific approach in dealing with the various problems particularly, in the areas of determining manpower requirements, production norms, incentives, wage differentials, etc., and

(v) Help in facilitating the introduction of the principle of "One Unit—One Union" as a bargaining agent in each industrial unit.

2. To make workers' participation in Management fruitful, Trade Unions may consider trainirg and development of their office-bearers and members in management principles and practices, including concepts and techniques of productivity. Such a process will bring about better understanding of each other's role and improved cooperation in the task of accelerating enterprise-level productivity and higher

standards of living for the working class. The services of NPC/LPCs may be utilised by them in an increasing measure for the purpose.-

IV. RECOMMENDATIONS TO NPC

1. The National Productivity Council may take appropriate steps to recommend to the Government and the Planning Commission the need to integrate planning for productivity with the National Plans for achieving a self-sustaining rate of productivity and economic growth.

2. Efforts may be made by NPC/LPCs to expand further their services, and to devote more attention to public administration, public utilities, welfare services, and commerce. Special attention may be given to productivity in Municipal, Zilla Parishad, and Panchayat administration.

3. In regard to agricultural productivity, NPC/LPCs may concentrate only on improving productivity in the agro-industries, besides devoting attention to post-harvest problems in general and in particular with the problems connected with transportation, marketing and distribution of agricultural inputs, products and implements, as well storage and preservation of agricultural products. Productivity in lumbering industry and forest administration may also require attention as many industries are dependent on timber as a raw material.

4. NPC may develop new methods of performance evaluation of managerial excellence. Expenditure budgeting needs to be substituted by performance budgeting, combining the concepts of costs, budgets, and management by objectives; also cost norms and cost audits should become obligatory like financial norms and financial audits.

5. With more and more costly machinery and equipment in use in the country, their proper maintenance needs attention. NPC/LPCs may, therefore, give greater emphasis to the area of maintenance organisation and systems.

6. NPC may organise, on a priority basis, a special Consultancy Wing to improve productivity of the small scale industries sector.

7. NPC may develop need-oriented training programmes to suit different types of industries, and there should be more of project-oriented and inplant training programmes.

8. It may suggest specific measures to be adopted by Trade Unions in orienting workers and trade union officials for raising the level of productivity. This should be another priority area for NPC/LPCs.

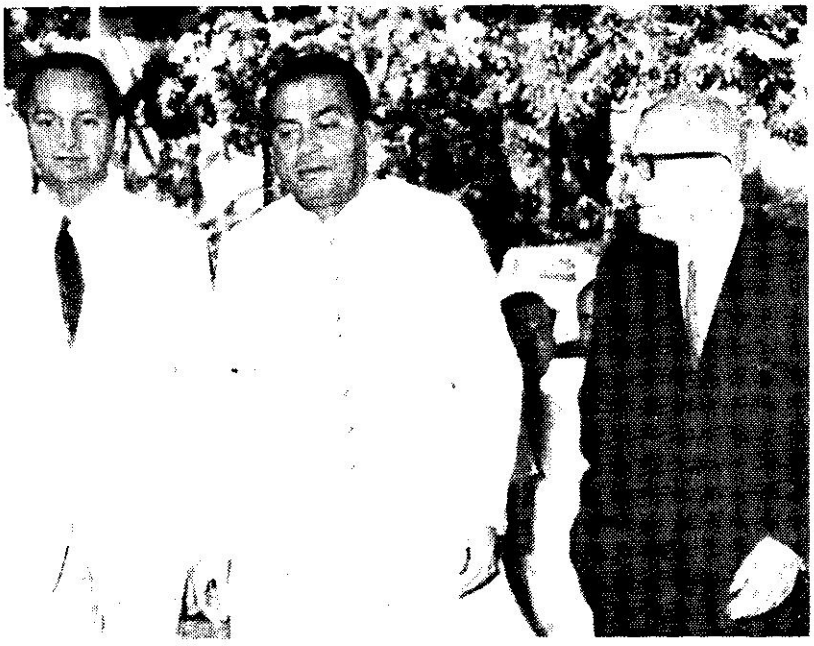
9. As productivity techniques cannot be applied in a strife-torn atmosphere, NPC/LPCs may develop a cadre of competent Arbitrators whose services could be utilised by managements and trade unions in order to avoid the need of taking disputes to the courts.

10. NPC may undertake research in the following important areas:

(i) Development of case studies in productivity, as lack of this has been an inhibiting factor in developing improved practices in productivity and management. For this, industry should provide access to information, and also financial assistance to NPC.

(ii) Study of the growth and development of productivity along with increase in wages in various industries over the past few years, so that the data could be utilised for framing guidelines on the vital issue of linking wages with productivity.

11. In view of the expanded role envisaged for NPC/LPCs in the coming years, efforts may be made to persuade the Central Government to increase its annual grants to NPC substantially, taking due note of the areas to be covered, and also in order to create a new atmosphere for strongthening the productivity movement in the country. At the State level, the LPCs may approach the respective State Governments for additional outlays on the promotion of productivity work. □

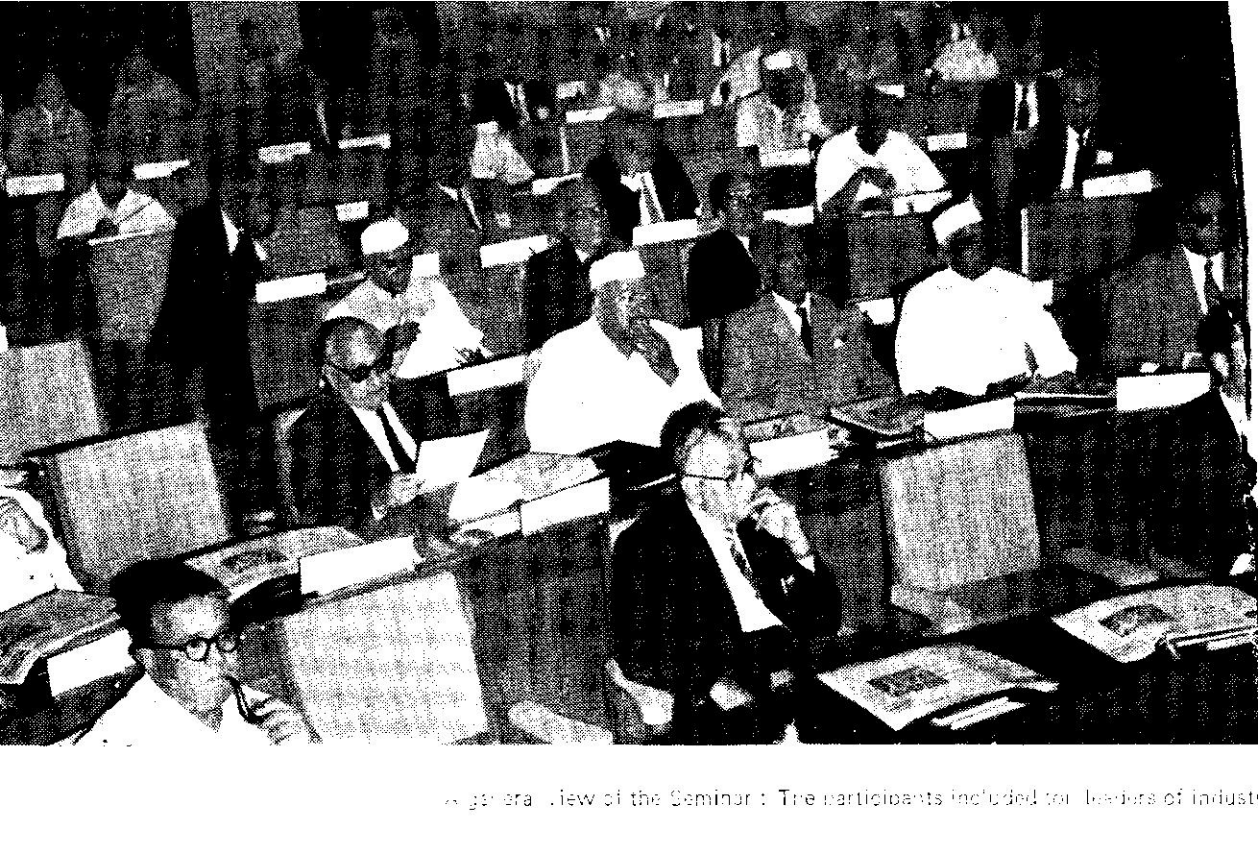


Mr Moinul Haque Choudhury, Union Minister of Industrial Development and President, NPC, arriving to inaugurate the Seminar. He is being received by Mr NN Wanchoo, NPC Chairman (Right) and Dr GR Dalvi, NPC Executive Director (Left).

National Seminar on Productivity

(March 24-25, 1972)

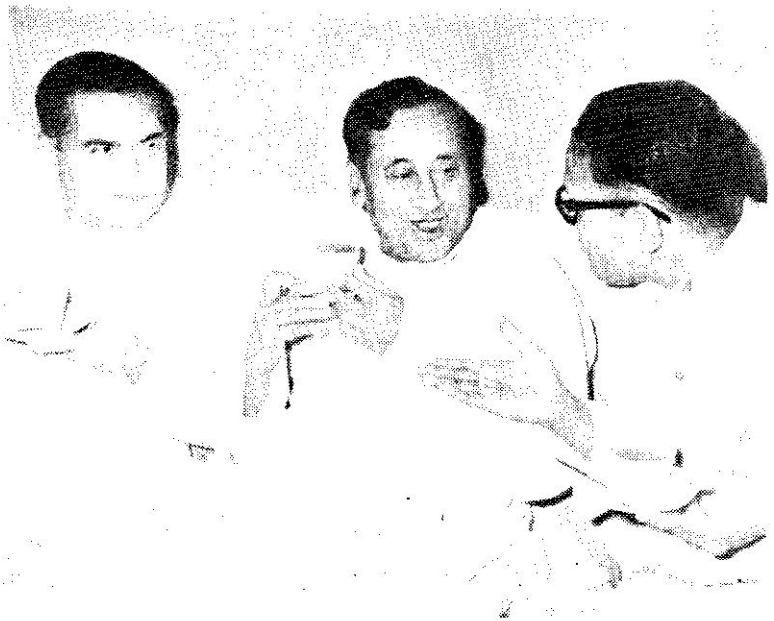
Mr NN Wanchoo, welcoming the Minister and the distinguished delegates.



A general view of the Seminar : The participants included top leaders of industr

Mr Moinul Haque Choudhury inaugurating the Seminar. Mr NN Wanchoo, NPC Chairman, and Mr Naval Tata, President, Employers' Federation of India are seated on his left.

unions, educationists, technologists and experts from International organisations.



Mr Moinul Haque Choudhury, Mr B Bhagwati, President, INTUC, and Prof Siddheshwar Prasad, Union Deputy Minister of Industrial Development, engaged in informal discussions.

(*Above*) Mr Takeo Tamarushima, Director General, Japan Productivity Centre Extreme Left) speaking at the Seminar. Seen in the picture are (*from left*) : Mr B Bhagvati, Prof Siddheshwar Prasad, Mr Mohibul Haque Choudhury and Dr GR Dalvi.

Mr Mohibul Haque Choudhury and Mr NN Wanchoo discussing a point.

Mr Naval Tata having informal exchange of views with the delegates.

Productivity Movement : New Directions And Dimensions*

This paper suggests the guidelines for intensification of the productivity drive in industry, agriculture and services. Apart from contemplating a greatly expanded role for the NPC, the paper highlights various measures for adoption by the industry on the one hand and by the organised labour on the other for increasing productivity.

TWELVE years ago a historic step was taken in the economic life of the country when the National Productivity Council was launched as an autonomous tripartite organisation. During the past decade, this organisation has succeeded in generating a widespread productivity movement in India. The National Productivity Council has created awareness of the importance of productivity and through its services in the field of training, consultancy and publications it has enabled a number of enterprises to apply productivity techniques and improve their levels of productivity. This is evident from the growing demand for NPC's services both from the public as well as private sector of industry.

Drive for Productivity

During the decade, the national economy has developed in a considerable measure. At the same time, the progress made the world over in science, technology and management has held out many promises and hopes. The NPC must, therefore look forward and prepare the ground for a leap forward in extending productivity consciousness and practical application of productivity techniques at the level of individual enterprise. As the country is passing through an era of new challenges and new opportunities, it is imperative to visualise the dimensions and the directions of the productivity movement in the coming decade. It is, therefore, in the fitness of things that the Minister for Industrial Development should have expressed his feeling on the floor of the Rajya Sabha to the effect that all those who are vitally interested in raising the levels of productivity, that is, the representatives of industry, labour and government should get together and prepare a workable plan for the next 10 to 15 years with the objective of creating an all round atmosphere of improved productivity in the country.

The central problem facing the country is the problem of promoting rapid economic development. The solution of a number of national problems would depend to a large extent on the solution of this central problem. For promoting rapid economic development the nation must accept two top priorities; *first* the necessity of increasing the output in agriculture, industry and services so that the economy achieves a growth rate of at least 7 per cent of national income per year. Self-sustaining growth will be possible only if this immediate target is reached. *Secondly*, it is necessary to effectively carry out an intensive drive for raising the levels of productivity so that the utilisation of resources is optimised. The twin drive for increasing production and productivity should be extended to industry, agriculture and services. It is only then that incomes as well as standard

*Working Paper presented at the National Seminar on Productivity, held in New Delhi on 24-25th March 1972.

of living of the greatest number of people will continue to rise.

Economic growth is accelerated by a rational employment of resources. As rise in productivity is dependent upon optimum utilisation of resources there is a direct link between productivity and economic growth. In view of the national objective of promoting rapid economic deveolpment, it is essential that the national plans are reinforced by specific productivity measures at the level of individual enterprises, public utilities and farms. Such organisations must be given appropriate assistance in the pursuit of a relentless drive for raising the levels of productivity. It is only then that the close relationship between economic growth and productivity can be meaningfully utilised for achieving industry-wise and sector-wise targets proposed in the Five-Year Plans.

Role of National Productivity Council

Although the problem of raising the levels of productivity is complex and formidable, it is by no means insurmountable. Whereas the National Productivity Council can derive a certain amount of satisfaction for having substantially contributed towards creating productivity consciousness in various spheres of eonomic activity and particularly in industry, the productivity movement needs to be considerably strengthened through greater involvement of industrialists, trade union leaders, workers, technicians and government officials. It is only through the joint efforts of all these that the movement can secure a rapid momentum. The time has come when the task of raising productivity needs to be given a top priority in our national policies. Consequently, it is necessary to provide all possible assistance to the National Productivity Council as well as the Local Productivity Councils to further extend, diversify and strengthen their programmes and activities. All these efforts need to be invested with a new sense of dynamism and greater vigour so that the productivity movement can acquire new dimensions and achieve bigger and better results.

Management and Productivity

The task of promoting productivity is essentially a function of management. The starting point of increasing productivity at the plant level is the application of productivity techniques which do not require heavy capital investment but which help in the effective utilisation of a given set of resources. However, it is the human resource which has to organise and utilise the plant and machinery or the raw materials and technology. The quality of leadership which the management is able to provide will induce the necessary mental attitude for increased efficiency and will make a world of difference in the task of achieving higher productivity. This approach assumes that the employees are treated as a human factor whose motivation is an essential requisite for achieving results. The emphasis therefore has to be on integration of the human factor into the organisation while creating an environment and atmosphere which can provide to the employee a sense of job satisfaction and self-fulfilment. This will in turn provide an opportunity for collective effort and joint action on the part of management and labour for securing higher productivity.

Industrial Relations

Sound personnel management must be accompanied by healthy and cordial industrial relations. Unhappy industrial relations can cause not only financial loss but lead to the erosion of morale which in consequence can defeat all measures for improving productivity. It is of utmost importance that management at senior levels should evolve a positive philosophy of industrial relations. Management should develop a clear and comprehensive policy for securing a satisfactory relationship with the employees and trade unions.

Economic Incentives

Thus proper motivation of the workers to cooperate fully in the drive for improved productivity by giving their best constitutes the heart of the problem. But how is the workers' cooperation to be enlisted? Apart from providing good working conditions, proper grievance procedure,

appropriate human relations, it is desirable to give the workers a sufficiently attractive economic incentive. It has to be made clear that the gains of improved productivity should be shared by the workers as well as the employers consistent with the broad interests of the community. Concrete measures have, therefore, to be adopted for sharing the gains of productivity. This can be done through collective bargaining for the purpose of achieving productivity agreements at the level of the individual enterprises. The question of sharing the gains of productivity is not a statistical or an abstract exercise. It is a philosophy and a policy of industrial relations. Managements must therefore make every possible effort to reach productivity agreements. On the other hand, once such an approach is indicated, employees and their associations should adopt a constructive view and be forthcoming in securing the application of productivity techniques.

Productivity and Labour

Cordial and constructive industrial relations must therefore be as much a concern of labour as of the employers. In fact, it is in the interest of labour to cooperate with management in their drive for productivity. It is evident that a rise in wages without a corresponding rise in productivity would lead to stagnation of the economy and force a rise in prices whereas a rise in wages consequent on a rise in productivity would contribute to an overall gain not only for the economy but for the worker also. The trade unions must accept in the interest of their members and in the interest of national progress their share of responsibility for creating an appropriate climate of industrial peace and industrial discipline. They must also acknowledge the importance of productivity as an instrument of national progress and more particularly as a means of raising the standard of living of the people including that of industrial labour.

One Unit and One Union

A factor that has added to the difficulties of securing cordial industrial relations is the existence of multiplicity of unions which are often established on the basis of difference in political persuasion and philosophies. In such a situation serious inter-union rivalries have bedevilled the prospect of securing industrial peace and industrial discipline. This has done more harm than good to the interest of the workers. It is therefore desirable to evolve a healthy convention of establishing a single bargaining agent for each industrial unit.

Productivity and Role of Trade Unions

It would be appropriate for trade unions to determine their future role and responsibility in relation to the national task of raising the levels of productivity. It may be necessary for them to go beyond their traditional function of collective bargaining. To build up sanctions necessary for effective bargaining and pursuing the drive for productivity, the trade unions must encourage themselves to take deeper interest in a socio-educational endeavour on behalf of their members. One of their tasks should be to educate and otherwise prepare the workers for the purpose of participative management. Apart from developing technical skills, a proper understanding of techno-managerial aspects of economic activities would be necessary for the vocational advancement of individual workers. It would, therefore, be wise for the trade unions to willingly participate in the programmes for training of workers in productivity techniques. It would be also desirable for them to take active interest in the training of supervisory personnel who provide a critical resource in manufacturing and service organisations. The work-force of today being predominantly young, possessing as it does a level of education which is higher than that of the preceding generation of industrial workers, its training and education for full involvement in the productivity drive requires special attention. Training of workers to upgrade their skills and orientation programmes for workers and trade union officials should, therefore, form an integral part of the efforts of the nation in the task of raising the levels of productivity. Both the work-force as well as trade union officials need now to acquire appropriate training for negotiating incentive schemes and productivity agreements. The National Productivity Council has initiated useful activities in this regard, but considering the magnitude of the task massive effort will have to be devoted for this purpose and concerted

action on the part of the NPC, the LPCs, Trade Unions and enterprises will be necessary in the coming years.

Provision of legal protection to unions is necessary for the promotion of healthy industrial relations. Although the historical context is understandable, politicialisation of the trade union activity has often proved detrimental to industrial peace and industrial progress of the country. The National Labour Commission has recommended that no union office-bearers should concurrently hold office in a political party. It is for trade unoin leaders and workers to deal with this situation in their own as well as in the national interest. The trade unions must make deliberate efforts to improve industrial discipline and encourage their members to take active interest in the drive for productivity at the shop-floor level. These steps will go a long way in forging productivity agreements in a growing number of enterprises.

Government—A Catalyst

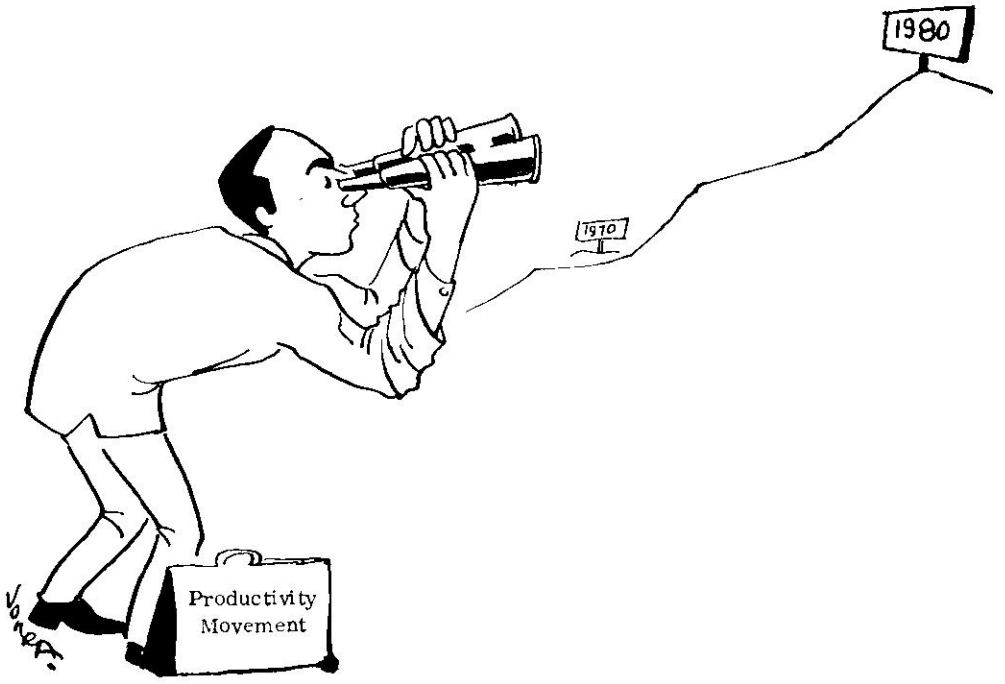
The Government has to play, for improving industrial relations, as important a role as that of industry and labour. The National Commission on Labour has emphasised the need for creating conditions for industrial discipline and industrial peace. Joint Committees and Joint Management Councils could make an effective contribution in this respect, but their success depends upon the attitude of management and the response from the unions. It is here that the Government has to act as a catalytic agent. One way of doing this would be to foster healthy industrial relations in public sector undertakings in which the country has such a large stake, so that these can serve as a model for others.

Productivity and Employment

A powerful factor in the Indian situation which influences the approach to the question of higher productivity is the problem of unemployment. It *appears* as if there is a conflict between job opportunity and higher productivity. In fact labour sometimes sees, although in a mistaken manner, as if this conflict is real and one which cannot be solved. A rational approach to the question of raising productivity can never approve any action which will aggravate the incidence of unemployment. The problem can really be tackled through a rapid expansion of job opportunities which depend on the growth of the economy. The pattern of investment in the national plans can be so worked cut as to provide for multiplying employment opportunities particularly through agricultural extension, rural works, small scale industries etc. The employment potential of small scale industries is higher per unit of capital employed, but such units if they are to function at proper productive capacity will need to be helped in adopting better methods of working, improving the quality of their products, achieving cost reduction and attuning their product and producton to the requirements of the market. The Governments of Tamil Nadu, Mysore and the Punjab have already established through the efforts of the National Productivity Council and the Local Productivity Councils special cells for providing consultancy services to small industries at a subsidised cost. In view of the importance of small scale industries to the development of our national economy, the other State Governments should be urged to take appropriate steps to establish simliar cells.

Utilisation of Installed Capacity

Partial utilisation of the installed capacity in many of our industrial units has not only seriously affected our production as well as productivity potential, but has also bedevilled the price situation. It is often argued that the situation has developed in this manner on account of shortage of raw materials, insufficient allocation of foreign exchange, difficulties in procuring spares and equipments, etc. While there may be some element of truth in this, there is also some justification in the comment that plant capacities are not fully utilised with a view to restricting output for securing higher prices and profit with a view to restricting output for securing higher prices and profit margins. Whatever may be the causes, this



situation needs urgent attention. It would be right to argue that shortages breed scarcity, and therefore expansion and growth are the only remedies against under-utilisation of plant capacities. So far as the Government is concerned, many steps have been taken for a better coordination between the various departments and agencies concerned with the planning and allocations of raw materials, foreign exchange, etc. However, what is more important is that the industries should try to solve these problems through their own initiative and resourcefulness. Import substitution must be accompanied by an effort to supplement or to substitute critical raw materials. At present the quantum of resources made available to research and development is ridiculously small. Industry should make larger funds available for this activity as well as make full use of the national and regional laboratories so that the country can develop its own know-how and equipments. This would be in the best interest of economic growth at the level of the enterprises as also at the level of the national economy. Attention also needs to be paid by the managements to the task of making full use of the knowledge and expertise of specialised organisations in reducing cost of production and improving the quality of products. Quality Control by itself brings in its wake significant economies in production and distribution costs. In order to encourage the industrial establishments to take advantage of science and technology, of research and development, suitable fiscal incentives can be devised and made effective. Equally useful would be a scheme for liberalising allowable provision for depreciation for the purpose of taxation.

The quality of leadership, which the management is able to provide will induce the necessary mental attitude for increased efficiency and will make the task of achieving higher productivity easier.

Productivity in Agriculture

Although in the initial stages of economic planning the progress registered by agriculture was short of the requirements, lately it has been demonstrated that application of scientific knowledge to agriculture and related activities can yield very encouraging results. As the reproduction cycle of agriculture is comparatively shorter, a greater emphasis on a larger investment in raising the level of agricultural productivity can produce substantial results which would be capable of transforming the rural economy. Agriculture, far from being the least productive sector, can provide maximum scope for productivity rise which in turn can contribute growth benefits by way of improving the real wages, augmenting the purchasing power and expanding the national market. The time has, therefore, come when the productivity movement needs to be taken out of the confines of the industrial sector and extended to agriculture. Apart from agriculture proper, a great deal can be done to reduce costs, eliminate waste and also improve the results in such areas as storage of agricultural products, warehousing, cold storage, transportation, marketing, etc. Productivity techniques as applied to these areas for which appropriate services can be made available by the National Productivity Council as well as by the Local Productivity Councils can go a long way in securing substantial benefits for the economy as a whole. Agricultural productivity can also be promoted by improving the performance of those industries which provide the various inputs for agriculture and agro-based industries.

Public Utilities and Public Services

There is an equally good case for extension of productivity techniques to Public Utilities, Service Industries and Public Services. For want of adequate resources, the National Productivity Council has not been able to undertake this much-needed extension, although it is convinced that the tools and techniques of productivity are as effective and beneficial in these fields as they are in industry. It is apt here to refer to two specific lessons of the economic history of the developed countries. First, historical evidence shows that as the economy grows the service industries sector expands at a higher rate than the basic sectors. Secondly, it is clearly established that employment opportunities tend to grow more rapidly in the service industries than in the rest of the economy. To this we may add the lesson of India's own experience in the sphere of economic development. The lesson is that efficiency of public services is vital to the success of economic planning in a developing economy.

Education in Productivity

It must be acknowledged that in India we have still to go a long way in making productivity a way of life with our people. It is necessary to lay greater emphasis on educating various sections of the population in respect of the advantages of productivity and the ways and means of securing them. If productivity is to have any meaning at all, it must touch the lives of all sections of the society. Productivity must form the basis of the new society whose members, whatever their vocation, display a continuous interest and restless endeavour to secure national progress. To achieve this objective it is essential to educate the young citizens of the country through various stages of schooling in a sound understanding and a strong interest in productivity. If productivity is an attitude of mind such an attitude can be nurtured only through a process of sound and liberal education. Similarly, the specialised knowledge and skills

acquired by the technical student are not enough to enable him to meet the challenge of transforming the economic system. The engineering and technology students should therefore be equipped with adequate knowledge about the use of modern techniques of Production Management, Human Relations, Marketing, etc. so that a flair is developed in them for improving performance all round. The universities and technical institutes should give a new orientation to their educational programmes and syllabi. Similarly, Business Management Departments of Universities should provide for proper study of the problems and methods of raising the levels of productivity. Apart from the student community it is necessary to see that the common man is able to understand and appreciate the importance of productivity. It is, therefore, necessary that the productivity movement should touch the life and mind of the common man. This would not be difficult to achieve particularly in view of the fact that effective mass communication has been made possible by modern science and technology. Such media of mass education and communication like films, radio, television, audio-visual publicity, etc. should be utilised in a judicious manner for this purpose. Still another and perhaps more effective way would be of introducing greater efficiency into the working of public offices as well as utility services with which the common man comes into frequent contact in the ordinary business of life. Government offices, Banks, Offices of Municipalities and Panchayats, Electricity and Water Supply Units, Public Transport Undertakings– all these by their efficiency and prompt services can promote the appropriate attitudes and habits of mind of the citizens of the country. Such public services and agencies can by their example give a new view of the importance of productivity efficiency and quality of work to the common man.

Public Recognition of Productivity Performance

It would also be useful to provide suitable encouragement through the award of prizes and certificates to individual enterprises, departments and organisations etc. for showing exemplary improvement in the level of their performance

The trade unions must make deliberate efforts to improve industrial discipline and encourage involvement of their members in the drive for productivity.

productivity. Provision of tax exemptions or fiscal incentives to those industrial units who are able to achieve demonstrably higher levels of productivity would be another positive incentive to industry to sustain the dynamism of a drive for productivity.

Recently, the NPC got an independent evaluation of its activities carried out by an outside expert. Whereas the expert, in his report, has stated that the NPC, with its limited resources has succeeded in providing specialist services to the various sectors of the economy, particularly the industrial sector, he has also urged the NPC to reorientate its existing services so as to make them more effective, extend its services to those sectors of the economy which have remained outside its purview so far and develop expertise in certain new and modern fields germane to its functioning as the apex productivity organisation in the country, and thus enable the Indian economy to meet the challenges of the age of innovation.

For instance, as management and technology have become interrelated in the modern industrial process, it is no longer possible to hold the various branches of the management science in individual compartments, and the management science, to be effective, must acquire an interdisciplinary approach. To meet this demand of the times, the NPC must, therefore, further develop its expertise in the important fields of Behavioural Sciences, Marketing and Market Research, Cost Accounting and Analytical or

Quantitative aids. Equipped with such expertise, it should be possible for the NPC to build an inter-disciplinary approach in its training programmes and diagnostic approach in its consultancy work. While it may not be within the competence of the NPC to develop expertise in the innumerable branches of technology, it must give its immediate attention to developing specialised services in fields like Tool Engineering, Product Design, Fuel Efficiency, Metal Finishing and Metal Forming Processes, Industry-wise Quality Control Methods, etc. which have an important bearing on improving productivity in our industries. It should also be worthwhile to maintain a national register of reputed experts both in technology and management for suitably drawing upon their expertise in carrying out prestigious assignments in India and abroad.

The NPC has carried out a large number of consultancy assignments since its inception and holds valuable data in its consultancy reports. In order to create more and more interest among industries in the adoption of productivity techniques, it would do well to codify this data and summarize and widely publicise the results achieved through consultancy work. At the same time, productivity research in specialised areas having a direct bearing on techno-managerial themes should become a regular feature of the NPC activities with a view to strengthening and improving its field services. It might also be pointed out in this connection that enough demand for productivity services has not been forthcoming from Public Utility Services and Public Administration. As improvement of productivity in these sectors of the economy is the need of the hour, serious efforts should be made towards popularising productivity services in these sectors.

The NPC also has to give due consideration to fostering closer coordination in programmes concerning productivity organised by the various national institutions and organisations. For instance, the education of workers in the concepts and techniques of productivity is a stupendous task. But the efforts of the NPC in this direction will have a multiplier effect if it can draw up a systematic plan for assisting the Worker Education Centres—which have all the necessary infrastructure for carrying out massive educational programmes for the workers, in developing suitable instructors in the tools and techniques of productivity, and duly supporting his plan by the issue of productivity literature in regional languages. The NPC could even consider correspondence courses for workers on Indian Economy, Productivity Movement and Sharing the Gains of Productivity, Productivity Agreements, Wage Systems, Collective Bargaining, Joint Consultation Systems, etc., especially for young industrial workers.

Productivity Cells for Small Industries

Since small industries need massive assistance in the field of productivity, the NPC should take increasing interest in providing training and consultancy services in productivity to them on an extensive scale, and also in undertaking research on factors impeding productivity in small industries. These activities should be coordinated under Special Productivity Cells for Small Industries for the establishment of which the NPC should urge upon all agencies—national, regional or local which are concerned with the development of Small Industries, to support NPC's efforts and utilise its services.

It has also been pointed out that much more needs to be done in terms of productivity training programmes for Top Management and Trade Unions Leaders. Involvement and orientation of these two important categories of personnel is imperative for the success of productivity movement. Whereas the Top Management influence the directions of enterprises in future and cultivation of highly advanced experts suited for the new age of technological innovation, the Trade Union Leaders influence the attitude of workers towards new concepts and techniques sought to be introduced into the operation of an enterprise. It is, therefore, necessary for the NPC to extend the scope of its work in this field. It might be useful to refer here to the fact that the Japan Productivity Centre pays special attention to this aspect, and it has established an Academy for Management Development within the Centre for this purpose which provides long-term courses of half or one-year

duration, not only for top but also for middle and junior management. This is in addition to a large number of seminars for Top Management organised by the Centre which, in this way, holds nearly 70 seminars and courses every year.

Some other directions in which the NPC should move are: conducting specific programmes for industries which are facing difficulties in respect of production and plant utilization; developing special programmes for export-oriented industries with emphasis on cost reduction and quality control; developing services to new units for providing guidance in the adoption of productivity techniques at the planning stage itself in the form of feasibility studies, project reports, plant layout, inventory control, materials handling, etc. However, in reorienting and intensifying its activities in an effective manner, it would, first of all, be essential for the NPC to expand its organisation by way of establishing Regional Directorates in more States (at present, there are 6 directorates each covering three to four States) and developing more Local Productivity Councils. These LPCs would not only help the NPC in extending the range and scope of its services to the maximum number of industries and other sectors of the economy, but also in enlisting greater involvement of the local talent and agencies in the process and for making these services more useful for them. All this would require additional financial resources.

In the end, we might agree with Prof. Gunnar Myrdal, author of the famous "*Asian Drama*", that, more than the other factors, it is the attitudes to work and institutions that keep the underdeveloped countries poor. Special techniques for the improvement of productivity can be taught with comparative ease, but bringing about a change in attitudes is a more difficult business, and in this leaders of all sections of the community must play their part. The utmost has, therefore, to be given to the improvement of the quality of the human material whether managers, trade unionists or workers and their proper motivation. It is assumed that managements are interested in a productivity increase because of the promise of more profits it holds for them, although they have to be motivated in the right way to enable them to function successfully in today's complex and difficult conditions. Workers too would readily cooperate if they could be convinced that larger gains for the employers would also mean greater social justice for them. The vexing question of sharing the gains of productivity has, therefore, to be seen from a practical point of view. Such an attempt has been made by the NPC in formulating certain agreed guidelines for sharing the gains of productivity supported by schemes which have been successfully tried in Indian conditions. These guidelines deserve widespread support.

Happy Trend

It would not be out of place to mention here that one of the national trade union organisations has appealed to the Government and the employers (both private and public) to cooperate with the working class in its efforts to increase productivity all round with socialistic distribution of the gains so registered. The organisation also declared its interest in the great task of national economic progress through determined efforts to raise productivity in industries and for creating a new climate for discipline and orderly progress so that socialism could become meaningful. Again representatives of trade union centres, irrespective of their affiliations, and of employers' organisations, at a meeting with the Union Labour Minister at New Delhi in December last year, assured the Government of unconditional and wholehearted support in maintaining and maximizing production in an atmosphere of cooperation and industrial peace during the national emergency. This is indeed a happy trend. Production of all goods and services at the highest level of efficiency would be of the greatest importance for a considerable time even after the emergency is over, not only to put the national economy back on its feet in the quickest time possible, but also to make up for the setback to national development. It would, therefore, be a momentous turn in the history of the economic development of the country if this spirit of cooperation and dedication becomes a normal feature of our industrial relations panorama. □

Productivity Drives: Supervisory and Middle Management Personality

Santosh Nath*

The middle management plays a very important part in the efficient operations of an organisation. According to the author, the Supervisory and the Middle Management Group which represents a vital link in any system of productive effort in an organisation has not received due recognition which it deserves. Given proper encouragement and motivation, the supervisory and the middle management group can play a very effective role in increasing productivity.

CONSIDERABLE thought has been given in the last two decades to productivity techniques both in India and abroad. Ideas have been taken from literature by foreign experts and attempts in India have largely followed western thinking in this behalf. In recent years, adaptation of the American/European philosophy has, however, been taken up seriously since concepts and practices valid for those regions do not necessarily apply to the Indian scene.

The Indian efficiency experts and practising managers have come to realise the importance of securing stable industrial relations as the primary prerequisite for productivity schemes. The cooperation of the workforce and its leaders is being sought and cemented through deliberate and pre-thought out moves by managements.

Middle Management: An Important Factor

Managements specially, and others connected with productivity drives in general, appear to have ignored the temperament of the supervisory and middle management team in putting through schemes for raising productivity in a plant or an office. Their consent and committed cooperation is taken for granted. This situation may have been true some years ago, but there is ample evidence to show that this group, an essential part of the management team, now shows a tendency to fall out of the team. It shows anxiety about its remuneration and is worried about the post-retirement prospects. Their mind is no longer dedicated to the cause of management necessarily. Placement in the officers group does not by itself make them a homogeneous part of the administrative, technological and supervisory set-up. They have begun to question the schemes put up by top management. They are often implementing these schemes as a formality taking the exercise as a part of their assignment but without exhibiting whole-hearted dedication to the promulgation or success of the scheme. A few 'doubting Thomases', in this group, are enough to spread the virus amongst others and even influence the thinking of the workforce employed under their supervision.

Need for More Effective Communication

A major reason for this unfortunate situation is lack of effort by management to mould this group in the desired manner. Effective

*Manager, *The Statesman*, New Delhi.

communication between the top layers of management and the supervisors is often left to chance. Their support being taken for granted, no time or energy is set aside for selling a productivity scheme to this group first before introducing it to the workers.

This supervisory and middle management group is facing a peculiar situation in the industrial and commercial world in India today. Its remuneration has not increased in the same ratio as that of the workers and the clerical group. Higher cost of living affects it in the same manner and in fact in greater measure. Expenditure on items like rent, finer varieties of fabrics for clothing, education of children, and transport, has gone up many times more than that on essentials of daily life. This group is often composed of officers recruited from Universities directly under management or executive training schemes. Promotion of officers from the workers or clerical group is fading out as a practice. A sizeable part of the group, therefore, comes from well-placed families and has been used to a comparatively high standard of living. After induction into this group in business houses or the public sector units the young and middle aged officers are naturally keen to adhere to some traditional way of life. Leaving aside instances where a particular officer overspends through "keeping up with the Joneses", even others fight a battle against rising prices.

A recent survey, published in the "*Times Weekly*", brings out the problem in graphic detail. A number of Executives employed in Bombay were interviewed. They fell within the salary group of Rs. 1,000/- per month to Rs. 3,500/- per month. The conclusion drawn from this survey is interesting. The report states that they suffer from frustration, anxiety and even emotional instability as their take-home pay packet does not cover expenditure. Except for one of them who was reported to be relatively happy, all others were in a sorry plight. The exception was a peculiar person. He did not change his residence or purchase any high-priced furniture or put his children to better schools. His spending habit, therefore, continued to be what it was when he started life in a very junior position. This is a rare and abnormal case.

It is desirable to secure a sense of commitment on the part of middle management team before any productivity schemes are introduced.

The anxiety created by an imbalanced budget is enough to upset any one in life. In addition, realisation by the group that differentials between its emoluments and that of subordinates have narrowed down considerably, adds fuel to fire. At the front line supervisory level the difference in the monthly emoluments between the highly skilled workers and the supervisors is in some instances only Rs. 100/- to Rs. 200/- per month. The worker and the clerical group earn overtime wages and often, their take-home pay packet is higher than that of their officer. Such situation has already led to reactions by officers in some industries. The Banking industry has witnessed this with grave consequences. Work in some banks has been held up. Officers appear to have taken to the same measures in some instances which their subordinates utilise in exerting pressure on management to get higher benefit.

Crucial Role of Middle Management

The need for securing stable industrial relations has already been emphasised. Productivity drives can thrive only if other attending conditions are also available. The first and foremost would be enlightened worker leadership free from political bias or party dictates. An equally important element would be a responsive workforce which has a live, healthy and progressive attitude towards work and the management's interest. A third factor of

A properly motivated supervisory and middle management group can play a very effective role in increasing productivity.

significance is a history of fair play by management, in the day-to-day dealings with the workers. These put together along with stable industrial relations would provide the appropriate psychological climate for efficiency schemes and for getting the best out of a plant or office and the manpower employed in it.

The middle management level plays an important part in securing or upsetting these factors. Fair play in day-to-day dealings can be exercised only by the Line Managers from the departmental head down to the first line supervisory level. This is likely to create a positive response from the workforce towards management interest. Once the response is available, the workers are likely to reject biased or prejudiced leadership and would be inclined to choose and appoint elightened worker leaders largely from their own ranks for settling issues with management. As and when these three ingredients take effect and the atmosphere in a plant undergoes a gradual but positive change from recalcitrance, doubt and lack of faith in each other's intentions to an honest and sincere rapport between the management team and the employees, the psychological environment for discussion and enforcement of productivity schemes is available. Unless the middle management level is convinced of the need for propagating the above-mentioned steps and is educated by top management for bringing about a climatic conversion of men and minds the success of productivity drives particularly and even of attempts to secure more production would be in doubt. In fact it would be necessary to secure a sense of commitment on the part of middle management team before any schemes are put out.

Gains of Productivity

In discussions on Productivity schemes held till now, sharing the gains of productivity has been an important factor. Traditionally two partners have been considered relevant, namely management and the workers. No share seems to have been ear-marked for the middle management level as such. The time has perhaps come when this group should also be given its share in gains of productivity since its motivation and contribution to the success of the drive is essential.

This brings us to the question of moulding the supervisory and middle management personality in suitable manner. Executives for line management are usually drawn from two sources. They are either selected from amongst the existing highly skilled operatives and allowed promotion to the executive cadre, or, they are recruited as fresh hands after they complete their technical or general education at Universities. Very often graduates from specialised institutions are preferred both for technical and non-technical posts. Candidates holding diplomas or degrees in Business Management are given preference. Induction of either category into the executive cadre is essential.

Effective Induction

The promoted officer from the clerical or the worker pool has to acquire a new outlook. The transition from the operator level to the supervisory group is not easy. It takes time and effort. Mere promotion will not necessarily bring about any change. It would be advisable to arrange for a series of discussions with the persons so promoted before they are entrusted with the responsibility of a shift or a section. The need for maintaining discipline without upsetting the apple-cart has to be brought home. These people need to come out of the cliques

within which they have operated and taught to be fair to all subordinates. They have to discard consciously old ties and earlier connections which might be used for personal gain by their friends. They are required to reclassify themselves into a new group in as far as their outlook towards production and the management's interest is concerned.

While taking on this new personality they have to take care that they do not acquire a superiority complex. Management on its part must arrange for them to feel at home in the officers group to avoid any sense of inferiority which inhibits their functions as officers. A very careful balance has to be struck. Obviously this cannot be left to chance. They enjoy a very big advantage over other officers in their rapport with the worker group. They have no difficulty in establishing dialogue with individuals or sections of operatives since they have grown up, in the plant or office, with such a group. All attempts have to be made to carry forward this rapport without impediments. Their access to the worker level should be an asset for supervisory function. They are well-equipped and suitably-oriented for detecting danger signals in time. They can control situations before a crisis leads to disaster. They are easily the best agency for honest and seasoned appraisal of the atmosphere in a plant or office and should be utilised as the feedback channel by senior levels of management for such information. Lack of educational qualifications or a university training can be easily made up by them by exploiting the above-mentioned plus factors.

The second category of officers is the young direct recruit to the cadre. In many cases companies have set up formal training schemes for these entrants. At some companies where formal training is not given, these young men and women pick up work as they go along. Whether there is formal training or not, induction into the officers pool is equally essential for this category of people. They are not used to the rigidity of routines arising out of factory or office work. They have to be broken in for acquiring a new personality. This category normally comes from well-placed families. Their way of life at home and at college is sophisticated. They find considerable difficulty in shedding off their socio-economic background. This is much more true of executives employed in factories and in offices attached to production plants. This group by habit prefers a desk job. It aspires for a senior executives' desk immediately after leaving the university. It shows little patience or perseverance while going through the various steps of the ladder before reaching even the middle management levels. A deliberated scheme has to be evolved by management to educate this category for manning line supervisory posts. The wall between them and the blue and white collar workers has to be demolished. They have to virtually get down to the worker or clerk level for understanding the various operations and then utilising their technical knowledge or general education for effective supervision of activity. Their greatest weakness lies in their inability to establish a dialogue with the worker group. They have to learn new habits and a new way of life to be able to converse freely with the workers.

Unless the middle management level is convinced of the need for propagating the idea of productivity the success of productivity drive would not be possible.

The officers group whether drawn from the promoted ranks or through direct recruitment, has to show a great deal of adaptability under the given conditions of work. Since production and productivity drives involve human relations, the interplay of situation over results

and more so of the psychological reaction of the workforce on any single incident or event is important. The worker's temperament can be played with for a positive or a negative reaction by interested parties. The officers have to take all this in their stride. They have to learn to live with various patterns of human behaviour. They cannot afford to lose patience while handling men. The good and bad worker is a part of the game. Experience abroad has shown that students with very high grades and brilliant academic achievements are not necessarily good business executives. A study of the career record of nearly a thousand graduates of the Harvard Business School shows that academic success and business achievement have relatively little association with each other. Academic ability does not ensure that an individual will be able to learn and to build a career in fields which involve leading, changing, developing or working with people.

A good officer must learn to derive satisfaction by getting work done through others. A brilliant brain seldom has the "will to manage". He loses patience because others do not respond to his instructions. He prefers to register his own performance and derives greater job satisfaction from the recognition that he gets for his own work. He becomes a "Do It Yourself" manager. Many of these young people stay put at the lower levels or get channelised into special assignments. They are prone to take to advisory services instead of taking responsibility for guiding a group directly for better results. The importance which has been given yet to a brilliant academic career needs to be reassessed. The average student is perhaps better raw material for being groomed into a supervisor. He has learnt to obey instructions without raising too many questions. He feels at home in groups of friends. With the necessary guidance and encouragement he can climb the managerial ladder by learning work and the art of managing men as he gets adjusted to new responsibilities.

The time has come when this group though small in number at a plant or an office, needs to get due recognition. They have been assigned a most difficult task. They bear the brunt of the growing indiscipline, in the first instance. Due to limited administrative powers they are unable to enforce discipline independently. They are continuously tempted to take the easy way out and ignore inefficiency.

A Vital Link

These people are a vital link in any system of productive effort. Time and money spent on them would not be wasted. Loyalties cannot be purchased with money only; fair play and recognition of needs go a long way in securing a healthy response from the educated class. This group can well play a positive part in changing the atmosphere in a plant or office. It can certainly tone up the general discipline by showing courage and determination. It can take over a good part of the administrative and management function from top management. For this the group would need looking after. In turn it should willingly acquire a new personality. These people should learn to exert only such power as is derived from the responsibility cast on them. They should be committed to achieve targets set out for their sections or departments. They should, however, learn to persuade operatives to cooperate instead of using pressure tactics. Their own bahaviour and devotion to work should set an example for others. For this they need sympathy, guidance and paternal care from their senior colleagues with demonstrated trust in them from top management.

The ingredients of the new personality are clear. Moulding the new entrants or those already in saddle should be a constant and essential function of top management. The officers have to be brought into and kept within the management fold. Their temperament and reactions have to be canalised through specially devised orientation schemes. This has been left to chance too long. Where a management has paid attention to these factors, it has achieved better success in reaching production targets and has established a more cordial atmosphere for work. □

Quality Strategy for Indian Industries

MVV Raman*

For developing a quality strategy, it becomes necessary to analyse and evaluate the existing situation in India from various points of view—government policy, entrepreneurship, consumer awareness, educational level, technological advance and maturity, industrial experience, economic development, political aspirations, cultural background and the like; it is only then that a meaningful and appropriate quality strategy can emerge. The author suggests a quality strategy and attempts to show how this strategy could lead to increased productivity and a full employment economy.

WHEN India attained freedom in 1947 the economy was characterised by weak infrastructure and elemental handicaps, without any base for progress in any sector of the economy. The problem of economic development was colossal in magnitude. Considering that there was no technical know-how for industrialisation and there was lack of capital and entrepreneurship, it was obvious that only planned development could bring some sense amidst prevailing chaos to usher the country into economic development and progress.

In Retrospect

The basic objective of India's development—as explained in the various documents of the Planning Commission, Government of India—is to provide the Indian people the opportunity to lead a good life. This is certainly not an easy job, considering the size of the country and the magnitude of the population of over 550 million. Eradication of poverty among the masses calls for a massive effort of gigantic proportions. The two main aims that have guided India's planned development are: (i) to build up by democratic means a rapidly expanding and technologically progressive economy and (ii) a social order based on justice and offering equal opportunity to every citizen. The approach to planned development has been summed up as:...."The task before an underdeveloped country is not merely to get better results within the existing framework of economic and social institutions, but to mould and refashion these so that they contribute effectively to the realisation of wider and deeper social values....".

In order to help strengthen the foundations of economic and social life and stimulate industrial growth and scientific and technological advance, a series of Five-Year Plans have been put into operation since 1951.

The heavy investments planned in the public sector were intended to create a substantial infrastructure of basic facilities and availabilities—

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power, steel, etc.—for the support and promotion of the mixed economy, the development of which formed, and continues to form, the hard core of the governmental policy. The substantial expansion of the private sector, particularly in the sphere of small industry, that has taken place during the two decades since Independence, is largely due to expansion of supplies and facilities made by public sector investments, and the associated increase in purchasing power due to income generated through enhanced public expenditure in the process of development.

The policy strategy adopted by the Indian Government appears to be sound, judged by recent experiences gained throughout the world. Robert McNamara, President of the World Bank, in his address to the Board of Governors at Washington in the recent annual meeting pointed out that development should not merely be reckoned with growth of output; economic policies must specifically include: "greater employment and greater equality of income distribution". Again, an American Journal in an editorial talking about Generation Gap says..."In effect, the youth has put a challenge before business and industry. They are saying that profit and production do not come first. What comes first is the well-being of the society".

Basis for a Strategy

Having briefly touched upon the economic background, a discussion on industrial development in this framework particularly the quantum, variety and quality of its products, will provide a basis for the development of a quality strategy leading to full employment economy. Considering the present problems facing the Indian economy, to talk about full employment may look far-fetched; however, what we are attempting is the development of a quality strategy, taking into consideration not only the magitude of the population but also other relevant characteristics of the population and the economy. In fact, this is a significant consideration which distinguishes the strategy from those of the more industrially-advanced countries, with their own cultural characteristics and other economy features.

Industrial development, the forerunner of a decent standard of living, cannot take place in vacuum. It requires technological maturity, investment, entrepreneurship, and a governmental policy conducive for such development. Starting with almost no technological base, shy capital and poor entrepreneurship, the present-day level of industrial activity is no mean achievement. However, considering the requirement as postulated in the Government policy, much still remains to be done; and considering the process of achievement, a lot more could have been done.

Admittedly, there are many impediments for a smooth progress—lack of consolidation of technology (created by poor management and entrepreneurship), need for advanced technology (created by lack of research), foreign exchange shortage, etc. However, these are not insurmountable; shrewd businessmanship and appropriate governmental policies could certainly pave the way for progress. In this connection, it should be pointed out that the present industrial development has taken place mostly on the basis of borrowed technology, and not based on our own research, which brings a host of problems along with it. In addition, there are no research divisions attached to industrial units. These aspects have implications with reference to quality, inasmuch as many problems pertaining to research crop up, which in other advanced countries, would have been solved prior to coming to manufacturing floor.

For a developing country like India, the increasing need for foreign exchange must necessarily be met through increased export earnings for which quality, price, delivery, and after-sales service assume great importance. Further, political and national conditions, as past experience has shown, force the economy to move towards self-sufficiency as far as possible.

As a governmental policy, Indian products enjoy protection from competition from abroad

When any particular product is being produced with reasonable quality, the import of that product is restricted or eliminated to conserve the much-needed foreign exchange. Experience of the use of some of the products has shown that the entrepreneurship in India has more often not taken this opportunity as an instrument to develop and improve the product and its quality, but has fallen prey to easy and quick profits and thus a state of 'stagnation' has been reached with reference to technology and quality in those cases. It is a sad commentary to recall that the Government had to intervene and appoint committees to investigate complaints against poor quality or abnormally high prices or impose price restrictions in some cases.

Product development, production and distribution and after-sales service are all limited in character. Only those products which have been developed and used in industrially-advanced countries and where technical know-how is obtainable, have been manufactured. No attempt at product development to suit the needs and pockets of the common people, most of whom live in villages, has ever been attempted. Lack of entrepreneurship and the tendency to look to government for providing jobs, have been the causes for not setting up small scale or other types of industries to tap this potential. It is only at the initiative of the government and with their assistance that the small scale industries are being established on regional basis.

The demand for many of the consumer products has outstripped the supply and it is not uncommon to wait for them, in spite of their doubtful quality (at least in some cases) and poor after-sales service. Though the consumer is indignant at the situation, there is nothing he can do about it. In this type of situation, particularly where there are shortages, neither competition nor quality nor price has anything to do to sell a product. Attention has now been focussed on the problem, but the solution calls for a new strategy, particularly with reference to quality. Obviously, this situation cannot continue.

Quality control programmes should lead to consolidation of technology through building of information on products, processes, materials and field performance.

The government (or public) sector has also a huge investment in industry and other services. However, the performance of this sector in terms of quality, costs and profits is far from satisfactory. In addition, this sector is supplier of raw materials and products which are to be used by other industries and services, whose quality and reliability counts a lot.

Though the quality control movement started quite sometime back and there are evidences of its applicability for the betterment of product quality, it cannot be said with confidence that quality control policies with well-defined objectives and emphasis on the use of all available methods and techniques, have found place in Indian industries. In the agony of developmental process, quality including its reliability and safety aspects has been a premium. What is more appalling is the lack of forceful propaganda move to show the benefits of quality control programmes in a convincing way to the industrialists.

Quality Control in various organisations has not found adequate place, though inspection aspects have somewhat been appreciated. Evidently a new strategy need be developed which has the force of penetrating top layers of management. Some advocates in a recent quality control conference suggested that government should legalise the quality of products as is done in the case of pharmaceuticals. Of course,

this would be an impossible task, and probably would never work.

Quality Strategy

The various aspects forming the background for development of quality strategy, namely quantum, quality, prices of products, technology, entrepreneurship, public and private sector exports, extent of quality control, etc., have been discussed, besides emphasising educational backwardness of the masses of people living in villages with low purchasing power who offer a significant market potential. The role quality control may have to play in this context is discussed in the following paragraphs.

Though the consumer is frustrated with the products, he is increasingly expressing his dissatisfaction with regard to quality and price. It may not be possible for the manufacturer to continue to do things which were somehow being tolerated. In addition, the stability and success of the economy depends to a great extent upon exports.

The present concept of quality control that is being propagated in India is Quality Reliability. Inspection aspects and statistical quality control (SQC) aspects have been well popularised during the last twenty years. The ideas of 'Total Quality Control' have also been well appreciated. The present emphasis on reliability is born out of experience with the use of products. The consumers' right to have trouble-free products of proven reliability at reasonable prices is the basis for the new thinking. This is forcing the producer to think in terms of product audits, performance in the field and consumer satisfaction, and adjusting his quality control programme to meet this new emphasis. It does not mean that it has gained the popularity with the producers to the extent of introducing reliability programmes in the majority of industries but it may be expected to be so in the near future. This, of course, is a move in the right direction and obviously should form part of any quality strategy.

From this new emphasis on the product itself and the consumer, the producer has to have adequate quality control programme, as otherwise he may have to face a new crisis in terms of product failure and customer dissatisfaction.

It is generally agreed that the implementation of a quality control programme in its fullest sense has not found place in the Indian industries, in spite of the fact that many successful applications have been documented. Obviously, it appears that the projection of quality control as something merely to do with improvements in quality has not caught the imagination of top management and technical personnel. It appears that effective penetration could be made by projecting quality control as 'Cost Reduction' programme in addition to quality improvement. Limited experience suggests that the inspection and rejection costs are in the region of 20%—25% of the total turnover, and this emphasis should prove effective in introducing quality control programmes in a systematic way. This then should form a part of quality strategy. Further implication of this *vis-a-vis* full employment are discussed in the subsequent section.

It has been observed that the product development and manufacture has been based on technical collaboration. The emphasis has been to introduce products and make profits as quickly as possible (may be nothing wrong from short term point of view) rather than consolidate technology and use it effectively for quality improvement, cost reduction, and new product development. It is, therefore, appropriate to use quality control programmes as consolidators of technology through building information on products, processes, materials, and field performance using all known methods and techniques. In fact, this strategy would be most suited to the present Indian conditions. Besides, it lays a foundation for effective modification and diversification which may become relevant with changes in "consumerism".

Suppliers' quality has been a major problem in the Indian industry. In fact, much of the product dissatisfaction has been attributed to this cause. Without going into details of this problem, it should be mentioned that the manufacturer has a responsibility towards his product and, therefore, he should play a positive role in finding solution to this problem. Thus vendor relations and their development based on specific steps should be evolved and practised to mutual advantage. These steps should include among others development of clear and realistic specifications, proper quality evaluation, effective communication, and mutual assistance. It is only then a supplier, acceptable (in terms of quality, cost and delivery) to the manufacturer can emerge under the Indian environment. This approach should form part of the quality strategy.

Though a lot of noises are made with regard to quality at all levels, the seriousness with which it is practised in terms of deliberate 'effort' is far from satisfactory at the top levels of the general management. The overall objective of the enterprise should be related to product quality, consumer satisfaction, and continuous development, and the whole organisation should be structured around this objective. The status of the quality control programmes should be elevated, as they have immense potentialities in Indian industries, particularly from the point of view of 'consolidation of technology'.

Though the internal markets have not yet been fully exploited, yet, export orientation to Indian manufactures appears to provide the necessary challenge and fosters the quality level achieved at competitive prices. This removes the idea, which seems to have embedded in the minds of some management and technical personnel, that there are two qualities (or quality standards) one for export and the other for internal markets, with differential 'efforts' and 'treatments'.

In summary, the quality strategy from Indian experience should be based on the following lines :

A well-planned quality strategy will lead to higher productivity and to a full employment economy.

i. Emphasis on product quality and consumer satisfaction, and adjusting the quality control programme internally to meet this aim ;

ii. Primary emphasis on cost reduction in addition to the quality improvement;

iii. Emphasis on vendor relations and development based on specific steps; development of realistic specifications, proper quality evaluation, effective communication and mutual assistance;

iv. Emphasis by the general management of the company on quality of the product and consumer satisfaction, raising the status of the quality control programmes to operate at a higher level and gearing the functions of other departments to suit this objective: also, to achieve coordination with external agencies—government and other agencies like standards body, research organisations, etc.

v. Emphasis on the quality control programme as a consolidator of technology, by a fuller development of specifications and better understanding of processes and products through effective documentation of internal experience by application of known scientific methods and experience. Obviously, this should be achieved by the introduction of a pro-

gramme keeping in view the premises and purposes: the information system to be documented comes from the application of the programme in the areas of Incoming Material Control, Process Control and Product Control, through the coordination of information in various aspects like, quality of design, quality conformance and quality of performance and by the choice of appropriate technologies in the fields of engineering, statistical and managerial, including quality costs, quality motivation, organisational and internal and external coordination.

In fact, this amounts to building a Quality Information System (QIS) capable of providing information at the point of use for decisions on all quality issues both internal and external, including quality improvement and product and process developments, import substitution and the like. The QIS may include all items of strategy mentioned, (and include others as well) but for the purpose of pinpointing a logical and feasible strategy, they are itemised independently.

Quality Strategy and Development

The quality strategy as discussed has immense potentialities, the emphasis that the applications based on the strategy will lead to cost reductions, while satisfying the consumer requirements, is the salient feature of the strategy. In essence, the approach has in it elements of effective utilisation of all input resources, avoiding wastes (in all forms) of men, machines, materials and other inputs through an effective QIS (including manuals or practices and procedures) by evaluating and coordinating information from all the activities of the various divisions (design, manufacture, inspection, marketing etc.) and at the same time increasing the value of output by quality improvements. Naturally, this would improve the output-input ratio on a continuous basis.

In addition, the quality costs are substantially higher: a rough estimate puts them at a minimum of 20% of the sales turnover, on the average, on appraisal, and internal quality failures alone; in addition, external failures and customer complaints and dissatisfaction inflate this estimate. Thus, the opportunities for effecting sizeable cost reductions are obvious by use of appropriate quality control programmes.

Achieving Total Employment Objective

The implication of the above statements is that the approach will lead to higher productivity through quality control—the crying need of the hour. The results should be most acceptable, as the emphasis is on quality. The meaning and implications of higher productivity have already been brought to light for the last ten years through a well-organised productivity movement. Its implications in terms of employment are also apparent. The cost reduction benefit when equitably shared amongst the concerned—entrepreneur, labour and consumers—will set in a chain reaction which will lead to the well-being of everyone. Firstly, cost reduction increases the purchasing power of money and creates demand for goods existing as well as for new; in addition, the increased profits will provide areas of expansion—new plants and services. This will increase employment. The continuation of the process leads to the well-being of all through better products and increased employment, which in turn will lead to a full employment economy.

Conclusion

An attempt has been made to show how quality strategy, evolved through the Indian experience could lead to a full employment economy. It does not, however, mean that this can be achieved overnight: on the other hand, concerted efforts of the industry and other organisations and the government through the medium of the suggested strategies can make the objective achievable. This has to be done as there appears to be no alternative; otherwise, we have to face the wrath of a mass of people who are looking for better things and better life at the prices they can afford. □

A New Look at Productivity of an Organisation

Dhawal Mehta*

Hitherto, too much importance has been given to physical output of production. The new concept of productivity will require focusing emphasis on the behavioural sciences approach, which means studying human behaviour. In an effort to increase physical output of production the human element in the process of increasing productivity should not be forgotten. Productivity, perhaps, will need to be redefined in terms of employee satisfaction.

THE changing concepts about the management of business organisations require a new look at the concept of productivity in India and many other developing countries. In the past, we have defined productivity in terms of the rise in the level of physical output or services with the same or reduced level of inputs. The focus of attention has always been, even in the present times, on the increased production of goods and services. Of course, the rise in the productivity as a result of better work methods and improved technology is a desirable thing. It is, however, through the employees that the ultimate increase in productivity is generated. If they are not motivated to work hard or better, no amount of improved or sophisticated technology is going to work. On the contrary, as it happens too frequently in the recent times, the factories are going to remain closed or the new machinery is going to remain idle on account of lack of willingness of workers to cooperate with management. It cannot be denied that the firms exist to create utilities to the society at reasonable costs and if they are going to do this progressively, increase in physical productivity is necessary. To accomplish this, emphasis is mainly placed on the adoption of work study techniques to increase output and improve working conditions. It is also hinted that the improved work techniques are going to result in better wages for the workers.

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Emphasis on Production

The dominant importance given to production has an honourable history and a long tradition. Industrial revolution in the western world started with the aim of making available to the society vast quantity of mass-produced goods. The factory system emerged as one of the dominant institutions in the society. This system required the changes in the work habits of its employees. The meaning and the content of 'work' changed for the workers. The workers were required to work in

'groups' to whose norms and standards of behaviour they had to adjust. Those workers who were committed to the industrial way of life as against the rural or agricultural way of life were thought to be more productive and better adjusted to the factory system.

In India, the increased concern for production is justified on the ground that it is a developing nation and that it cannot afford to lose sight of productivity for several years to come. The relevant question to ask at this stage is, 'who gains when the production and/or productivity increases'? The recent National Commission on Labour has attempted an answer in categorical terms. According to it, "We note that increases in money wages of industrial workers since independence have not been associated with a rise in real wages nor have real wage increases been commensurate with improvements in productivity. Simultaneously, wage costs as a proportion of total costs of manufacture have registered a decline and the same is true about the worker's share in value added by manufacturers." By and large, during the years 1949-1964 for which data are available, it is the share of employers and those who have provided capital in the expectation of a dividend which has increased to a considerable extent from 35% in 1949 to 45.7% in 1964." The general impression that the wage costs have been increasing as proportion of total costs is unfounded. It is, therefore, disturbing to note that the benefits of increased industrial production are enjoyed more by employers and shareholders than any other class in the society. It is not an accident that wage disputes under these conditions continue to be the most important cause of all industrial disputes. Though there is a good case for an increase in the real wages of the workers in India, it cannot be denied that labour troubles have taken place in the companies which are financially stable and which follow very progressive personnel policies. Permitting wage increases alone is, therefore, not enough.

So far as management is obsessed with the productivity aspects of industrial production; the Taylor's ghost is still haunting over them. Productivity in the past has too often been defined in terms of either labour or capital productivity. We need to redefine productivity in terms of employee satisfaction. Wage satisfaction is one of the factors in employee satisfaction and there it is an important part of productivity as defined by us. At the same time, job satisfaction as defined in terms of improved working conditions and especially the structure of the job which makes it meaningful for the workers should also be a part of the definition of productivity.

Historically, three factors have contributed to the exclusive attention of the management to physical productivity. First is the identification of owners with management and management's identification with ownership. If owner is at the top of the organisational pyramid, his gain from the increase in production and productivity is direct. In years to come, we will witness an increasing disassociation of manag ment from ownership function with th result that exclusive concern with physi productivity will decline. This will happen onl in organised large-scale sector of industries whi the small-scale and unorganised sectors o industries and trade will continue to emphasis productivity at the cost of employee satisfaction. Secondly the physical output of a firm i measurable and quantifiable. In the case o service sectors of our economy, services quantifiable in terms of money. On the oth hand, employee satisfaction is an elusive conce though there are now indirect techniques t measure it. One such technique is an attitu survey of employees within a firm. Employe have attitudes of high valence toward their fi supervisor, work group, wages and other benefit content and structure of the job they are do etc. Attitudes with regard to such vital matte can tell us a great deal about the state of mora and job satisfaction of the employees. Thirdl the concept of work in a factory situation i changing fast. For ages, work has been view as a necessary evil. Work is something wl has to be done in order to get livelihood and was thought as a form of suffering.

The Human Aspect

Modern management emphasises the cha lenging nature of work. The concept of wor

has been undergoing a change at least for upper and middle levels of management. In the modern firms, organisation structures are being experimented upon to make work more meaningful and psychologically rewarding. Unfortunately, this concept of work does not apply at present to the clerical staff and the blue collar workers. Accordingly, their expectations from their work-life are minimum. They do not expect work to be challenging and interesting. The new concept of productivity will require experimentation with the organisational as well as job structures so as to make work more meaningful to the employees. This involves focusing on the behavioural sciences approach which means studying observable and verifiable human behaviour in organisations using scientific procedures. The older and the conventional approach to productivity emphasises the study of work methods, man-machine system, improved control methods, operations research etc. The new concept of productivity emphasises the study of jobs, personality, learning, change and interaction patterns within the groups.

It should be pointed out here that employees who are better satisfied on the jobs are not necessarily more productive in the conventional sense of the term. Several researches have been made in the U.S.A. and elsewhere to discover the direct relationship between productivity and job satisfaction. No systematic relationship has been found between productivity and such morale variables as intrinsic job satisfaction, financial and job status satisfaction and satisfaction with the company. In a large study of 6000 workers made in the tractor factories, a factor analysis was made to indentify the components of satisfactions for them. Four identifiable factors resulted from this analysis: intrinsic job satisfaction, satisfaction with the company, satisfaction with supervision and satisfaction with rewards and mobility opportunities. None of these factors was significantly related to the actual productivity of employees in the tractor factories.

Social Responsibility of Business

What is then the motivation for the employers to work toward the satisfaction of their employees if there is no gain in productivity in their factories? A reasonably valid answer to the above question will require a change in the perception of the employers with regard to the social responsibility of business. The social responsibility of business does not end with its contributions to the welfare or educational agencies of the society out of its large profits. The society has allocated a part of its human resources to produce goods and services in the factories and other institutions. These human assets should be utilised with a minimum of wastage.

The concept of productivity will require experimentation with the organisational as well as job structures so as to make work more meaningful to the employees.

The emotional strain as a result of dissatisfaction at places of work is a form of wastage which should be avoided by taking concrete steps. One such step in the right direction would be developing acute sensitivity to the grievances and complaints of the workers and other white-collar employees and readiness to do something about it. Most of the complaints and grievances are not psychological (as human relationists will have us believe) but are real and require concrete steps for their resolution. Some of the solutions require only minor adjustments while some require bold action involving even the reorganisation of the departments. Society has a right to expect a better utilisation of the manpower it has contributed to the business organisations for their day-to-day working. It is common knowledge that shareholders who have contributed capital are informed through annual reports as to how their firms are doing profitwise.

Medium of Morale Survey

There should be some system whereby society at large has also some way of knowing how its manpower is being utilised by the business organisations. If the manpower is utilised poorly by the companies, the employees become disgruntled and dissatisfied with them and indicate disapproval of working conditions and of their supervisors and managers. Increasing rate of absenteeism, grievances and the disciplinary cases are some of the indicators of poorer utilisation of the personnel in the companies. An independent research agency should be able to do the job of human assets evaluation and the state of job satisfaction fairly well and without any bias. This could be done through a morale survey. A reasonably comprehensive morale survey would reveal as to how employees in a company feel about their wages, supervision, company, physical facilities, structure and content of jobs, shop rules etc. If employees have a negative attitude towards most of the above things, morale is said to be low. Findings of this survey should be made public so that it knows how the companies are making use of their employees. Many progressive organisations even now are carrying on such surveys but they are meant purely for internal use.

When the morale or attitude surveys show downward trends and the important members of the society including the shareholders know about these, the management becomes alert in discovering the sources of unfavourable attitudes. It gets motivated to review its personnel and wage policies and makes an effort to obtain higher levels of employee morale. When the attitudes are getting to be progressively favourable, it serves as a prestige-point for the companies concerned. Companies with favourable trends could proudly claim that they are fulfilling the social responsibility of business in the real sense of the term.

To summarise the main points, productivity, as has been traditionally defined, focusses on the physical output of the production process. To compensate for this overemphasis, as it were, the proponents of productivity school add by way of additional remark that the gains of productivity are to be shared between the workers and management. What happens to the human element in the process of increasing the productivity is easily forgotten. Empirical data on the sharing of value added by manufacture indicate that the share of wages and salaries in the VAM is decreasing in favour of profits and dividends. To some extent, this decreasing share represents the degree of mechanisation in the industries. There is, therefore, a strong case for the review of our wage policy. Wages and other benefits are, however, a part of the total job satisfaction which is influenced by the nature of supervision, working conditions, nature and content of jobs, opportunities for further promotion, etc. If the shareholders who supply capital to the company have a legal right to receive the balance sheet and the profit and loss account audited by an independent auditor, there is no reason why the state of employee satisfaction should not be published from time to time (say, once a year) by the employers. A firm may be making a large profit but its employees may be in the state of grave frustration. In this context, employee morale survey will be a healthy institution for establishing sound management practices as well as responsible social behaviour by th employers. □

All of us must look into the vital problems which when properly solved can make a significant contribution to the rise in national productivity. At this moment, the problem that comes to my mind as the most outstanding is one of sharing of the gains accruing as a result of improvement in productivity in which besides the other factors of production, the whole-hearted co-operation of the workers is an essential pre-requisite. The question, no doubt, is a complex one and finding a satisfactory solution to it is no easy task. But this is all the more reason that we should keep on making efforts in this direction whenever we get an opportunity, as success in this would itself provide a big boost to our efforts towards raising national productivity.

—V.V. Giri

Disguised Unemployment and Zero Marginal Productivity of Labour: Some Complications

BN Ghosh*

The concept of zero marginal productivity of labour has been assigned a decisive role in the theory of disguised unemployment. But it is neither a necessary condition nor a sufficient condition for the existence of surplus labour. It often leads to unnecessary confusion and disagreement. The author attempts to show that the concept of zero marginal productivity of labour as it is related to disguised unemployment leaves many vital issues unexplained; it is neither theoretically sound nor methodologically fool-proof. The doctrine that marginal productivity of labour is zero under disguised unemployment requires an urgent revision.

THE theoretical scaffolding of disguised unemployment relies mainly on the assumption of zero marginal productivity of labour. In recent years, especially after sixties, the validity of this assumption on both theoretical and empirical planes, has been subjected to serious attacks from different quarters. The purpose of this paper is to consider the theoretical rationale of the problem, referring to the empirical aspect only tangentially.

Much of the confusion and disagreement over the theory of disguised unemployment arises not so much out of any other reason as it is due to the zero marginal productivity of labour. The confusion and disagreement perhaps could have been avoided if low marginal productivity of labour rather than zero marginal productivity were assumed because there is no disagreement over the fact that in underdeveloped countries, in general, marginal productivity of labour is very low.

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Theoretical Scaffolding

The root cause of the whole confusion lies in not making a proper distinction between labour and labourer. The number of labourers should not, in fact, be taken as a valid measure of labour. Zero marginal product of a unit of labour and the zero marginal product of a worker are not the same thing. If 6 persons of equal efficiency work in the field and put 5 hours' work per day per worker, the marginal productivity of 30th hour of work may fall to zero but that does not make any worker redundant. A family farm in maximising output may put in labour till the marginal productivity of the last hour of work is zero; there is nothing wrong in this principle.[1] The waste here arises not because the marginal product of the 30th hour of work is zero but because each worker by putting only 5 hour's work a day is really working below the normal capacity and consequently is underemployed. Now, if one

[1]H. Myint: The Economics of Developing Countries, London, Hutchinson & Co. Ltd., 1967 pp. 86-88.

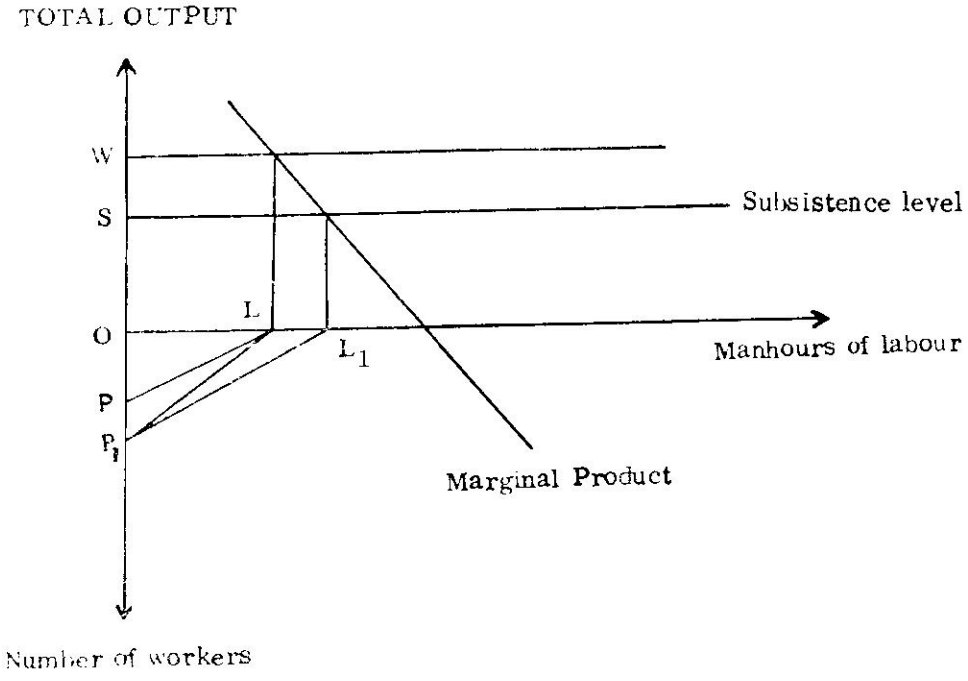

Fig. 1

worker is withdrawn from the production process, output may remain constant provided the existing (5) workers put in 6 hours' work per day. But to ascribe zero marginal productivity in this case to the sixth worker who is withdrawn is very illegitimate.[2] Sen's[3] argument reflecting the distinction between labour and labourer is illustrated in Fig. 1.

Under capitalistic system of farming OL manhours of labour would be employed because here wage rate (W) is equal to marginal product of labour and for this, P amount of labourers contributing normal number of working hours per day would be engaged. Now if P_1 amount of workers are engaged for the same job there may be disguised unemployment of PP_1 amount of workers but the situation does not necessarily involve zero marginal productivity of worker if it is considered from the perspective of a family farm. The same amount of labour which makes the marginal productivity of labour zero (here OL) may be extended by more amount of labourer through the device of work-sharing. Or in other words, workers would be working more leisurely. Much of the labour may be unused—but it cannot be depicted necessarily as a situation of zero marginal productivity of labour. In fact, the work-stretching and work-sharing may arise in such cases due to a number of factors which are characteristically to be found in low-income agriculture. But work-sharing, more reasonably, is a situation of low marginal productivity rather than one of zero marginal productivity. As in Fig. 1, the employment of more labourers (Pp_1) for performing the same job as before by extending the manhours of work to L_1 is also consistent in a family farm where the value of subsistence (S) that is provided to a worker is much below the market wage (W). The fact that the value of subsistence per worker in a family farm is lower than

[2] R Subramanyam : 'Aspects of Disguised Unemployment,' Indian Economic Journal. Jan.-March 1957. p. 535.
[3] A.K. Sen: 'The Choice of Technique,' Basil Blackwell and Hott, Ltd., Oxford, 1960.

the market wage rate is established by empirical evidence.[4] As the subsistence level is lower, productivity may reasonably be lower and consequently more labourers than what are normally required have to be employed. This clearly does not *ipso facto* lead to zero marginal productivity of worker though it may lead to lower productivity.

The use of the concept of zero marginal productivity of labour without any qualification makes it vague and ambiguous as all types of marginal productivity of labour under disguised unemployment do not necessarily correspond to zero. J Bhagwati and S Chakravorti have shown that marginal social productivity of labour under disguised unemployment may not be zero even if marginal physical productivity of labour may be zero[5].

The question that obviously arises is why should the worker work, if his marginal productivity is zero, i.e., part of his labour time (or the entire labour time) is unproductive marginally? Why should he not have leisure? One should presume in this case that either he is ignorant of his being employed unproductively or work does not involve any disutility. However, neither of these presumptions is realistic and the entire rationale is far from satisfactory on economic or any other ground.[6] How can a situation in which workers are working unproductively be depicted as one of zero marginal productivity when this situation is meant to prevail far inside the margin?[7] It is not at all clear why zero marginal productivity should be a condition for under-employment nor is it obvious why the phenomenon of disguised unemployment is to be explained with reference to the margin as it would obtain not only at the actual margin but far back on the scale of the number of labourers available—to a point where the labourers were so few that there would no longer be any idleness.[8] Myrdal observes that when an increase in the labour force does not imply a similar increase in the labour input there is hardly any sense in stating that marginal productivity of workers is zero.[9] In some studies zero marginal productivity of labour is implied but it is not at all explained why marginal productivity is not unreservedly zero.[10]

Slip-shod Methodology

Zero marginal productivity of labour is not, after all, a necessary condition for the existence of disguised unemployment or surplus labour. Even if the marginal product of labour is above zero, one can still assert that there may be surplus labour. This is because many people work less than any reasonable conception of full employment norm and man-hour output is well below in the primary sector.[11] Positive marginal productivity of labour is compatible with the existence of surplus manpower.[12] Price and Etherington found that the marginal productivity of labour input will be positive even though surplus agricultural labour may persist.[13] As a methodological tool the concept of marginal productivity of labour has very limited significance because, macroeconomically speaking, in practice, unless the level of employment in the economy were known marginal productivity of labour would be indeterminate.[14] The basis of calculation of the marginal productivity of labour in determining disguised unemployment may be called in question. It is baffling to note that

[4]R.C. Saxena: Agricultural Labour—Wages and living conditions in Meerut District, New Delhi, Research Programme Committee, Planning Commission 1969.

[5]Jagdish Bhagwati and S Chakravorty: "Indian Economic Analysis", American Economic Review Sept. 1969.

[6]John Weeks: Political Economy of Labour Transfer, "Science and Society, Winter 1971, Vol. XXXV, No. 4, p 470.

[7]Gunnar Myrdal: 'Asian Drama". Vols 2& 3, London, Allen Lane The Penguin Press, 1968, p. 2053.

[8]Ibid., p. 2052.

[9]Loc. cit.

[10]See, A. Navarrete and I.M. Navarrete: "Underemployment in Underdeveloped Countries", International Economic Papers, No. 3, 1958, pp, 235-9.

[11]LG Reynolds: "Economic Development with Surplus Labour: Some Complications", Oxford Economic Papers, March 1969, pp, 92-93.

[12]AK Sen: "Peasant and Dualism with or without Surplus Labour", Journal of Political Economy, Oct. 1966, p. 431.

[13]James E Price and Dan M Etherington: op. cit., "The Paradox of Surplus Agricultural Labour and Positive Marginal Productivity of Labour", Indian Economic Journal, April—June 1966, p., 686.

[14]Ashok Mathur: "The Anatomy of Disguised Unemployment", Oxford Economic Papers July 1964, p. 164

most of the empirical studies which reveal huge amount of disguised unemployment rely incorrectly on the 'stock' of labour rather than on the 'flow' of labour in calculating the marginal productivity of labour. Careful studies seem to support the view that marginal productivity of labour is positive if reference is to the flow of labour. JW Mellor observes that this appears to be the case even in the densely populated areas of the world.[15]

The concept of marginal productivity of labour must logically refer to the labour input, which in the ordinary way must be calculated not by the size of the labour force whether working or not but by the actual performance of the workforce in days, hours, weeks etc. A clear deviation from this is noticeable in some empirical studies. For instance, Rosenstein Rodan's study in southern Italy at once comes in mind.[16] If a portion of the labour force is idle it does not appeal to reason to ascribe zero marginal productivity to it and call it a situation of disguised unemployment. Idleness of labour force introduces one more complication. As a consequence of the removal of some disguisedly unemployed people the remaining workers have to work harder to make up for the missing comrades, but if the workers are voluntarily idle, harder or longer hour of work cannot be expected of them. The marginal productivity of labour can be considered zero only on the assumption that the remaining workers compensate for the lost production. If agriculture is run on very capitalistic lines, disguised unemployment even in this sense will not exist because it is unlikely that an employer will underutilise labour and employ labour for what is considered to be less than a working day.[17] Zero marginal productivity is proven if no new adjustment is needed after the surplus labour is transferred. But writers (including Nurkse)[18] broadly agree that reorganisation of various aspects of agriculture inclusive of work-method is necessitated under such circumstances.

It may turn out that adult workers are not fully employed even at the peak seasons, but this cannot directly reflect anything about marginal productivity of labour.[19] However, two important aspects in agriculture namely, hiring of labour and labour mobility which have a direct bearing on the margiral productivity are accepted almost by all. It is assumed that a farm which hires labour does not *per se* contain any labour having zero marginal productivity.[20] Similarly, the higher the mobility of labour from labour surplus to labour deficit area, the greater is the possibility of absence of any labour having zero value in the latter area.[21]

JE Meade observes that at the point where the average product of labour equals the physical subsistence level, the marginal product of labour may well be zero or even negative.[22] It is not clear what led Meade to make such a sweeping and fallacious generalization on this issue. It is by all means conceivable that even if the average labour product is equal to physical subsistence level, the marginal product of labour may still be much above zero and need not be as low as zero. Another significant issue which should not be lost sight of in connection with this problem is one of technical co-efficient of production. Some argue (notably Eckaus) that as the technical coefficient of production is constant in agriculture, addition of more labour force alone, other factors remaining constant, will bring out zero marginal productivity of

[15]JW Mellor: "The Use and Productivity of Farm Family Labour in the Early Stages of Agricultural Development", Journal of Farm Economics, Vol. 45 No, 3, Aug. 1963, p. 518.

[16]Rosenstein Rodan: Disguised Unemployment and Underemployment in Agriculture, Monthly Bulletin of Agricultural Economics and Statistics, Vol. 6, No. 7/8 Aug., 1957.

[17]AP Thirlwall : 'The Valuation of Labour in Surplus Labour Economies", Scottish Journal of Political Economy, Nov. 1971, p. 302.

[18]Ragnar Nurkse: Problems of Capital Formation in Underdeveloped Countries, Oxford, 1953, p. 33.

[19]LG Reynolds· op. cit p. 92.

[20]Among others, Nurkse, Viner, Pepelasis and Yotopoulos are of this opinion.

[21]See, Jacob Viner: 'Some Reflections on the Concept of Disguised Unemployment", Indian Journal of Economics, July 1957, p. 80 and R. Mabre, "Employment and Wages, in Dual Agriculture, Oxfords Economic Papers, Vol. 23, No. 3, Nov. 1971, pp. 401-416.

[22]JE Meade : The Theory of International Economic Policy, Vol. II. Trade and Welfare, Oxford University Press, 1955.

labour. But nobody, as Viner remarks, "has ever given a convincing illustration of a technical coefficient which is 'fixed' in a valid economic sense".[23]

Conclusion

Nurkesean proposition that zero marginal productivity is a convenient starting case loses much of its significance because the concept, as it relates to disguised unemployment is neither theoretically very sound nor practically very useful. The optimum population approach which is more relevant in underdeveloped countries directs its attention to average productivity and not marginal productivity. The obsession to margin leaves many important aspects unexplained and creates an unnecessary muddle of confusion. It should be clear by now that disguised unemployment cannot be generalised as a situation of zero marginal productivity of labour. Hence, zero marginal productivity of labour is only one possible definition of disguised unemployment with a very special and limited sense—obviously a very static definition. Surplus labour, as one Indian economist has observed, is a relative concept linked to agricultural surplus—rather than productivity, which would be changing with changing productivity and consumption.[24] The considered view of Joan Robinson on this problem should be stated here. She remarks that when "it is difficult to posit a case of fixed coefficient of production, it is better to say that marginal productivity of labour is very low".[25] Indeed if underemployment is defined as a situation of under-utilisation of labour-power, marginal productivity of labour may be thought to be positive.[26] Needless to say, positive marginal productivity of labour is found to be consistent with the model of unlimited supply of labour. Be that as it may, the doctrine that marginal productivity of labour is zero under disguised unemployment requires an urgent revision in the light of facts. □

[23] Jacob Viner: op. cit, p 79.

[24] GC Mandal: Agricultural Surplus, Labour Surplus and Economic Development—Theoretical Approach, Indian Journal of Agricultural Economics, Oct-Dec. 1967, p. 79.

[25] (Mrs) Joan Robinson : Paper on "Rising Supply Curve" in Collected Economic Papers, Oxford 1951. pp. 35-43.

[26] GP Misra: "Underemployment and Development Policy in a Labour Surplus Economy" in Employment Theory in a Labour Surplus Economy, Bombay, Popular Prakashan, 1970, pp, 30-31.

Over the last decade the developing nations have achieved the historically unprecedented rate of growth of five per cent a year. This has been made possible in part by a reasonably sustained level of external assistance. Yet as the 1970s open, the evidence accumulates that economic growth alone cannot bring about that steady social transformation of a people without which further advances cannot occur. In short, we have to admit that economic growth—even if pushed to the six per cent annual rate proposed as a target for the 1970s both by the Pearson Commission and by the United Nations Committee on the Second Development Decade—will not, of itself, be enough to accomplish our development objectives. Growth is a necessary but not a sufficient cause of successful modernisation. We must secure a six per cent growth rate. We must deploy the resources necessary for it. But we must do more. We must ensure that in such critical fields as population planning, rural renewal, fuller employment and decent urbanism, positive policies support and hasten the social transformation without which economic growth itself becomes obstructed and its results impaired.

—*Compass*, Vol. V, No. 4, 1971, p. 12

Productivity in German Foundry

Dr YK Subrahmanya*

The German foundries show a much higher productivity than those in India and this is the combined result of the investment, modernisation and personnel policies of the management and the determination of the labour to work harder for the country's prosperity and their ambition to earn more and live better. In this article, the author gives his impressions of German foundries he visited recently.

'MADE in Germany' has become synonymous with a quality product all over the world and behind this well-known mark lie the enormous efforts of an advanced, disciplined, dynamic and progressive nation.

The foundry industry in West Germany serves practically all types of machine building and manufacturing industries and has a very important role to play in the country's machinery production. The necessary recognition given to this aspect of the German foundry industry is seen in the tremendous progress made in terms of mechanization, automation and the resultant high productivity achieved in the past decade.

German Foundry Industry

The German foundry industry was highly developed even before the second world war when Germany had been manufacturing various types of machinery and other products. The foundries had their own large share to contribute to their country's war efforts. When the world war ended, the industry was practically ruined and what was left were heavily bombed buildings and damaged machinery. Their skilled labour had been all lost as soldiers in the war and those who were left were only the very old or the very young employees and also some disabled soldiers who had returned from the war. The well advanced and modern foundry industry in that country today is entirely due to the commendable skill and determination of the people, who, even under conditions of absolute scarcity of funds, food or shelter, have struggled to make up the loss by contributing their best to the cause.

In the beginning of this post-war era, some financial contribution was made available by the USA, but it is hard to believe that such an advancement in all spheres as seen today in that country could ever have been possible without the initiative, skill and hard work of the people themselves.

In a bid to cater castings to the various industries which sprang up after the war, the German foundry industry had to develop means to produce castings most economically and at a very fast rate, but with the least requirement of human effort, as there was severe shortage of manpower at all levels, and these conditions called for the maximum possible mechanisation of this industry. Though at the very beginning much had to be done manually for want of machines, all new machines which came in after the second world war had two main motives in their design:

(a) *Maximum Output*—This involves modern and high production equipment like automatic moulding machines, core shooters, shell moulding, pouring machines, mold-matic equipment etc.

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The connected balancing equipment, like electric melting furnaces, fettling equipment, etc. are also included.

(b) *Minimal use of Manpower*—Extensive use of mechanical (hydraulic and pneumatic) electrical and electronic equipment for the automatic operation of machinery and equipment. This has minimized the use of human labour as far as possible. Any operations which can be done by machines are not to be done manually. A seven-man-operated machine moulding unit can produce as much as 400 tonnes of good castings of average piece weight 20 kg. per month, which otherwise would require 40-50 men in Germany itself.

The added advantages resulting from these main features have been:

(1) *Minimization of variables due to human element in the end-products*: This is particularly of advantage for the foundry industry, which has still retained a look of art in spite of all the technological advancements, due to the large number of variables involved.

(2) *Uniformity in the quality of the product*: This has been one of the big advantages achieved which has enabled reduction of rejections and also the standardization of the products.

(3) *Manufacture of castings on a large scale for meeting the demands for inland and export markets*: This has gone a long way in capturing the foreign markets, which, otherwise, with small-scale production, would never have been possible. This is of much importance to that country which needs to import many raw materials, food stuffs and other necessities by exporting its industrial products.

(4) *High productivity of human labour*, which, due to severe shortage of human labour force, attains the greatest importance.

(5) *Fillip to the other industries*: The necessity of such high production machines has created demand for the technology involved, which in itself has become big business. Complete foundry plants and projects are able to be exported from that country to practically every corner of the world.

(6) *Improved foundry working conditions*: The high mechanization has taken away the hardest part of the work from the human hands, thus making the foundry work more bearable than ever before. There is, of course, yet much more to be done in this direction to attract the right type of skills to this industry.

Productivity of German Foundries

The productivity of German foundries could be compared today with some of the highest in the world. Even in comparatively less-mechanized grey iron foundries in West Germany, the productivity is around 4-10 times that in India. The average Indian grey iron foundry with moulding machines and cupolas, but with no mould conveyors has an average output of less than 0.5 M.T. per man per month. Even a fairly well-mechanized Indian foundry has an average of 1-2 M.T. per man per month, the higher figures relating to the foundries manufacturing low-price jobs like agricultural implements and also to foundries manufacturing heavy and extra-heavy castings. Even the comparatively less-mechanized West German foundries are better equipped than some of the supposedly well-mechanized Indian foundries and their productivity is very much higher than here. The productivity of the specific plants in the West German foundries lies anywhere between 2 to 12 tonnes per man per month, the average for the whole foundry being in the region of 2 to 3. A chart giving details of some of the foundries and their productivity figures is shown in Appendix on the next page.

APPENDIX : FOUNDRY PRODUCTIVITY

Foundry	*Product*	*Particulars*	*No. of workmen*	*Production tonnage*	*Output per man per month*	*Remarks*
				M.T.	*M.T.*	
1	2	3	4	5	6	7
A	Jobbing grey iron	Semi-mechanized; Mostly machine tool small and medium castings; Weight range less than 1 kg. upto 6 M.T. Grade produced GG 18-25, Cold blast cupolas with skip charging; Heavy moulding machines; Machine moulding unit with 6 pairs of moulding machines; All furan cores—mixer muller used. Fettling by wheelabrator and shot blast, snagging grinders. Single shift. Investment approx. 10 million DM.	120	350-400	3 3.2	
B	Jobbing—Grey iron and S.G. iron	Well mechanized; Mostly machine tool and general engineering castings; weight range : very small upto 10 tonnes per piece. Grades produced GG 12-30. S.G. iron GGG 28-70. Hot blast cupolas with bucket charging, S.G. iron induction furnace. Medium and large castings hand-moulded. Small, completely mechanized machine moulding unit with 5 pairs of moulding machines. Coremaking—mostly furan; also CO_2 and oil mixer. Slinger and coreshooters used. Fettling—shot blasting and wheelabrating, cut-off wheels and snagging grinders. Investment approx. 15—20 million DM.	240	Grey iron 500 SG iron 50	2.28	
C	Captive 10% Jobbing 90% Grey iron and S.G.Iron	Well mechanized. Over 3000 jobs per year handled. Machine tool, general engineering and art castings. Weight range 0·05 kg.—25 M.T. Melting—hot blast cupolas and 3 induction furnaces; Cement sand moulding for heavy castings, Furan for medium moulding; well mechanized heavy and small machine moulding sections. Cores mostly in furan. Mixer Slinger used; cores also in CO_2 and oil. Core blowers and shooters used. Feetling—large castings by shot blasts. Small castings by wheelabrators. Investment approx. 30-40 million DM	470	Grey Iron 1100-1300 S.G. iron 150	2.67 — 3.08	
D	Jobbing—Grey iron and S.G. iron	Well mechanized small casting machine moulding units; semi-mechanized medium and large castings foundry. Weight range : less than 1 kg. upto 10 MT per piece. Melting grey iron—cold and hot blast cupolas. S.G. iron in Induction furnaces and hot blast cupolas. Small castings in 2 highly automatic machine moulding units. Medium castings in semi-mechanized machine moulding and furan sand. Large castings by hand moulding; core making in furan and oil. Fettling by hydroblast, shot blast for medium castings, wheelabrator for small castings. Snagging grinders, pneumatic chisels and cutoff wheels. Investment approx. 30 million DM.	406	Grey iron 600 S.G. iron 300	2.22	Automatic machine moulding units 400-500 T with 50 men. Approx. 8-10 T/ man/month.

Appendix (*Contd.*)

1	2	3	4	5	6	7
E	Captive 40%—50% Jobbing 60%—50% Grey/SG iron	Small machine moulding unit highly automatic with own separate sand plant. Manhole covers and medium machine moulding units highly mechanized. Large moulding machines with sand articulators provided. Heavy and pit moulding manual. Melting—hot blast cupolas with automatic charging equipment; S.G. iron twice a week. All medium and large core making in furan sand. Small cores by CO_2 and oil. Fettling by hydroblast and shot blast for medium and large castings; wheelabrator and snagging grinders for small castings. Investment approx. 20 million DM.	170	S.G. iron 100 Cast iron 800	5. 3	Special machine moulding unit 300-400 T/month with 8-10 men at 44-40 T/man/month. Automatic machine moulding unit 150-200 T/month with 8 men at 18.8—25 T/man/month.

Lessons for India

The vast variation between the productivity levels in Indian and West German foundries is thought-provoking. An analysis brings out two main themes for consideration of the Indian foundrymen; these being the roles to be played by the management and the labour.

The West German foundry managements appear to believe that there is no future for this industry without modernisation and mechanisation and have done all they can to achieve this end. This has involved heavy investment in buildings, equipment and machinery. Frequent replacement of machinery to adopt new techniques, methods and materials have also been called for, which has further enhanced the investment. But this progressive policy of investment for mechanisation and modernisation has been pursued by these managements in order to keep themselves abreast of the technology elsewhere in the world. It has been paying them good dividends.

Though it was observed that the utilization of machinery and equipment was far lower than desirable in certain foundries, provision of such equipment was preferred to keep the human labour content low.

The labour also contribute a great deal to achieve this high productivity. The West German foundry workmen are highly disciplined, industrious and hard working and have the necessary skills, training and stamina to carry out such work. More than anything else, it is the determination of the workmen to produce maximum in the interest of their employing firm, the country as a whole and themselves too. They appreciate that their own prosperity and well-being depends upon that of their employer, and of their country and that it is possible to achieve that only through their hard and sincere work. Having been used to a high standard of living conditions so far, it is hard for them to imagine going down, and this forms a motive force for putting hard work.

Due to shortage of manpower, there is absolutely no unemployment in that country. The sense of security of employment is in itself a great incentive offered by their government. The additional facilities of insurance, old age pension etc. leave the people without any worry for their future, which goes a long way in making the people give out their best.

To conclude, there is much to be emulated in India from the experiences of German foundries. The mechanisation and modernisation approach by the managements with the necessary investment and personnel policies and also the high productive attitude of the workmen are essential factors contributing to higher productivity. □

Wages and Productivity Nexus

Harish Mahindra*

This paper has, according to the author, the limited objective of merely tracing attempts to link productivity (overall or labour) with wages. It does not concern itself with the techniques of increasing productivity or any other aspects of productivity in absolute terms. In this context, the author briefly touches upon the two terms 'Productivity' and 'Wage' and examines what they normally connote.

PRODUCTIVITY is as much a key to progress as it is symbolic of it. A country is said to be advanced or backward industrially and economically depending upon the level of productivity of land, labour, capital and whatever factors of production one could conceive of. As such it is an instrument to promote economic growth. It helps in increasing the standards of living of the people and snapping the vicious circle of poverty constricting economic advancement. It can be relied upon to communicate prosperity.

Productivity

The term productivity basically refers to the judicious use of productive resources or the optimisation of the utilisation of resources, physical as well as mental. It means also the avoidance of wastage of material and fuel productivity. Here it is considered in its broadest terms and not merely in terms of the productivity of a farm-hand or a factory-hand. Thus, we speak of productivity of capital, of labour, of raw-materials, of power, of fuel and so forth. For instance, through elementary fuel efficiency, our steel plants have reduced the consumption of coke from 1100 Kgs. per tonne in 1963 to about 800 or less per tonne at present. Even this figure is considered to be on the high side insofar as in Japan the equivalent consumption is 550 Kgs. All said, productivity boils down to increasing the output for a given unit of input or inversely reducing the input for the same output.

Productivity does not refer to the function of production alone. It relates to the right and positive attitudes in thinking and it is all-embracing. It is said that productivity principles are applicable to all industries from curry-powder to computers and they cover or ought to cover all workers, blue collar or white collar, from "the charwoman to the chairman". Nevertheless, as the title suggests, in this paper it is proposed to confine the discussions only to labour productivity and to total or overall productivity. Jonathan Swift's message in *Gulliver's Travels* was that nobody is big or small except by comparison. We could, therefore, begin by making certain international comparisons in respect of productivity. But as we shall see presently, it will only show how elusive the nature of productivity is !

Take steel production. The U.S. Steel Industry is considered to be the most advanced in the world, with 11.9 manhours per tonne of

*Chairman, Mahindra Ugine Steel Co. Ltd,. Worli, Bombay.

steel shipped, whereas in Japan it is 12.4 manhours and in W. Germany 14.5 manhours. Productivity per worker appears to be the highest in the U.S. because it happens to be the largest producer of steel in the world. This is in other words the influence of volume (of production) over productivity. But this advantage is not enough to counter the lower labour cost and therefore the higher productivity in Japan and W. Germany. For instance, the hourly wage in the U.S.A. is $ 4.68, whereas in Japan it is as low as $ 1.83 and in Germany $ 2.65. In other words, the labour cost of production per tonne of steel shipped on the basis of the above is as in Table 1.

Table 1

Country	*No. of man-hours per tonne*	*Hourly wage rate*	*Total Labour cost*
(1)	(2)	(3)	(4) = (3 × 2)
U.S.A.	11.9	$ 4.68	$ 55.692
Japan	12.4	$ 1.83	$ 22.692
W. Germany	14.5	$ 2.65	$ 38.425

Source : Columns (2) & (3) *Fortune* July, 1971.

One could, therefore, say that though in an international comparison the U.S. Steel worker's productivity is higher than that of his counterparts in Japan and Germany, *prima facie*, it appears that he is overpaid or that the workers in Germany or in Japan are underpaid. Also it could be that both the assumptions are correct. But what other positive conclusions, unassailable or uncontestable, can we arrive at with this table of data ?

By yet another measure we could compare the productivity per worker in the Indian Steel Industry with similar data for several other advanced countries. Table 2 compares the productivity per worker as expresssed in terms of ingot tonnes per manyear.

In all the industries compared, India ends up at the bottom of the productivity scale.

Table 2

Comparison of Industrial Productivity in India and other countries

Industry	*Country*	*Ingot Tonnes/ Manyear*
I Steel	U.S.A.	218.8
	Japan	92.9
	West Germany	122.0
	France	133.0
	U.K.	87.4
	India	68.0
II Aluminium	U.S.A.	200.0
	Canada	125.0
	Japan	75.0
	India	30.0
III Cement	U.S.A.	1333.0
	Japan	1143.0
	U.K.	1097.0
	West Germany	909.0
	India	196.0
IV Sugar	Hawai (U.S.A.)	430.0
	Peurto Rico	392.0
	Philippines	119.0
	India	24.0
V Textiles (Spinning)	Japan	10.0
	India	3.0

Source : Adapted from the papers presented at the II PM Conference, Madras, May 1971.

Should this mean that labour productivity in India is pitiably low? Or is it that the level of technology is primary or at best intermediate and that Managements are thoroughly incompetent? In this situation, generalisations can be very misleading.

Wages

The literature about wages as we understand it today started pouring out only after the 1880s, though the classical economists had their own Wage Fund Theory. Perhaps no other term has generated more conflict and heat (and less light) of ideas as Wages. Naturally enough, one is rather circumspect about saying anything about wage policy or wage determination, lest a hornet's nest be stirred.

Those connected with productivity keep making glib statements endlessly about produc-

Wages is not a function of productivity only; several other criteria influence wage determination in differing measures.

tivity at all levels. But it is when productivity particularly that of labour is discussed in relation to wage determination or wage policy both the terms acquire meaning and significance and issues therein get sensitized. If productivity is talked about in absolute terms, it could only result in arid discussions, especially at the present juncture when capital-intensity in Indian industries is increasing more than ever before, changing consequently and continually the input-output ratio autonomously and outside the purview of labour productivity, notwithstanding the de-emphasis on such techniques in preference to labour-intensive technology inasmuch as the country is long on labour.

Wage Criteria

Productivity is not the only criterion for wage determination. In a developing country like ours where the industrial culture is yet to blossom forth in all its splendour (God forbid its ugliness) where the standards of living are woefully low, no one in his right mind would ever talk exclusively of productivity (in absolute terms) of all sections of people in all walks of life. Conceding that the principles of productivity should be applied to the work of all, from the chairman to the charwoman, when it comes to the question of wages to the charwoman, to think of paying her strictly according to her productivity alone, disregarding other criteria for wage fixation amounts to indulging in mere boondoggling. In other words, wages is not a function of productivity only. Several other criteria influence wage determination in differing measures. These are :

1. The supply of and the demand for labour
2. The capacity to pay of the employer
3. The minimum needs of the worker
4. Face-to-face, across-the-table individual and collective bargaining with or without Government mediation.
5. Changes in the price level
6. And others such as the stage of development of the economy, the national income of the country, the stage of development of the industry, or firm and so forth. Also, of late the desirable goal of distributive justice in a land where there are gross inequalities in incomes has been willynilly influencing discussions about wage policy more decisively than before, though such a goal has always been a basic tenet of our five-year schemes of development. This should not mean, however, that the lazy bones and the inefficient should be allowed to live on the dynamic and efficient in the name of automatic equitable distribution of incomes. In a sense, there can never be complete equality even where two persons may be doing almost the same work. One may execute it brilliantly and the other shoddily. Finally, even in the most equal of societies equality has to be only with reference to opportunities for self-improvement and actualisation and not equality in respect of incomes. There can be no efficiency if there is not a premium for it.

Nevertheless, it would be a solecism to state that productivity is not of over-riding importance under a set of conditions where the other substantive wage criteria mentioned in the foregoing para have been attended to in some measure.

In India, wage policy as a subject has only served as a hotbed of taut controversies. Many

of these disputes arise out of the very stage of economic development of the economy. Where-else than in a country like ours, would, for instance, one come across a situation in which the capacity to pay an industry, which could be regarded as the ceiling, lies below the floor of the needs of the worker? (Of course, such an industry does not deserve to exist. Or as one of the former Labour Ministers is said to have observed, 'if the products of the industry are considered essential, the workers should not be made to suffer or subsidise such much-needed existence of the industry. Such a burden rests on the able shoulders of others, may be the consumers.)

In the long run, it is only in the context of increasing or decreasing productivity one could think of determination of wages.

Wage-Productivity Relationship

Productivity and wages can be discussed meaningfully only when they are studied together. (Though there is nothing to suggest that there would always be movements in one factor in response to identical movements in the other.) Where increases in productivity outstrip increases in wages or compensation, all the benefits of higher productivity go to the employer. But where wages do not grow in correspondence with productivity but overtake increases in productivity, there is every possibility of a wage-push inflation being triggered off, first, in the initial stages, in an endemic form, but soon in a pandemic form. How soon such a wage-push inflation as in the case of other cost-push inflation spreads, of course, depends on by what measure productivity lags behind wages on account of the wage rise and also on the strength of the forward and backward linkages such an industry has with other industries and sectors. In the case of the intermediate Iron and Steel Industry, for example, it is supposed to have the strongest linkage both backward (through purchases) and forward (through sales), somuch so, a 10% increase in Iron and Steel prices could lead to a 0.15% increase in the price of even a consumer item like biscuits, 0.18% increase in fruits and vegetable preservation, 0.25% increase in petroleum products, 1.9% increase in construction, 2.06% in transport equipment, about 3% in metal production and about 13% in iron and steel itself. In the case of industrial machinery also price increases could be substantial.

In the long run, it is only in the context of increasing or decreasing productivity one could think of determination of wages. Here is an instance. Wages in the organised sector is supposed to be higher than in the unorganised sector because productivity in the former is also higher. Conversely, for giving a sense of direction to wage policy, it is extremely crucial that the movements in productivity are marked and kept account of. It cannot be said that a given wage increase would lead to a wage-push inflation unless simultaneously it is examined whether a corresponding increase in productivity has more or less compensated the increase in wages, and whether productivity of management, capital, fuel and so forth have remained the same.

Value Premises

In any discussion about wages and productivity, conflicts occur more because it is not thrashed out at the very beginning whether the value premises of each individual participant in such discussions have been fully taken note of. The value premises could make a world of difference in the kind of arguments that would be forthcoming for wage determination, independent of productivity or in co-relation with it. Once there is a measure of rapport as regards the value premises, one could get to the brasstacks of the subject soon and talk more

meaningfully. With them as the backdrop, we could discuss more precisely whether a given policy would achieve the desired goal or not. For instance, frankly a person who believes in a mixed-economy type of economic set-up is bound to clash head-long with another who subscribes fully to the Exploitation Theory of Karl Marx, formulated at a time when the so-called factories in England were nothing but sweatshops.

If one may venture to offer a value premise which could be acceptable to all sections, perhaps one would do well to enquire as to what the worker would aspire to obtain under the best of circumstances and set up. In this respect, what Seebohm Rowntree (in 1921) suggested is worth being considered by employers. "..... it is possible, without lowering efficiency, to accord to the workers a status as good as they would enjoy under any alternative system.... with regard to remuneration and working conditions. I am satisfied that it is *possible* under capitalism to provide conditions which compare not unfavourably with those which could be expected under any other system, but it is no satisfaction to the workers to note that a given system of industry is *capable* of providing good conditions unless in fact it does so*." Rowntree goes on to ascribe the reason for discontent among workers to the fact that the industrial conditions of his time fell short of what they could and ought to have been.

Those who labour that under a different set of circumstances workers would be better off have only to look at industrial relations in public sector undertakings. As anyone could see strikes and lock-outs are not a unique phenomenon to be found in private organisations alone. They are very much of a malaise in Government organisations also, which are owned in the final analysis by the people, who include the workers themselves and which have nothing to do with 'monopolists' and capitalists. This further adds conviction to the belief that it is only when productivity is linked to wages it can be ensured that there is an orderly growth in real wages, that there are no erratic movements in prices, that the inherent conflict between saving and capital formation on the one hand and equitable distribution of incomes on the other is purged of its impermeability and tenseness, that the morale of the workers is maintained and wages as a motivating factor is made good use of.

The Concept of Man

Frederick Taylor, HL Gantt and to a certain extent other pioneers in Scientific Management shared among them the engineering concept of man. He was only a living machine with not much of a head of his own and much less of a heart. The pioneers in Scientific Management, with due respect to them, practically ignored the human aspect in their complete preoccupation with 'a fair day's work for a fair day's pay'. It was only later that Industrial Psychology began to have a larger say in industrial management, when Elton Mayo recommended rest pauses to take note of fatigue. The contribution of Mary Parker Follett (1868-1933) was that she, for almost the very first time, drew attention to the human relationships in industry. She believed in "constructive conflict" which meant that both the parties to a dispute happened to succeed in integrating their desires and constructing acceptable solutions.† It was much later that Ergonomics or the science concerned with the "study of the relationship between man and his working environment" making use of a multi-disciplinary approach "involving functional anatomy and anthropometry, physiology, psychology, physics and engineering" came into its own. Thus, in due course a sociological concept of man as a worker emerged. More recently he is being studied even as a political concept.

Today, it is still not yet taken for granted that one can neglect the human aspect of workers at one's own peril. Where matters are not happy in this respect, one cannot prod the

* Seebohm Rowntree *The Human Factor in Business*, Longman, 1921, p. 187.

† A Tillit, T Kempner, G Wills—Eds. *Management Thinkers*, pp. 254-267

workers with any measure of success to work towards higher productivity. A contented and happy labour force is a *sine-qua-non* in this respect. In much of what is said about productivity in this paper there is no reference to those who do not yet receive a fair wage. For our purposes, they have not yet arrived on the productivity scene.

One can neglect the human aspect of workers at one's own peril. A contented and happy labour force is a sine-qua-non in any measure of success towards higher productivity.

Wages, Productivity and Motivation

There is an age-old truth that money wages can be regarded as a major factor upto a point in motivation. It is said that a man works if paid enough and man works *harder* if paid *more*. In this context, we are necessarily drawn into the question of motivation as a key to productivity. We think of remuneration alone as a motivating force for increased productivity on account of the fact that our thinking is largely influenced by the domineering economism and abject poverty of the masses in our country. Thus the basic link between productivity and wage is established more without a reference to productivity than on the basis of a measurement of productivity at two different points of time. For instance, the annual increment given to an employee is on the basis of an assumption that the worker has acquired more skill and more experience and can do a given job better than before. (Today, however, it is found that at a certain point of life, which could differ from person to person, a man ceases to learn and begins to live on his accumulated intellectual fat . if at all any!)

Under this given situation, incentive payment systems should be regarded as the best way to link wages to productivity. In fact, at the turn of the century, the system of payment by results predominated. Much of the work done by pioneers in Scientific Management, as mentioned earlier, revolves around 'a fair day's work for a fair day's pay, work measurement and other material incentive schemes. The system ran into difficulties when measurement became difficult and was largely replaced by a combination of time-rate system and payment by results.

In India, labour stands in a unique position to improve the input-output ratio. (This is perhaps equally true of other factors of production, though, of course, in varying degrees.) The question of motivating labour, therefore, is of crucial importance. We have noted earlier that on account of the abject poverty and comparatively lower standards of living and increased costs of living, wages will, for a long time, continue to be the chief motivating force. But beyond the money wage, it is recognised even in a collective society that remuneration alone cannot go far and one has necessarily to look for other factors and certain human relationships.

In Communist China, the hard facts are that in order to contain a large and rapidly growing labour force and to make-do with what little capital is available, ideological incentives are being increasingly used to augment production and productivity. Before the "Great Leap" (1958-62) and the "Cultural Revolution" (1966) material incentives were being used for the same purpose. There were also schemes for awarding bonuses and incentives for 'above-average performances'. This system came under a heavy fire in 1967 and bonuses and incentives found themselves on the way out. Today, ideological and non-material incentives keep

up the morale of the workers. The thinking behind this policy is that there is an inverse relationship between rising incomes and standards of living on the one hand and the revolutionary zeal of workers on the other.

It was of all people Lenin, who happened to say that once the workers are paid wages, they begin to demand poetry. The theories of motivation beyond the wage-packet are epitomised in the sequential pyramid of human needs and objectives given by Abraham Maslow. His submission that as material goods become adequate or plentiful, further acquisitions become less and less affective in motivating him is very true. It may be equally true to say that there could only be very few units in selected industries where wages might have ceased to act as a strong incentive for harder work, as when the physiological needs have not been met.

The worker is, however, prepared to put his best where he is assured of an opportunity for self-actualisation, fulfilment, success, respect, a sense of belonging and security. There is increasing awareness of these powerful motivations provided by the need for achievement (n/Ach) in all people, though the n/Ach score may vary from community to community, section to section or from person to person. As a little-known academician says, "good remuneration can only prevent people from being dissatisfied, but they rarely light a spark in the eyes".

The Indian Experience

One could relate these discussions with the conditions obtaining in this country at the moment. Unfortunately, correct, reliable and up-to-date data are not available regarding increase in productivity and wages for all sectors and industries. Whatever data are available are archaic and cannot be of more than academic interest. Studies, however, have been made on the basis of such figures and we have several points relevant to our discussion emerging out of such studies. A passing reference is made in the following paragraphs.

In Table 2 we found that the ingot tonnes per manyear in India is as low as 68, whereas the corresponding figure for U.K. is 87, for Japan 92.9, for W. Germany 122, for France 133 and for the U.S.A. 218.8. The biggest mistake one could do is to jump to the conclusion that the productivity of the Indian labourer is low. As stated earlier, productivity is not a function of labour productivity *alone*. Management, type of machinery used, stage of technology, production process, location, quality of raw materials and every other conceivable factor could be said to share the blame for lower overall productivity. Nevertheless, other things being equal, it cannot be denied that the labour productivity in absolute terms is lower in India than elsewhere. But considered in conjunction with wages, it can be argued that there can be no question of adequacy of productivity. Whatever has been said could be true of a general set of circumstances. But where already a modicum of fair wage prevails and the conditions of work are by any standard upto the mark, it is necessary to examine whether productivity is ahead of wages or *vice versa*.

There can be as many different approaches to this question as there are different data. Though too much cannot be read into them, it is worth our while to relate our discussion to this question. Take the stand that wages have fallen behind productivity. Going by the criterion of the shares of wage and non-wage incomes in the value added by manufacture, in the Engineering Industry of Bombay it is found by a recent study that there is a lag in wage increase in relation to productivity and as a corollary it is found that non-wage incomes have increased more substantially. This means that in the value added by manufacture by the Engineering Industry, the share of non-wage group has increased. This is shown in Table 3. It is also found in the same industry that the share of wage cost has been steadily decreasing between 1951 and 1960. Wage costs, inclusive of salaries, as a percentage of total cost declined from 22.20% to 16.01% over this period.

Table 3

Percentage Indices of Wages and Productivity and Percentage Shares of Wage and Non-wage Items in Value Added by Manufacture in the Engineering Industry

Year	*Index No. of earnings*	*Index No. of products at current prices* **1951 = 100**	*Wages (excluding salaries) including money value of concessions*	*Non-Wage Income*
1951	100	100	47.25	39.95
1954	124	109	53.42	38.85
1955	123	115	50.64	41.85
1956	132	138	45.41	47.69
1959	100	100	40.68	45.64
1960	115	129	36.22	54.55

(Up to 1956, 1951 = 100, for 1960, 1959 = 100)

In the case of the Cement Industry, it is found that labour productivity has kept pace with capital productivity, though fuel and material productivity had shown a declining trend during the period 1950-1964. To be more exact, productivity of labour has gone up by 118%, whereas, productivity of capital has gone up by 132%. The next question is whether there has been a corresponding increase in money wages. Here again it is seen that money wages per manhour have also gone up by 161%, though the real wages per manhour are higher by only 73%. Taking total productivity into account, it is found that the increases in money wages are at a higher rate than in total productivity:

One of the pitfalls in talking about productivity in general in vague terms for the industry as a whole instead of at the plant level is that the problems are oversimplified and the solutions that are concocted for them tend to be spuriously misleading. Take, for instance, the popular belief that over the past 15 to 20 years increases

Table 4

Indices of Productivity and Money Wages per Manyear in the Cement Industry

Year	*Labour Productivity*	*Capital Productivity*	*Total* Productivity*	*Index of real wage per manhour*	*Index of money wages per manhour*
1950	100	100	100	100	100
1951	54.6	44.9	46.6	109.2	113.9
1956	84.0	60.6	64.9	133.2	138.9
1960	239.3	250.6	258.4	143.0	176.0
1963	269.9	317.9	309.2	185.6	247.0
1964	217.8	231.6	229.1	172.8	261.0

*Excluding Fuel and Material Productivity.

Source : Table-3 and Table-4—Adapted from "Productivity and Wages in the Bombay Engineering Industry" by B. R. Rairikar and "Wages & Profits in the Cement Industry 1950-64" by K. Ramanathan—"PAPERS AND PROCEEDINGS OF THE SEMINAR ON WAGE POLICY AND WAGE DETERMINATION IN INDIA" Bombay University—1970.)

Table 5

Indices af Money Earnings of Employees in Manufacturing Industries and Labour Productivity

Year	*Index No. of Money Earnings*	*Index No. of Real Earnings*	*Index af Labour Productivity*
1961	100	100	100
1962	105	103	100.6
1963	109	103	102.6
1964	114	94	105.9
1965	128	97	105.7
1966	139	95	107.7
1967	151	91	105.8
1968	160	94	109.9
1969	166	98	117.5
1970	—	—	116.2

Source : Adapted from data in Indian Labour Statistics - Govt. of India '71

in productivity in several Indian industries have outstripped increases, if any, in wages. It is definitely so if real wages are taken into account instead of the money wages. But the data presented in Table 5 have a completely different story to tell.

The figures presented in column 2 and 4 appear to go against the popular belief. Even where real earnings are taken into account, which themselves are imperfect, the wage lag is not that substantial as is generally made out to be.

Again take another example. In the Iron & Steel Industry taken as a whole, between 1947 and 1963, productivity in terms of the value of gross product per manhour has quadrupled, from Rs. 2.40 to Rs. 10.90 whereas during the same period, the average annual earnings have not even trebled, moving as they did from Rs. 1230.40 to Rs. 3036.63. No one quarrels with these facts and figures. Be that as it may, juxtapose these facts with Table 6 presenting the data regarding the productivity and wage picture in three of the largest steel plants in the country.

The reading here is that while there has been a more than three-fold increase in wage during 1961-62 and 1966-67, productivity has remained almost stagnant. The data presented here appears to fly in the face of the statement in the foregoing para that wages has been dallying behind productivity. (Though the periods are not comparable, obviously within the matter of a few years the data for the two variables cannot differ materially.) It is also to be noted that in the above table productivity is expressed in terms of ingot tonnes per man-year and compensation is expressed in terms of total emoluments to all employees. One may not be very wide off the mark even if this data is expressed uniformally. All said, one cannot put too much faith in industry-wise data.

The second consideration that should be given due weightage is that whether the base year chosen for measuring wages and productivity happens to be the year when wages matched productivity. Otherwise, it is just possible that the rise in productivity during a particular period unaccompanied by a matching wage rise merely goes to compensate for the lead in wages in the base year. It could also be the other way round.

One more objection to industry-level as against plant-level studies is that conditions may

Table 6

Wages and Productivity in Three of the Largest Steel Plants (1961-62 to 1966-67)

Year	*Payments to and provision for employees (Rs. in million) in all the three plants*	*Labour Productivity Ingot Tonnes per man-year*		
		Plant A	*Plant B*	*Plant C*
1961-62	106		43.5	37.6
1962-63	169	62.4	56.8	58.2
1963-64	207	66.5	71.8	58.2
1964-65	240	58.2	68.8	65.5
1965-66	303	58.4	61.7	67.0
1966-67	367	74.5	45.0	52.3

Source : Adapted from 'Movements of Wages & Dearness Allowance' by M.V. Madiman—"PAPERS AND PROCEEDINGS OF THE SEMINAR ON WAGE POLICY AND WAGE DETERMINATION IN INDIA"—University of Bombay—1970.

differ from state to state and region to region. There are in the Textile Industry, for instance, some units at the mercy of the wolf of bankruptcy, the vital figures having gone into red earlier, some that just make both ends meet and others where wages and productivity could be as satisfactory as anyone could expect. In other words, the old wisecrack that there are three kinds of lies viz. lies, damn lies and statistics sounds true. If this is so, there is not much sense in drawing woolly generalisations from meagre and outdated aggregate data for an industry as a whole, though one could never underestimate their usefulness in indicating broadly the situation prevailing in an industry. Also extreme care and caution, however, are required in drawing conclusions from such statistical data.

Productivity Bargaining

The statistics of wages and productivity increases do not lead us anywhere. There have been many voices which have called the bluff in these figures. The methodologies adopted to calculate productivity have been questioned. It is also asked as to whether it is necessary that increases in productivity are a precondi- n for increases in wages and also whether abour can claim all the credit for increases in uctivity. Under such circumstances, it is but natural that one has to harp on the significance of productivity bargaining in face to face negotiations. It is only recently (after 1960s) that productivity bargaining is being talked about in India. Appreciable progress has been registered in this field in countries such as the U.S.A., Germany, Britain, France etc. This is another way to acknowledge that payment by results or measured day work or any other incentive system can succeed only if it is tailor-made to suit the individualities of every unit of production.

For instance, the reader may be aware of the famous Scanlon Plan which relates inventives to cost-saving and productivity bargaining. The ratio of labour costs to sales value of production is determined and if the ratio has gone down, which means that labour cost has fallen, a bonus is paid to the employees either on a group basis or for all. Similarly, an important and well-known productivity agreement, which has served as a model for others is the Fawley Productivity agreement of 1960 at the Fawley Refinery of Esso, in England. The blue-book incorporating the agreement provided for discussion among the employees numbering about 3300 owing allegiance to about 8 Trade Unions. The outstanding feature of the agreement was that it offered a 40-hour week and upto 45% increase in wages, if cer-

It is only recently that productivity bargaining is being talked about in India. Nevertheless, in the case of several long-term agreements references have been made to productivity.

tain conditions relating to productivity were satisfied. These conditions were reduction in overtime, elimination of craft demarcation, doing away with rest-pauses in work such as tea break, walking time, washing time etc. The agreement also provided for abolishing special payments like heat money, dirt money, etc. The direct outcome of this agreement was that within a period of two years, productivity registered a 50% increase, apart from a reduction in overtime from 18% to 8%.

A more impressive agreement that has come into light recently is the deal struck at British Oxygen. This radically reformed its working. It also helped boost sales by as much as 61% in just two years. The dramatic changes brought about in BOC and its way of dealing with employees have come under a great deal of microscopic examination. Under this agreement, the management "operates people only on the end of a long piece of string". The responsibility for profitability devolves on employees themselves. In BOC, it is said, productivity has been correctly understood as basically an attitude of mind which takes it for granted that "change is axiomatic". Before the ink is dry on an agreement, the employees themselves are anxious to strike another deal, strictly on a *quid pro quo* basis.

Measuring Productivity and Sharing Gains

The basic difficulty in productivity relates to the measurement of the contribution of each factor of production. When the question of sharing the productivity is discussed, the two main stumbling blocks are firstly the formulation of an acceptable means of measuring increases in productivity in general and labour productivity in particular and secondly devising a formula which is also acceptable to all. for fixing the share of labour and capital in the increased productivity. As capital intensity of production increases and technological sophistication in the process of production also reaches new heights, the problem of measuring the contribution of each factor assumes larger dimensions. At times, the contribution of both capital and labour could be only marginal. For instance, Abrhamovitz has calculated that between 1869 and 1944-53, the per capita output in the U.S.A. increased four-fold, but of this, the share of capital and labour taken together was only 14%. Similarly, an event for which technology can take the credit for almost the entire increase in productivity was the use of high-speed steel permitting cutting of metal at a rate which was 100% more than the previous speed. It also led to the birth of a new attitude on shop floors and to the reorganisation of factories. Similarly, the use of machine tools wrought remarkable progress on the time scale.

The numerous complications in measuring productivity and sharing the gains therefrom have to be sorted out. In this situation, we would do well to rely upon reasoned bargaining at the plant level. This view has been put forth for the simple reason that there cannot be an universally acceptable formula for measuring productivity and sharing the gains insofar as the factor-mix is most likely to differ from industry to industry and plant to plant. Nevertheless, certain plans, endorsed by parties to productivity have been recently put forth, which can offer the basic guidelines at the plant level in this respect.*

*Refer to Report of the Sub-Committee of the NPC 'Sharing the Gains in Productivity' (Aug. 1970) wherein a view was expressed that while it is "extremely difficu. to give a uniform formula for general applicability in all situations", nevertheless, a "practical and pragmatic" formula that has a good chance of be accepted by all is the one that provides for the gains on a fifty-fifty basis.

The usual criticism of productivity bargaining that productivity cannot be measured has not prevented organisations such as British Oxygen to go ahead and strike it rich in this direction. In Britain every year innumerable deals are struck, notwithstanding yet another criticism that bargaining procedures that are used are such that they require greed and selfishness as sources of power and the dedicated and the restrained are punished.

In India, productivity techniques are viewed in certain cases as a Pandora's Box which would make workers slog or would lead to their retrenchment. Also there is very little clear thinking as to what portion of the total wage should be left to be determined by the employer beyond the minimum wage and how much should be determined by collective bargaining. Nevertheless, in our own country, in the case of several long-term agreements references have been made to productivity. For instance, one such long-term agreement between the management of a major steel manufacturing company and its trade unions, provides for improving labour productivity, with the assurance from the management that there would be no retrenchment, that the necessary training would be provided to employees and that the average earning of the employees would be guaranteed to them. These assurances are in return for the trade unions agreeing to give "full support and co-operation to the company in the matter of securing improvement in labour productivity". Any dispute arising out of the implementation of the agreement would be referred to arbitration by independent experts and the decision of the experts would be binding on both the company and the unions. The case is also cited of a light metal company employing about a thousand hands, having done the creditable job of concluding a series of productivity agreements between 1960 and 1965 and achieving a three-fold increase in productivity and compensating increases in the emoluments. The agreement provided for the following :

"Fixation of better working standards, rationalised crew sizes, reduction of idle time and wastages, avoidance of restrictive practices, elimination of helpers in some cases, work simplification, streamlined material handling system, method improvement, planning and scheduling, new lay-out etc."

The usual criticism of productivity bargaining that productivity cannot be measured has not prevented many organisations to go ahead and strike it rich in this direction.

There are several other cases where the employers and employees have got together and have been able to understand that there is an urgent and real need for more productivity bargaining and less of wage bargaining.

The Drags

Factors that promote increased productivity are quite well-known, such as improvement in skills, product designing, lay-out, capital intensification, and improvement in management methods. Personnel policies also contribute a great deal in motivating workers to put in their best. But unfortunately the wage-productivity link cannot be so easily forged on account of several drags: Firstly, inflationary price spurts can set at naught many a plan and render productivity bargaining sour. Secondly, the multiplicity of Trade Unions, which are often themselves at loggerheads with each other.

Incidentally, the intra and inter-union rivalries that it engenders further adds credence to the theory put forward by Prof. Ralph Dahrendorf regarding the decomposition of capital and labour by which is meant the increasing professionalisation of management, keeping

capitalists out of the picture and the class struggles within craft-based trade unions, which are tearing apart the unity amongst them as Karl Marx had probably envisaged.*

Yet another hurdle in the way of wage-productivity alliance is a "system of unrelated development" of wage components such as D.A., overtime, festival and holiday pay etc. accounting for a big chunk of the wages instead of being an integral part of it.

It is not only the politicalisation and the conflicts between intra and inter-unions that tell on the wage productivity relationship. It is also the attitude and life patterns of the people themselves that come in the way.

It is in this context that Gunnar Myrdal submitted that the South-Asian countries are soft states, lacking social discipline and as such they cannot be very competent in bringing about economic and social changes. They are countries with ancient cultures and as such cannot but be resistant to changes. In other words, the folkways and mores, attitudes and social values have an over-whelming influence on all issues. The solution, therefore, to the problems of fostering a healthy and progressive attitude towards productivity lies in an institutional approach—changing the sociological and political set-up of the people. At the same time, no one can subscribe to the prejudicial view that senility is part of our nature and employees cannot be expected to see for themselves the identity of interests of labour, capital and management in higher productivity. Such prejudices are treated best by being knocked out of our discussions.

In essence, the Wage-Productivity syndrome calls for a thorough analysis, which should be strictly objective. The persons connected with the investigations should have a systematic and scientific approach to the contentious problems. The stakes involved in resolving such problems in augmenting productivity are pretty high. They are almost synonymous with the problems of ensuring a better quality of life and a faster rate of economic progress for the masses. □

*Ralph Dahrendorf 'Class and Class Conflict in Industrial Society', Routledge & Kegen Paul, London, 1963 —pp 41-64.

Motives for Work

Human beings, faced with a complex and significant task about which they lack exact knowledge, try to simplify the issues involved. One of the most misleading simplifications is the idea that men work for money. Men have all kinds of wants for things that are not material. And, once the basic physical needs are satisfied, these other wants take a leading place in the hierarchy of human motives.

Profit is another misleading simplification. Of course, profitability is essential if a business enterprise is to survive. But the idea that it may not survive is usually remote from the minds of the majority of its employees. And to expect them to become enthusiastic about realising a profit in which they do not participate directly is mistaken. Employees like to know that a business in which they are participating is profitable. It gives them a sense of security. But the sense for security is not a positive motive and may issue in panic *"sauve qui peut!"*

An added danger in both these simplifications is that they incline men to be cynical. Everyone knows the phrases "Money talks," "The almighty dollar," "I am not in business for my health." But few men work well for a cynic. They work wholeheartedly only with a man who himself believes wholeheartedly in them and in what they are trying to do together.

— *Management Review, May 1970, p. 51.*

at the start of his service.

End Point: It is the maximum monthly salary that an employee can get while working on a scale.

Span: It is the number of years an employee, who earns only one increment a year, takes to reach the end point after starting from the initial point of a scale.

Slab: Often there are different increment rates in a scale such as 150-5-175-6-205-7-240. The divisions of a scale made by different rates of increments are called as 'Slabs', such as 150-5-175, 175-6-205, 205-7-240, in the above scale.

Mid-Point: It is the arithmetic mean of the initial and end points of a scale or a slab of a scale.

Percentage Increment Rate : It is the increment rate expressed as a percentage of the mid-point of a slab or a scale.

Efficiency Bar: denoted by E.B., is a salary level in a scale beyond which annual increment shall be awarded only if the employee passes the prescribed test or level of performance.

Why Rationalisation of Scales ?

In large organisations unless conscious effort is exercised to control variety in scales, it does not take very long for their variety to proliferate into almost confusion. In this country, the situation prevailing in almost all governments and their establishments (whether commercial or administrative) is worse than confusion. The consequences are not difficult to understand; dissatisfaction and torrent of representations regarding increment rates, end points or other inferiority of scale structures in comparison with those of similar or dissimilar jobs within the same organisation or in other organisations. Often, *ad hoc* decisions are taken to meet high pressure situations. Such an approach does not take the problem nearer resolution but often piques many other employees and invariably encourages aggrieved ones to build pressures for wresting concessions. The problem cannot be solved piecemeal but only through overall rationalisation. The study on which this paper is based was undertaken under similar circumstances. Exhibit 1 indicates the variety of scales that were applicable to different groups of employees. (Owing to large variety in designations it has not been possible to list them all; thus only some are included as a sample).

In the wake of scientific management, it was realised that employee wage should correspond with his job worth. Techniques of Job Evaluation grade different jobs according to their relative worth. Given a suitable coefficient, the grades can be converted into monetary figures representing wages. This coefficient can be easily arrived at when wage ratings are constant figures and not subject to annual increments. It is impossible to determine a representative value of different scales when neither their initial points nor end-points nor mid-points follow a consistant pattern as is shown below:

(i) There are 8 instances covering 20 scales, wherein two or more scales commence at the same initial point but reach different end-points: for example, two scales commence at 75 but end at 95 and 110.

(ii) There are 5 instances involving 12 scales wherein two or more scales have the same end-point but different initial points: for example, three scales end at 110 but commence at 80, 85 and 95.

(iii) There are 2 instances involving 4 scales wherein initial end-points are the same but increment rates are different, for example, two scales commencing at 325.

Scope of Study

As is usual, the company where this study was undertaken had two personnel divisions—Officers and non-Officers. As the former are not covered by industrial legislation, there was no problem of industrial relations in their case. Neither, it was intended to apply job

Exhibit 1

ANALYSIS OF EXISTING SCALES

S.No.	Employee	Scale	Employees	% increment rate of slabs		Span	End Point / Initial point
				1st	Last		
1.	Peon, Guard, Sweeper	70-1-85	218	1.3	1.3	10	1.21
2.	Helper, Fireman	75-1-85-2-95	51	1.3	2.2	20	1.27
3.	Cook	75-2-95-3-110-4-130	5	2.4	3.3	20	1.73
4.	Plumber	80-1-85-2-95-3-110	6	1.2	2.9	15	1.38
5.	Helper, Hammerman	85-2-95-3-110	47	2.2	2.9	15	1. 3
6.	Helper, Lab. Attendant	85-2-95-3-120	101	2.2	2.8	15	1.41
7.	Leading Fireman	90-5-120	8	4.8	4.8	6	1.33
8.	Book binder	95-3-110	1	2.9	2.9	5	1.16
9.	Mason	110-3-131	3	2.5	2.5	7	1. 2
10.	Driver (Light)	110-3-131-4-139	18	2.5	3	9	1.27
11.	Driver (Heavy)	110-3-131-4-175-5-180	18	2.5	2.8	19	1.64
12.	Clerk, Mechanic II	110-4-150-5-180	415	3.1	3	16	1.64
13.	Draftsman III	110-4-170-5-200	3	2.9	2.7	21	1.82
14.	Pharmacist	130-5-175-6-205-7-212-EB-7-240	2	3.3	3.1	19	1.85
15.	Jr. Asstt. Jr. Steno	130-7-200-10-280	112	4.2	4.2	18	2.15
16.	Fitter I	150-5-175-6-205-7-240	158	3.1	3.1	15	1. 6
17.	Nurse	150-5-175-6-205-7-240-8-280	3	3.1	3.1	20	1.87
18.	Librarian	150-10-300	1	4.4	4.4	15	2
19.	Operator I.	160-8-280	166	3.6	3.6	15	1.75
20.	Store Keeper, Overseer	180-10-290-15-380	108	4.2	4.5	17	2.11
21.	Tech. Asstt. Steno	210-10-290-15-410	40	5	4.3	16	1.95
22.	Chargeman II	210-10-290-15-425	14	.5	4.2	17	2.02
23.	Chargeman I	250-10-290-EB-15-425	49	3.7	4.2	17	1. 7
24.	Inspector	250- 450	1	—	—	—	1. 8
25.	Chief Draftsman	300-20-400	3	5.7	5.7	5	1.33
26.	Accountant	325-15-475-20-575	17	3.8	3.8	15	1. 8
27.	Asstt. Foreman	325-25-575	62	5.5	5.5	8	1. 8
28.	Office Supdt	350-20-450-25-475	1	5	5.4	6	1.36
29.	Asstt. Architect	350-25-500-30-590-EB-30-800-EB-30-830-35-900	1	5.9	4	19	2.67
			1632				

evaluation to them. Accordingly, management ruled that study should cover only non-officers. The lowest initial point of scales for officers was Rs. 400. In accordance with the Government policy, the minimum basic wage adopted by the company was Rs. 70 p.m. Thus the study covered scales having initial points ranging between Rs. 70 to under Rs. 400.

Frequency Analysis for Variety Reduction

Every standardisation specialist is familiar with the use of frequency occurrence for reduction in variety. It may be seen from the Exhibit that as many as 17 scales cover under 20 employees each with total coverage of 105 employees i.e., just about 6.3% of the total of 1632. The remaining 12 scales cover 93.7% of the employees.

We could have straightaway recommended elimination of these 17 insignificant scales and adoption of the remaining 12 scales. This, however, would not solve the problem as what was required was not merely reduction in variety

but rationalisation of scales. Nevertheless, frequency distribution does indicate both the need and scope for rationalisation.

Rationalisation of Initial Points

There are 17 initial points on all the existing scales: 70, 75, 80, 85, 90, 95, 110, 130, 150, 160, 180, 210, 250, 300, 325, 350 & 400. The percentage by which the next point increases over respective initial point is calculated as follows: 71, 66, 62, 59, 56, 15.8, 18.3, 15.4, 6.7, 12.5, 16.7, 19.1, 20.0, 8.3, 7.7, 14.3. From this erratic behaviour, it may be rightly concluded that the selection of these points is devoid of any rationale. Now, let us see how scientific selection could be done.

For efficient cutting (turning) of bars of different materials and different diameters the drive shaft of a lathe machine must be capable of running at different speeds (revolutions per minute or r.p.m.). Supposing we need design an elementary lathe with 5-step pulley having speed range 800-4000 rpm. An unqualified designer will most likely fix shaft speeds at 800, 1600, 2400, 3200 rpm and 4000 rpm. This is called arithmetical progression, each step increasing by an equal amount over its preceding one. Now percentage increase of respective steps over their immediately lower steps works out to be 100%, 50%, 33-1/3%, 25%. Supposing a component requires 800 rpm, it will be cut efficiently as that speed step is available. If required speed is say 1000 rpm, it shall still be run at 800 rpm with the result cutting operation is inefficient by 1000-800/1000 =20%. This inefficiency shall be maximum when required cutting speed is 1200 rpm when the machine will still be run at 800 rpm, i.e., 1200-800/1200=33-1/3%. It may be noted that running at higher speed is not permissible. On the other hand maximum inefficiency between 3200-4000 rpm shall be at 3600 rpm and equal to 3600-3200/3600=11%. Supposing, it happens that the machine is required to process a job requiring 1200 rpm for several months, imagine the loss incurred by inefficient cutting. Now an experienced designer for the same situation will fix shaft speeds at 800, 1200, 1800, 2700, 4050—a geometric progression, in which each step increases by 50% of the lower step. Now the machine shall cut most inefficiently when required speed is 1000, 1500, 2250 and 3375 rpm and percentage inefficiency is the same in all these cases—i.e., 1000-800/1000=20% or 3375-2700/3375=20%.

In the foregoing we have been speaking about the principles on which Preferred Numbers are constructed. These numbers are now widely used in several branches of engineering. Indian Standard-1076 specifies preferred numbers for several industrial applications. We shall use these principles in selection of initial points.

Supposing 'P' is the percentage that suits our selection, then 'R' is a progression factor equal to (1+P/100).

The geometric progression of initial points shall be 70, 70R, $70R^2$, $70R^3$, $70R^4$.... $70R^n$.

The end point $=70R^n=400$

$$R^n=(1+P/100)^n=400/70=5.714$$

To solve the above equation, we could either adopt a suitable value for 'n' and calculate 'P' or adopt a suitable range for 'P' and calculate 'n'. Average of percentage increase in respect of existing scales given under first paragraph of Section 6 works out to be 11.7%. Since we desired reduction in the number of scales we may take P=15% which gives 'n'=12.4. For n=11, calculations yield P=17.2% and geometric series as given below:

70, 82, 96.2, 112.7, 132, 154.8, 181.4, 212.6, 249.2, 292, 342.3 which upon rounding off correspond with the existing initial points as: 70, 80, 95, 110, 130, 150, 180, 210, 250, 300, 350. While the above initial points should be adopted, the following initial points should be dropped: 75, 85, 90, 160, 325.

Increment Rates

It is anomalous that some higher scales (possessing higher initial and end points) carry

less increment rate than lower scales: for example 325-15-475-20-575 and 300-20-400.

From the Exhibit it may be seen that increment rate varies for different scales from 1.2 to 5.9 per cent. It is understood that unskilled workers are paid lower than skilled ones and skilled workers are paid lower than supervisors. But it does not stand to reason why percentage increment rate be also so much different for them. In a country that swears by socialism, a peon is paid 1.3% increment and an Office Superintendent 5%. The average of percentage increment for existing scales works out to be 3.6%. Percentage increment rate of about 4% is recommended. However, the rupee figure calculated therefrom should be rounded off to whole figures or multiples of five.

Span of Scales

What has been said with regard to increment rate is true for span of scales, too. The latter is seen to vary from 5 to 21 years. It is not necessary for span to be constant for all scales. A longer span shall become redundant if employees hired thereon are likely to move up or out much before the end point is reached. But sooner or later saturation limit does reach in every organisation when several employees must continue for longer period in every scale. On long-term considerations, it is advisable that scales should be kept fairly long. Taking that working life for an average employee is 30 years (from 25 years to 55 years), and that he can get promotion at least once, the span of all scales is recommended to be 15 years.

Rational Scales

From Exhibit 1, it may be seen hat ratio of End Point to Initial Point is very low in some cases (1.21 for a peon) and 2.67 for an Asstt. Architect). After adoption of uniform percentage increment rate and span, this ratio of End Point to Initial Point shall also work out to be the same for all scales. For 4% increment rate and 15 years of span, the ratio shall be 1.8, which is seen to be reasonable. In accordance with the parameters selected above the rational scales were suggested as follows:

70-3-85-4-125
80-4-120-5-145
95-4-115-5-170
110-5-135-6-165-7-200
130-6-160-7-230
150-7-220-10-270
180-10-270-12-330
210-10-260-12-380
250-12-310-15-460
300-15-450-20-550
350-20-550-25-650

In the above scales, increment rates are consistent not only by scales but also by slabs. Here, efficiency bar has been dropped from all scales due to its insignificance and redundance. Efficiency bar was found to occur only in three scales covering 51 employees. Further, efficient performance of employees is desired continuously and should be evaluated as such. The inefficient employees should be penalised at the appropriate time instead of waiting till efficiency bar is reached.

National Wage Rationalisation

The confusion regarding wage payments prevalent in our country requires little elaboration. It is high time to evolve a National Wage Policy.

In Soviet Union all the workmen are classified into 6 wage categories, each having its government-fixed monthly wage. We need perhaps adopt similar solution. The government should fix for all trades in non-managerial group 8-10 wage categories. Each category should have its own scale in respect of basic wages. While leaving the other parts of wage like incentives, dearness allowance and bonus to collective bargaining, the proposed wage policy should be made applicable on national basis, excepting probably small establishments. The variations in these scales should be negotiated at National level. If certain guidelines on raising of dearness allowance and profit-sharing for bonus are also adopted, most of the irritants affecting labour relations will be eliminated. □

Integrated Management Services

NC Mukherjee*

The concept of integrated management services is not only new and nebulous, but also highly controversial. This paper is presented on an objective basis with a view to generating discussions as to its practical applicability, wholly or partially, particularly in Indian conditions today.

THE pattern of management of business, commerce and industry in early stages of economic development was quite different from the pattern in the middle stage, and again the pattern of management of such enterprises in the present days is different from what it was during the middle stage. Modern management being so complex and varied in nature requires constant and continuous support from specialised service groups so that decisions can be taken more on rational and scientific basis rather than on intuition, hunches or assumptions.

Meaning of Management Services

A significant development which had been taking place during the last decade or so has been the application of mathematical techniques for management decision-making. Management Services comprehend existence and utilisation of specialist knowledge, technical know-how and service groups within an organisation to assist and guide the various line and functional managements in taking better management decisions for higher Company profitability. Integrated Management Services is a step further in that it envisages inclusion of the various Management Service Groups, operating departmentally within each functional department, under one common and unified service group with the objective of rendering coordinated and cohesive company-wide Management Services to the organisation.

*Manager, Organisation & Methods, Indian Oxygen Ltd., Calcutta.

Evolution of the Concept of Integrated Management Services

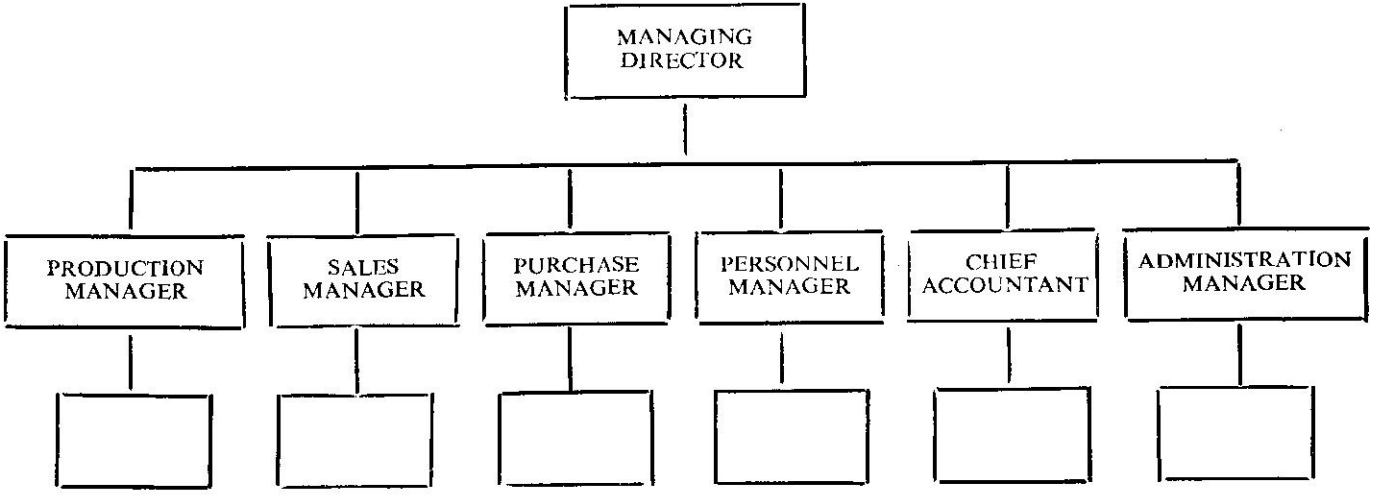
In the early stage of industrial operations, the organisational structure was almost exclusively primary-function based, inasmuch as every function was mainly concerned in discharging its primary function. (Reference Chart A). For example, the Production Manager was more concerned in producing a certain quantity of goods and services within a given time, may be, *at any cost*; the Sales Manager's primary responsibility was to sell those products *anyhow* without, perhaps, giving due consideration to the appropriate market or appropriate prices; the Purchase Manager's main concern was to buy materials and keep *enough stocks* so that there was no trouble for him from the production side for lack of adequate stocks; the Chief Accountant's main responsibility was to keep *books of accounts as required by the Statute*; the Personnel Manager's main responsibility was to carry on routine personnel management functions including perhaps frequent hiring and firing of people and the Administration Manager's main responsibility was perhaps to carry out *routine* administrative functions.

With the gradual passage of time, however, carrying out the above functions only *anyhow* or *at any cost* was no longer considered as the sole function of the respective functional Management authorities. Instead, carrying out the various Management functions, either purely functional or general, in the most efficient and

CHART—'A'

A NOTIONAL ORGANISATION STRUCTURE OF AN INDUSTRIAL ORGANISATION AT AN EARLY STAGE

(Primary-Function Based)



N. B. : This is not a Status Chart

Linking Wage and Salary Payments to Productivity

KJ Divatia*

The modern manager has the responsibility of discovering and applying such methods of wage payment as will optimise the output per manhour. The central aim of any incentive scheme should be to raise productivity. A form of wage and salary payment aimed at higher productivity must have the capacity to adapt to changing situation. The author believes that the choice of payment scheme to improve productivity and to maintain it at a high level is essentially a matter of finding the right scheme which is appropriate to the situation to which it will be applied and not of finding one which merely satisfies the employee motivation in general.

SYSTEMS of remuneration for work in industry are mainly of two fundamental types, viz., payment by time and payment by output. Under the former arrangement, a worker is paid a pre-determined amount for a specific unit of time. As long as he is engaged on tasks specified by his employer there is no direct control on the amount of work done by him except through supervision. In the latter arrangement, the worker is paid according to his output or the output of the group to which he belongs. This relationship may be simple when the remuneration is for a straight piece work. However, it may assume complex forms as in the case of "differential piece work" wherein rates of remuneration per unit of output may be either progressive or regressive. Long-term collective systems relating wages to costs, production, sales or profits are other variants of payments by results.

Objective of Optimum Output

It is the responsibility of the management to provide most efficient equipment, conditions and methods of work, and adequate training as well as suitable psychological and material incentives for the workers. One of the main concerns of the Manager in the modern organisation is to discover and apply methods of wage and salary payments which will optimise the output per manhour, and at the same time be acceptable as equitable by the employees and their trade unions. Most payment systems for operative work are based on an assumption that individuals are unwilling voluntarily to make the best contribution of which they are capable, and this unwillingness has to be overcome by stringent administrative controls or by offering cash inducements; in other words, the organisation seeks ways of inducing the individual to make fullest contribution to its objectives of which he is capable, by financial rewards. It is also observed that the form of inducement differs between manual workers on the one hand and the professional staff on the other. This is primarily because one of the important inducements to professional staff is the prospect of a career in the organisation, a prospect which in most cases is not so bright for the unqualified worker. The professional man is also moved to high performance by the codes and standards of his profession and the judgement of his fellow professionals, whereas manual workers have little professional training and very

*Executive Director, Sarabhai Chemicals, Baroda

It is the responsibility of the management to provide the most efficient conditions and methods of work and adequate training as well as suitable psychological and material incentives to the workers.

limited career prospects. In other words, the assumption that the offer of cash rewards will in all cases bring forth extra effort does not always hold good, since the effort-reward relationship is influenced strongly by various other conditions, such as educational background of the individual, his professional integrity and the conditions of demand and supply in the labour market.

Limiting Factors

There are various reasons for limitations of output of an individual—such as idleness, the absence of proper managerial control over the working arrangements, norms of the group to which the workmen belong and the control it exercises over their behaviour. The level of productivity in an enterprise would also be largely influenced by the general level of economic activity of the enterprise, the technology employed, arrangement for controlling the flow of work, and the nature of arrangement for collective and individual bargaining. The method of wage payment is also a very relevant factor but the major consideration in the choice of a form of wage and salary payment for higher productivity is its capacity to adapt to the changing situation.

The contract of employment between the individual and the enterprise cannot be so precise as the contract of sale between the buyer and the seller of consumer or capital goods. The employee places his skill and capacity at the disposal of the organisation for a specified wage, but the amount of effort expected from him and the exact nature of the work he will be asked to perform is not included in the contract. All that is expected is that he will do for the enterprise what is asked of him within the limitations of the skills and capacities for which the agreed wage is a payment. There is, therefore, much scope for bargaining about the relationship between effort and reward. It is possible that the employee on a fixed wage may differ from his employer as to the amount of physical and mental effort expected of him for the wage. The employee who is paid by results, i.e. piece work, or the employee who is paid bonus for higher performance, may also wish to argue that the extra rewards offered are not worth the extra effort demanded. To the extent that the individual is free to do so, he will probably wish to make effort bargains with his employer for each job he is required to perform. One would, therefore, expect some relationship between the price of the effort (i.e. earnings) and the demand for the supply of effort.

The employer has also to regard his workmen more as valuable productive resources to be carefully utilised, and not as "hands" to be hired and fired at will. There is a good deal of evidence to show the kind of organisation structures and the supervisory and managerial methods which are centered around the employee and his needs, which are likely to bring about higher performance. The employee deserves to be treated as a mature and responsible human being rather than as a unit of labour to be deployed in a mechanistic way to suit the requirements of machines, plant layout and administrative procedures. If he is so treated, he will perform as a mature human being. i.e. he will be cooperative and helpful and will freely use all such skills and capabilities as he possesses. This view is well appreciated by those who welcome spread of democracy and erosion of inequalities and class divisions

Influence of Trade Unions

The individual employee has affiliations other than those with the organisation in which he

works and the important amongst these are his affiliations with trade unions and also sectional interest within the trade unions of employees with similar jobs. Therefore, however well-intentioned the organisation may be towards its employees, it might be faced with powerful trade unions and sectional pressures, which upset the rationally-conceived payment structures and systems. Clerical and technical workers in most enterprises traditionally enjoy greater security and privileges than manual workers. As individuals they have tended much more to identify themselves with the enterprise which employ them. Their external affiliations have usually professional orientation and the motivation of individual career opportunity still inhibits their collective action.

Impact of Automation

Another aspect of the relationship between the wage structure and productivity is the impact of automation. It is sometimes said that in situations where the output is controlled by the machine and not by the efforts of the operator, payments by results is not provided as the operator has no discretion to influence the output. This, however, may not be true in all cases of automation as the process does not need men to run it, but it still does require technical supervision and maintenance of the machines on whose performance the plant depends. By any means, automation is not the panacea to the problem of wage payment, but merely adds another dimension to the problem. It is, therefore, apparent that the choice of payment scheme to improve productivity and maintain it at high level is essentially a matter of finding the right scheme which is appropriate to the situation to which it will be applied and not of finding one which merely satisfies the employee motivation in general. The motivations of individuals, which are themselves complex—are by no means concerned with cash rewards alone, but are very much influenced by various environmental factors.

The employer must regard his workmen more as valuable productive resources to be carefully utilised, and not as hands to be hired and fired at will.

Need for All-out Effort

The fact that the central aim of an incentive scheme is to raise the productivity in the establishments needs no emphasis. In this matter, the responsibility of employers is indeed primary. It is they who have to seek the necessary response from the workers. However, since productivity improvements will be beneficial to the community, both by reducing the costs and by providing higher wages to the workers, Government as custodian of the interest of the community, should also play its share in promoting productivity and in building up incentives which would help such promotion of productivity. The objective of increasing productivity must be raised to the level of high national purpose and the regulation of industrial relations as well as policies in other related fields should be oriented towards this objective. It is hoped that Government policies will be increasingly directed towards this objective. It is possible that in a democratic system there would be differences of opinion on many issues between the party in power and other political parties. But it is presumed that no political party is against the concept of development, although there may be differences in regard to the specific measures or strategies. Even then, we hope that the goal of planned economic development will always be kept above party politics. □

Technology has mastered the art of saving time but not the art of spending it.

—George Soule

Rationalisation of Wage Scales: A Mathematical Approach

TS Minhas*

This paper is based on the study undertaken by the author while working as Industrial Engineer with Indian Drugs and Pharmaceuticals Limited The data for this study are factual and were obtained from the Company's Antibiotic Plant at Rishikesh. The study reveals how through a mathematical approach, the problems of multiplicity of wage scales, as well as other anomalies in the wage scales could be solved and rationalisation of wage scales could be brought about.

In most countries, wage rates remain constant for a particular job year after year until revised, owing to either wage agreements/ awards or disequilibrium in demand and supply of workmen in respect of that or similar jobs. In our system, which in turn is a copy of the British system, every employee is given a wage increase (in monthly wages) normally after every year of lapse in service and in accordance with a predetermined schedule called as pay-scale or salary scale or wage scale, an example of which may be given as Rs. 160-8-280. At the start of this scale an employee will get Rs. 160 per month. Normally, he will get in that post Rs. 168 in the second year and Rs. 280 after fifteen years of service. Of course, a meritorious or favourite employee could earn multiple increments—Rs. 16 or more—in a year or rise in the event of promotion to a higher scale. It may be added that these scales generally relate only to basic or guaranteed wage.

One could put valid arguments both for and against giving annual increments. The demerits are: (a) that employee cost goes on increasing with passage of years but without corresponding increase in productivity, (b) that workmen are not stimulated to improve their efficiency and calibre for higher jobs and (c) that it creates too many steps in employee salaries whereby status levels both within and across the departments usually degenerate to unhealthy consciousness, thereby inhibiting *esprit-de-corps*. On the other hand, hardly any organisation can offer promotion to all eligible employees and increments provide at least monetary consolation and help mitigate misery of such people who may be left behind for no significant inadequacy on their part. Besides, the older employees drawing more salary than their younger colleagues, though, while doing similar jobs is socially consistent inasmuch as older set has more obligations. In fact, it is open to dispute whether there should be annual increments or not. However, as the system is universally in vogue in this country, we shall accept it as a matter of fact.

Explanation of Terms Used

Initial Point: It is the minimum monthly salary on a scale that a new employee gets

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economic manner resulting in the highest possible productivity, efficiency and profitability was given more and more importance. Application of budgetary control and standard costing which set pre-determined physical and monetary targets, and, therefore, costs, gave an incentive for better managerial performance all-round. Gradually, therefore, we find that a separate 'efficiency wing' is being progressively developed under each area of functional management: for example, Industrial Engineering under Technical, Market Research under Sales, Value Analysis under Purchase, Management Accounting under Finance, Management Development and Training under Personnel and Organisation & Methods under, say, Administration. (Reference Chart B). Under this system, the specialist services are divisionalised on a functional basis, the main advantage being intimate contact with the respective areas of functional management and, therefore, better appreciation and speedier solution of the functional problems.

A new concept is, however, slowly but gradually growing in the U.K. and elsewhere, and also to a certain extent in India, according to which all the specialist services concerned with increased productivity, efficiency and cost effectiveness are intended to be grouped together under *one* wing. As per this new concept, specialist functions like Work Study, Market Research, Value Analysis, Management Accounting, Management Development and Training and O&M should function as integrated and coordinated services under one overall and unified Management instead of functionally-dispersed services. This new concept, as has been mentioned above, is now known as 'Intergrated Management Services' (Reference Chart 'C').

Coverage under Integrated Management Services

A broad indication of the general coverage under Integrated Management Services has already been given above. However, for a broader appreciation, the total coverage of an Integrated Management Services Department are amplified as follows:

(a) *Industrial Engineering*

(i) Work Study including methods study of factory operations including investigations into procedure of work and critical examination thereof, value engineering, process variability analysis, etc.
(ii) Work Measurement, including Time Study, Pre-determined Motion-Time Systems (PTS), Analytical and Comparative Estimating, etc.
(iii) Technical planning involving resources allocation techniques, Graphical Planning Aids, Programme Evaluation and Review Techniques, etc.
(iv) Productivity analysis and measures for improving productivity etc.

(b) *Market Research*

(i) Product/Process Research
(ii) Product/Process Development
(iii) Consumer Research
(iv) Marketing Research
(v) Economic Research
(vi) Rational Pricing and Ideal Sales-mix
(vii) Long-term and Short-term Sales Strategies, etc. etc.

(c) *Value Analysis and Other Related Matters*

(i) Standardisation and Variety Reduction
(ii) Value Analysis
(iii) Selective Inventory Control on ABC Analysis basis, etc.,

(d) *Management Accounting*

(i) Budgetary Controls and Standard Costs
(ii) Cost Control and Cost Reduction Techniques
(iii) Risk Evaluation
(iv) Other Management Accounting Techniques etc.

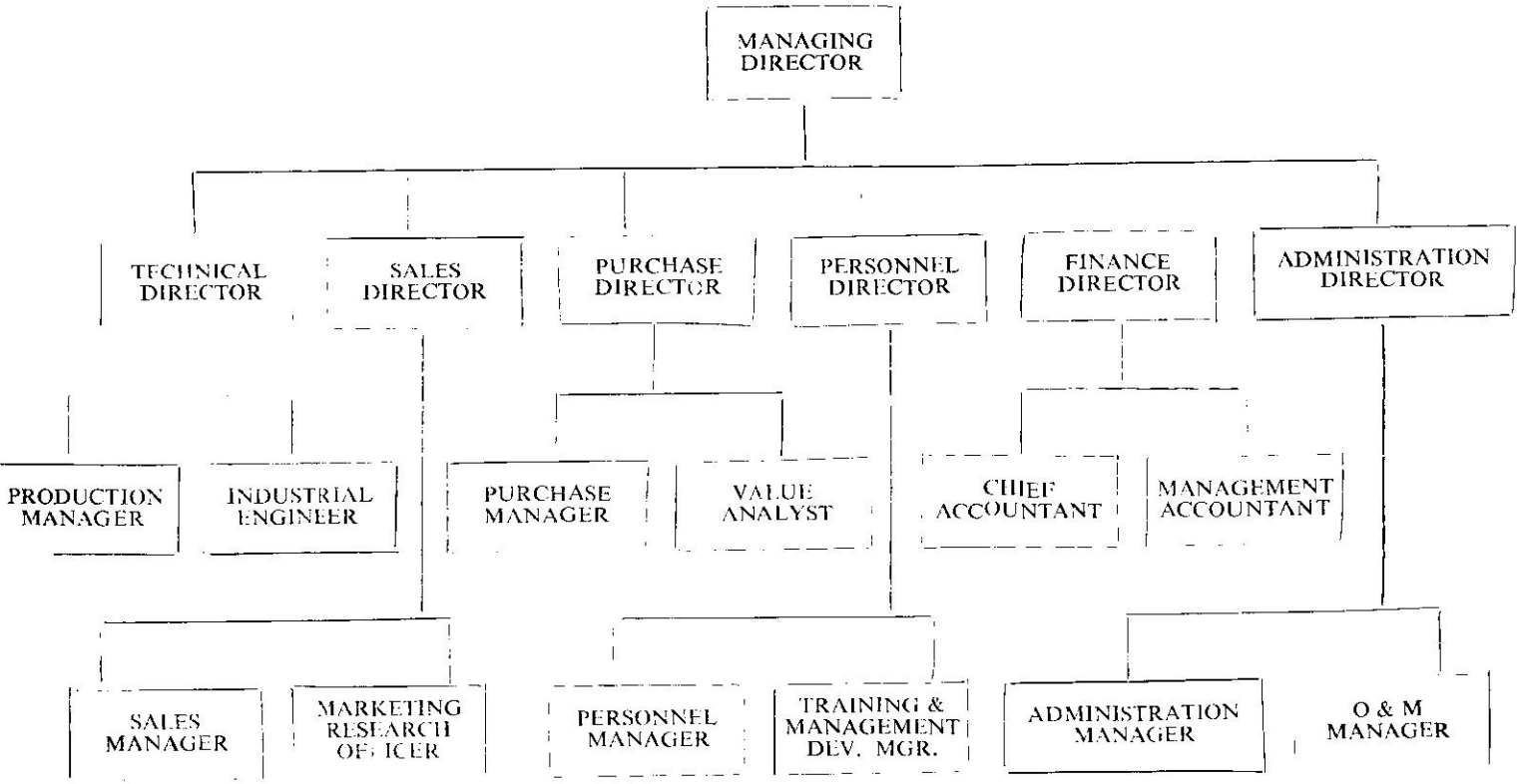
(e) *Management Development & Training*

(i) Management Manpower Planning
(ii) Management Succession Planning

CHART 'B'

A NOTIONAL ORGANISATION STRUCTURE OF AN INDUSTRIAL ORGANISATION AT MIDDLE STAGE

(Divisionalised Management Services)



N.B.: This is not a Status Chart.

(iii) Management Development Plans
(iv) Management Training Schemes
etc.,

(f) *Organisation & Methods*

(i) Organisational Development and Planning
(ii) Critical Evaluation of Systems and Methods
(iii) Determination of Work Norms/Optimum Utilisation of Office Personnel
(iv) Other related O&M Work, etc.

From the above can be drawn up the broad Terms of Reference of an Integrated Management Services Department, more or less in the following form:

(i) To ensure that the organisation within the Company is kept under review, to advise the Management on the need for organisational change and to assist in such studies.
(ii) To keep the efficiency of the Company's administrative systems and methods under continuous review.
(iii) To devise on and assist in all aspects of productivity within the Company and to arrange approved inter-firm comparisons in this field.
(iv) To provide a consultancy service within the Company designed to ensure that in managing its business the company has available the best management assistance, techniques and methods.
(v) To retain, if required, external consultants, to undertake specific assignments within the field of management services.
(vi) To assist in the formulation and implementation of a company policy for training and development of management personnel.
(vii) To provide suitable training facilities and to collect and disseminate information on company and outside experience in the general field of management services.

The latest trend is to include mathematical and computing services also within the Management Services Group which will include, *inter alia*, mathematical programming, statistical design and analysis of experiments, time-series analysis and simultation procedures.

If this is included, the following additional Terms of Reference may also be added:

(viii) To plan and develop the computer and related mathematical policy and resources throughout the company in collaboration with the appropriate Divisions/Departments.

It will be clear from the above that Management Services are advisory in nature and have no mandatory powers.

Arguments in Favour of Integrated Management Services Department

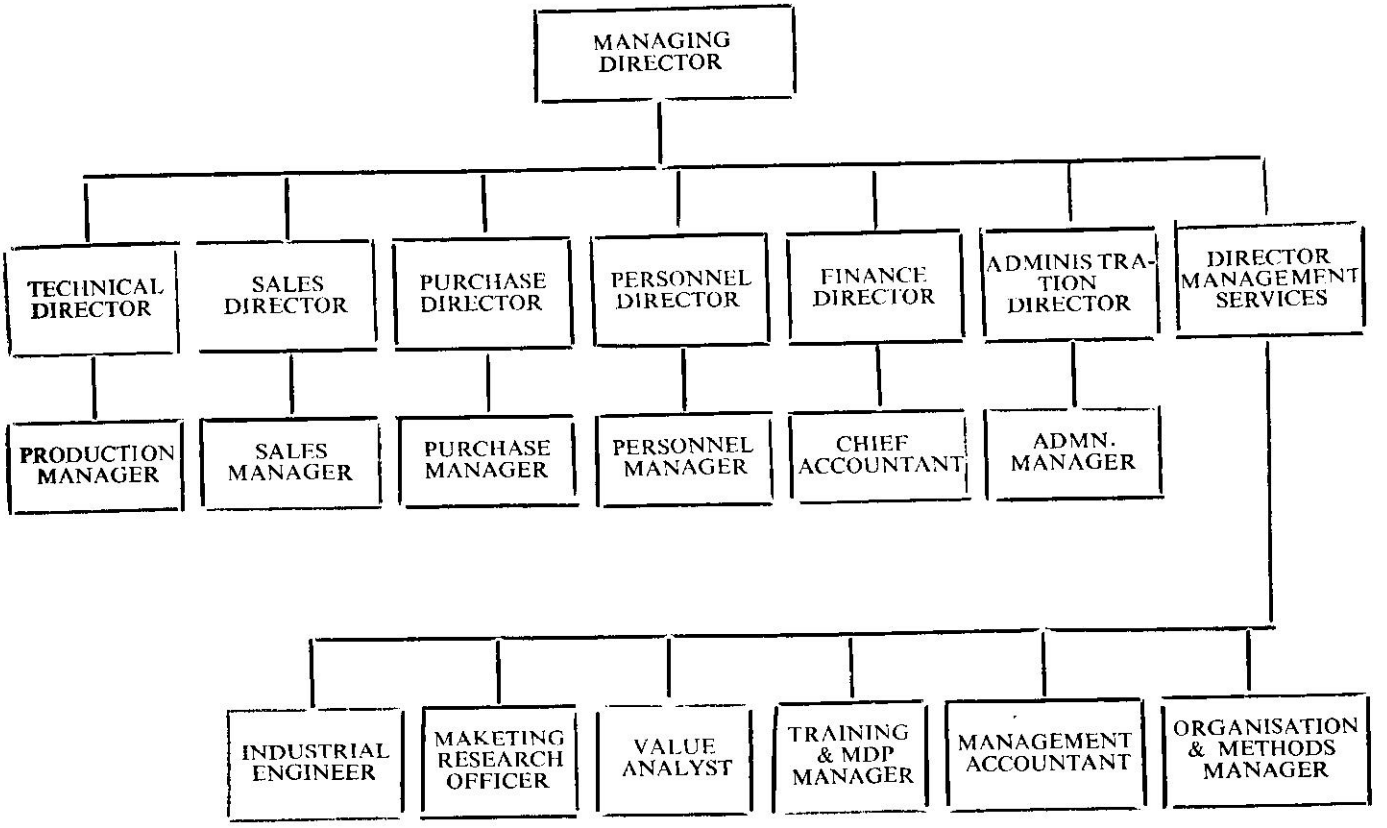
The following arguments are usually advocated in favour of a centralized and unified Management Services Group:

(i) Most effective utilisation of the specialist services. The functional Managers are far too pre-occupied in their day-to-day activities and administration. They, therefore, normally deploy themselves only in routine management and have little time to practise innovative management, but the effective utilisation of the specialist services requires more care and attention to be given to them which may not be possible under the existing system.
(ii) Risk of duplication of efforts. If management is regarded as the process of optimum utilisation of the limited resources in the form of materials, men, money and machinery, etc., no duplication of efforts could be allowed to take place in order that the most economic performance was attained. Decentralised specialist services may result in some cases in duplication of efforts.
(iii) Need for moving in harmony with the other functional approaches. The need for a coordinated and cohesive approach could hardly be overemphasised.

In particular, it is to be appreciated that most management problems are not mere technical

CHART 'C'

A NOTIONAL ORGANISATION STRUCTURE OF AN INDUSTRIAL ORGANISATION WITH INTEGRATED MANAGEMENT SERVICES



N.B.: This is not a status chart.

problems but they are, in fact, techno-commercial problems. It is, therefore, necessary to keep in mind the overall company objective rather than the narrow departmental outlook. *Divisionalised* specialist services often tend to be somewhat biased in their approach.

Arguments, however, are not lacking against setting up of a unified Management Services Department. It is held that trying to group far too many expertises under one wing would mean a very unwieldy structure; such a monolithic Management Services Department may not be quite sound and stable. Further, there are risks of operational difficulties. It is not unlikely that a number of personnel problems, which may be very much personal in nature, may also crop up; the possibility of inter-professional jealousies among the group members cannot also be ruled out. Also, it may not be always possible to maintain continuous efforts of the MSD at the optimum level at all times.

Management Services comprehend existence and utilisation of specialist knowledge, technical know-how and service groups within an organisation to assist and guide the various line and functional managements in taking better management decisions.

Establishing An Integrated Management Services Department

Establishment of an Integrated Management Services Department in an organisation covering the above diverse functions is not an easy task by any means. The most difficult thing perhaps is to get a person who would be so well-qualified and experienced to deal with so many diverse functions. He is supposed to be an efficient 'all-rounder' who can consider 'efficiency' matters as his prime concern, a person who must have the ability to get on well with other people. It will be no wonder, therefore, if there is a dearth of such 'all-rounders'. At the same time, it is also felt that such a person who may be known as say 'Director—Management Services' or 'General Manager– Management Services' need not necessarily be competent in all the subjects but he may be a specialist in one of the disciplines and he should be chosen primarily for his ability to manage. The other specialists, forming the team, must obviously have to be highly proficient in their respective faculties: there is no place for commoners in the MSD. At the junior level, however, it is not necessary that the staff should be on a permanent basis; the tenure could be for a fixed period of, say, 5 years. In other words, there could be some 'birds-of-passage' in the Department. The Management Services Department could also be regarded as a field for career development. To be a useful and successful Department, the MSD would obviously have to prepare short-term and long-term plans after fixing proper priorities maintaining constant liaison with the functional departments both in planning as well as in execution stages. Coordination among the various management services will be one of the primary responsibilities of the person heading the MSD. Though the actual

A Management Services Department is to be treated neither like a Fire Brigade unit nor like a Fire Extinguisher Carrier, crying out 'free-for-all service.'

task of implementation of recommendations might be the responsibility of the respective functional heads, the Management Services Department must take keen interest in the matter of actual implementation of the accepted recommendations, as without practical implementation, the suggestions and recommendations made would have little practical value.

Application of MSD

As far as our information goes, Integrated Management Services have made substantial headway in the U.K. In progressive organisations in the U.K. such as I.C.I., Guest Keen, etc., Integrated Management Services Departments whether wholly or substantially have already been established some time back and there are indications that they are rendering useful services to their respective Managements. It may be of interest to know that a Conference on the concept of Integrated Management Services was called in Paris a few years back and the case for such a Department in an organization was vindicated there. In India too, in certain organisations such as I.C.I., Guest Keen, Dunlop and in few other organisations, Management Services Depts. have been established, though not in the total integrated form as the concept envisages. Even in the public sector projects of Hindustan Steel, a Management Services Group has already been established and the Group has already started functioning.

It may be assumed from the above that although there may be some difficulties in establishing an Integrated Management Services Department, it is not impractical at all; the problems which may arise can certainly be resolved where determination and goodwill prevail and sustained effort is made.

Conclusion

Like any other service, the services rendered by MSD would certainly require to be evaluated --both on short-term and long-term basis. In the long run, the Management Services Department must have to be a 'surplus' department. The measure of success is also dependent upon the continuing and growing demand of the functional managements as well as of general management on the services of the Management Services Department. It should, however, be remembered that MSD is to be treated neither like a 'Fire-Brigade' unit nor like a 'Fire-Extinguisher-Carrier' crying out 'free-for-all service'. If the activities of the MSD are judiciously selected, well-directed, well-coordinated and well-conducted, keeping in mind the best interest of the organisation as a whole, there is no reason why a unified Management Services Department with a 'problem-solving approach' should not be in a position to render comprehensive Management Services to the satisfaction of all concerned. □

Bad Decision is Better than No Decision

"The lack of decisiveness in business is a terrible thing for two reasons" says C. Lester Hogan, President of the Fairchild Camera & Instrument Corporation. "First, employees' morale suffers if they see the boss unable to come to grips with a problem. Second, if you put off a decision, the chances are that you won't have any more facts to help make the right decision.

"If you make a decision, and it's the wrong one, you can correct the mistake. A bad decision is better than no decision at all. A bad decision at least gives you more information. Failing to make any decision gives you nothing at all."

—*International Management*

Management by Objectives: Perspectives and Problems

SK Chakraborty*

Management by objectives is neither a tool/technique (in the sense that linear programming or PERT are) nor a new management theory. Rather it is a total approach to enterprise management. MBO can be used advantageously for management appraisal and development, improvement of productivity and profitability, and long range planning. MBO approach has been able to generate considerable interest and acceptance among all those who are engaged in management business. The author suggests some hypotheses as to why MBO appears to be on the threshold of widespread acceptance in India, and highlights some of the perspectives, as well as problems connected with introduction and implementation of MBO schemes.

IN early 1970, a competition called 'The Management Brain of Britain' was organised in that country. Five finalists were selected from a nation-wide first-round contest based on a questionnaire relating to various managerial aspects of operating a business. These finalists were put together as a hypothetical Board of Directors, and were asked to tackle three problems facing the imaginary company: (1) poor communications, (2) increasing industrial unrest, and (3) frequent internal and external misunderstandings. With almost a total lack of information on other aspects of the company's business, it was surprising to observe the immediate first response of the Board to be in favour of adopting MBO to resolve these problems[1].

The above interesting anecdote highlights the implicit faith the MBO approach has been able to generate in the minds of people having anything to do or think about managing business. Organisations in banking through mining to manufacturing, from public sector to private sector, are now adopting MBO systems.[2] And, the contagion seems to be steadily catching on the industrial world in India too. We should, therefore, like to suggest some hypotheses as to why MBO appears to be on the threshold of widespread acceptance in our country.

WHY MBO IN INDIA?

The recently-ended *recession* in the Indian economy seems to be a major factor spurring on the search for more structured and coherent total management approaches. There must have been some enlightened managements which perhaps had set or had begun setting their house in order before the recession. But, for the majority it would seem to be true that the jolt of economic downturn was the *causa-proxima* for fresh thinking. The study of MBO in the National Coal Board, U.K., has also shown that it was only after a few years of the beginning of secular decline in coal demand in 1957-58 that the groundwork for MBO system was undertaken at the Board's Staff College.

* Macneill and Barry Ltd., Calcutta.

1. Heller, R: 'The Management Brain of Britain', *Management Today*, March, 1970.

2. Thus, Barclay's Bank DCO is adopting MBO for its 1700 branches in 39 countries ('Global Approach to Target Setting'—D Oates—*International Management*, March, 1971), the National Coal Board (U.K.), and the G.E.C. (U.S.A.) have sufficiently long experience in the practice of MBO.

Secondly, it is suggested that the gradual *disappearance of sellers' market* conditions in many industries, especially in the consumers' goods sector, is forcing a reassessment of business objectives.[3] The nebulous objective of profit-maximisation is no longer sacrosanct.[4] There is need for a multidimensional specification of objectives, incorporating several key result areas for the business, as well as for managers within the business. MBO, in various forms, builds upon such multiple objectives.

The third hypothesis is that Indian industry is witnessing today the rapid emergence of what Galbraith calls the '*technostructure*'[5]. A professional class of managers is entrenching itself in the corporate sector. Profit-maximisation could logically be assumed to be the primary objective of the owners of business. But this may not serve the interests of the technostructure which aims at steady and secure employment opportunities over the long-term. Since the technostructure holds the real power for managing the enterprise, it is perhaps unknowingly engaged in a reinterpretation of business objectives. And MBO comes in handy for it to translate its rational urge into reality.

Finally, like individuals, organisations also require a sense of direction during times of *change and uncertainty*. The past decade or so has indeed undergone a succession of major changes and innovations in technology, markets and organisation theory. It is not easy to keep on track amidst the complex interactions of these elements which are themselves in flux. A continuous reexamination of business objectives becomes indispensable for satisfying the ultimate goal of the majority of the enterprises—survival and growth. MBO attempts to provide a systematic and structured framework for organisational analysis, diagnosis and prescription. Rapidity of change, along the dimensions mentioned above, is also quite apparent in India today. The organisations are now in greater need than over before to know the direction in which they are moving, and in which they should be moving. MBO seems to be a promising exercise in identifying and maintaining this unity of direction in the organisation's changing life-pattern.

The above points represent a set of hypotheses which have appeared relevant to the author. There is need to subject these to careful scrutiny by research into management practices through a cross-section of Indian industry. It is quite probable that such a study could yield newer hypotheses which might support or contradict those suggested here.

PREPARATION OF GROUNDWORK FOR AN MBO SYSTEM

MBO need neither be considered as a tool-technique (in the sense that 'linear-programming' or 'PERT' are), nor a new management theory. Rather, it is a *total approach* to enterprise management.[6] Hence it is necessary to explore certain vital problems likely to be faced in any programme of MBO installation. The quality of research done before initiation of MBO within the organisation would be the most important single determinant of its subsequent implementation and effectiveness.[7] The following steps suggest the manner and direction in which such exploratory work could be conducted.

An Attitude Survey :

The practice of conducting attitude surveys on various aspects within the enterprise is being increasingly accepted in the U.S.A. and the U.K. The preceptors of MBO system could extract much help from such an exercise.

3. Such a re-examination, for example, was forced on the German firm of Demag—R. Ingersoll : 'Demag Tightens The Reins', *International Management*, March, 1971. This happened to our own industries during the recent recession—e.g. in the HMT unit.
4. Galbraith, J.K. : *The New Industrial State*, Pelican 1967.
5. Ibid.
6. Chakraborty, S.K.,: *British Coal Mining : Some Aspects of Organisation and Management in a Declining Industry*, unpublished Ph. D. thesis, Liverpool University, 1970.
7. John Humble touched on this issue in a recent MBO conference in London—reported in *International Management*, March, 1971.

is the execution part of a long-range plan. Against this, Howell would argue that long-range planning itself is the final stage in the evolution of MBO.[17]

The point emerging out of the preceding discussion is that MBO should be able to encompass both strategic and/or long range planning systems without any far-reaching changes needed, except in the *processual orientation* where MBO scores over the other two. Thus, the National Coal Board (NCB) (U.K.) does not have any seperate strategic or long-range planning systems. It has, however, a comprehensive nationwide MBO system, beginning from 15-year general national plans and ending with 4-month colliery operating plans. And, it is the process aspect—the way in which the system functions within the human milieu—which has ensured the success of MBO there.[18]

(c) *The Budgetary Control System and MBO*

In discoursing on this aspect this author has always had to face the question: 'What does MBO do which budgetary control does not? I have tried to examine in some depth in an earlier article the antecedents and assumptions underlying budgetary control practice even in the advanced western nations like the U.S.A. and the U.K.[19] Thus, while I am surprised to observe the strong reactions from accountants in this country about any suggestion that MBO is conceptually much deeper and refined, I concede that such reactions are natural and healthy. Very briefly, the following basic differences between budgetary control and MBO may be suggested:

(1) Budgetary control tends to emphasise the control aspect, which is only the last phase in the whole managerial process. MBO is a total management approach incorporating all managerial processes.

(2) Budgetary control does not seek explicit integration of individual goals with organisational goals. Responsibility budgeting is a limited attempt to remedy this basic defect because it holds him responsible for only such cost elements on which he can decide. But it does not establish in the first place whether the budgeted responsibility figures have themselves secured his commitment or not. MBO takes care of this aspect.

(3) Management development and personal achievement goals are outside the scope of budgetary control systems. One of the explicit aims of MBO is in this direction.

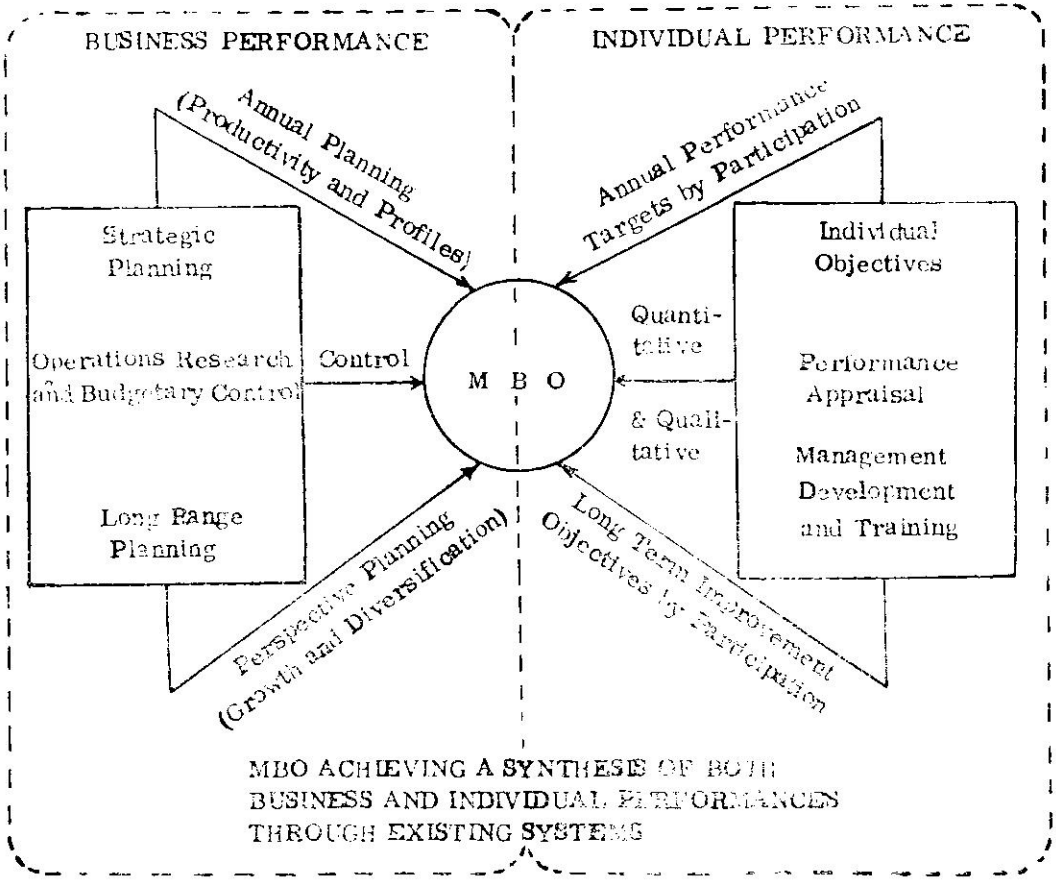
(4) Budgetary control focuses on end-results and quantitative variables only. The efforts of management to satisfy such criteria often tend to be short-term, sub-optimising and harmful for the intervening result-areas like employee loyalty and motivation.

(5) The principles of budgetary control are derived from those of Taylorian scientific management, classical hierarchical organisation theory, and so on. MBO, on the other hand, is rooted in latest researches in human relations, industrial and organisational psychology.

It must, however, be added that there is no reason why an existing budgetary system cannot gradually adapt itself to the newer philosophy and principles of management. But does it follow from this argument that MBO is nothing different from MBO?

So, when it is proposed to introduce an MBO system, it would be necessary to examine the orientation of the existing budgetary system and its administrators. A slow and genuine effort for exposing them to the most recent ideas and conceptions is necessary. They will have to be taken within the MBO fold of thinking by convincing them that what is in fact being attempted is an expanded and sophisticated version of management and control with budgets playing their due and proper role. The diagram on page 12 attempts to portray the relationships outlined above.

17. Howell, RA op. cit.
18. Chakraborty, SK — op. cit.
19. Chakraborty, SK 'Management by Budgets v. Budgetary Control', *Management in Government*, January-March, 1971.



Purpose for Which MBO is to be Used

Although Howell has suggested (as cited above) a three-stage evolution of MBO in an enterprise, it is not necessarily true that this sequential development is without exception. MBO can be used mainly for three purposes:

(a) management appraisal and development,
(b) improvement of productivity and profitability, and
(c) long-range planning.

The hypothesis suggested here is that, if the enterprise is facing serious competition in both its product and factor markets, and is in the grip of secular decline it will tend to use MBO primarily for immediate improvements in productivity and profitability. It is only when the business secures a better foothold and creates a new area or two of distinctive competence, that it will be able to think in terms of expanding MBO into managerial appraisal and development, and long-range planning. Thus, the National Coal Board, faced with long-term decline since 1957, began using MBO from the early 1960s as a means of securing economic viability to begin with. Only after having done so, it has recently started using MBO for appraisal and development. And the long-range planning part of its MBO

The purpose of MBO is said to be integrated development and improvement of personnel and business performance.[8] In other words, MBO intends to operationalise McGregor's Theory Y[9]. The extent of efforts needed to achieve a Theory Y end-state could only be measured by knowing the existing state of the organisational system, particularly along the human dimension. In other words, we need to know what are the perceptions of the organisational members right through the hierarchy about their respective roles, about the organisation's goals *vis-a vis* their own, about their superior's attitudes towards themselves and towards the organisation, about the way organisational relationships—formal and informal—are built and maintained, about the reward-penalty and succession practices, about two-way communication opportunities relating to their work, about the company's image they possess, and so on. Responses to a box-type questionnaire may be solicited, with complete anonymity guaranteed to the respondents. Information so obtained, part of which may be rudely shocking in the first instance, could put top management in the right frame of thinking as to what has to be done to let MBO have a 'soft-landing' in the organisational milieu.

An Examination of Existing Systems

Not only is the individual member of the enterprise going to bear the impact of the MBO system. Other existing systems within the organisation too would have to be reviewed with respect to their purpose and functions. The question has to be faced squarely: what is MBO going to achieve, which existing systems do not and how ? We shall analyse here three systems which most modern organisations do possess: a management appraisal system, a business planning system, and a budgetary control system, and try to examine the impact MBO is likely to have on these.

A continuous examination of business objectives is indispensable for achieving the ultimate goal of survival and growth. MBO attempts to provide a systematic and structured framework of analysis, diagnosis and prescription.

(a) *Management Appraisal System and MBO*

One section of opinion holds that management appraisal and development systems should precede the installation of MBO, for the former will then already have created a climate receptive to a total MBO approach to management.[10] Yet another writer has suggested that the first phase of evolution of MBO practice has in fact been imbedded in managerial appraisal[11]. Be this as it may, if we assume such an appraisal system to pre-exist, it then becomes important to clearly appreciate the nature of its relationships with the newly-introduced MBO system.

Conceptually, the difference between the two is significant. In an appraisal system by itself, performance objectives are set from individual to individual. But with MBO, individual objectives are framed in the wider context of enterprise objectives. This matching of individual objectives with organisation objectives is not implicit in the appraisal system *per se*. In fact, this author's experience shows that in the absence of MBO framework even individual's

8. Odiorne, G.S : *Management by Objectives*, New York, Pitman, 1965.
9. McGregor, D. : *The Human Side of Enterprise*, McGraw Hill, 1966.
10. Brown, A.M., : *Management Development and Management by Objectives*, Somaiya, 1970.
11. Howell, R.A., : 'Management By Objectives—A Three-Stage System', *Business Horizons*, Vol. XIII, No. 1.

objectives are impossible to set out—ninety per cent of the appraisal forms mention 'nothing specific' against the question 'What is the appraisee's next year's targets?' This applies to both performance and personal improvement objectives. It is, therefore, suggested that MBO would reinforce and strengthen the existing appraisal system. No particular problems of adjustment between the two systems are visualised. However, the spade-work should be done to fit the procedural aspects of appraisal with the new appraisal criteria established under MBO.

(*b*) *Business Planning System and MBO*

Clarity out of chaos is what planning aims at. By this standard, all enterprises have to plan their activities in varying degrees. The extent of thoroughness and foresight exercised in planning make for one dimension of qualitative difference between enterprises. A business having *strategic plans* would be prepared to deal with changes in product-market mix owing to changes in its economic environment. By their very nature such plans have to be flexible, and it may be necessary to keep the content of changed strategies a high-level secret.[12] However, changing strategies tend to give an impression of discrete, disjointed planning, unless placed in the context of a *long-range plan*. The long-range plan can thus be seen as a more stable, overall framework of goals and actions, which the appropriately changing strategies would serve to accomplish.[13] It may, therefore, be usual to find that although an enterprise does not have a long-range plan, it cannot simply do without strategic planning. Assuming such a situation to exist fairly generally, one needs to see how MBO can be implanted therein.

Does MBO imply planning? Obviously, yes. When MBO is in its second stage of evolution, according to Howell, the integration of individual with organisational objectives is done on an annual basis.[14] In this sense, MBO should mesh with the strategic business plans. The difference and strength of MBO, compared to strategic planning, would lie in the former's effort to obtain individual identification with objectives flowing from overall strategic plans. A lot of explicit research effort will be needed to fulfil this requirement. Even careful reviews of articles and writings on strategic planning usually fail to show real concern about normative integration, in addition to statistical integration of the goals and objectives of the organisation and those of its members. MBO insists on doing so.

Pursuing the line of thinking suggested above, a well-planned and sequenced scheme of strategies over a longer time span (depending upon the nature of the business, the economic environment, and top management outlook) should lead to a long-range plan.[15] On the other hand, a long-range plan may be formulated first, to be followed by appropriate strategies responding to environmental pressures.[16] Which end of the string one should proceed from will perhaps be dictated by the exigencies of current circumstances faced by the company. If its existence tends to be at stake, perhaps the exercise would begin with the formulation of strategic plans. The process could begin from the opposite end, however, if the organisation is under easier operating conditions.

Irrespective of the sequence in which the long-range plan may have been derived, if such a plan exists, the proposed MBO system is eminently suited to absorb it as well. The additional contribution which MBO should be making is the same as described above in relation to strategic planning i.e. translating organisational objectives in terms of individual performance goals. This translation will bring one closer to the short-term annual performance goals. That is why perhaps some would suggest that MBO

12. Anthony, RN : *Management Control Systems*, Irwin, 1965.
13. Steiner, GA : 'Making Long-Range Company Planning Pay Off,' in *Readings in Cost Accounting, Budgeting and Control*, ed. WE Thomas, Taraporevala, 1970.
14. Howell, RA : op. cit.
15. Tilles, S : 'Making Strategy Explicit' in *Business Strategy*, ed. HI Ansoff, Penguin 1969.
16. Steiner, GA : op. cit.

over etc.)[26]; how would the effects of organisational system interdependencies be eliminated in judging individual performance; and what would be the reaction of white-collar unions to MBO and related remuneration plans? All these issues must be given careful and continuous thought.

MBO and Participation

By emphasising the participative philosophy MBO tends to bring Etzioni's 'Normative-Moral' typology of organisational power climate into play.[27] But, recently some concrete research evidence is emerging that participation may not always bring about the intended results. Thus, it has been argued that given no expertise and little desire for participation amongst the participants, a participative exercise helps only to strengthen the influence of the superior or the expert. The socio-cultural milieu of the participants is also an important determinant of the utility of participation. However, since MBO is applicable to managers, there is reasonable chance for worthwhile participation in most cases.[28]

But, it is at the operatives level on the shop-floor that MBO apparently does not keep its promise. Yet motivation at that level is indispensable. Perhaps participation in goal-setting may not serve well in all such cases. Other group-centred participaton exercises around, say, each machine-centre, for its specific problems, may be more meaningful. The National Coal Board has used 'face-team conferences' for coal miners with great success as a supplement to its overall MBO system.

Line *Vs.* Staff Implementation of MBO

If MBO had got off to a start with managerial appraisal, then it would be a responsibility of the Personnel function within the organisation However, as soon as its focus is on enterprise goals of productivity, profitability, growth, etc., the necessary integration of individual group goals within the overall framework must be a line responsibility. A comparative case study of MBO implementation by line management *Vs.* personnel department has shown that in the latter case there has been serious lack of understanding and commitment at the first level of supervision.[29] It is, therefore, absolutely essential for line managers to appreciate their own role in an MBO system. It would be suicidal on their part to say that they are far too busy with their normal work to pay any attention to the needs of the system.

Internal Competition Under MBO

The generation of commitment to objectives is the positive aspect of MBO. But it is often found in practice that over-commitment leads to competitive rivalry with respect to claims on scarce resources of the enterprise. The overall enterprise objectives may be lost sight of in a bid to outreach sectional objectives. This is an incipient danger of any system which seeks identification of clearly defined individual or group objectives in an all overall system. Some educational effort needed to enable managers to take an overall approach to performance objectives. At the same time, the MBO system itself must not surreptitiously encourage suboptimising efforts in the short-term, which is all too easily done.

Conclusion

Within the short span of this article no more than a brief sketch of some crucial problems in the installation and implementation of MBO schemes has been possible. More clarification and debate on the issues presented above are essential. We should like to conclude by making a final suggestion. The conduct of internal research, through attitude survey and other methods, on the effectiveness or otherwise of the MBO system should form a normal part of its practice. Otherwise the system will stagnate and ossify, and may even remain dysfunctional in many unrecognised ways. □

26. Tosi, H.L. et. al. : 'Setting Goals in Management by Objectives', *California Management Review*, Summer, 1970.
27. Etzioni, op. cit. : Our suggested non-monetary incentive package should help to strengthen this climate.
28. However, empirical research here too has found lack of participation. See AP Raia : "Goal Setting and Self Control', *The Journal of Management Studies*, February, 1965.
29. Ivancevich, J.M., : 'The Theory and Practice of MBO', *Michigan Business Review*, March, 1969.

Cybernetical Approach to Railway Operations

K Viswanathan*

Cybernetics has been variously defined as "The science of communications and control in men and machines" (Wiener) and "The science of proper control within an assembly treated as an organic whole" (Stafford Beer). Railway operations involve a number of recurrent control processes accompanied by a massive volume of statistical data and accounting activities. All repetitive processes, more especially control of operations in real time and treatment of information for decision-making operations are amenable to a cybernetical treatment, with the help of computers, leading to rationalisation of management techniques and substantial savings in human in-put and monetary out-go.

THE time-table represents an overall programme network, within which a semi-automated man-machine system has been functioning from the early days of rail transport. The operation of the track network is in the hands of the "stationary" staff, like cabinmen and station masters and of the "mobile" staff, like drivers and shunters. The effective control range of both has been limited by sighting distance and shortcomings of conventional signalling and telecommunication equipment. On the basis of the scrappy information available to them, each one is responsible for his limited duties but hardly able to get a composite picture of the operating situation. The chief drawback of this system is in its de-centralised mode of operation, interconnected by a great variety of communication channels. Time-tables often go away due to delays, accidents and failures; the normal channels of communication get strained and bogged down under the stress of abnormal conditions. In spite of a fairly synoptic view afforded to the central controller by his telephone system, to be continually *au fait* with situation, he is at the mercy of the men on the spot to report back promptly, and truthfully. Again his reactions can at best be in the nature of an emphatic advice; the responsibility for the execution of his instructions still rests with the local officials. Thus the global responsibility for smooth operations is splintered into many parts. Despite this fragmentation of responsibility, the average railwayman at site is called upon to make an extremely large number of decisions every day, which taken singly may not amount to much but, which has an overall impact on the efficiency and safety of movements.

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Trends in Automation of Traffic Control

In the jargon of cybernetics, all the physical and administrative operations in a transport system constitute the "action chain". The statistical and financial results represent the "reaction chain". By comparing the objectives with the results, one obtains a general orientation of the commercial and managerial aspects of work. By retrospective evaluation of the statistical data, it is possible to increase the forward planning and maximise the return on capital investment; thus the "reaction chain" becomes an effective feedback route (Fig. 1).

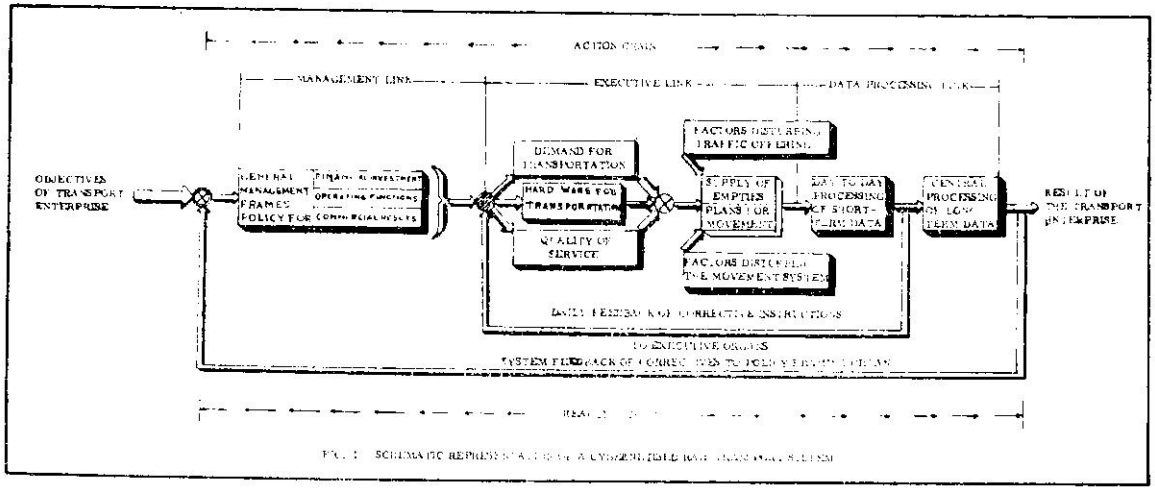

FIG. 1 SCHEMATIC REPRESENTATION OF A CYBERNETICISED RAILWAY SYSTEM

The application of cybernetic principles to such a system is mainly intended to maximise productivity of the transport undertaking. The various steps adopted in this direction are summarised in brief:

—Information over the telephone being supplemented by optical train describers or train position indicators.

—Centralisation of operation of points and signals over stretches of railway.

—Automation of classifying, marshalling of wagons and formation of trains in big yards, with the help of small computers.

—Programme control of shunting operations.

The above measures represent the efforts to modernise the availability and circulation of basic operating information among the functional levels, where they undergo the relevant processing operations, either for local decisions to be taken or to pass on the results achieved to other levels. Still, the system has not got over the ubiquitous necessity to make copies of basic records, everyone of which is not fully utilised, with consequent redundancy of management offices working in parallel with field offices; this results in an overwhelming "red-tapism". It has been estimated that even in the well-organised French railways 28% of the total staff were engaged in some form of record keeping, prior to the adoption of modern management techniques in 1962.

The invention of the electronic computer, and progressive development of its "skills", has enabled vast masses of data to be stored, processed, and updated all the time. Calling for data, programming for solution of iterative processes and obtaining results in printed form have simplified decision-making. It is in the introduction of stored programme electronic computers backed up by reliable communication channels (Fig. 2) that cybernetics has made its greatest contribution to pull Railways all over the world, out of a welter of mounting losses, high costs and stifling paper work. How the mechanics of the computer has helped the kinetics of operation is spelt out in the following paragraphs.

Improvement of Operational Efficiency

Operational efficiency is judged by how quickly, safely and economically goods can be transported from one point to another; and on this is dependent the vital factor of customer satisfaction.

Towards this end, the operations manager would like to keep a constant tab on day-to-day

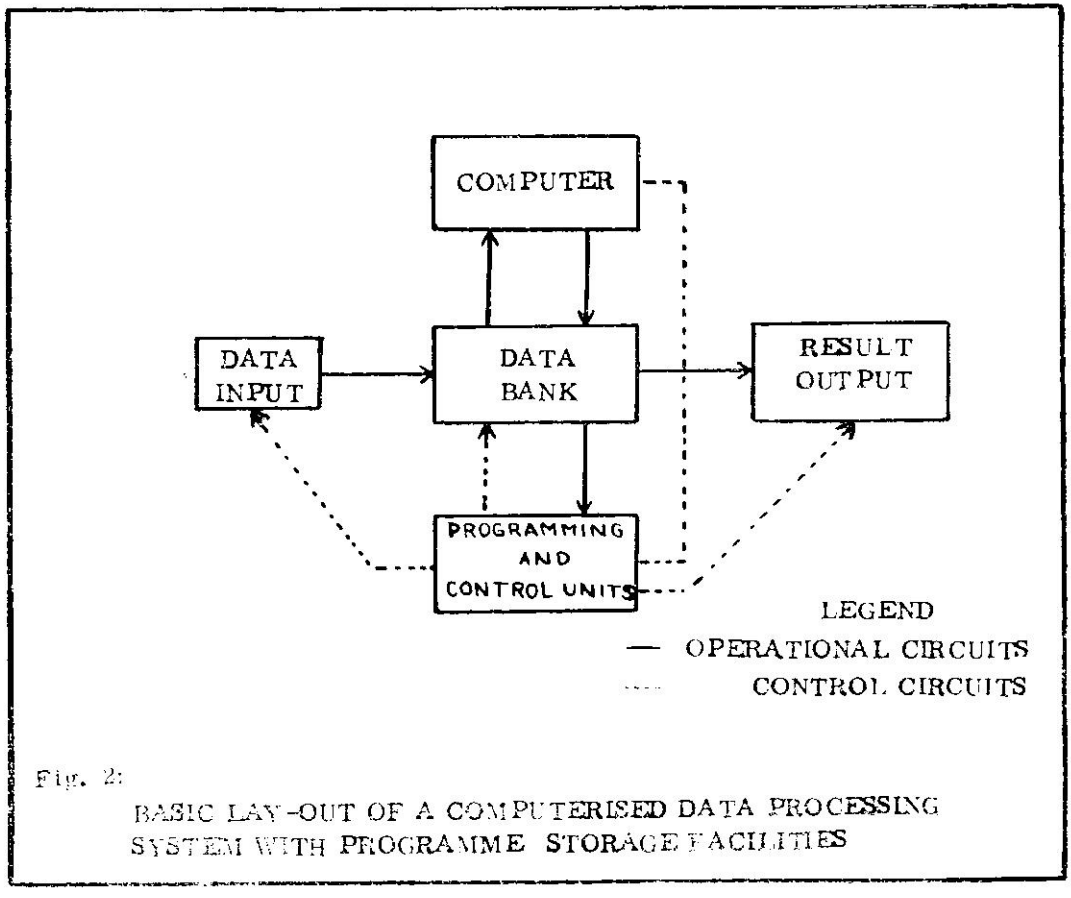

Fig. 2:
BASIC LAY-OUT OF A COMPUTERISED DATA PROCESSING SYSTEM WITH PROGRAMME STORAGE FACILITIES

movement of each wagon, details of its load, its origin and destination, supply and demand for special type of wagons at discrete points in the system, accuracy of rate calculations and justification for compensation claims and a whole jungle of related and tangled problems. both for short-term planning and long-term results.

Data collection for these basic requirements in the railway industry is vastly more complex than in other industries as they are subject to certain special constraints which are:

—The data collection network is extremely ramified

—The individual transport processes go on and overlap all the time.

— Mobility of the active units like locomotives and wagons can also result in unproductive operations.

In view of these difficulties, data collection as well as data processing is restricted to certain well-accepted control points:

— important loading and unloading points

—marshalling yards

—traffic control centres. (Fig. 3).

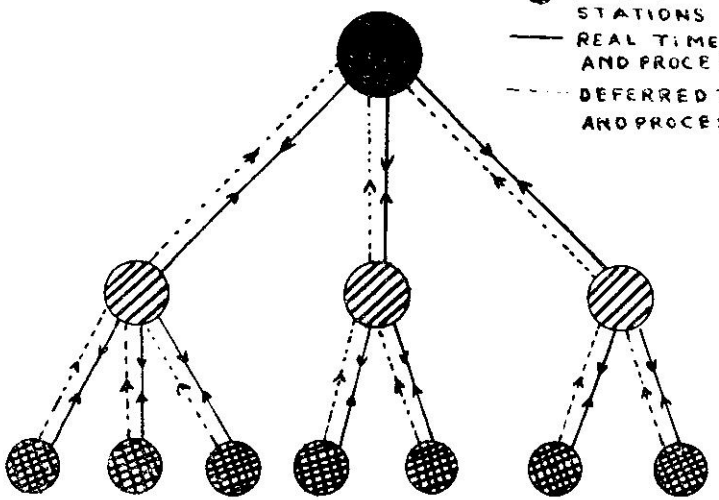

Fig. 3:
OPERATIONAL LEVELS OF DATA COLLECTION FOR GOODS TRAFFIC CONTROL

Data required for basic railway operations can be categorised as:

(i) *Original source data* from external sources like consignment notes, way bills, etc.

(ii) *Fixed data* like wagon numbers, capacities, track geography, locomotive availability etc.

(iii) *Performance feedback* to gauge the degree to which instructions have been followed and the efficiency with which they have been implemented.

(iv) *Logic* spelt by the prescribed rules for operating the system, within the ambit of which the manager has to optimise his decision.

Electronic Data Processing (EDP) System

While in American Railroads, commercial types of computers have been used, the European Railways, who were anxious to use computers for management functions as well, have resorted to integrated data processing installations. Compared with commercial computers, these plants

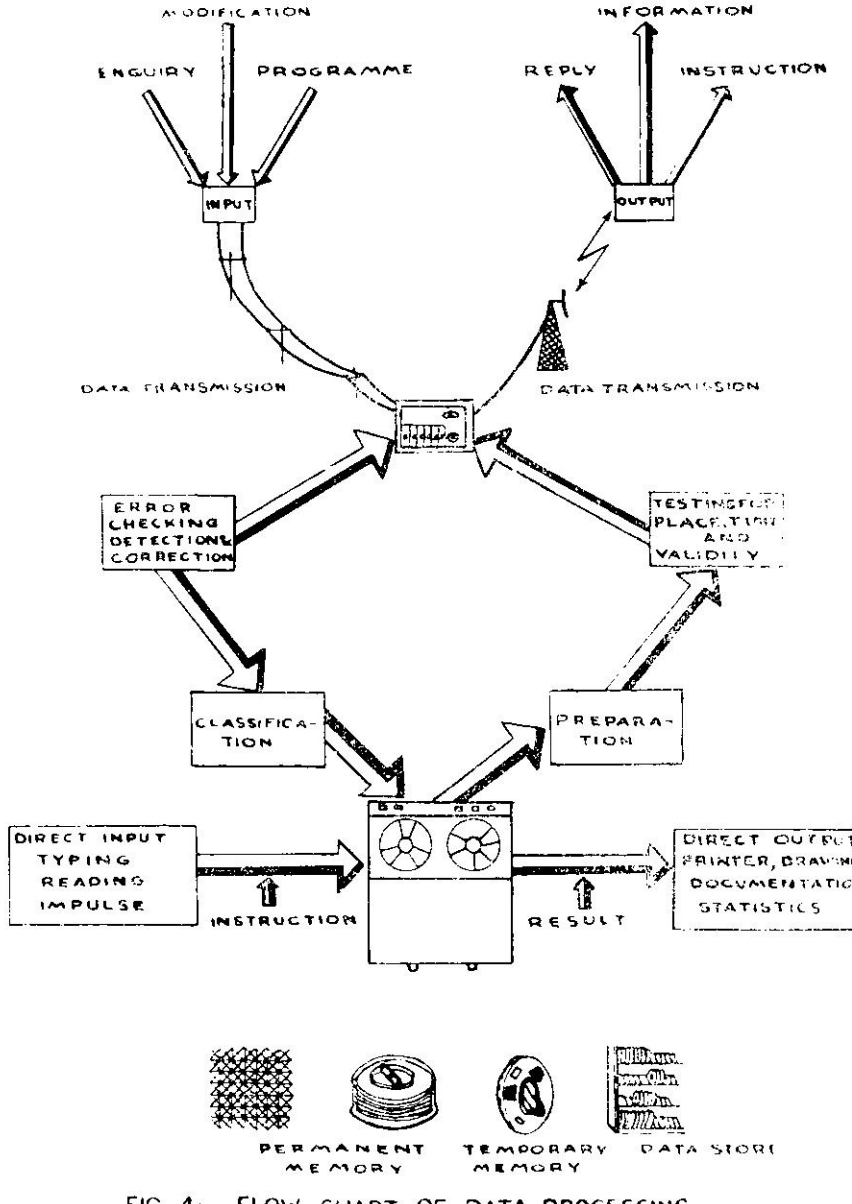

FIG. 4: FLOW CHART OF DATA PROCESSING

system had not come into effect till the time we finished our research (end of 1969).

The top management of the enterprise has, therefore, to take a hard look at its present and proximate economic situation, and decide on the primary objective of its MBO system. The details and emphasis of the system would vary with the initial purpose of installation.

Analysis of Existing Organisation Structure

All management tools, approaches etc. operate within a specific structural framework. Since we believe the basic philosophy of MBO to be the search for *commitment through participative communication*,[20] it is necessary to examine whether the existing structure conduces to such communication or not.

As an initial working hypothesis it may be suggested that *flat and decentralised* structures would be more hospitable to MBO than the tall and centralised ones. The spans of supervision of managers would be wider and lines of communication shorter in a decentralised structure. These would permit greater team-building and quicker and clearer communication. However, this could conflict with the pressures of economic conditions which, if tight, may call for more centralisation. But a large measure of centralisation benefits could as well accrue from a shorter line of command. Thus, some time after the introduction of MBO, the NCB converted a 5-tier organisation to a 3-tier structure which, although achieving some centralisation, by itself did not damage the organisational morale.

The other important point to examine relates to the implementation of MBO in the organisation. Who should do this? Some would suggest a separate corporate planning or similar section to handle the job. Others would favour direct involvement of all line functions at all stages of the process, with necessary specialist help from time to time. The issue remains unresolved till now. Conceptually speaking, the former arrangement represents a 'wheel' system of communications, the corporate planning section being its centre. This suits situations demanding quick problem-solving. But MBO is much more than *ad-hoc* problem-solving. It is based on continuous full participation and mutual interaction of all group members. Accordingly, a 'circle' system of group communication would be more appropriate. Hence, planning cells at different levels in the hierarchy should be constituted by taking members from all functional areas, with no mutual barriers to interaction.[21]

Top-Down or Bottom-up Implementation?

Conceptually, the participation-involvement drive to an MBO system could be satisfied most if the 'bottom-up' process of goal formulation and integration were adopted. However, in practice it is perhaps more usual to find MBO practised in the 'top-down' direction, especially if the enterprise is facing difficult economic conditions e.g. the National Coal Board. Participation of lower levels must not go by default however. If an organisation is in the happy situation of being able to allow bottom-up implementation, there too it should not imply that the higher levels do not do their bit of checking and integration.

Where and When to Introduce MBO?

It is common to contemplate the introduction of MBO in the more structured areas like production and sales. The important point to bear in mind is that even when the MBO system is being tried on a pilot scale at first, it would be wrong to introduce it in only one area like production or sales. Their interrelationships are so numerous that any isolated attempt along one functional area is likely to yield erroneous conclusions from the pilot study. In several organisations, therefore, it has been found useful to begin experimenting with MBO in such areas as research and development. Although such a function is much less structured, yet it has got the advantage of being able to be experimented on in isola-

20. Chakraborty, SK : 'Management by Objectives—Its Genesis, Philosophy and Principles', *The Management Accountant*, June, 1971

21. Abercrombie, MLJ., : 'Small Groups' in *New Horizons in Psychology*, ed. BM Foss, Pelican, 1969.

tion. And once the 'elitist' R & D people accept MBO it becomes easier to make it generally acceptable throughout the organisation.[22]

As to the timing of introduction of MBO, it would be advisable to judge the mood within the organisation—its receptivity to the new system—before formal installation. An important way to achieve this is mentioned below. Overall environmental stability could also give some leverage to top management to feel their way through the new system.

Training for MBO

Systematic training efforts should be conducted in the organisation for disseminating the concepts and philosophy underlying MBO. Since this approach entails a lot of intra-group and inter-group communications, some amount of group dynamics or sensitivity training would seem to be essential.[23] Only thus can a receptive soil be prepared in advance of launching of MBO.

Top Management's Commitment to MBO

This aspect could in fact constitute the Achilles' heel of an MBO system. More often than not it is found that after paying lip-service to similar systems at the time of launching, it is then left to take care of itself, which of course it cannot do. John Humble—the preacher of MBO gospel in the U.K.—sounds a clear warning on this trite yet overlooked pre-requisite.[24]

The preceding paragraphs have highlighted some of the perspectives to be clarified and problems to be faced before an MBO scheme is built up. Such an exercise, depending on the size of the organisation, could take anything between one to two years to complete. In the next section attention is drawn towards certain areas which need to be continually investigated in an on-going MBO system.

PROBLEMS IN AN ON-GOING MBO SYSTEM

MBO and Managerial Remuneration

A business enterprise typically falls under the 'Remunerative-Calculative' category of Etzioni's typology of complex organisations.[25] Rewards and penalties are, therefore, one of the accepted ways of exercising organisational authority over its members. Some managers exhibit great moral concern in being unable to use a suitable reward/penalty structure to buttress performance appraisals based on MBO since, under prevailing conditions, it is the good performers who have to carry the burden of the laggards. Some, on the other hand, argue that to link MBO with reward/penalty would amount to bringing in the piece-wage system from the shop-floor to the Managers' office. This would bring in its train all the problems of administering piece-wage systems.

One suggested way out of this impasse is that rewards and penalties may be thought of in *qualitative terms* also, instead of the usual monetary alternatives. Thus, suitably enlarged spans of control and authority, a carefully prepared and credible system of certification of good performances, recognition in the form of participation as faculty in in-company training programmes etc: may be worth the effort. These could well be effective because MBO is applied to managerial personnel who can be motivated in ways finer than purely money incentives.

Other aspects associated with this problem are: what relative weightage is to be given to performances on the 'hard' criteria (e.g. target reduction of overtime) *vis-a-vis* those on 'soft' criteria (e.g. absenteeism, grievances, labour turn-

22. For example see 'Motivation by Objectives—A Case Study', by ER Frank, *Research Management*, November, 1969.

23. Gill, J and Molander, CF : 'Beyond Management by Objectives', *Personnel Management*, August, 1970.

24. *International Management*, March, 1971.

25. Etzioni, A : *A Comparative Analysis of Complex Organisations*, Free Press, N.Y., 1961.

are better-suited for real-time and on-line operations. In addition, they have refined programme interruption system available on several levels so that they can handle a number of different programme requirements with various priority rankings. Besides, their high storage capacity, short access time and high processing speed make them eminently suited for quicker dissemination of information and variegated control activities (Fig. 4).

Adaptation of EDP for Goods Traffic

The data usually processed for optimisation of freight movements are of two types:

—*Long-term Data*: Those needed for long time such as wagon details, route configuration, holding capacity of stations etc. which are stored and can be called up whenever required.

—*Short-term Data*: Data required for a short time or for one trip only such as information about sender, consignee, weight of the load route, etc.; these are introduced and deleted from time to time.

The short-term data are usually combined in a payload number, which is associated with the wagon number for the duration of the journey. With the aid of the wagon and payload numbers, any particulars can be called up from the central store in part or *in toto* and can be had as a print-out if needed.

Field Back-up for EDP

The most important building-block in the EDP system is the timely and correct collection of data.

—The wagon numbers and other characteristics of a wagon can be electronically read out from the passing wagon by special line-side automatic car-identification equipment and fed directly into the computer. Such reading devices are in use in America but are generally expensive unless a very large fleet of wagons have to be checked in real-time as they arrive at a marshalling yard.

—Alternatively, use of teleprinters or data input devices (which are special electronic devices to convert ordinary information into coded form acceptable to the computers and transmit them at very high speed.

Error Correction Devices

When transmitting a vast mass of numbers, errors are bound to slip in and vitiate the functioning of the EDP. To overcome this, several automatic error correcting systems are available. They generally apply a plausibility check on the coded information and automatically call for a repeat of the suspected group of codes. The wagon numbers on all the European railways have been specially designed for application of the plausibility check.

Every wagon number consists of 11 figures (followed by a self-check number) e.g. 21 87 9336 401. The computer on receiving this number applies the check as follows:

(i) Multiply by 2 everyone of the 6 digits in odd positions. If the result is a 2 digit number, add up the digits to reduce it to a single digit number and add up all the results and call it Total A.

(ii) And the 5 digits in even positions with Total A to get Total B.

(iii) Subtract from 10 the digit in the unit position of Total B to obtain the self-check number.

If the self-check number calculated by the computer does not tally with what has been received, the number is automatically rejected and a repeat is requested.

For the wagon number taken as the example, the self-check number can be calculated as follows:

2×2	=	4
8×2	$=16: 1+6$	$= 7$
9×2	$=18:=+8$	$= 9$
3×2	=	6
4×2	=	8
1×2	=	2
Total A	=	36

Total B $=36+1+7+3+6+0=53$
Self Check Number $=10-3=7$.

AXIE COUNTING EQUIPMENT now used as a simple count-in/count-out device for safety purposes, can be adapted as the control organ for the EDP. As the number of axles of each wagon is included in the long-term data store, the exact position of the wagon within the train can be computed from axle counter data and the wagon list.

Once this concept of tracking individual wagons is accepted, the notion of regarding the train as the standard operating unit will yield place to the use of the wagon as the standard unit, together with its permanent and temporary parameters.

Utilisation of Results of EDP

A. At the PERIPHERAL CENTERS, the smaller computers furnish advance information about the trains expected leading to:

— pre-allotment of a vacant line for its reception, avoiding detention at signals,

— pre-planning of the marshalling order or cut-list, so that the train is broken up within minutes of its arrival,

— simplification of wagon-inspection, and

— advance calculation of brake power for outgoing trains.

In general, the time spent by a goods train in marshalling yards, now estimated at 60 to 70% of the total journey time can be drastically curtailed.

B. At the CENTRAL OPERATING LEVEL, the EDP system deals with the totality of the data received and forecasts results in real-time apart from providing records and satistics, as detailed below:

—The average round trip time of wagons is the barometer of the efficiency of wagon utilisation. The data brought in by the EDP helps plan tighter schedules and cut delays, either by varying the number of wagons made available for loading daily (i.e. a kind of traffic intensity) or the number of wagons actually in operation, i.e. the active rolling stock. The improvement in wagon turn-round thus effected gives threefold benefits: (i) a virtual increase in goods handling capacity and hence earnings (ii) postponing further investments in rolling-stock (iii) possibility of eliminating old wagons, which it is no longer profitable to repair, without reducing the handling capacity

—provides continuous forecast of wagons falling free for further loading

—provides movement instruction for directing empty wagons to zones of maximum demand

—automatically establishes realistic dates for arrival, release and re-booking of wagons

—works out the best sequence of train movements for maximum utilisation of line capacity

—provides an optimum rate structure consistent with customer service, achieved through lower operating costs, reduced transit time and greater flexibility in meeting demands of shifting markets.

C. At the MANAGEMENT LEVEL, the policy structure is kept updated by:

—reduction in middle management positions and escalating the level at which policy decisions are made, either directly with executive participation or indirectly by the programmed decisions of the executive.

—making real-time management feasible by ensuring 'hands-on' availability of realiable data.

—promotion of advance planning of long-term generation of facilities *vis-a-vis* financial end-results.

Adaptation of EDP for Passenger Traffic

When dealing with the general travelling public, the emphasis swings from efficiency to customer service. Customer service is closely tied up with comfort afforded by an assured seat.

Electronic Reservation

The first requirement of a good passenger service is that trains should run punctually to a regular time-table. Passenger comfort comes next with its need for reserved accommodation. The airline systems have generally recognised that an efficient reservation and enquiry system is essential and have resorted to computerised techniques to achieve it. The railways in Europe and Japan are now following suit.

When an intending passenger wants to book a seat, the booking clerk feeds the relevant details of the journey to the computer, which checks its validity, extracts the detailed reservation chart for the particular train and tries to match the request as to class, coach, position of seat etc. If it is not possible to meet the request fully, the computer relaxes the requirements and tries to locate the next best seat. The details of the seat available are fed back to the booking counter, keeping the seat held, pending acceptance by the passenger.

Electronic Enquiry System

Enquiry systems are also similar in principle but are much more complex in operation. Apart from having to store the entire time-table and fare-structure, the computer should be able to build up a cross-country route when called upon, by choosing the appropriate connections and workout the fares. The system should also be capable of handling a fantastic number of enquiries per hour, sometimes as high as 10,000.

Record of Computer Utilisation

A census of computer population in some of the leading railways of the world leads us to some interesting facts given in Table 1.

The Russian railways have shown a very enlightened approach to the question of computerisation. The emphasis is on the use of computers as a tool for better management rather than for replacement of clerical staff engaged in

TABLE 1

Railway	Length of network (Km)	Average per zonal centre (1964)		No. of Main Computer Centres	No. of Zonal computing centres
		Length (Km)	Net ton-Km x 10^9		
French	41000	41000	65.0	1*	—
British	28000	28000	25.6	1	—
West German	35400	2212	4.5	1	16
Indian	56923	7115	13.4	1	8
Japanese	20525	3421	9.8	1	6
New York Central	16000	16000	59.0	1**	—
Russian	130000	5200	74.2	1	25

*Though the main computer centre is one, there are actually 3 units doing different categories of work.
**Actually there are several computers in this centre.

TABLE 2

No.	Problem	Percentage of basic data per 24 hours	No.of operations per unit of data	Percentage of computer time
1.	Forecast of wagon flows, traffic planning and control	57.1	40	43.2
2.	Statistical statements of wagon, traffic, locos etc.	14.3	48	13.1
3.	Stores accounting and inventory control	2.9	107	5.9
4.	Engineering problems and calculation, of norms	0.7	1700	22.6
5.	Labour pay bills and accounting	25.0	32	15.2

statistical or accounting tasks. An analysis of the break-up of their computer-utility-time should serve as a revealing guideline for any modern enterprise.

Unfortunately most of the American Railroads admit that 90% of their computer time is taken up in record keeping and not in management activity. This is because of the allure of financial returns from the high pay-off clerical activity, on which the computers are being engaged.

New Management Techniques Based on a Cybernetic Approach

Management by Exception is a well-known principle and with the aid of EDP's this can be developed to a great finesse. The most urgent decisions to be taken are those resulting from a difference being detected between the normal pattern and the abnormal pattern. It matters less to know whether everything goes right than to get quick and accurate information on exceptions, derangements or anomalies, as they develop. In a conventional train control system there is a continuous flow of information on the indication panels. With the introduction of an EDP, the aim will be to restrict the transmission of computer-controlled information to those occasions when things go wrong and decision-making is called for. This is based on the computer's capacity, assisted by suitable programming, to draw the controller's attention to operating situations which tend to deviate from the standard and so require intervention. For these alerting programmes, the computer compares actual times with scheduled times and evaluates the discrepancies and presents it as a convenient read-out for the controller; as a step further, it is possible to programme for advising information to direct the controller's attention to possible consequences and even suggest remedies.

Network Modelling: Network modelling is a cybernetic technique of logistics planning. The network is a simulated section of railway, with all constraints and facilities simulated. The results of the simulation allow comparisons of alternative policies in optimising the origin-destination performance of wagons, trains, yard operations, costs etc.

Theory of Queues: Train operations in suburban systems constitute a queue of trains taking paths when they become available. But this queue should never wait or come to a stand-still. From a knowledge of the conditions giving rise to queues, derived from random conditions, it is possible to develop a "Non-queue theory", where operation without queueing can be ensured. The application of this theory finds a special application in some suburban sections, where run-through trains or slow goods trains are interspersed with suburban trains.

Theory of Games lends itself to application to yards subject to sudden surges in the traffic. When a distinct and sustained surge hits the yard, the wagon in-take increases. Though increased efforts are made to cope with the problem effort always lags behind requirement and wagon detentions increase. But prolonged detention in the yard dampens further input of wagons due to imposition of restrictions and flattens the surge. Relevant operating measures to relieve the situation can be devised with complete available information manipulated under the Theory of Games.

Theory of Graphs finds use in Project Evaluation and Review Techniques (PERT) and Critical Path Methods (CPM) to coordinate tasks and constraints for a minimum duration of activity and minimum cost with an optimum labour force.

Conclusion

The application of cybernetical methods and electronic techniques is an urgent necessity in the field of rail transport. Its aim is not to render human effort surplus but to maximise and rationalise human output. It is a help and not a hindrance, an ally and not a foe. □

Marketing and Productivity

Richard N Farmer*

In this thought-provoking article, the author highlights the need to visualise productivity in marketing from long-term perspective. According to him, a manufacturer in a developing country like India should resist falling into the trap of its supply-oriented economy and try to grab enormous opportunities available to him particularly in the field of export marketing.

MODERN marketing problems and techniques are rarely well-known or used in many Less Developed Countries (LDC's). This is not surprising, since much work in this field has little relevance to problems in such countries, and money spent on marketing in the American or West European manner might well be wasted.

However, it sometimes seems that the good gets ignored along with bad. Marketing does have many insights which could save much trouble in countries such as India, if only key persons were aware of some of the implications. And one place where this point is very true is in productivity measurement problems.

A country such as India already has a well developed industrial complex, one which is growing more sophisticated each day. Most of my Indian friends tend to compare their country's developments with the very sophisticated American or European systems and depreciate their achievements, but those familiar with what Indian industry can do would often argue that such self-depreciation is unnecessary. Indians can be very proud of their achievements.

But as sophistication, complexity, and capability grow, there is real danger that new traps can arise for the unwary productivity technician. Productivity normally is some measure of output compared to input, and unless one knows a bit about marketing, the most productive system can end up, to everyone's surprise, being the least productive. What appears to be, when measured, a very unproductive system, can make a country rich.

Why? The following simple cases may suggest reasons.

Consider an Indian factory manufacturing a fairly simple component for a car (say, a carburetor or fuel pump), which we call X. As is sometimes true in LDC's, the factory has orders backlogged for years, and the management and engineering problem is to get as much production as possible with the least resources. Anything manufactured can be sold, within any foreseeable limits.

Now, suppose that X now takes 10 manhours of labour to produce. Management turns its technical staff to work, and shortly, new improvements are made so that it now takes only 5 manhours to produce this item. Moreover, no new capital equipment was required—here we have a manhour productivity gain of 100 per cent. The management is rewarded, workers get a raise, and output expands with the same size physical plant. Everyone is satisfied---the factory has done its job the way it should.

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Marketing does have many insights which could save much trouble in countries like India, if only key persons were aware of some of its implications.

The result in this case would be the same if output were measured in money. The item sells for 50 Rupees, and costs used to be 40 Rupees. Now, with the improvements, costs are 35 Rupees (they do not fall by 50 percent, since some costs are for capital, land, and component parts, whose costs do not change). A perceptive manager would keep price at 50 and raise profits, since he can already sell as many at 50 as he can produce. Hopefully, he might even put the profits into something like research and development to get costs down still more.

So far, we find no problems, and many LDC situations are computed about this way. Productivity has risen, and all is well. But at this point an odd American walks into the factory manager's office and asks him if he would be interested in producing fuel pumps or carburettors for antique American cars. These would be similar to, but not the same as, item X. This new item Y would be made by the same skilled and semi-skilled men, on the same machinery, and exported to the United States.

After checking the American's credentials (which are impeccable), the manager sits down and does some calculations. Item Y will take about 5 manhours of labour to produce, plus perhaps a few thousand Rupees of special tooling. But the American insists on things not needed in India, such as special polishing and extra quality control checks. It seems that Americans who will buy these items are not as concerned about price as they are about quality, durability, and exact copying of the original item which appeared on 1929-32 Fords, 1929-31 Chevrolets, and 1933-36 Plymouths. Moreover, production runs will be short since the American only wants delivered a few thousand of each model at one time, so much labour will be required in tearing down and setting up the production line. Product X, made in very long production runs, does not have this cost.

The manager computes that it will take at least 15 manhours to produce each of these items. Astutely, he quotes a price of Rs. 200 each, since he feels he can get it. He can, and the deal is on.

But what has happened to productivity here? Actually it has declined, in real terms, or even in money terms. Item Y, which looks just about like item X, and which contains the same materials and components, is actually produced less efficiently than item X. Product or money cost measurements of productivity would suggest that the plant is now less efficient than it was producing item X, even though revenues and profits have risen. Moreover, the plant is now generating scarce foreign exchange, whereas before, with its better efficiency, it would only supply the local market.

Now consider our factory manager when he is in a free market situation, producing item X for the local market. Because demand exceeds supply, he is able to raise price. Now he charges 80 Rupees for X instead of 50, and he still can sell all he can produce. If we measure productivity by real costs or inputs to get physical outputs, nothing has changed. But if we measure productivity by value added per employee, the factory is now much more efficient, since value added (which includes profit) has increased dramatically.

Both Blades of the Scissors Cut

Alfred Marshall once noted that supply *and* demand are both relevant in determining value and productivity measurements, after all, are merely one way of figuring real values and costs. The problems suggested above come from which blade of the scissors is being considered—supply or demand. The technically-oriented personnel will tend to focus on supply problems, since in their production oriented world, getting the output is the key item. And

such men tend to dominate thinking in any LDC, where desperate shortages of many items are common, and where manufacturers only have to produce to sell. In such cases, the technical men may well be correct. Cost is everything, particularly real cost.

But the demand blade also cuts. In the above examples about crazy American buyers and free markets, the fact that demand was very significant and quite specific led to higher costs—but still higher values. In many cases, becoming more inefficient in the supply sense means becoming more efficient in the demand or marketing sense.

What has all of this got to do with Indian efficiency? From where I sit, halfway around the world, I see endless minor markets, like those for 1933-36 Plymouth carburettors, ripe for the taking by existing Indian manufacturers. Yet, somehow, this never happens. Often the key marketing linkage is missing—the Indian firm does not know what might be done. But no one appears interested in trying to find out (at considerable inefficient cost) what such markets might be. To do so *would* be inefficient, in a supply-oriented world. How could an Indian public firm justify to suspicious auditors a trip of a senior executive to the United States or India just to find out a bit about markets? How could the cost (in hard currency) of a market survey be justified? So it does not get done.

I also see Indian representatives arguing for lower tariffs in imported goods to the developed countries at major world meetings. Logical enough, for the production-oriented world, where the only way to sell is to cut price. If tariffs are lowered, prices decline in the developed countries, and sales increase. Right? Wrong—at least for items like our X above, where no one wants that specific thing. What they want is not cheap goods, but *correct* goods. If the price is higher, and if such goods cost more, then more will be paid.

What is correct? The right quality; the right design; the right delivery time; the right marketing channel; the right product mix for the customer—these things count, not price. But production-oriented people do not and cannot think this way. Better to sell cheap cloth at a Rupee a metre than styled Indian shirts in exclusive American shops at Rs. 50 a metre. A 30 percent duty in the first case precludes any sales; in the second case, it is a minor nuisance. Better to sell refined zinc at a Rupee a pound in America than to sell zinc made into special carburetors in India at Rs. 200 a pound to Americans. The former is efficient; the latter is some peculiar quirk of the American market which no Indian can quite understand.

Productivity normally is some measure of output compared to input, and unless one knows a bit about marketing the most productive system can end up being the least productive.

India is a fascinating and frustrating case for the outsider from the affluent world who sees its potential. India could, within ten years, be earning billions of dollars in foreign exchange in a wide variety of odd markets in affluent countries, if what was stated above was really grasped. What the country appears to need is what modern marketing scholars call the total marketing approach—that is, figure out what foreign customers want, and what they are willing to pay for it, and then produce the *correct* items in the really quite adequate Indian industrial establishments. And charge the foreigners a nice price for such a privilege.

But what India appears to have is the total production approach. Never mind selling, because production is what counts. If the customer is not quite satisfied, too bad—he has no options. This is a very useful strategy

What India appears to need is what modern scholars call the total marketing approach rather than a total production approach.

for a very poor country—but in many industrial ways, India is not that poor any more.

A real problem for any LDC is that this subtle marketing point is automatically taken into account in any affluent free market country. When productivity measures are computed, the fact which is not spelled out is that productivity is being measured for the *correct* items. We look at output per man in the American automotive industry and see a production figure—so many cars per manhour, or some such thing. The unstated premise is that the cars produced were actually sold in a highly competitive market, that the manufacturers did figure out what customers wanted, and then produced something that the buyers were willing to pay for. In short, these manufacturers were taking full account of *both* supply and demand considerations.

If all they had to do was consider supply, we would still be producing Model A Ford, designed in 1927, or some such thing, because this would be so very much more efficient than trying to change models, rebuild assembly lines, pay good money for new tooling, and all the rest needed to mesh supply with demand considerations. Of course, the cars would not sell, but the firms would have phenomenally high productivity figures.

This is an easy trap for a supply-oriented economy to fall into. The trap is baited and waiting for Indian manufacturing firms and planners. Will the bait be taken? □

IT'S WHAT YOU SELL, NOT WHERE

Through a reorganised sales effort that assigns each salesman to a product line rather than to a territory, one American Company has achieved customized, more effective selling, and a better penetration of its markets.

This reorganisation entailed reducing the number of sales districts from seven to four, each served by six specialised product diversions. Customer service is improved and the time needed to find new business is decreased, because the salesman becomes familiar with companies that require his product line. The salesmen are assisgned to a specialty on the basis of their previously demonstrated strengths in selling particular product lines.

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Industrial Relations : A Systems Approach

Dr JL Rastogi*

An attempt has been made in this paper to apply systems approach to the study of union-management relations at the enterprise level. The author feels that like any other organisation, an enterprise is an open dynamic system. In fact, it is more than a social system, it is a socio-technical system because it requires both a technical organisation and a work organisation. The systems approach to industrial relations not only calls for maximum development and a perfect integration of parts of each organisation, but also of the enterprise and the union with each other in such a way that each achieves its objective by directing its energies towards common goals without harming the cause of the offer.

THE term 'industrial relations' has been interpreted by different writers differently according to their own convenience, needs and the prevailing circumstances. At the higher level these may imply relationships between the employers' organisations and trade union federations with a view to laying down basic terms and conditions of employment; while at the lower level they may mean 'those relations which arise out of the common association of managers and employees in the work of an undertaking. They include the arrangements for the settling of wages and conditions of work and for the settlement of disputes.[1] Even at the latter level a trade union may be involved to deal with employer(s) or his (their) representatives on behalf of the employees. Thus unlike the early stages of industrialization when industrial relations were largely individual between the employer and the individual worker, these have been institutionalized in the sense that industrial relations today are more in the nature of collective relations between the employer's organisation and the trade union federation. However, for the sake of convenience, we would concentrate on industrial relations at the enterprise level, i.e. between the management representing a particular enterprise and the union representing its employees.

Characteristics of a System

In this paper an attempt has been made to apply systems approach to the study of union-management relations at the enterprise level. However, before doing so it would be worthwhile to understand certain basic characteristics of a system:

1. 'A system is an assembly of interdependent parts (subsystems) whose interaction determines its survival. Interdependence means that the change in one part affects other parts and thus the whole system.[2]
2. Every system exists within a socio-cultural environment (super-system) and has its boundary which differentiates it from other systems within the super-system.

* Lucknow University. The author wishes to acknowledge his gratefulness to the Editor, *Indian Labour Journal*, Simla-4, for his kind permission to use his paper,'Trade Unions—A Systems Point of View' published in October 1971 issue of the above Journal, in completing this paper.

1. Report of the Royal Commission on Trade Unions and Employers' Associations, 1962-68, London, p. 305.

2. Douglas McGregor, The Professional Manager, 1967, pp. 39-40.

3. A system is open, organic and dynamic. It is open because it transacts with its environment in terms of inputs and outputs. It is organic because it adapts itself to the changes in the environment. Again, it is dynamic in the sense that it undergoes constant change as a result of interaction among sub-systems and with the larger environmental system.
4. A system has multiple goals which relate to itself, to its sub-systems and to the super-system within which it exists. As soon as a system is constituted, consciously or unconsciously, it acquires certain objectives which are generally more important than the immediate objectives of its sub-systems. Thus the most important objective of a system is survival and growth and its all other objectives depend on effective attainment of this. It does not imply mere retention of physical existence or maintenance of *status quo*. It implies a dynamic equilibrium depending on its capacity to sense and adapt to the changes in the environment.
5. Besides the system's basic objective, it also has to facilitate the attainment of the goals of the sub-systems in a coordinated way for which the system might have been constituted or which might be needed to attain the former.
6. A system's objectives towards the super-system arise out of its obligations towards the society of which it is a part and the attainment of which is likely to further its other objectives.
7. Every system has an operative feedback which helps it 'to correct for its own malfunctioning or for changes in the environment'[3]

In applying systems approach to union-management relations at the enterprise level, we have two alternatives. Either we can treat both the union and the enterprise as sub-systems of a bigger system (society) interacting with each other and also with the super-system (socio-cultural environment), or we can regard the union and the enterprise as full-fledged systems interacting with each other within and also with the super-system (socio-cultural environment). Of these two, the latter alternative or the inter-system model seems to be more plausible for studying union-management relations. When we make use of the systems model (i.e., when we treat both the union and the enterprise as sub-systems of a bigger system), 'we may lose the critical fact of the autonomy of the components, or the direct interactional or transactional consequences for the separate components when we treat the sub-systems as merely parts of a larger system. The inter-systems model exaggerates the virtues of autonomy and the limited nature of interdependence of the interactions between the two connected systems.[4]

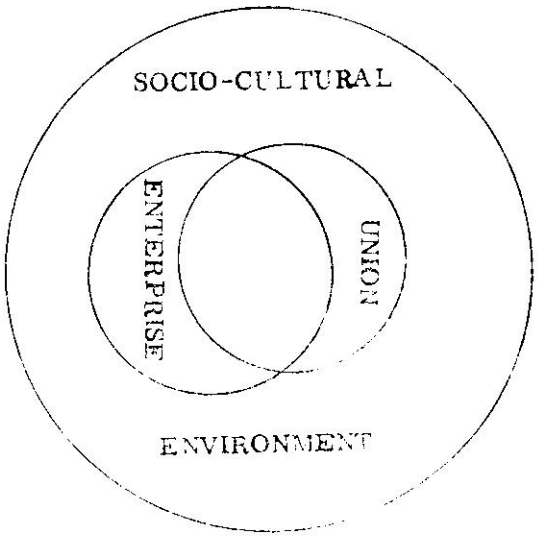

Fig. 1
Inter-System Model of Union-Management Relations

3. Daniel Katz and Robert Kahn: The Social Psychology of Organizations, New Delhi, 1970, p. 28.

4. Robert Chin, The Utility of Systems Models and Development Models for Practitioners, in The Planning of Change, Ed. Bennis, Benne and Chin, 1969, p. 297.

Enterprise as a System

Like any other organisation, an enterprise is an open dynamic system. But it is more than a social system. It is a socio-technical system because it 'requires both a technological organisation—equipment and process layout—and a work organisation relating to each other those who carry out the necessary tasks. The technological demands place limits upon the type of work organisation possible, but a work organisation has social and psychological properties of its own that are independent of technology.[6] Thus the enterprise has to balance its technical and human (socio-psychological) sides in such a way that while serving the technological demands of the organisation, it also satisfies the needs and aspirations of the people involved.

As an open system the enterprise transacts with its environment in terms of imports and exports. It "imports" various things from its environment, utilises these imports in some kind of "conversion" process, and then "exports" products, services, and "waste materials" which result from the conversion process. One important import is the information obtained from the environment pertaining to the primary task—that is what the organisation must do in order to survive. Other imports are the raw materials, money, equipment, and people involved in the conversion to something which is exportable and meets some environmental demands.[6] The enterprise is a dynamic system in the sense that it adapts itself to the changes in the super-system (socio-cultural environment), at the same time affecting the latter.

As a system the enterprise has multiple objectives to attain. Besides achieving the institutional objective of survival and growth, the enterprise has to protect the interests of various constituents of industry and also promote the welfare of the community of which it is a part. The institutional objective is the most important and all other objectives depend on successful attainment of this. Its survival is based on economical and effective performance of its primary task, i.e., the task which it is created to perform—creation and distribution of goods and/or services. However, this is not enough. It has also to sense the changes in the super-system (socio-cultural environment) and adapt its primary task to the changing needs in order to grow.

Equally important objective of an enterprise is satisfaction of personal objectives of the members of the organisation. According to Ralph Davis, these are ensuring '(a) profits for owners, (b) salaries and others compensation for executives, (c) wages and other compensation for employees, and (d) psychic income for all, including (i) pride in work, (ii) security, (iii) recognition, and (iv) acceptance.'[7] As the enterprise coordinates the contributions of various constituents of production, it has a special responsibility. It has not only to promote the welfare of the absentee-shareholders, but also to protect the interests of other groups viz., the management employees and the consumer. Thus profit maximisation is no more the sole objective of any productive enterprise. While performing its primary task, the enterprise coordinates the interests of various interest groups in such a manner that they attain their personal goals while directing their energies and efforts towards organisational objectives.

The social objectives of the enterprise arise out of its obligations towards the society of which it is a part. These are furtherance of the national goals and acceleration of the processes of growth and development. The national goals of a country are determined by her political doctrine, social values and cultural heritage. In a democracy these generally are liberty, justice and equality. The processes of growth and development, on the other hand, are essential for a country's survival and independence. 'The former refers narrowly to increasing income or output per capita, while the latter relates more

5. AK Rice, Productivity and Social Organization—The Ahmedabad Experiment, Tavistak Publications, London, 1970, p. 4.
6. Edgar H Schein: Organizational Psychology, Prentice-Hall of India, New Delhi, 1969, p. 90.
7. Ralph C Davis, Industrial Organization & Management, Harper & Row, 1957, p. 26.

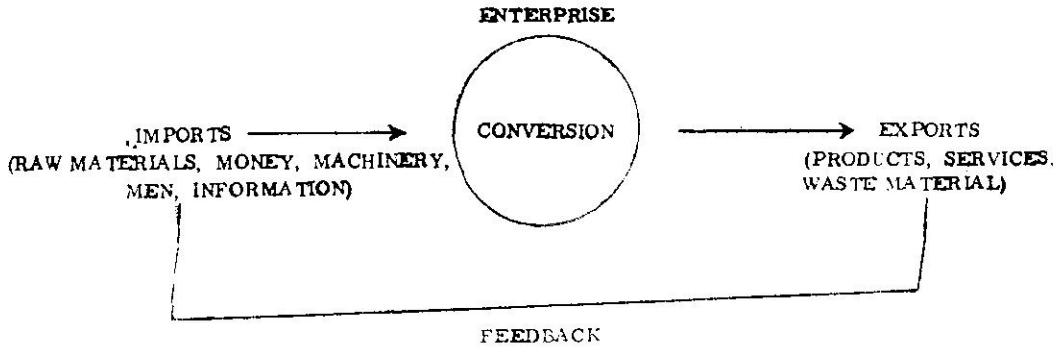

Fig. 2.

broadly to the emergence in society of the attitudes, values, skills and knowledge essential for sustained growth. Where the one stresses the quantitative output performance of an economic system, the other focuses attention on its qualitative input characteristics.'[8] Thus, the process of growth implies continuous economic development, full employment and maximum utilisation of natural resources, while the process of development aims at creation of environment and institutions needed for the fuller life in the community by providing healthy surroundings and educational and recreational facilities.

In order to achieve its multi-dimensional objectives, the enterprise has a number of functions to perform. No doubt, creation and distribution of goods and/or services remain the most important task, but it has to perform a number of functions to attain a dynamic equilibrium and sustained growth—maintenance, adaptive and managerial. Katz and Kahn have defined the tasks of functional sub-systems of an organization (as show at the right).

Role of Management

The management is the most dynamic aspect of the enterprise. Its success, achievement of its objectives, and assumptions of its proper roles and functions depend to a considerable extent on the effectiveness and efficiency with which it is managed. Managers are usually the persons who act for and on behalf of the enterprise They 'use formal authority to organize, direct

Sub-system Structure	*Function*
1. Production: Primary Processes	Task accomplishment: energy transformation within organization
2. Maintenance of working structure	Mediating between task demands and human needs to keep structure in operation
3. Boundary systems:	
A. Production-supportive : procurement of materials and manpower and product disposal	Transactional exchanges at system boundaries
B. Institutional system	Obtaining social support and legitimation
4. Adaptive	Intelligence, research and development, planning
5. Managerial	A. Resolving conflicts between hierarchial levels
	B. Coordinating and directing functional substructures
	C. Coordinating external requirements and organizational resources and needs

Source : Katz and Kahn, op. cit. p. 86.

8. Karl De Schweinitz, Jn., Growth, Development and Political Monuments, in Interdisciplinary Relationships in the Social Sciences, Ed. M Sheriff and CW Sheriff, 1969, p. 211.

and control responsible subordinates (and therefore, indirectly, the groups or complexes which they may head) in order that all service contributions be coordinated in the attainment of an enterprise purpose.'[9] Thus coordination remains the most important responsibility of managers. It 'includes some decision-making; establishing broad objectives, initiating and approving changes in key personnel and in management organization, approving decisions on various matters to avoid conflicts with other decisions.'[10] The managers not only integrate various aspects and constituents of production but also balance the needs of the enterprise and the pressures of other interdependent systems and that of the environment.

Trade Union as a System

A trade union can also be viewed and or developed as an open dynamic system because it possesses certain systems characteristics and can easily acquire others. However unlike an enterprise it is only a social system being a combination of workers (sub-systems) formed to attain certain objectives by joint and coordinated efforts. Thus being the organisation of people, 'their (members') relationships and behaviour determine the inputs, the transformations, and the outputs of the system.'[11] Again, 'it engages in transactions with a larger system: society'.[11] as an open system and has to adapt itself to the changes in the external systems around it. 'It is dynamic in the sense that it undergoes constant change as a result of interaction among the subsystems and with the larger environmental system.'[12]

Once a trade union has been formed, it acquires certain goals which are very often more important than the immediate objectives of the membership (sub-systems). As an open dynamic social system, its most important objective is survival and growth. In order 'to survive, the organisation (trade union) must continue to perform its primary task—the recruitment, proper utilisation, motivation, and integration of the people in it'.[13] A union has also to sense the environment from time to time and adapt itself to these in order to grow.

The membership goals of a trade union are generally the objectives for which it has been established. Therefore, usually its success is judged with reference to these. These objectives are directly concerned with satisfaction of various levels of membership needs, i.e., economic, safety, social and psychological (egoistic and self-fulfillment). The economic needs of members include higher wages, shorter hours, improved conditions of work, etc.; safety needs include security of service, protection against arbitrary and discretionary actions of employers/managements; and social needs arising out of members' association with other people. On the other hand, psychological needs of membership may involve '(a) dignity, status, self-respect, psychological security, satisfaction through participation; (b) outlet for the frustrations of industrial employment; and (c) use of skills and abilities not required or negated on the job.'[14] Trade unions help workers achieve need satisfaction both on and off the job. On-the-job benefits are obtained for members by collective bargaining or by inducing government action while off the job benefits are provided by unions either by organizing welfare programmes or inducing participation in unions' internal working.

The social objectives of a trade union are those which relate to the broader society. Besides benefitting the super-system (society), these are likely to further other union goals. These may relate to national integration, 'socialisation of members for their roles in other organisations and larger society', disciplining members by setting rules of their own for internal working and also those of the work place jointly with

9. Robert Tannenbaum, The Manager Concept: A Rational Synthesis in Management, Ed. William B Wolf, 1965, p. 15.
10. Paul Pigors and Charles A Myers, Personnel Administration, 1965, p. 5.
11. Douglas McGregor, op. cit., p. 40.
12. Ibid, pp. 40-41.
13. Edgar H Schein, op. cit., p. 15.
14. Arnold S Tannenbaum, Unions Ch. 17 in Handbook of Organizations, Ed. James G. March, 1965, p. 718.

the employers managements, and safeguarding the interests of the industry and the nation.

The functions of a trade union in a country are directly dependent on its philosophy and objectives and the way in which these have been acquired. Usually the traditional functions of a trade union are need satisfaction of members and their protection particularly in dealing with employers managements. Thus it seeks 'to reduce human cost of production by such means as helping to protect workers from arbitrary or discriminatory decisions of management, improving the employees' peace of mind through greater job security, and raising the level of dignity and respect with which wage-earners are treated in the plant.'[15] However, it is too narrow a perception of trade union functions. As an open dynamic system, besides performing the traditional functions, a trade union has to assume two additional roles: maintenance and adaptive. The former is concerned with the development of internal sub-systems (membership) and integration of these with each other and with the larger society, while the latter is concerned with sensing and adapting to the changes in environment. Thus maintenance function is an educative role. It would not only help the members to fully develop their personalities and achieve maximum need satisfaction but also enable them to acquire various socially desirable traits and qualities like responsibility, discipline and cooperation and give them a vision which would enable them to look beyond their narrow horizon.

The adaptive function of a trade union is concerned with its transactions with the external environment. These would provide the necessary feedback 'about environmental conditions and about the functioning of the system (particular union) in relation to its environment. The feedback of such information enables the system to correct for its own malfunctioning or for changes in the environment.'[16] Equally potent way to meet the environmental pressures would be to facilitate and induce change in the environment itself by exporting its values, norms and philosophy. 'Individuals can belong to many organisations and this variety of organisational roles, sometimes furnishes outlets for more of their personality needs.'[17] However, when they participate in one organisation they do not shed away the values of the others of which they are the members. The membership of multiple organisations help mixing and integration of values and norms of different systems, hence changing the environment.

Common Characteristics of Enterprise and Union as Systems

As open dynamic systems both the enterprise and the union have certain common characteristics:

1. Both the enterprise and the union are interdependent systems which themselves are constituted of a number of interdependent parts or sub-systems. Survival of each system thus depends not only on its interaction with the other systems but also on the interactions between its parts or sub-systems.

2. Both the enterprise and the union are parts of the same socio-cultural environment. Therefore, their interactions are not only affected by the norms, values and attitudes of the super-system (socio-cultural environment), but these may also affect the latter and force it to adjust to the changing values, norms and attitudes evolved through enterprise-union interactions.

3. Both the enterprise and the union are open dynamic systems. They are open because they transact with their environment in terms of inputs and outputs. They are dynamic in the sense that they undergo constant change and adapt themselves to the changing needs as a result of interactions among their subsystems and with the larger environmental system.

15. Richard A. Lester, As Unions Mature, 1958, p. 13.
16. Katz and Kahn, op. cit., p. 28.
17. Ibid, p. 120.

4. Both the enterprise and the union have multiple goals which relate to themselves as systems, to their sub-systems (parts) and to the super-system (socio-cultural environment) within which they exist.
5. Both the enterprise and the union have their operative feedback which helps them to adjust to the changes in mutual interactions and super-system (socio-cultural environment).

Besides, both the enterprise and the union serve the same base of membership to a considerable extent, and in so doing they compete with each other in satisfying workers' needs and aspirations and in securing their loyalty and commitment to their respective goals. Again while dealing with each other, the representatives of neither the enterprise nor the union enjoy an absolute area of freedom. It is restrained by the nature of work of the enterprise, policies and practices of the organisation concerned, experts' advice (in specific problems), union-management agreement if any and labour legislation.

Distinguishing Features

In spite of above common characteristics of the enterprise and the union, these also have certain distinguishing features. While the enterprise is a socio-technical system, the union is only a social system. Thus, while the enterprise is production-oriented usually and coordinates the technical and human sides of the industry, the union is mainly people-oriented and caters to only one aspect, i.e., the human beings. Again, in attaining their objectives, while the enterprise tries to achieve need satisfaction of various constituents of production on the basis of their respective contribution to productive efforts, the union concentrates to the needs of its members. However, notwithstanding these differences in the enterprise and the union as systems, there is little scope for antagonism and strife between them.

Conflict *Vs* Cooperation

'Organized groups like individuals, may develop four general types of relationship toward one another. They may isolate themselves; they may cooperate, voluntarily or involuntarily; may compete; or they may enter into conflict.[18] Isolation means severance of all contacts and interactions with each other. 'In competition, two or more parties seek to gain reward from a third party' while 'in conflict, two or more parties seek to gain from each other.' Co-operation, on the other hand, implies collaboration between the parties in furtherance of common objectives and equitable sharing of benefits of joint endeavour. As regards industrial relations while there is no scope for isolation between the management and the union, and there is little scope for competition/conflict, there is considerable scope for cooperation and collaboration between them. Industrial relations being a result of interactions between workers/trade unions and the management/employers' association(s) as determined by the level of interactions, attitude and philosophy of management and strength and maturity of trade unions and the prevailing environment, the parties cannot exist and progress in isolation. In spite of some similarity between competition and conflict, the former is not very relevant in the context of industrial relations. Although both the management and the union compete with each other to secure workers' loyalty, they can secure their respective objectives without harming the interests of the others, if workers' needs and aspirations are properly and adequately integrated with the goals of the enterprise.

Usually certain degree of conflict between the management and the union is taken to be inevitable. Prof. Clark Kerr advances four reasons for this:

1. The desires of the parties are more or less unlimited, while the means of satisfaction are limited. Wages can never be as high as workers desire or profits or salaries as high as owners or managers might wish; yet the money available for distribution between the contending claimants is always limited in the short run.....

18. Clark Kerr, Labour & Management in Industrial Society, 1964, p. 168.

2. Someone manages and someone is managed; this represents an eternal opposition of interest, which may be made bearable but can never be eliminated in a complex industrial society.....

3. Industrial societies are dynamic. Even if a certain distribution of income and power could be devised which in a given situation, was not subject to controversy (though this seems unlikely), the situation itself would change because of new regulations by the state, changed expenditure patterns of consumers, higher costs of raw materials, a reduced value of monetary unit, increased real income for a comparable group elsewhere—and the parties would need to seek a new allocation of income and power.....

4. If management and labour are to retain their institutional identities, they must disagree and must act on the disagreement. Conflict is essential to survival.....[19].

Besides, Prof. Kerr argues that conflict in industrial relations is not always bad and has certain constructive aspects also. 'First, out of aggressive conflict or its latent possibility comes the resolution of many disputes.....Second, conflict, and particularly open conflict, reduces tension.....Third, out of the conflict of management and union—and this on occasion may involve aggressive action—the worker is better served. As the two parties compete for his loyalty, his interests are advanced[20]. However, Prof. Kerr concludes that socially harmful effects of industrial conflict can be controlled by either of the three ways: '(1) by reducing the sources of mutual discontent; (2) by affecting the process by which decisions to act are made, either (a) by reducing the power to make such decisions (through control of one party by the other or of both by the state) or (b) by facilitating the making and implementing of decisions to act nonviolently; and (3) by channeling the conflict along the least destructive lines.[21]

Yet another writer, Prof. Douglas McGregor, regards industrial relations as a process of psychological growth. To him conflict and cooperation are two stages in the continuum of industrial relations. 'It has frequently been noted that union-management relations follow a fairly typical course of historical change. When a union is first organized in a plant, the relationship is likely to involve a high degree of suspicion and conflict. Usually this "fighting stage" gradually disappears and is followed by a relatively neutral stage characterised by a decrease of suspicion, a growth of mutual understanding, and in general a mildly friendly atmosphere. This is the stage of successful collective bargaining. Where circumstances have been favourable, a third stage in union-management relations emerges. This is a stage in which suspicion and conflict have disappeared, and in which the atmosphere is one not alone ofacceptance but of constructive joint effort to solve common problems.[22]

From the systems point of view there is very little scope for conflict in industrial relations and a wide scope for cooperation and collaboration between the management and the union. The systems approach presupposes perfect integration of sub-systems into various systems; and of objectives and aspirations of different systems existing within a particular socio-cultural environment (super-system). Thus, under this approach industrial relations coincide with the third stage in the evolution of enterprise-union relationship which is based on certain degree of maturity in the parties concerned and better understanding of the role of each in wider context of maximum social advantage. However, tensions and strains do often appear in interactions between the sub-systems; and also between systems when the environment changes and they are slow to sense and adapt to these. But such is only a temporary phase.

Causes of Maladjustment

Despite interdependence, why do then the enterprise and the union fail to acquire systems

19. Clark Kerr, op. cit., pp. 169-170.
20. Ibid, pp. 172-173.
21. Ibid, p. 200.
22. Douglas McGregor: Union-Management Cooperation—A Psychological Analysis.

characteristics and to facilitate perfect integration of their respective goals in the interest of all concerned? It can be attributed to the following causes:

Managerial Gap

Like any other dynamic aspect management concepts have undergone a continuous change with the advance of industrialisation, need for dealing with increasing complexities of production and emerging organisations and with external and internal pressures. But the management in general has failed to keep pace with the knowledge explosion in this regard. It has been more concerned with the technical side of production and with the operative efficiency of the enterprise. In so doing it has partly utilised systems concepts, consciously or unconsciously, particularly in integration of different processes of production and various aspects of management. But it has largely ignored the human side of the enterprise, and no efforts have been made to integrate the needs of workers and the goals of their informal and formal organisations with the objectives of the enterprise. Thus interdependence of the enterprise with other systems and with the wider environment is yet to be recognised. Again, owing to lop-sided approach, profit maximisation continues to be the most important objective of the enterprise, and its sectional and social obligations remain neglected in most of the cases.

However, the management's awareness of the changing concepts and its adaptation to the changing needs have varied from country to country. While in the developed countries of the West and in Japan 'professionalisation of management is progressing fast and management development is being increasingly accepted by industry as a "must" for senior executives and for promotion to senior posts,'[23] management in general has lagged far behind in this regard in developing countries leaving a wide gap between managerial practices and the latest

From systems point of view there is very little scope for conflict in industrial relatioms and a wide scope for cooperation and collaboration between the management and the Union.

theories. Consequently 'there are still in most countries attitudes carried over from a non-Industrial age which are prejudicial to the good operation of modern industry. Many of these occur among the managing group itself. Relations between subordinates and superiors are still paternalistic in many enterprises. There is still too great a reluctance to delegate authority and a consequent over-centralisation of decision-making at the top, even where there are competent subordinates. There is still too little readiness to accept responsibility at lower levels.[24] Although management development programmes at various levels are, to a varying degree, trying to expose the participants to the changing needs of the environment and the concepts to meet these, they alone have failed to bridge the managerial gap. Because of rigid and obsolete attitude of the top bosses, even the professional managers with training in latest techniques of management have failed to assert and implement the modern approaches in solving various industrial and human relations problems.

Again, workers in many enterprises are still treated as individuals and industrial relations as relationship between the employer(s) and the individual workers. Thus, the constructive role of trade unions in evolving a sound base for mutual relations has not been recognised, although in some cases they are accepted as a necessary evil. Thus, little effort has been made

23. Labour-Management Relations Series: No. 35, Management Development and Personnel Policies and Practices in Asia, I.L.O., p. 35.

24. Labour-Management Relations Series: No. 35, op. cit. p. 16.

to understand the nature, objectives and functions of trade unions as social organisations and their role in directing workers' energies to productive channels and integrating them with the work community.

Displacement of Union Goals

The evolution of trade unions has not followed any uniform pattern. 'Each organisation is influenced by its own circumstances and experience the way it was formed, the tradition it has developed, the industrial challenges it has faced, the sort of opposition it has encountered, and the character of the growth it has achieved.'[25] Ordinarily, a trade union is a means to an end and not an end in itself. However, to some members the union becomes important 'not only because of the goals it achieves, but because these members become involved, committed to or dependent upon the union as a social structure. If the leadership is from the rank-and-file members, its goals are precisely the same as that of the latter. But the discripancy arises when the authority and control are in the hands of the external leaders and 'the union although created as a means towards the achievement of certain ends, may seem to some members or leaders to be an end in itself or a means towards other 'personal' ends quite independent of the avowed and primary purposes for which the union has been established.'[26] When the union becomes an end in itself or its goals become subservient to the personal ends of the leadership, it looses its basic character. Because of goals displacement the systems characteristics of a trade union remain underdeveloped and the gap between the professed goals and objective reality widens.

The displacement of union goals is very often facilitated by the attitude of the management towards the trade union, because more the delay in acceptance of the union as a responsible agency of workers, and in negotiations with it over wages, hours and other conditions of employment, greater would be the scope for displacement of union goals. 'It is often said that employers get the kind of unions they deserve; that unionism is a mirror of employer policies and practices. It would probably be more accurate to say that employers get the kind of labour movement that their fathers or grandfathers deserved. It is perhaps unfortunate but nevertheless quite true that union philosophies often are formulated at the worst possible time during the early and more disturbed and less humane stages of industrialisation.'[27]

State Intervention

Too much interference of the government in matters relating to industrial relations has also contributed towards maladjustment between the management and the union(s), as it fails to promote a spirit of confidence, responsibility and cooperation and leaves little scope for mutual regulation or enterprise-union relations. No doubt, State policy towards labour in most countries has shifted from "pro-employer" to a highly protective/regulatory one, but over enthusiasm on the part of the government to safeguard the interests of labour and to ameliorate its conditions, has prevented the creation of environment conducive to healthy industrial relations. Usually the government through various labour legislations not only regulates working conditions; prescribes wages, hours of work and other conditions of employment, welfare measures and social security; and facilitates the development of appropriate organisations like employers' organisations and trade unions; but also regulates strikes and lockouts and prescribes machinery for settlement of industrial disputes. A high degree of government involvement has prevented the systems characteristics of various enterprises and unions, including industry science, and their respective autonomy to develop. Again, it leaves very little to be worked out between the management and the union(s) and they have mainly to concentrate on implementation of laws, orders, settlements and awards. Similarly, dependence on statutory machinery for settlement of industrial disputes, particularly adjudication,

25. Richard A Lester, op. cit. p. 22.
26. Arnold S Tannenbaum, op. cit. p. 718.
27. Clark Kerr, op. cit. p. 25

cuts at the very root of mutual accommodation and understanding, besides being time-consuming and costly. It exaggerates differences as each party takes an extreme position and tries to impress upon a third party the strength and justice of its own case. Again, the adjudication award generally gives an idea of victory or defeat to the parties which is injurious to industrial harmony in the long run.

Measures Needed

The systems approach to industrial relations not only calls for the maximum development and a perfect integration of parts of each organisation, but also of the enterprise and the union with each other in such a way that each achieves its objectives by directing its energies towards common goals without harming the cause of the other. If properly applied, it would provide the basis for greater collaboration and cooperation between them and in no way affect their respective autonomy. The following steps may help to create a favourable climate to develop and adopt this approach in solving industrial relations problems:

Create Systems-Consciousness

No doubt, highly utilitarian and constructive, the systems approach to industrial relations can neither be imported, nor implemented overnight. It needs a patient and persistent effort on the part of all concerned to put systems ideology into practice. The most important step in this direction would be to create systems consciousness in society. The systems characteristics of the enterprise and the union existing within a particular environment and interacting with each other should be adequately magnified. Their multiple objectives and functions as open dynamic but interdependent systems should be brought home and the contribution of their feedback in correcting their dealings with each other should be properly stressed. Thus, the systems approach should be made a part of the curricula of all industrial relations and personnel management courses. Besides, a number of seminars should be organised at various levels to disseminate systems concepts and to facilitate a smooth transition from the present state of enterprise-union relations to that on systems lines.

Develop Systems-oriented Management

We need a different type of management personnel, to implement the systems point of view, who are systems-oriented, have wider outlook and understand their obligations not only to the enterprise but also to various interest groups constituting it and to the society as a whole. To begin with, the objectives of the enterprise—institutional, sectional and social—should be clearly defined and the management at various levels should be encouraged to re-assess its own role *vis-a-vis* these. In initial stages the services of systems experts may be sought to enable the existing management personnel to grasp the basic needs and benefits of the systems approach and to assist them to scrutinise their own position in the light of the changing requirements. It will also help them to understand the role of other systems existing within the same socio-cultural environment with which the enterprise is interacting, including trade union(s) in correct perspective and thus to identify the gaps in their attitude and philosophy. Besides paving the ground for better enterprise-union understanding and cooperation, the systems-orientation of management would lead to optimum performance at all levels due to greater integration of various processes of production and different aspects of management.

Strengthen Trade Unions

The systems approach to industrial relations presupposes existence of strong, unified and self-reliant trade unions who are aware of their role as open dynamic social systems interacting with other systems within a particular socio-cultural environment. Thus, even the trade unions have to be made systems-conscious. The objectives and role of trade unions should be redefined in systems terms emphasising interdependence of parts (members and leaders) and that of various systems including the enterprises concerned within the super-system (society). Again, the existing unions should be helped to understand their obligations not only towards

themselves, but also towards the sub-systems (membership) and towards the super-system (society). The unions should also be assisted to identify their existing systems characteristics and the gaps between their present state and the ideal to be attained. The workers' education scheme can play a useful role in this connection by creating leadership which is systems oriented and has traits like open mindedness, responsibility, flexibility and selflessness. Thus recognition of wider objectives and functions of trade unions would narrow down their conflicting interests and ideological differences and enable them to consolidate into strong and responsible unions at various levels to serve their respective obligations to themselves, to the membership and to the society.

Adjust State Policy to New Requirements

Although direct State involvement in industrial relations is inconsistent with the systems approach, yet it has to play a very important role in its evolution, understanding and acceptance. Voluntarism[28] should be accepted as a desirable goal in industrial relations and the government policy should reflect and strengthen the same. Thus, generally, the government should relinquish its protective/regulative role and adopt a supportive role to help evolve an environment conducive to the growth of various institutions as autonomous but interdependent systems which are alive to their own place in the socio-cultural environment and of their obligations towards themselves, towards their constituents and towards the society.

Encourage Enterprise-Union Interactions

As effective enterprise-union integration presupposes equitable adjustment of their conflicting interests, successful collective bargaining must precede any collaborative effort. 'Bargaining experience frequently serves as instructor and stabiliser. The parties come to know and understand one another. Management becomes more aware of the kind of organisation a union is and especially of the internal working of the particular unions with which it deals. Joint arrangements and machinery develop. Some of difficult problems separating the parties are solved by workable compromises, thus reducing the core of conflict.... In other words, accommodation tends to take place.'[29] As regards disputes relating to interpretation and enlargement of agreements, the parties concerned should be encouraged to work out their own arrangements. Recourse should be taken to conciliation and voluntary arbitration.

Provide Separate and Joint Forums

Until systems approach to the enterprise-union relations has gained momentum, the parties experimenting with it should be provided with adequate opportunities to pool knowledge and exchange information, views and experiences in this regard. For this purpose separate and joint forums of enterprises and unions should be organised. The separate forums would enable each set of systems (enterprises, unions) to pool its knowledge and experiences and evolve a common strategy to deal with the other. On the other hand, the joint forums would enable them to understand each other better and to iron out doubts and differences as and when they arise. While the initiative for establishing separate forums should come from the parties concerned, the government, being the guardian of justice, peace and progress, should take the initiative to provide the joint forum(s).

These steps would help the enterprises and trade unions to develop as autonomous but interdependent open dynamic systems, to evolve their relationship on the basis of mutual trust and understanding and achieve their respective goals by directing their energies towards common objectives without harming the interests of the other. □

28. Voluntarism in industrial relations implies voluntary efforts on the part of the enterprises and trade unions to regulate their respective relationships and interests in a peaceful and mutually agreed manner within the broader framework of national objectives and government policy.

29. Richard A Lester, As Unions Mature, 1958, p. 119.

Industrial Relations in India and Abroad: A Comparative Study

MK Varma*

The type of Industrial Relations problems faced in European countries and the U.S.A. are somewhat similar to those obtaining in India, although the approaches towards Industrial Relations differ. While in India these problems emanate from poverty and unemployment, in Europe and America, they spring from totally opposite situations that of affluence and over-employment. In this article, the writer has attempted to put together the impressions he gathered during his recent visit abroad.

ALTHOUGH Europe, USA and Canada have had a much longer history and tradition of industrialisation than India, the *types* of industrial relations problems and their *shades* are remarkably similar to those obtaining in India today. In that sense, the handicap India may have had in a later start in industrialisation appears to have been more than made up by the accelerated rate at which we in India have grown in maturity and wisdom in the sphere of industrial relations. Of course, a late starter always has the advantage of learning from the experiences of others.

For instance, some of the burning topics being very keenly debated in Europe are:

—Workers' participation in Management
—Internationalisation of Unions
—Recognition by industries of their social responsibilities
—Subsidy by industries for union's administrative expenses.

It must, however, be mentioned straightaway that there is a vast difference between the approaches towards industrial relations which obtain in India *vis a vis* the European countries. The basic enigma in India are chronic poverty and unemployment; and all industrial relations problems get their motivations, directions and sharpness from these essential problems. The interesting thing about the problems in Industrial relations in the affluent countries abroad is that while, in the ultimate analysis, the issues are similar to those in India, they spring from a totally opposite situation— the situation of affluence and over-employment.

In Europe and the USA, the economic *compulsion* to work is less today than it has ever been because of over-employment and higher wages. This, no doubt is a measure of progress, and in itself a good thing, even though it inevitably poses problems in its wake. On the other hand, the *incentive* to work is a different thing; this has been blunted by high taxation and too many social benefits. Yet another and more sophisticated aspect is the profound influence that higher standards of universal education is having in making people less inclined to take things for granted, and to accept orders and discipline imposed from above. It is breeding a society that increasingly wants to know the reason why whenever an employee is asked to carry out a certain task. The other aspect is that modern technological development tends to make the nature of work itself more boring and less satisfying, although undoubtedly it is easing

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their way of life. On the whole, technological development tends to produce frustration and alienation of interest and commitment; and, for reasons which cannot be easily discerned breeds active militancy leading to occasional outbursts which bring relief from the monotony of work.

Against such a background, the employers in Europe and the USA appear to be very much worried at the thought that in spite of maintaining an extremely costly wage and benefits structure they are unable to prevent high turnover amongst skilled workers.

Workers' Participation in Management

Workers' participation in management deserves a special mention. In India we have been talking about it – and in the process we have become conditioned about it – already for nearly two decades. Therefore, when it was announced recently that workers will be placed as directors on the Board of Management– in the public sector organisations to begin with—it did not come to us as a surprise.

In an international conference held on the same subject in Scotland which this writer had the privilege to attend, it was somewhat amusing to find that at the very mention in some European countries of the desirability of introducing workers' participation in management (not necessarily by making him a director of the Board), the delegates appeared to be very much perturbed. The thoughts that were expressed at the conference were in themselves not wrong or naive but the extent to which the representatives of industries abroad appeared to be perturbed was somewhat amusing. This writer had the exhilirating feeling that here was one important issue of industrial relations where India was already far ahead of the European countries in its stage of thinking and the wisdom that it has required on the subject.

The employers' representatives attending the conference were generally skeptical about the concept of workers sharing with the management the responsibility of taking vital decisions about the running of the industries; yet, they conceded in a lukewarm fashion the desirability of allowing the workers to have some say in matters affecting them. One of the employers' representatives specifically mentioned that it was high time that the employers gave up their repeated reference to 'Management prerogatives'.

The most interesting observations, however, came from the union representatives attending the Conference. Mr R McCusker, Assistant General Secretary of the Organisation of Scientific and Technical Staff and Management, declared in clear terms that he was against workers' participation; that he believed that the unions did not really want participation, at least in Britain: According to him, the real reason for German co-determination was that after the war German trade unions were practically dead and workers' participation in management was introduced by way of a 'shot in the arm'. According to McCusker, the advantages for employers were far greater than those for the unions. For one thing, the employer could pluck the cream of the workers' representative and absorb him as part of the management team; and thus make his organisation much more efficient! According to him, the management could use workers' participation as a means for getting a 'captive underpaid consultant' who could provide a lot of interesting advice about how the unions thought and behaved and how they, that is, the unions, could be 'treated'. Speaking in a serious vein, McCusker said that all that the trade unions wanted to be involved in was "a real, genuine, negotiative and consultative machinery"– this according to him, was far better than co-determination or participation. He was seriously scared about trade union leaders losing their identity and forfeiting the faith of the workers by belonging to the role of management.

Similarly, Mr FJ Chapple, General Secretary of Electrical Electronics and Telecommunication Union, said that it was not true that there was any great desire on the part of the workers to have the kind of participation (i.e. at the Board level) which was being advocated; the workers were really interested to have a say on matters immediately related to their work and to the conditions governing their work. He

further mentioned that having a workers' participant on the Board, would serve no useful purpose—if he fulfilled his duties as a full-fledged member of the Board, he was no longer trusted by the rank and file; if he remained a fighter against the management in the Board, he could not make any worthwhile contribution. He mentioned that the unions had no objection to the workers graduating themselves into members of the management staff by the regular method of well-deserved promotions; but they did mind a worker being elected to the Board and being expected to function on what appears to be a self-contradictory job.

In passing, he mentioned about a very refreshing kind of participation between unions and management. His union ran a college for training members on various jobs. This was costing the union approximately £ 25,000 per year. This college was attended not only by members of his unions, but also by those from other unions. Sometimes the management were also invited to run a joint course with shop stewards where a few general managers and managing directors of certain companies attended the courses as participants.

Industrial Relations in Europe

Industrial relations in Europe appear to be torn by a *peculiar dualism*:

(a) On one hand the unions of various countries are trying to get together to form an international bargaining unit with a view to compelling employers in different countries to concede service conditions at the highest scale obtaining anywhere in Europe. On the other hand, when a multi-national employer wants to shift some of his uneconomic operations to such countries, even in Europe, where either the productivity is high or the wages are comparatively lower, these international-minded unions come up with sharp opposition on grounds of national or even regional, considerations. The demands so familiar to us in India, about opportunities for 'sons of the soil', are frequently raised.

(b) The air has been charged with expectations about successful conclusions of the negotiations with regard to the European Common Market. The unions also are looking upon this development with favour, because it is in accord with their efforts for internationalising their unions. But, this writer noticed unmistakable signs of worry in certain countries where the cost of living has so far remained lower than in other European countries; the worry is that very shortly their cost of living will also go up and may lead to inflation.

(c) As mentioned earlier, the problems of industrial relations in Europe, though similar to those in India today, arise from opposite reasons. Affluence and over-employment lend a special feature to these problems. For instance, demand for lesser working hours (40 hours a week, 4 days a week), for workers' participation in management, for the employer sharing the administrative costs of the union, are all being raised; and what is significant, these are being conceded by employers—not because the workers are oppressed but because they are in a commanding position simply due to the fact that they can always walk out on one industrial unit and be received with open arms by another industrial unit. The employers are genuinely concerned about controlling the turnover of employees, about stepping up welfare activities amongst the employees, about making increasing use of industrial psychology to help problem-employees—not necessarily because the conditions of the workers are pitiable or appalling, but because the employers are haunted by the worry of losing their skilled workers unless these things are done.

Latest Legislation Governing Collective Bargaining in Canada

Recently-proposed amendments to existing industrial relations legislation in Canada are very interesting for us in India especially because of their similarity to the provisions of our Industrial Disputes Act. If the proposed amendments are adopted in their present form, the employer will be bound by a collective agreement to advise the bargaining union 90 days in advance of any

technological change that is likely to affect the employment of a significant number of his employees. The right of determining what number is "significant" will be held by the Labour Relations Board, a body set up under the industrial relations legislation. The union will subsequently be able to apply to the Board for permission to commence bargaining with the employer for the purpose of revising the existing collective agreements in order to assist employees affected by the change. The employer may not make the change until the Board has either refused permission to the union or has agreed and a new agreement has been reached. If permission is given but the parties fail to reach an agreement, after exhausting the required statutory procedure, the restraint on the parties may be waived and the union would be free to go on a strike and the employer to declare a lock-out. If an employer fails to give advance notice of changes he may be ordered by the Board not to proceed with the changes and reinstate any displaced employees with back-pay pending the Board's decision.

Industrial Relations in the USA

In the USA, the problems in industrial relations are more or less the same as in European countries and they also spring from the same sources as mentioned earlier—affluence and over-employment. Of course, the USA experience in consolidating unions on vast national, as well as international levels, has already been completed and there is no such development as European Common Market in the USA. There is no talk either about workers' participation in management—the trade union leaders have a "no nonsense" attitude about it. They firmly believe that it is the employer's responsibility and headache to manage, and that it is the trade union's privilege and duty to make demands on the employers on what they consider to be their legitimate rights. Therefore, one always gets the impression in the USA that there is no confusion either amongst the employers or amongst the trade unions about their respective roles; and whatever the problems in the field of industrial relations, they are raised on a clear-cut idea about the respective boundaries of the employers and the unions.

However, a real dark shadow is beginning to be cast in the USA—not only in the field of industrial relations but in the total sphere of politics, economics and industrial activities. The costly and unresolving political experience in the Far East and the consequent cut-down on defence and space activities which are well-known, have dealt a rude shock to industrial activities in general. The vast number of very qualified engineers and scientists who have been thrown out of employment and who are now craving for even clerical positions, is in fact, a tragedy greater than the one we, in India, are facing on account of the large number of fresh engineers remaining unemployed. This has, naturally, started casting a gloomy shadow on industrial relations too.

The problems in Canada and the USA, very briefly, are as follows:

(a) There is recession.

(b) There is shrinkage in employment opportunities.

(c) Because of the successful demands for higher wages and better working conditions, which the industries have had to concede during the past decades, the American labour has become extremely expensive.

(d) In spite of highly automated machinery being employed in American industries, the overall productivity of American labour can no longer claim to be higher than in any other less developed country; therefore, the American goods are no longer finding ready market in foreign countries as they used to in the past.

The net result of all this is that there is an unmistakable sign of nervousness underneath the surface amongst the workers and their unions. It appears that they have reached the unavoidable conclusion that in the matters of wages and benefits as well as in improving the productivity and flexibility in manpower utilisation, the American labour will have to pull up their socks. It is in this context that this writer found not only in his discussion with the union leaders but also with the Director of the Industrial Relations School that they have now become very much more receptive to the idea of greater productivity and greater discipline and restraint in the field of industrial relations. □

Job-Shop Scheduling Approach for Scheduling Maintenance Activities

Dr Nesa Labbe Wu*

Close inspection of machine behaviour should be performed to determine when and how much maintenance should be exercised within certain limits to avoid costly breakdowns. Issuance of standard practice inspection procedures and check-off lists to all inspection parties involved is vital to the welfare of a maintenance programme. In this article, the author discusses job shop scheduling approach for sheduling maintenance activities.

THERE are two types of maintenance activities which have to be combined to reflect an harmonious maintenance system: breakdown repair and preventive maintenance (PM). When breakdown repairs are the only maintenance activity, then machines run at maximum utilisation levels. However, when PM maintenance is installed, it reduces emergency situations and therefore cuts down production output on a scheduled basis, rather than risking delays when a breakdown occurs.

If one can establish a breakeven-cost point between expenditures for PM and expenditures caused by loss of production due to machine breakdown and breakdown maintenance repair cost, then the answer will yield the optimum amount of necessary PM work. The establishment of this breakeven-cost point is subject to accurate records and careful analysis of historical data, which do not exist in most companies.

Breakdown maintenance is a necessary evil that should be reduced or minimised by preventive methods. Breakdown maintenance is the most unpredictable activity that results in production slow down, production stoppage, inefficient use of maintenance manpower, production and maintenance overtime, production lateness, and many others. And yet, breakdown maintenance is still the basic and largest responsibility of the maintenance department or plant engineering department in most of our industries.

Any breakdown has to be given top priority so as to get equipment back into service as quickly as possible. In addition to repairing a broken down piece of equipment it is the responsibility of the maintenance people to investigate the cause of the breakdown in order to avoid a similar or worse breakdown in the future. This function is too often overlooked.

Routine maintenance of equipment, buildings, utilities and grounds must be considered on a planned and scheduled basis. It minimises equipment breakdown, interruptions in production schedules and prolongs the life of the equipment: this means dollar savings. Routine maintenance should not interfere with production schedules and therefore has to be scheduled within the idle machine time or, as is the case in most industry, during the second shift if the routine maintenance activity involves an approximately eight hour job for each working day of the week. Routine maintenance schedules have to be established carefully. Load levelling is a must,

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as maintenance labour is expensive. As a matter of fact, maintenance labour is 60 to 70 per cent of the overall maintenance cost. Considering that the average maintenance labour operates only at a 40 to 60 per cent efficiency magnifies the need to cut non-productive man-hours.

Preventive maintenance is a sound, tested system of planned upkeep to obtain maximum efficiency and production with the existing equipment. It is very much like routine maintenance except that it is not as well defined in terms of job performance. Mostly, all routine maintenance activities are known in terms of frequency of performance and job time for a rather long time period. The preventive maintenance jobs are not that well defined in terms of frequency of maintenance job performance.

Inspections for Establishing PM Job-Cycles and Due Dates

The factors, besides manufacturing recommendations, which play a major role in determining the PM requirements are: the production load distribution, the equipment age of the piece of equipment, previous maintenance upkeep and others. The effect of previous upkeep on the future maintenance requirements are totally unpredictable, whereas production distribution over time and production interruptions have a measurable effect on the maintenance requirements. In general: an increase in the production is reflected in an increase in the maintenance activity, likewise, for an increase in production interruptions. The poorer the previous machine unkeep the higher the future maintenance efforts have to be to bring or to keep the machine on its normal operating level.

Close inspection of machine behaviour should be performed to determine when and how much maintenance should be exercised within certain time limits to avoid costly breakdowns. The data from these inspections will also help determine the functional relationship between production-load, production interruptions, previous maintenance unkeep and necessary PM maintenance activities. These so-called PM maintenance inspections can be conducted by production equipment foremen for attended equipment by quality control people for automated unattended equipment, and by maintenance craftsmen for unattended equipment and material handling systems.

The unavoidable inspection evil leads to functional responsibilities and co-operation between two different departments: the maintenance department and the production department. Just as the maintenance manager has the responsibility to provide the production department with trouble-free equipment and safe structures, the production manager has to ensure co-operation of his department with the maintenance department by adjusting production schedules and by directing the machine and equipment operators to perform PM inspections daily or regularly.

PM inspection procedures as conducted by production equipment foremen and quality control people should be different from PM inspection procedures as conducted by maintenance craftsmen. Never should production foremen or quality control people be asked to make on-the-spot small adjustments like: lubricating, or making extremely small repairs. In case of necessity for the above adjustments they should notify the control group in the maintenance department through their supervisors. Maintenance craftsmen, however, should make on-the-spot small adjustments when necessary. Deficiencies of major nature, however, have to be reported to the control group, so that they can be scheduled.

The issuance of standard practice inspection procedures and check off lists to all inspection parties involved is vital to the welfare of this programme. These check-off lists should include such items as : (1) machine name, (2) manufacturer, (3) machine identification number , (4) machine location, (5) items to be inspected, (6) frequency of inspection, (7) recommendation for maintenance crew, (8) nature of problem , and (9) emergency factor. Correctly filled-out check-off lists help planning maintenance activities. The analysis of these

maintenance activities to be scheduled and the production activities over a period of time leads to better future maintenance and production planning.

PM Scheduling Approach

In practice, when a maintenance man notices the needs of PM work, he will perform the necessary PM work if it does not take more than 30 minutes and if it does not interfere with production. One may want to discuss this standard decision rule. However, it has shown to be effective since it eliminates scheduling time, walking time, and other unavoidable delays which may cause a too-high work efficiency loss for a 30-minute job. From the inspection sheets, following information can be gathered on pending PM work :

(1) Machine name, manufacturer, *identification number*, location ; (2) items to be inspected *by craft* and estimated *time*, and (3) emergency factors in terms of due dates. Together with production information, such as machines to be used to produce certain number of items before a due date, above information on pending PM work can be combined to generate actual PM schedules.

One may suggest job shop scheduling techniques to schedule maintenance and production activities over machines, taking into account due dates for each type of activity, maintenance or production. The two restrictions that one may want to build into the model is the maintenance task force and machine hours (eight hours on a one-shift basis, sixteen hours on a two-shift basis, and so on). It should be noted that due dates for PM work are somewhat different from due dates set up for production. Production due dates depend on shipping date, importance of customer to the company, and others. PM due dates in general reflect emergencies. One possible code may be : "E" for work that must be initiated today to avoid a major breakdown "1" for a job that is required to be performed tomorrow, "2" for PM work that is required before the end of this week, "3" may indicate work that is required some time after next week, and so on. As time, scheduled work, and PM performance proceed, above codes will change: last day's "E" codes should disappear, new "E" codes are formed from previous "1" codes, and so on. Because above codes are set up by using estimated due dates, it is possible that a PM work-order that had yesterday a "3" code suddenly changes today to an "E" code, due to an unforeseen shift in the piece of equipment that could not be expected when code "3" was assigned.

PM Maintenance Planning

In plants which have a planning and scheduling department and have established a sound preventive maintenance programme, it is found that approximately 60% of the total maintenance time is absorbed by PM activities, whereas the remaining 40% is spent on minor repetitive and routine maintenance. In case of emergencies it is the task of the planning and scheduling department to determine what PM jobs can be delayed to supply manpower for the emergency situations.

Maintenance work orders are the data needed for correct PM planning. These work orders, after they have been analysed and estimated for labour and material, are used to establish work sequence and job priorities. Taking the equipment availability into consideration, a daily work schedule is to be preferred over a weekly work schedule, as weekly schedules place a great degree of job-execution-responsibility on the craft foreman's shoulders, since it requires close supervision.

Once a complete PM system is established and is running smoothly, the PM orders can be generated automatically, according to fixed PM maintenance cycles for each machine and craft.

Preventive Maintenance Through Design

SS Tak* and GK Agarwal**

The authors look at preventive maintenance as a tool for higher productivity. A tool, which in its simplest form consists of inspection, lubrication, adjustment or replacement; while in its most sophisticated form it includes any activity that not only prevents breakdowns, but also, maintains the quality of products. An important among these activities is designing for maintenance. The aim of this activity is two-fold; firstly, it aims at eliminating the maintenance task as far as possible; secondly, wherever maintenance cannot be avoided it aims at reducing the cost and time for maintenance. Paper describes, how a proper review of design from maintenance point of view can reduce down-time due to maintenance, the sequence of the review process and finally what should constitute the review process. This aspect of preventive maintenance can be of great help to the maintenance engineer even after the design stage.

HIGHER machine productivity depends upon uninterrupted, efficient working of machine throughout its life. One of the major causes of lower machine productivity is breakdown of the machine during production schedule. These unscheduled breakdowns of machine result in the locking up of scarce capital resources, and holding up of production and subsequent operations, increased consumption of spare parts, keeping the operator idle, and more maintenance personnel working without a thought-out plan at hectic speed and pressure. These factors tend to reduce volume of production and push up the unit cost of production. These unscheduled breakdowns if not totally eliminated, can be reduced to the minimum through preventive maintenance. Preventive maintenance is carried out on the principle of "A stitch in time saves nine". It is a systematic approach to take care of the equipment to prevent premature breakdown or failure.

Preventive maintenance not only helps maintain a higher level of productivity, it also safeguards against rapid deterioration of equipment. In fact, preventive maintenance occupies the same position with regard to industry as preventive medicine does with regard to public health. Just as the investment in periodical inoculations and check-ups is less costly than epidemics, the expenditure on preventive maintenance is an investment that pays many times.

Scope of Preventive Maintenance

Preventive maintenance varies widely in scope and intensity of application. Many executives think of preventive maintenance only in terms of periodic inspection of plant and equipment to prevent breakdowns before they occur. To this limited view some add repetitive servicing upkeep, and overhaul. There are others who include other repetitive maintenance functions such as lubrication, painting and cleaning. Still others include the use of plant and worker protective equipment. Further along are those who also study materials and finishes of the equipment (or building or facility) before it is purchased and installed.

Good preventive maintenance, it is said, begins with proper design and installation. Instead of setting up routines to keep motors clean in dusty areas, for example, they specify

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T.E.F.C. (Totally Enclosed Fan Cooled) motors to eliminate this continuing expense.

There are a few more enlightened people who broadly apply the preventive maintenance philosophy to any activity that not only will prevent breakdowns or cut operating costs but also will improve output or quality of product. In one plant, a control, automatically shuts down a machine tool when any particular machine tool has worked on a predetermined number of pieces. The worn out tool is replaced. This is preventive maintenance of a highly-developed character—a far cry from the purely inspection adjustment routine of the majority of programmes. It is typical of a trend in highly-mechanised industries that will accelerate as automation gradually takes over.

Thus we see that in its sophisticated form, preventive maintenance starts with the design of equipment and includes any activity that will not only prevent breakdowns and deterioration of equipment but also will maintain quality of the production.

Design Characteristics for PM

From maintenance point of view a good design must have the following inherent characteristics:

(i) Frequency of maintenance should be minimum.
(ii) All maintenance tasks should require minimum amount of time with least number of people.
(iii) The maintenance task should require minimum amount of training of the personnel.
(iv) The variety and quantity of maintenance tools and test equipment should be reduced to minimum.
(v) The expenditure on spares should be minimum.
(vi) There should be provision to prevent quick deterioration of equipment.

A successful design balances added cost to provide these characteristics against saving in maintenance cost and cost of down-time.

Very often the designers, in an effort to satisfy functional production and cost requirement, are apt to forget the maintenance aspect of the equipment. What may have been an achievement from the other point of view, may turn out to be a great disadvantage from maintenance point of view. Therefore, to ensure that the maintenance aspect is not overlooked and to ensure that the above-mentioned maintenance characteristics are incorporated in design, the equipment design must be reviewed from time to time during its development stage by a maintenance expert.

Sequence of Design Review

As equipment design progresses and engineering layouts, detailed drawings, list of material etc., are prepared, the maintenance expert should carry out day-to-day review of the design. The purpose of the review must be to ensure maximum maintenance characteristics in design. The review should be conducted by evaluating individual design features. Approval of design results in sign-off while disapproval results in preparation of recommendations for the product improvement, which should be in turn submitted to competent design engineer for consideration. After review of maintenance expert's recommendation, the design engineer makes a decision as to whether the recommendation should be incorporated or rejected. Incorporation results in a drawing change and subsequent second review by the maintenance expert. Rejection generally results in a meeting between design engineer and maintenance expert. The reasons for rejection are discussed. The overinformal design review sequence is illustrated in Fig. 1.

Maintenance Review

While reviewing the design from maintenance point of view, a maintenance expert has to consider a number of factors to incorporate the six characteristics mentioned previously. Some of the important considerations are:

Reduction of Need for Maintenance—Ideally the designer or maintenance reviewer should know the characteristics of the various

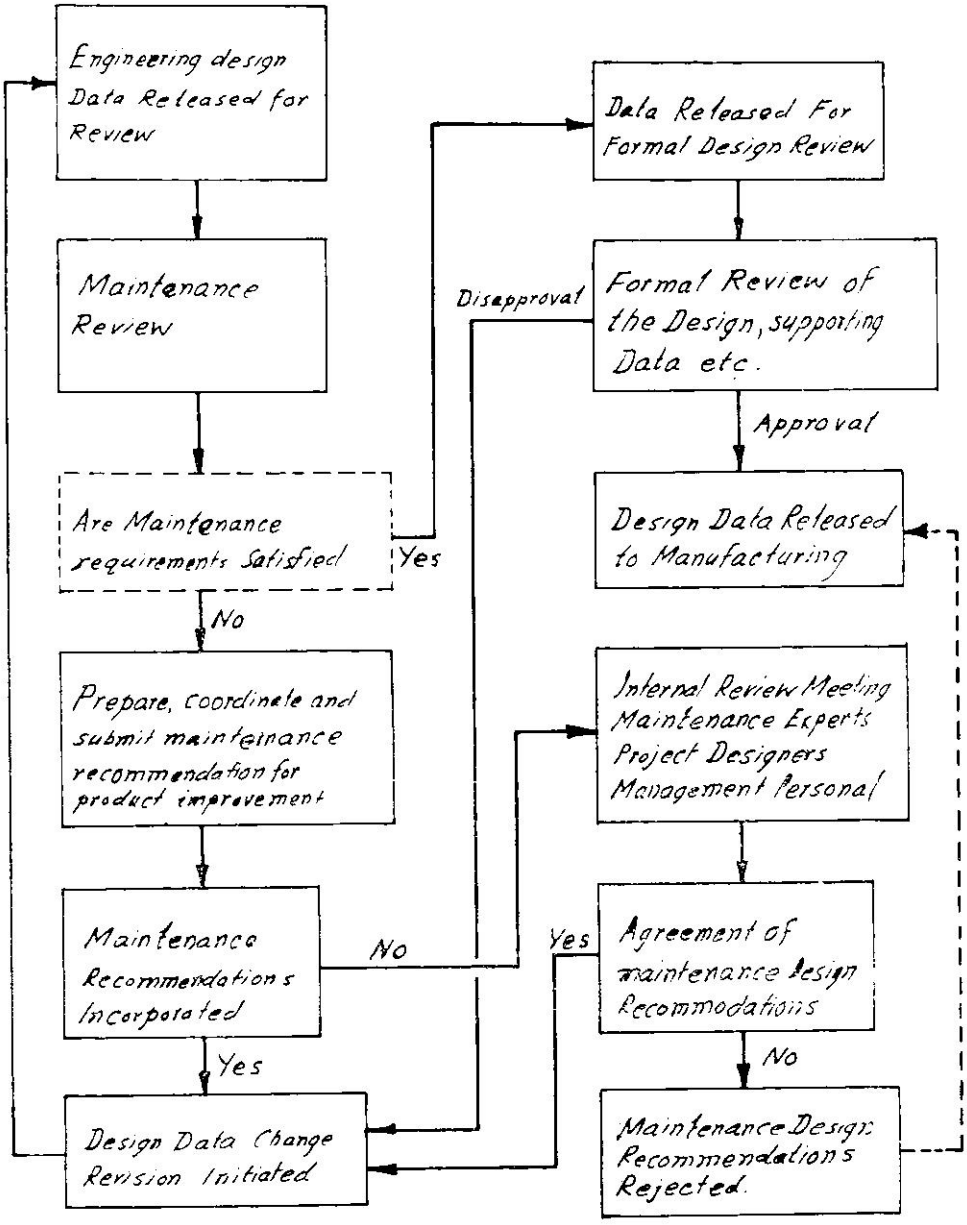

Fig. 1 : Sequence of Design Review

components of the equipment quite early in the evolution of the design. He can acquire this knowledge by way of experience, past records of similar items and/or from experiments on prototype. The equipment items can then be classified under four classes namely:

(a) Those which will need no attention of any kind throughout the life of the product and which are unlikely to fail as a result of normal use and minor mishaps.

(b) Those which will need only occasional attention e.g. inspection adjustment, replacement etc. during the life of the product.

(c) Those which will need frequent attention.

(d) Those which can fail at any moment after manufacturing is complete.

The component under class 'c' requires maximum contribution from the reviewer. These components require regular attention by way of inspection, cleaning, adjustment, lubrication, adjustment or replacement. The designer or viewer must ask, of each of these components, whether it really needs all this attention? It is often possible to eliminate the need or to reduce it, by some modifications in the design. A different construction, improved materials, or some automatic device may reduce the need for maintenance. Here are few examples to illustrate this point.

(i) Most of the automobiles need to be lubricated periodically at suspension, steering and transmission. But few of the latest models have automatic chasis lubrication, while in a few others a change in materials have made lubrication unnecessary.

(ii) The carbon brushes of small commutator motors are made very long and are held in contact by long travel springs, thereby reducing the frequent change of brushes.

(iii) Provision of automatic chip collection, in modern machine tools protects the ways from chip damage.

(iv) By inserting nylon wear-strips on the U channel of its bottle-conveyor line one plant stretched chain life from ½ to 3 years.

(v) Burning of electrical contacts may be reduced by choosing resistant materials, or by varying electrical conditions at the gap to suppress the arc. In D.C. contact breakers, a condensor is often shunted across the gap for this purpose.

Accessibility—Although it is possible to reduce the quantum of maintenance work through proper design it cannot be totally eliminated. Therefore, the second aim of the reviewer should be to reduce the time of the maintenance through proper design. Accessibility is one of the characteristics of equipment design which reduces the time of maintenance. The points of inspection, adjustment and lubrication, individual components and sub-assemblies should be directly accessible. Since it may not always be possible to arrange easy accessibility to all components, the accessibility should be based on inspection, adjustment or replacement frequency. Parts with high frequency of inspection adjustment or replacement requirement i.e. items under class (c) and (d) must be most accessible. Access doors can be provided for this purpose. The doors should be self-supporting and in adequate size for tool access. When blind accesses exist, protective features should be provided to preclude personnel injury.

Standardisation—The bolts, keys, cotters, parts and sub-assemblies should be standardised as far as possible. Such standardisation aims at using standard components as well as standardising the sizes of similar items used in an equipment e.g. if an equipment is using bolts of 10 different sizes for fastening purposes, the sizes can be standardised to two or three. This not only reduces the spare-part requirements but also reduces the type of tools and equipment needed for repair.

Optimum Layout—The components should be functionally grouped to help in isolating the faults. This characteristic is very important in electric and electronic equipments. The layout should be as simple as possible. Fig. 2 shows grouping and layout of test points in two different designs for comparison.

Fasteners—Often a maintenance man has to remove fasteners like nut, stud, screws, etc. for maintenance purposes. The reviewer or designer must see that minimum time is required

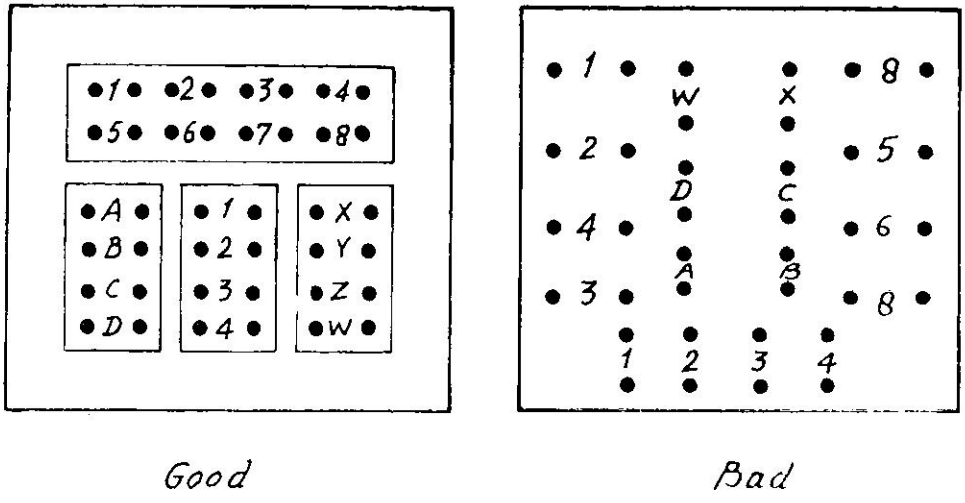

Fig. 2

for dismantling and reassembling operation. This can be achieved by providing quick release fasteners and reducing the number of fasteners by using large fasteners in lieu of many small fasteners. The number of fasteners per application should not exceed four as far as possible. The number of turns required to tighten a bolt or screw should not be more than ten. Wherever loss of screws, bolts or nuts might cause a malfunction or excessive maintenance time, the captive fastener should be used. The screws which require frequent removal should have hexagonal socket head instead of hemispherical head. The hexagonal head screws can be removed quickly by wrench, in case of slot damage whereas a hemispherical head screw has to be be drilled out.

Adjustments—Fine adjustments should be provided through large adjustment movements. The adjustment items should have locking devices to preclude inadvertent charges due to vibration etc., and should have stopping devices to prevent over-riding the limit of adjustment. As a convention, the clockwise rotation of adjustment point should result in an increased adjustment value.

Cables—The cables should be fabricated in removable sections and routed to avoid sharp corners. The cables should be adequately clamped and protected. They should be of different colours as per the prevailing code for easy identification. It is preferable to have cable connectors of quick-disconnecting type i.e. U-shaped.

Protective Devices—The equipment design should make provisions for self-protection against damage to components or parts after a malfunction has occurred. If a system has protection devices such as fuses, circuit breakers etc., the equipment can be protected from further damage. In addition, these devices also help in isolating the malfunction.

General—The delicate parts should be adequately protected. Provision of good means of handling of the various parts, sub-assemblies and equipment are of great help to the maintenance man. Where positioning of a component in a particular manner is important, design should preclude installation in wrong position. All controls, test points, doors and weights should be adequately labelled.

Maintenance Engineer and Design

The above discussion should not give the impression that the design aspect of preventive maintenance is important only while designing

the new equipment or facility. A maintenance engineer can apply this concept of preventive maintenance to reduce his day-to-day work with equal effectiveness. All manufacturers are not equally conscious, of this aspect of design and hence a frequent cause of breakdown may be attributed to an improper design. Whenever a maintenance engineer observes that the failure of a particular part or subassembly results in frequent breakdown, he must devote his attention to analyse the causes of failure and should explore the possibilities of improving the design. Such analysis, of course, should be based on cost effectiveness. A particular pump, operating under unusual conditions, may show a high incidence of failure but because of simplicity of repair may have a low total maintenance cost, and if it is the only one of its type in the plant, an intensive investigation for better design may not be justified. On the other hand a simple component, such as a capstan bearing on a spinning machine, which although having low unit replacement cost, can fail so often and on so many machines that the total cost per year may run into thousands of rupees. Here a detailed investigation for improvement in design can be extremely profitable.

Conclusion

Preventive maintenance is one of the tools of higher productivity. It pays many times its cost. The extent to which preventive maintenance can be carried out depends upon the degree of mechanisation. Higher the degree of mechanisation, higher will be the returns through preventive maintenance. In its sophisticated form preventive maintenance starts even before the equipment comes into existence i.e. right at the design stage. Through proper review of design, from maintenance point of view, quite a good amount of maintenance work can be eliminated while the remaining maintenance task can be simplified, so as to reduce the downtime to minimum. In its highly sophisticated form, preventive maintenance provides for devices to prevent deterioration of equipment and to maintain the quality of service rendered by the facility. In order to obtain maximum benefits from preventive maintenance the maintenance engineer should also devote some time for design aspect of preventive maintenance. □

REFERENCES

1. WYDER, CG — "Preventive Maintenance" Chapter 8, section 1, Maintenance Engineering Handbook. Edited by LC Morrow, McGraw Hill Book Co. Inc. 1957.

1. — "Special Section on Preventive Maintenance" *Productivity* Vol V No. 4, Winter, 1964, National Productivity Council Journal.

3. WISE, CE—"Design for Repairability" Machine Design June 26, 1969 Penton Publication.

4. BUCK CH—"Problems of Product Design and Development, Pergamon Press 1963.

5. — "Plant Maintenance" Section 24th of Production Handbook Edited by Carson, GB., The Ronald Press Company, 1959.

6. NIAZI, AA— "Management of Maintenance" Asia Publishing House, 1967.

7. WILLSMORE AW— "Product Development and Design".

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—John W Gardner

STUDIES IN COST ACCOUNTING by P Dasgupta: Published by Premier Book Company, Daryaganj, Delhi-6, 1972; Pp. 8+598; Price Rs. 12.00.

This book is addressed to those studying costing for examinations of various professional accounting bodies and B. Com. and M. Com. examinations of different Indian Universities. As a textbook, it does not claim originality in the subject material presented. The manner of presentation of the materials and the competent way in which different problems have been dealt with make the book quite suitable for those uninitiated in the subject. The problems and solutions in different areas in costing and the detailed explanation given of some of the tricky issues in cost accounting would make the book eminently suitable for those intending to appear in the university and professional examinations on the subject. The coverage of topics dealt with has been fairly wide and comprehensive. This has, however, affected adversely the discussions in the book on such topics as cost audit. In view of the fact that already several industries have been brought under the purview of cost audit and that cost audit is being given more and more importance, the author could perhaps deal with this subject in a little greater detail. Specially, the cost audit pamphlets published by the Institute of Cost & Works Accountants of India could have provided the base material for a more detailed discussion on the subject. It is hoped that the author will take account of this in the subsequent editions of the book. However, even as it is, the book lives up to expectation as a textbook.

—P CHATTOPADHYAY

MODERN PRODUCTION MANAGEMENT by Elwood S Buffa—Third Edition: Published by Wiley Eastern Private Ltd., New Delhi; Pages 795; Price Rs. 18.00.

Modern Production Management applies more and more quantitative techniques for decision-making. From the time of advent of factory system of production, economists and technicians were in continuous search for methods and techniques which help to solve the problem of management and to give more rational and scientific approach to problem solving. The father of scientific management, Frederick Taylor, introduced the basis for measurement of work and thereby he introduced management

systems for production. Many other stalwarts like Gilbreths, Gantt, FW Harris, Walter Shewhart, Tippet, RM Curie, etc., have worked to advance the analytical techniques to management systems. However, the mathematical analysis of the management problems remained primitive due to the complexities and variabilities involved in the management systems and the enormous difficulties and time needed to solve the complicated mathematical functions even when they were constructed. Only during 1950's with the advancement of computers the insurmountable task of solving complicated linear and non-linear functions were made easy and quick. Now, many analytical aids like Work Study, Systems Analysis, Human Engineering, Network Analysis, Operations Research, etc., are available and widely used in decision-making in the field of Production Management thereby intuitions and hunches making way to analytical approach and rationale of decision-taking.

Mr Elwood S. Buffa in his book on Modern Production Management has treated the subject with a view to presenting the modern quantitative and analytical techniques to the managers and technicians for decision-making in the field of production in a more understandable and practical form. He treats production management with a broader viewpoint of "Operations Management"; he adopts the broader systems point of view in explaining the subjects like inventory management, operations planning and control, maintenance, production methods, information flow, etc.

Mr Buffa has arranged the book as a text book and in Parts. Part I as 'Introduction' deals with the historical development of management science and the decision-making process involved in production functions. Part II explains the various Analytical Methods used in 'Operations Management'. Part III explains the Design of Production Systems, namely, product design, process planning, network planning, automation, plant location, work methods, production standards, etc. In Part IV, the various 'Operations Planning and Control' systems are dealt. Part V comprises "Appendices" where the fundamentals of linear programming and its application techniques are dealt.

The treatment and exposition of the subject by the author is very unique and satisfying both to the students of Production Management and also to the practising managers because the book is neither elementary nor too mathematical. Quantitative techniques which are generally dealt by Operations Researchers with higher mathematics, are explained by the author with practical examples and with minimum mathematics. Certainly, the book is intended neither for a beginner nor for a manager without basic education. The book also covers the subjects dealing with field work as exhaustively as possible. Each technique is explained with practical examples and also at the end of each chapter Mr Buffa has given a series of problems which makes it more valuable to a student of Production Management.

The third edition of the book retains the basic format of the second edition but Mr Buffa has updated the material. He has added a new chapter on 'Network Planning Method'. A major change is made by him on three chapters dealing with Inventories and Production Control. In the third edition these materials have been expanded and completely redeveloped into four new chapters that integrate new materials on forecasting, inventories, aggregate planning and scheduling. New material has also been added under Job Satisfaction and Worker Response.

The book 'Modern Production Management' is a valuable contribution as an aid to all those who desire to practise and propagate scientific management.

—MM JACOB

SOME ASPECTS OF PRODUCTIVITY IN THE JUTE INDUSTRY OF PAKISTAN by Habibullah: Published by Bureau of Economic Research, University of Dacca, Dacca; Pages 180; Price Rs. 8.00.

The purpose of the survey was to ascertain the effectiveness of supervisory practices and management policies at the operational level

in offtake has occurred in respect of USA, USSR, Iraq, the UAR and the Socialist countries of Eastern Europe. On balance, however, it appears that the supply of tea has exceeded the demand for it in recent years.

In 1969, the crisis became so acute that the tea producing countries decided to tackle the problem of lower prices due to overproduction through regulation of tea exports. By common agreement, the exports for 1970 were curtailed by 90 million lbs. This step was designed to reduce the stock of tea in the UK and restore the 1968 price level of the London auction.

The author, however, is right in saying that withholding of tea from the world markets for stabilising the price of tea represents at best a short-term remedy. The ultimate solution for the difficulties of the tea industry can be found in demand creation and cost reduction. Of the two remedies suggested by the author, demand creation is by far the most important. There are several factors which influence the world demand for tea. The most important factor is income. However, changes in population and its age composition, urbanisation, climatic and institutional factors, also influence the international demand for tea.

There is a limit to which the preceding elements can be influenced. However, the world demand for tea could certainly be promoted through sustained efforts at export promotion. This aspect has not received the emphasis that it deserved in this otherwise very useful study. The reason why some of the East African countries like Kenya have made such a remarkable success of selling tea is that these countries are placing in the world market precisely what it needs, namely, packaged tea, tea bags and instant tea. Although bulk exporters like India and Ceylon have made beginnings in selling tea in the above processed forms, an enormous amount of tea still goes in tea chests.

Nor is there a single market for tea. It might be an exaggeration. But one might almost say that there are as many markets for tea as there are the number of countries. Instant tea has a large market in the US. But it will hardly sell in the UK. Again, while tea bags will find a market in France and Canada, superior varieties of tea find better response with the German customer. And this really brings us to the crux of the matter. The present reviewer is convinced that the offtake of tea in the world can be enhanced satisfactorily, provided the producing countries make a deliberate effort to survey the requirements of different markets and serve the customers according to their needs.

— SS MEHTA

SPREAD EFFECTS OF DAIRY ENTERPRISE —A CASE STUDY OF ANAND: Published by Small Industry Extension Training Institute, Hyderabad; Pages 82; Price Rs. 5.00.

Two economic concepts of Gunnar Myrdal namely 'backwash effects' and 'spread effects' have been well utilised in analysing the impact of investment in the Kaira Milk Union of Gujarat. The 'backwash' effects in the dairy industrial unit under study are evident from the employment creation and modernisation effects. The Anand Complex has helped eliminate underemployment of male labour and improved employment opportunities for the women folk of the area. The occupation has had accelerating influence on incomes, level of living, education, health and overall progress of the countryside. The dairy complex is an ideal instance of how investment in a traditional industry of the rural area not only create employment but help modernise the industry without deleterious effects on rural and urban relationship. Encouragement of such labour-intensive industries is what is just desirable for overcoming India's enormous problem of unemployment/underemployment and at the same time for avoiding the inevitable banes of heavy industrialisation.

The 'spread effects' of the Kaira Milk Union have been analysed in the survey by the number of dairy farms and factories developed, the growth of input industries and services and the development of infrastructural facilities as also the impact of the dairy industry on the growth of industries. In other words, the survey sought

to delineate the expansionary effects of the dairy complex in the rural region concerned.

"It is rather too optimistic to expect that a dairy unit would, by itself create sufficient stimuli for growth". Nevertheless, that the complex which was started with only a limited objective of reaping the rich potential of milk in the District has succeeded in creating a reservoir of employment (for ten to 15 per cent of the population in the rural Kaira) is by itself creditable. Apart from job generation, the development of the dairy complex prompted the establishment of veterinary dispensaries, village cooperatives, etc., that have further employment potential. Again the complex helped the creation of demand for new construction activities, investment in infrastructure like roads, power, transport, communication, irrigation, hospitals and schools. The income effect swelled consumption expenditure too. The multiplier process has thus sparked off a chain of expansionary reactions. Notwithstanding the limitations of the spread effects the dairy complex has thus paved a step ahead of the region's prosperity.

In essence the survey is a description of a successful example of how even limited investible resources can be channelised into traditional lines of production which are essentially labour-intensive so that not only that particular activity can be modernised with beneficient impact on employment position but related activities and even the socio-economic infrastructure of that region can be stepped up, no matter in whatever limited way that might be.

—VDN RAO

LEVELS OF LIVING by BP Gupta and JN Sharma : Published by Indian Publications, Calcutta-1, Pages 181; Price Rs. 22.00 or $ 4.

The paucity of authentic statistical data and lack of proper evaluation of available data has been an impeding factor in the proper appreciation of diagnostic trends in socio-economic factors. In fact, a realistic evaluation of increases in money wages in relation to real wages of industrial workers since independence presents a dismal picture both in terms of real wages as well as the levels of living. Even wage costs as a proportion of total cost have registered a decline and the same holds true of workers' share in the value added by manufactures.

The book "Levels of Living" excellently incorporates the outcome of the research data collected as a result of surveys conducted in 10 important centres in the country. It highlights the inter-centre viz-a-viz inter-region levels of living of the industrial workers. It further attempts to evaluate on a rational basis the changes in the levels of living of the industrial workers over a period of time. What is fascinating about this book is the approach adopted in respect of the concept of levels of living, types of family living, studies and their uses. In particular, the analysis of demographic and other related characteristics and the validity of the non-material aspects of living has been well brought out.

Any study of the aspects of 'levels of living' in India suffers from two drawbacks: (i) the price fluctuation and consequent steep rise in the cost of living, and (ii) the invisible effect of wage rise in the standard of living. Further, it is no exaggeration that the price fluctuation has completely nullified the basis of monetary as well as fringe benefits granted to the working class. Therefore, one drawback which the book suffers is that the present basis of study will have very little relevance when examined on the factual plane even in those centres where the study was undertaken and in any case it cannot be construed with any authenticity that these ten centres will have any direct relationship with the levels of living in scores of other centres in the country.

On the whole, the approach and the methodology adopted in the book is excellent. In fact the data provided is of immense benefit to the students of economics and statistics who wish to undertake research on related aspects of the changes in the levels of living of the industrial workers over a period of time. From this point of view the methodology adopted in this book is highly systematic and needs to be commended.

—AN SAXENA

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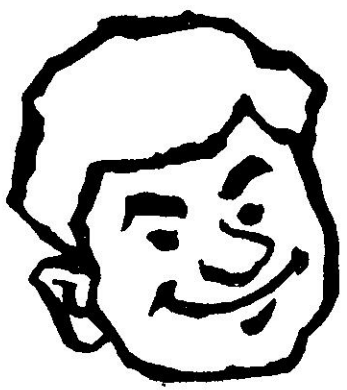

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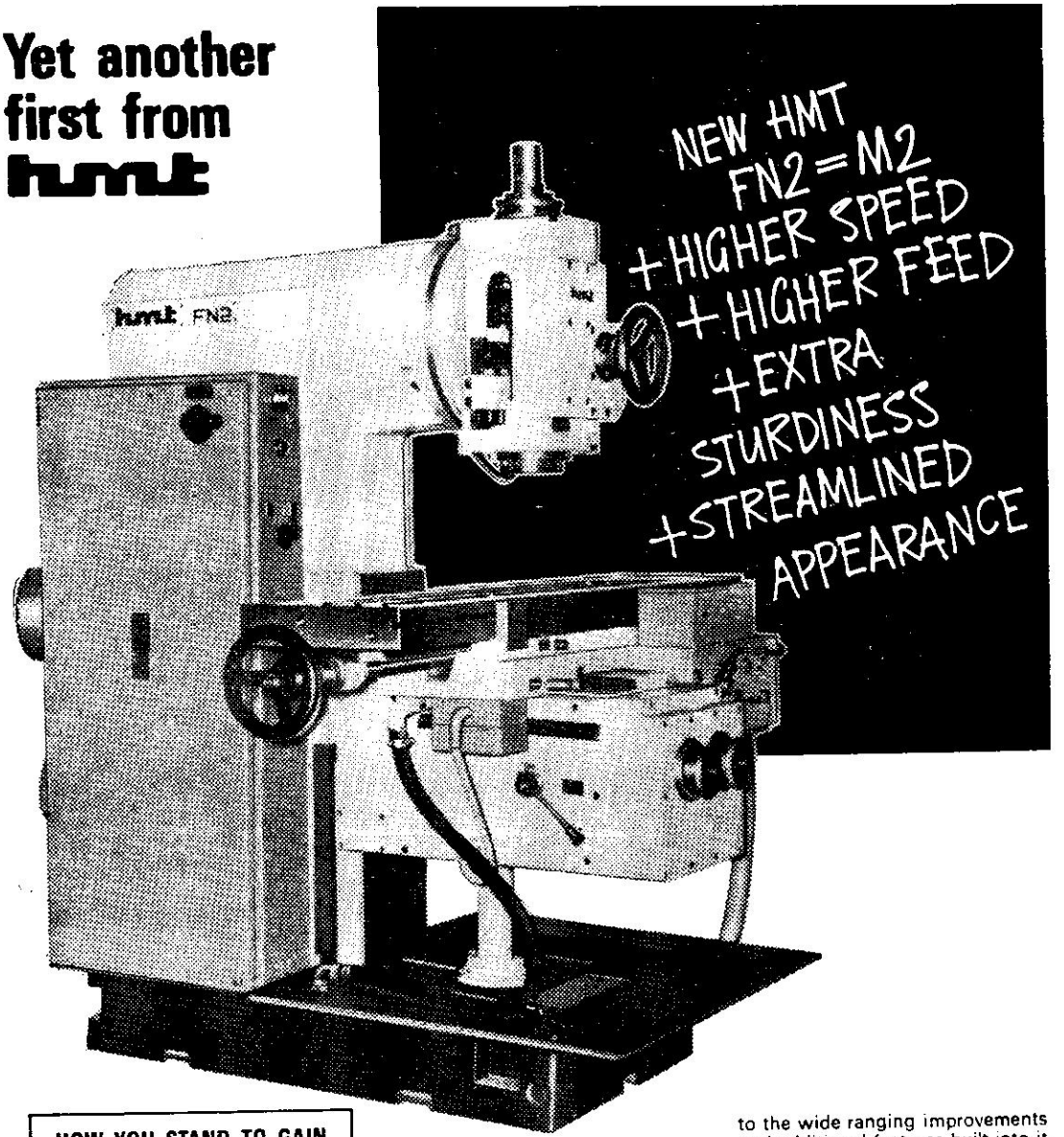
Specially designed for more toe space.
Just step into one and feel the difference.
Total comfort for your feet.
Right from the first day.
Available in black and dark brown.
Bata Stepmaster.
It believes in keeping your feet in **comfort while you work.**

Stepmaster 14
Sizes 5-10
Rs 30.95

Bata

Yet another first from hmt



HOW YOU STAND TO GAIN FROM FN2:

1. **Extra weight — more rigid**
2. **Independent motor for feed means more power at spindle**
3. **Automatic climb milling attachment is standard**
4. **18 speeds — 35 to 1800 rpm.**
5. **18 feeds — 15 to 800 mm/min.**
6. **Rapid traverse up to 3200 mm/min.**
7. **Grouped push-button and joystick controls to operate at the flick of a finger**

HMT-6740

No manufacturer in India has HMT's technical expertise in building size 2 milling machines. There are already over 5000 HMT M2 Milling Machines in operation to prove it.

HMT's constant efforts to increase customer satisfaction through improved machine performance has resulted in the new, improved FN2 Milling Machine.

The FN2 does anything an M2 can do — and does it better. Thanks to the wide ranging improvements and additional features built into it.

What's more, tooling and accessories used for the M2 can be used for FN2.

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