Editor : VS CHOPRA | Vol. XIII | No. 2 | July - September 1972

PRODUCTIVITY

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Critical Importance of Productivity to India's Progress†

Ram Agarwal*

Productivity is a subject in which employers, labour, community and the Government have all strong mutual interest. Yet, employers and labour often work at cross purposes. Peace-meal ad hoc and often disjointed agreements are sometimes arrived at between some of them which do not solve the problems satisfactorily. Productivity levels in India are very low, highlighting tremendous possibilities and scope for increasing the same. According to the author, there is a definite possibility of doubling the present level of productivity which can accrue very large overall gains to Labour, Community, Government and shareholders.

DURING the recent 14-day war, production with the same machinery, men and space was raised to phenomenal levels—at places as high as 400 times, in some Ordnance factories. This reveals the immense potentialities in our production system which we are unable to tap. During war-time, there is a strong motivating force, patriotic fervour to win the war, which is released and which enables people to perform incredible feats of strength and stamina whether on the battlefield or on the high seas or in the skies or in the factories. As soon as that motivation disappears, the mercury drops suddenly.

It is generally accepted that people seldom work at full capacity. One estimate is that workers are using less than half their potential, ranging between 15 to 49%. Dr Argyris estimated that an average worker works at only about 1/3rd of his capacity. A vast reservoir of productivity is, therefore, available to those who know how to tap it. A million rupee question is how to do it.

Climate and Motivation Required

The harmony which exists in the relations between employers and labour, combined with patriotism provide the climate and the motivation during an alien attack of our country. Jawaharlal Nehru, Lal Bahadur Shastri and Smt. Indira Gandhi have been talking about the question of poverty on a "war footing". For tackling that productivity is the key factor. And yet, the required climate and motivation for productivity are not being provided by all concerned.

* Chairman, ALMECO, Bombay, & Vice-Chairman, NPC Governing Body.

† Based on the paper presented by the author at the National Seminar on Productivity, held in New Delhi on March 24-25, 1972.

Productivity Benefits All

Productivity is a subject in which employers, labour, community and the Government have strong mutual interest:

Employers' Gains: Since productivity reduces costs of production and increases competitive capacity as well as profitability employers' interests are closely linked with productivity.

Labour's Gains: Increased wages (real) are possible to any substantial extent only through productivity. Since initial productivity levels are often very low there is a vast scope for increasing workers' earnings. Even where these levels have been raised and are now substantially high the potentialities for further increase in productivity are considerable. By sharing the gains of increased productivity labour can improve its wages substantially and achieve its objectives for a better standard of living.

Community's Gains: Increased production at reduced costs in all sectors of the economy means increase in national income and through price reduction increase in standards of living. As a matter of fact this is the only way the community can be served better. Problems like unemployment, poor health, lower standards of education and morals of the society, etc., can be tackled satisfactorily only if poverty is removed.

Government's Gains: With increased production profits of industries and individual incomes as well as tax-collections would increase considerably. Indirectly it would help managements and the community also as and when Government reduce taxes (direct and indirect) when overall collections exceed Government's needs.

Mutual Suspicion and Apathy

Yet despite this strong mutual interest in productivity employers and labour often work at cross purposes. Attitude of employers and labour is more abstract and sentimental than practical. They suspect each other's motives and merely resist whatever the other party suggests. Piecemeal, *ad hoc* and often disjointed agreements are sometimes arrived at between some of them but they do not solve the problems satisfactorily. Strifes and tensions go on increasing as is evident from the rising and alarming trend of lost manhours due to strikes and lockouts. Meanwhile Government merely "sits on the fence" watching both the parties indulging in a war of self-annihilation. The community at large meekly suffers.

Balance Sheet of Productivity

Value of productions of 4,715 selected limited companies (out of a total of 28,422) was Rs. 11,553 crores in 1968-69. These companies had a paid up capital of Rs. 3,329 crores (Rs. 3,724 crores being for all companies, i.e. 28,422). Thus these companies represented 86.5% of the total paid up capital. The production of all companies may therefore be safely taken at about Rs. 12,000 crores.

It has been established by many surveys that productivity levels in India are very low.

Average for the country may be taken to be anywhere between 25% and 40%. If we assume it to be. say 35% there is definitely a possibility of doubling it so that the production of Rs. 12,000 crores could be increased to Rs. 24,000 crores. For increase of production by Rs. 12,000 crores only variable expenses like materials, power, fuel, lubricants may be required. The break-up would be as follows :

Present Position on a Production of Rs. 12,000 crores (Sale Value)

Item	*Non-variable* %	*Non-variable* *Rs. (crores)*	*Variable* %	*Variable* *Rs. (crores)*	*Total* %	*Total* *Rs. (crores)*
Materials ..	—	—	65	7,800	65	7,800
Labour ..	12	1,440	3	360	15	1,800
Overheads ..	13	1,560	2	240	15	1,800
Total ..	25	3,000	70	8,400	95	11,400
Gross Profit ..	—	—	—	—	5	600
T. Sales ..	—	—	—	—	100	12,000

Position After Production Increases to Rs. 24,000 crores (Sale Value)

Materials ..	—	—	65	15,600	65	15,600	Savings in
Labour ..	6.0	1,440	3	720	9	2,160	Labour Cost
Overheads ..	6.5	1,560	2	480	8.5	2,040	Rs. 1,440 Crores
Total ..	12.5	3,000	70	16,800	82.5	19,800	
Gross Profit ..	—	—	—	—	17.5	4,200	
T. Sales ..	—	—	—	—	100	24,000	

Distribution of Gross Profit of Rs 4,200 crores

Item	Before Productivity Drive (Rs. crores)	After Productivity Drive (Rs. crores)
Taxes ..	300	1,700
Labour's share in gains of Productivity at 60% of the savings in labour cost ..	—	864
Dividends ..	240 (7%)	420 (12%)
Total ..	540	2,984
C.F. ..	60	1,216
Total ..	—	4,200

If price reduction of 10% is affected Rs. 2,400 crores would be reduced from the profit and the position would be:

	(Rupees in crores)			
				936
	—	—	Taxes	500
Earlier Gross Profit Estimate:		4,200	Dividends 12%	436
less: Reduction in prices:		2,400		420
Balance Gross Profit:		1,800	C.F.	16
less to workers:		864		

Productivity is a subject in which Employers, Labour, Community and Government have strong mutual interest.

Thus there would be the following overall gains:

(i) *To labour:* From Rs. 1,800 crores to Rs. 2,554 crores, i.e. 48%.

(ii) *To Community:* Rs. 2,400 crores by way of price-reduction, besides increase in total national income.

(iii) *To Government:* From Rs. 300 crores to Rs. 500 crores, i.e. 66.66%.

(iv) *To Shareholders:* From Rs. 240 crores (7%) to Rs. 420 crores (12%), an increase of 75%.

Need for Total Approach

Ad hoc and piecemeal discussions on productivity are of no avail to tackle this vital problem. Total and integrated approach on the different aspects is urgently called for. This approach should cover the following main areas:

(a) Development of mutually acceptable objectives and policies for productivity drive, including labour participation at various levels of decision-making, particularly those affecting them.

(b) Approaches to measurement of productivity and to sharing the gains. Any thought of having a mathematically accurate determination of the contributions of different elements or factors to increase in productivity, and similarly of the shares of different parties (labour, shareholders, company and community) should be meticulously avoided.

(c) Those workers who are getting comparatively very low wages, should be given a higher share in the gains than those who have already reached fairly high levels.

(d) Organisation planning and personnel administration should be purposive and conducive to good industrial relations.

(e) Productivity services should be introduced in organisations to aid managements and labour to increase productivity to optimum levels.

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

—EUROPEAN PRODUCTIVITY AGENCY

Accelerating Productivity Actions in India: A Few Important Areas†

Birendra Nath Bhattasali*

It is time that productivity finds a proper place not merely on a conceptual plane, but on the actual physical plane in the macro-economic activities. Economic planning in order to be really successful has to be integrated with productivity planning for each element and at every stage. The author highlights some of the important areas, where productivity techniques can be applied with distinct advantage. Productivity can find no better expression in India today than by providing subsistence for the population. Only bold and imaginative actions by well-motivated and well-trained technocrats can foster successful productivity actions. Productivity techniques can also aid the process of transfer of technologies. Foreign trade is another promising area where productivity techniques can generate spectacular national gains.

As is well known, productivity stands for providing more and more output values from less and less input values for the community—and on a continuing basis. In India, although the productivity movement during the last fourteen years had made an appreciable headway, yet considering the vastness and the magnitude of her developmental problems, the impact of the movement on the economy as a whole had been rather limited, leaving many vital areas uncovered or ineffectively covered. Only a massive public support for this movement under competent administrative and professional supervision can produce any major impact on the economy, more precisely upon the efficiency of the day-to-day activities of those who operate the economy—right from a cabinet minister at the top to a village level worker at the bottom.

National Productivity Council of India, in the past, apart from its general efforts to generate productivity consciousness, had, by and large, concentrated its efforts on rendering micro-economic and enterprise-level productivity services. Time is overdue for productivity to find a proper place, not merely on a conceptual plane but on the actual physical plane in the macro-economic activities as well. In a short paper like this, it is not practicable to delineate an exhaustive account of various activities, where, in the near future productivity actions are not only desirable but also feasible or to develop any detailed productivity programme to cater to the specific needs of different situations. Its objective will be reasonably served by highlighting a few areas of basic importance as indi-

*Senior Advisor, Asian Productivity Organisation, Tokyo.

†Based on the Paper presented by the author at the National Seminar on Productivity held in New Delhi on March 24-25, 1972.

cated below for further consideration and development of a specific action programme.

Productivity and Economic Planning

Athough the idea of productivity had been highlighted in India's Plan documents for over a decade now, in the absence of adequate professional support and specific know-hows for stimulating productivity in different fields, it has received little more than platitudinous acceptance in broad general terms. Economic planning, in order to be really successful has to be integrated with—what is equally important—productivity planning for each element and at every stage, following them up tenaciously in the field, and adopting corrective measures in the case of shortfalls or imbalances.

Planning, programming, implementation and follow-up could cover all the processes of resource development, resource mobilisation, resource distribution and resource utilisation. In the highly-competitive world of economic activities in which we live today, and with the ever-increasing technological gap and the prevailing socio-economic constraints, the needs and objectives, as well as the methodologies and the tasks of development have to be calculated and evaluated in productivity language in order to produce the desired results.* For ensuring that planning and productivity go side by side, the planning organisations at the Centre and in the states have to be suitably equipped and provided with the necessary staff and other facilities.

Productivity in Public Administration

In most of the developing countries, there is no other option but for the government to take the major initiative in economic development. If productivity has to be incorporated in the processes of development, it is essential to have the public services, institutions, organisation and personnel, working at different levels, to be properly oriented to it and trained for it. Maximisation of the service, economic or social objectives of different types of public services require, apart from well-trained staff, well-planned organisation and methods worked out by *professional expertise* catering to the specific needs of different situations. Equally important are the motivational factors—both in the way of recognition and reward for talents, as well as effective deterrents for defaulters.

All these may sound like well-known platitudes, but when one examines the contents and duration of training and re-training of public servants, the background and the calibre of a typical O & M officer in a government department, or the motivational factors incorporated in the service rules of the public servants, he finds that little more than perfunctory attention has been paid to these areas in the past. Equally noticeable is the absence of any substantial linkage of productivity techniques with the training, working methods and the service environments.

Application of Productivity Techniques in Specific Areas of National Endeavours

The working paper presented the by NPC in the recent National Seminar on Productivity listed a number of points for the intensification of productivity drive. Apart from these, following are a few other important areas where productivity techniques can be applied with distinct advantage, the results of which in turn would have decisive and far-reaching bearings on the national productivity as a whole.

*"Productivity and Economic Development" by BN Bhattasali, published by Asian Productivity Organisation, Tokyo, 1972.

Attainment of a Basic Subsistence Level for the Entire Population

This objective really falls under economic planning but deserves special treatment for reasons explained below. Inability to provide a basic subsistence to the people after twenty-five years of independence happens to be the greatest weakness of India's planned development and one which is eating up the vitals of the national life. Only sustained all-out effort with a sense of urgency all around can meet this fundamental challenge. Right from Kautilya to Karl Marx to Keynes almost all economic philosophers have been stressing in one way or the other that 'Hands can only work when the mouths are fed.' The vast multitudes of unemployed or underemployed who continue to consume food and other necessities of life no doubt on a reduced scale without corresponding contributions, are a constant drag on national productivity. The frustration, social unrest, crime, loss of efficiency, propensity to disease on this score, cause incalculable harm to the national economy. The USA during the second half of last century, Germany and USSR during the thirties, and China during the fifties, amongst others, had employed their surplus labour forces by providing basic subsistence in productive work in the rural or newly colonised areas mainly for infra-structure development work like mobilisation of water resources, road and railway, and construction work in general, power generation, agricultural and agro-industrial development on selected lines. Payment to the workers essentially in kind—from whatever information that is available—had also been practised by China with reasonable success.

Agriculture and agro-industries are the mainstay of subsistence for the Indian people. With the injection of massive doses of productivity towards the production and the distribution of the basic subsistence level items, which are essentially agricultural or agro-industrial, it is feasible to use most of the dormant working population for productive work. Reliance on market mechanism, with reasonable state participation for price stabilisation and creation of buffer stock and surveillance over the middlemen—as had been done in the case of 'fair price shops,' etc.—and payment in cash wages would appear to be quite feasible in the context of present-day India.

Dr Nicholas Kaldor, the noted development economist, envisaged two stages of economic development. In the first stage in an emerging economic society, wages are regulated in a fashion to ensure a minimum subsistence, and the balance declared as a profit. In the second stage, when the society has developed well beyond the subsistence stage, profit is determined first, and the balance declared as wages inclusive of other incentives and welfare measures. Dr Kaldor's fundamental ideas may need some adjustments here and there when translating them into practice, but they appear to have basic validity for emerging economies.

Nothing is more degrading to national pride and individual self-respect than the perpetuation of dependence for subsistence on a foreign country. Even though it is no longer economic from the marketing point of view, Japan still protects its agricultural production by lavish subsidy for good reasons. Productivity could find no better expression in India today than by providing subsistence for the population. And this involves imaginative and integrated action plans, starting with one or two limited areas in each state, spreading to other areas gradually over a period of time.

Productivity in Industrial Development Policies

Productivity has its application in the very conception of Industrial development, and a number of its basic tenets have already found place in India's past plans. The concept of balanced development is no doubt productivity-oriented. The balance had, however, often resulted in limitation of production of goods and services, based on certain vague assumptions or sketchy data concerning the consumer requirements, often contrary to the principles of growth. At unfriendly quarters abroad it is often aired that while talking about socialism, India has, in fact, fostered the worst form of capitalism, i.e. monopoly capitalism. Competitive capitalism, as is well known, has substantially contributed towards industrial growth, techno-managerial progress and value satisfaction to the community at large in many countries and also towards more egalitarian social structure, emanating from the operation of the production-consumption cycles with its far-reaching implications.

Much of the trouble, again, is attributable to inadequate productivity support to the developmental themes. It is unfortunate that the number of executives who have proper professional training in techno-economic and productivity analysis, engaged in industrial development work or advisory work thereupon, is extremely limited. A good number among them exercising regulatory powers are uninitiated to the basic methodologies of sampling, costing or break-even analysis. Thus professional mechanisms of techno-economic analysis for fostering development are sometimes substituted by power-mechanisms of bureaucracy up to a degree which severely affects the causes of productivity and development.

Let us take the example of uncritical proposals that frequently go on in the name of the development of 'small scale' industries. It is not always realised that world over, those small industries which are producing limited number of marketable products increasingly on a "large scale," taking the full advantage of economics of scale right from raw material, tooling, production, quality control, up to marketing, are in fact the most growth-positive sector of small industries. Thus small industry more often than not, has to produce on a "large scale" rather than on a "small scale," for the sake of viability and growth whereas certain large industries like a ship-building firm or aircraft manufacturers may indeed produce on a "small scale." In fact, the very theme of economics of scale, in all its aspects, needs much more systematic and analytical treatment in the development administration, providing sufficient flexibility for future growth and competition, through well-calculated imbalances. In early days of expansion of Japanese production, unanalytical imbalances certainly had produced some difficulties. Today, however, once assured of the qualitative excellence of their product, Japanese business houses go for deliberate imbalances, so as to take the full benefit of economies of scale.

There are other areas of industrial development, where well-known concepts of growth had not been as successful as they should have been. It was not that the economists enunciating these were incompetent, but the task of rational administration of their ideas rested on certain assumptions concerning the efficiency of the executive machinery, social and political acceptance, which were not often forthcoming. Take, for example, one of the main thesis of Prof PC Mahalanobis in which he had given high priority to investments in those areas of national economy where capital created more capital. Quite apart from the analytical treatment of this theme by Prof Mahalanobis, even

Peter the Great of Russia, or Emperor Meiji of Japan, based on their keen perceptions and future visions, had not only advocated but successfully implemented the same essentially under state initiative and capital, thus sowing the seeds of techno-economic progress within the country. Indeed, in spite of very many shortcomings, the heavy industries sector in India has come to stay, and is destined to play a major role in the country's industrial development in future.

Quite apart from the heavy industries, with the availability of a wide variety of flora, fauna, and mineral resources within the country, the primary sector could make available such materials and resources as have tremendous value-adding or export-earning possibilities—all adding to the national capital. However remote the ideas may seem, the specific advantages of sunlight being available to us for most of the year, and the enormous potentials of water resources—the traditional cow, or even the humble fish—have enormous contributions to make towards the multiplication of Indian capital. Only bold and imaginative actions by well-motivated, well-trained technocrats, free from outdated regulatory constraints could foster successful productivity actions in the field of economic development.

National Integration

Linguistic nationalism, caste and communal feeling not infrequently continue to affect the judgement and actions of high and low, in public services, in private occupations, and in social contacts. The efforts made so far, towards national integration, have been carried on a far-too-high, idealistic plane, often in an unimaginative manner. As a consequence, the results produced so far have been far too meagre, resulting in divisive tendencies showing their ugly heads.

Nothing damages the cause of the productivity movement more than if an individual is demotivated towards self-exertion and innovation by a feeling that no matter what he might do or not do his caste, language, or religion will taint his career prospects. No small amount of disharmony and discord in productive work have their origins in linguistic, religious or caste prejudices inhibiting creativity and achievement motivation, particularly at the lower levels of the ladder.

Productivity techniques are no longer confined to industrial or agricultural avocations alone. These lend themselves to effective application in the field of social and psychological responses as well with a view to producing maximum responses from minimum of stimulation. Application of productivity techniques to the high-sensitivity areas for positive responses in social and organisational behaviour can produce unimaginably large dividends as compared to their costs. In these, educational, social and administrative planning is deeply involved.

Without broad social acceptance of the fusion of different ethnic, linguistic and religious groups through marriage in the family system, mere compilation of verses or songs in a high idealistic pitch under state awards is hardly adequate for securing national integration. In this context, the experiences of other continental economies could provide valuable lessons. The student-power of both sexes from different regions living together for study or play under imaginative and inexpensive plans, can provide one such high sensitivity area, amongst several others, for national integration. They will act as the vanguard, the pace-setters for general social acceptance of new integrated families spread over a period of time.

ed its productivity proposals to be discussed by the employees covered by eight unions and offered 40 to 45 per cent wage increase and a reduced hours of work per week, provided that wage increases would be phased to follow the achievements of the productivity objectives. In a report made in 1969 on the basis of a study of 40 companies by the British National Board for Prices and Incomes it was shown that in this way three-fourths of the companies were able to achieve lower unit costs for reduction in total labour costs. The Board in its report laid down certain guidelines which, briefly, were as follows:

Measurements of efficiency should be based on the application of relevant standards of performance. A realistic calculation of the relevant costs of the agreement and of the gains attributable to the workers' contribution would normally show that the total cost of output or the cost of providing a given service would be reduced. There should be effective controls to ensure that projected increases in efficiency are achieved and higher pay or other improvements made only when such increases are assured. When appropriate, major changes in working practice or working methods should be specified in the agreement. There should be benefits to the consumer by way of contribution to stable or lower prices. Negotiators should avoid setting levels of pay or conditions which might have undesirable repercussions elsewhere.

The Board pointed out that in many industries the negotiation of such agreements might help the companies to move towards the goal of continuous adaptation to changing technology. Further progress under agreements would need to be monitored and adjustments made from time to time according to whether the progress exceeded or fell short of the estimate. Therefore, the fact that a company had negotiated a productivity agreement by no means implied that there would be no scope for further agreements. Partial agreements applying to only one group of workers were subject to the risk that managements might be driven to extend pay increases to other workers excluded from their scope, with the result that the total increases in costs might outweigh the gains in productivity arising from the original agreements. On account of this risk, comprehensive agreements, wherever possible, are preferable. Where this is not possible partial agreements might be useful provided they form part of a planned approach. An agreement applying to one group of workers only should bear the cost of consequential increases to other groups, if any have to be granted. Non-manual workers could contribute to greater efficiency by more economical use of all the factors of production but it was necessary to decide whether the operation itself was necessary or capable of simplification. When this was done the possibility of work measurement had to be considered. Work measurement techniques and other methods of improving efficiency could be successfully applied to a wide variety of clerical and other non-manual jobs also and could lead to substantial increases in efficiency and reduction in labour costs.

Efforts in India

There have been instances in India also of agreements reached by "productivity approach" through management initiative. Under the system the managements offer wage increases and other benefits, usually larger than normally offered in long-term agreements, in return for specific contributions to productivity by the workers. In one such agreement in an engineering concern, a three-fold increase in productivity was achieved with appropriate increase in the emoluments of the employees. The agreement included fixation of better work standards, rationalised sizes of staff in vaious jobs, conso-

lidation of job categories, reduction of idle time and wastages, avoidance of restrictive practices, reduction or elimination of helpers in some cases giving minor maintenance and cleaning work to productive workers, work simplification and method improvements, efficient material handling system, etc.

As stated above, there have been only a few such agreements in India. Whether such an approach would be successfully extended in other companies and industries, time alone can show. The Conference of the Indian Institute of Personnel Management appeared to be optimistic about this approach and considered it better than the usual system under which the union makes demands and the management is on the defensive.

A Continuous Process

It is generally accepted that wage incentives by relating earnings to output elicit greater effort from workers than under the time-rated system and that in the existing conditions in India with a high-cost economy and in, many cases, low productivity of labour, properly-devised incentive schemes would lead to greater production and benefit both the employer and the workers. It has, however, to be borne in mind that "productivity bargaining" is a continuous process, both because of necessary technological changes and also because norms and rates may require modificaion—for example, if there have been errors in fixation of norms, or on account of the resulting remuneration being out of proportion to the wages of time-rated workers or where changes in norms are required due to such factors as improved plant or change in processes or the work content of the job.

In this country, however, modifications in wages or norms are not easy to make because of the provisions of the industrial legislation under which, if there is a dispute or no agreement with the union, modification that may be very necessary or reasonable cannot be made until the matter goes through the stages of conciliation, adjudication and perhaps unil it is decided by the Supreme Court, which may take years. The nature of the problems in the field of productivity techniques and incentive schemes is such that they cannot be anticipated and decided once for all, and when they arise they have to be tackled on the floor. Hence, conciliation and adjudication methods for deciding industrial disputes are not helpful to the parties in tackling problems relating to productivity. Further, agreement with the union on norms of production is often difficult unless the norms fixed are low in which case it would not be worthwhile for the management to introduce an incentive scheme. The situation is still more difficult in factories or establishments where the environment is affected by union rivalries. Further, the question of sharing the gains of productivity between the employer, workers and consumers does not easily lend itself to determination by any mathematical formula or any formula that would be generally applicable.* These are some of the difficulties, but overcoming them is a challenge to both the management and the unions.

Where there are good industrial relations, there is scope for agreements linking wages to productivity, whether by the method of initiation by the management referred to above or in the course of collective bargaining when unions make demands, according to the circumstances, and this could make a significant contribution to the prosperity of industry and the well-being of the employees who work in it. □

* For the last 12 years, the National Productivity Council has been seriously deliberating on this question and recently has come out with a number of guidelines for sharing the gains of productivity alongwith some illustrated models. They have been compiled in the form of a NPC Publication entitled "Sharing the Gains of Productivity—Guidelines and Illustrative Models" 1972, Price : Rs. 5. —*Editor.*

After filled-in questionnaires are received they have to be scrutinised carefully by people familiar with the subject of the survey. Built-in checks through cross references have to be provided in the questionnaires for this purpose. It is surprising how often data are found to be patently inaccurate or inconsistent with data supplied in other parts of the questionnaire. However, sophisticated be the analysis, the final conclusions from a survey are only as accurate as the raw data supplied; it is usually well worthwhile, therefore, to get the inconsistencies ironed out and doubts cleared by referring them to the individual units before compilation is taken up. The analysis is greatly facilitated if electronic data processing methods are used. It goes without saying that suitable programmes for analysis should be written up before a survey is launched.

The main purpose of inter-firm comparisons, as the name signifies, is to provide data and indices of performance that are comparable between the various units surveyed. Sometimes, simple indices such as mean, median or modal values or ratios, etc., pertaining to many aspects of performance are sufficient for this purpose, e.g., mean strength of a product being manufactured by the units concerned, or production per machine per hour for a common product, or sales over investment ratio, etc. However, in many cases the data from individual units have to be "treated" to make them *inter-se* comparable and derived indices have to be obtained to make the comparisons meaningful. Perhaps this can best be illustrated by an example from the cotton spinning sector of the textile industry.

Mills manufacture different "counts" of yarn from cotton. The count is an inverse measure of linear density and is expressed as the number of hanks, each of 840 yds length of yarn, contained in a pound. By the very nature of the process and product, unit productions are a function of the count spun since different counts are required to be spun at different production rates, even if the absolute efficiency of operations in terms of condition and type of machine, supervision, degree of skill of workers, etc. is the same for different counts. How then are two mills, manufacturing different counts in different quantities to compare themselves as regards machine productivity as a whole? Can an absolute index be derived which eliminates the effect of differences in count and brings down the performances of the two mills to a common footing? The answer, fortunately, is yes. The productions can all be converted to a common standard count, say count 20.

Let the actual productions in a mill be P_1 P_2.. P_{20} kg. of yarn for counts C_1 C_2..and count 20 and the machine hours run on these counts be N_1, N_2, N_3,... N_{20} respectively (N_{20} and P_{20} can be zero in a particular mill). Let P_1, P_2,... P_{20} be the *standard* productions per machine hour on these counts. If the machines running on any count C_1 were switched over to produce count 20, it is assumed that the actual production per machine hour on count 20 would bear the same proportion to the standard production on count 20, as the present production on count C_1 bears to the standard production on count C1. This may be called the principle of equivalence of performance. It follows, therefore, that expected production per machine hour, P'_{20} say, on count 20 from the N_1 machine hours will be given by :

$$\frac{P'_{20}}{P_{20}} = \frac{P_1 N_1}{P_1} \text{ i.e. } P'_{20} = \frac{P_1 N_1}{P_1} \cdot P_{20}$$

and the total production on count 20 from these N_1 spindle hours would have been

$$\frac{P_1}{P_1} \cdot P_{20}$$

Hence the "converted" production per machine hour for the whole mill, on count 20 would be

$$\frac{P_{20} \quad \Sigma \frac{P_i}{P_i}}{\Sigma N_i}$$ where the summations are done over

the different counts being spun. This one index for a mill is then comparable to a similar index for any other mill irrespective of the production patterns in the different mills, and thus an integrated criterion of machine productivity is obtained. Of course, for individual common counts direct comparions can be made.

Such derived indices are often required in IFC surveys, particularly on productivity. Labour productivity between mills in the spinning department is compared by computing the labour hours required to produce 100 kg. of count 20 yarn, which in turn requires the laying down of standard production rates and labour allocation for various counts. Likewise at weaving, productivities are computed after converting the fabrics to one of standard construction and sometimes standard width. An alternative approach at spinning and weaving, instead of converting productions to standard count or fabric construction could have been to relate the performance on each count or fabric style directly to the corresponding standards and to construct an integrated index from the different performance indices so obtained, by giving them due weightages. The latter approach is in fact being followed at ATIRA in comparing performances in respect of labour cost. The labour cost ratio derived for each mill is the ratio of the total labour cost incurred by a mill to the labour cost that would have been incurred by a hypothetical standard mill working at standard conditions, paying wages at standard rates and having exactly the same volume and type of production as the given mill. Similar principles can, no doubt, be applied in other industries.

Generally speaking, the construction of derived indices requires the use of certain standards. It is well to remember that standards cannot be static; they should reflect the continuous growth in technology and should, therefore, be revised from time to time. In so doing, the comparisons of performance criteria from year to year often become untenable and for the purpose of such comparison the indices of previous years have also to be corrected for the change in standards.

ATIRA's Efforts for IFCs

The IFC surveys carried out by ATIRA have always evoked an enthusiastic response from industry and are widely used by all levels of technologists and management for constant reference. The following surveys are conducted:

(i) Spinning Productivity and Costs
(ii) Weaving Productivity and Costs
(iii) Sizing Productivity and Costs
(iv) Bleaching and Finishing Productivity and Costs
(v) Consumption of Stores and Accessories in Spinning and Weaving Departments
(vi) Productivity, Cost and Financial Performance (Conducted in collaboration with Ahmedabad Management Association).
(vii) Quality of Yarns and Fabrics

Some of these surveys are conducted every year while others are taken up once in two years. Surveys on some other areas such as balling and packing costs, dyeing costs, etc. are being contemplated. In order to increase the effectiveness of the surveys the results are discussed in small groups as well as in seminars, and consultation is given to individual units on how to make the most effective use of the report. Wherever possible, useful ancillary data are given on machinery and processing parameters, state of modernisation, and the trends over the past few years in respect of productivity, cost and modernisation. The reports are available only to participating mills which are given code numbers to preserve anonymity. □

Inter-Firm Comparison : A Fruitful Management Technique

MC Bhandari*

The technique of Inter-Firm Comparison can result in improvement in productivity and profitability through voluntary exchange of information pertaining to costs, performance, efficiency, profits, etc. The technique can be applied to manufacturing concerns as well as trading organisations. Although relatively very little has been known in India about this technique, yet it is gradually finding application in Indian enterprises. Concerted efforts need be made to popularise this technique. In this context, the National Productivity Council and the Bureau of Public Undertakings can play an important role.

THE technique of inter-firm comparison is a fruitful exercise, which a firm can adopt for more efficient and profitable management. The main object of any management is the best utilisation of the resources and facilities at their disposal and thereby increase the productivity and profitability. Appraisal of performance of any organisation is possible by application of different scales for comparisons i.e. (i) inter-period, (ii) standard and predetermined figures and (iii) inter-firm comparison, both national and international.

Inter-Period Comparison

It would be helpful to indicate the trend of profitability and to signify or locate the extraneous causes leading to increase or decrease of profit and also areas where management decisions are urgently required. There is no denying the fact that the comparison of actual achievement against standard is the better way of appraising the performance of an undertaking as compared to the technique of inter-period comparison, but if the change (variances) represents a deterioration in results, everyone, including the management accountant, gets engaged in the exercise of finding out why this has happened. If it is near or exceed the predetermined figures there is a sense of complacency with the idea that the undertaking is running efficiently and the resources are utilised profitably.

Predetermined/Standard Cost

The techniques of standard costing do not provide the data to enable one to assess as to how much better an undertaking is achieving as compared to that of another undertaking in the same industry. Inter-firm comparison would provide a greater depth of exercises and will not be invalidated by changes from time to time in prices of bought-in commodities and services, wage rates, etc. A survey carried out by Indian Jute Mills Association showed that there is a

* Past President, Institute of Chartered Accountants of India, New Delhi.

tremendous variation in productivity and employment of capital between two identical jute mills in spite of the fact that standard costing system has been operating in both the factories.

Inter-Firm Comparison

IFC is a technique by which the voluntary exchange of information, costs, performance, efficiency, prices and profits of the undertakings in the same industry can be studied and oriented for better utilisation of resources available at the disposal of management to improve upon the productivity and profitability.

Historical Development of IFC

In late 1880's some sort of comparative surveys were conducted in a number of industries in connection with wage negotiation and price agreement in Great Britain. The surveys were conducted by specialists and they kept the records in secret, so that the method adopted was not available. In U.K., Munitions of War Act (1914) was passed and the system of compulsory arbitration was introduced. This led to comparative surveys to feed data to the Arbitration Tribunals for adjudication. In late 1920's or early 1930's, again some interest was shown for Inter-Firm Comparison in connection with some rationalisation schemes like the joint enquiry in the ship-building industry. The survey was conducted primarily to ascertain the production efficiency in concerned industries; incidentally, the management of individual firms became aware of the relative efficiency of their units. It was then that the concept of Inter-firm Comparison in its present form developed. Those surveys were directed primarily to remove the defects of labour organisation, plant lay-out and utilisation. Later, the concept was introduced in agriculture and some useful efficiency standards were set by the National Agricultural Advisory Service of the Ministry of Agriculture in collaboration with a number of Universities.

The first International Conference on Inter-Firm Comparison held in Vienna in 1956, was represented by the members of trade and industry, research associations, trade unions, professional institutions and Universities. In 1958, the British Institute of Management conducted a special survey for Methods of Inter-firm Comparison used in various countries and Centre for Inter-Firm Comparison, a specialised body, was established by the British Institute of Management and the British Productivity Council in 1959 to take an active part in such scheme. Relatively little has so far been known in India as to the way in which Inter-Firm Comparison was carried out, although in various other countries (West Germany, U.S.A., Switzerland) it has for many years been extensively used with valuable results.

Methods of Inter-Firm Comparison

Different firms in the same industry would send the information on various agreed aspects to a common pool. Ratios are worked out by the investigators from the data supplied and the so-called "Pyramid Structure" of ratios using the return on capital employed at the apex as the indication of overall business success is adopted. Succeeding ratios are decided upon in the light of the requirement imposed by an extremely wide variety of firms in the industry from the view point of size, complexity, type of work, etc. Too many ratios would be confusing.

Selected ratios may be divided into four, viz., (a) Primary Ratios, (b) Supporting Ratios, (c) General Explanatory Ratios, (d) Specific Explanatory Ratios.

RATIOS

(i) Operating Profit to Capital Employed
(ii) Sales to Capital Employed
(iii) Fixed Assets to Total Assets
(iv) Material Consumed to Stock of Material
(v) Average Trade Debts to Average Sales per Day
(vi) Operating Profit to Sales
(vii) Cost of Production to Sales
(viii) Cost of Marketing and Distribution to Sales
(ix) Cost of Administration to Sales.

At the apex of the pyramid is the ratio, (a) of Profit to Capital Employed which in turn would depend on (b) Ratio of Operating Profit to Sales and (c) Ratio of Sales to Capital Employed.

If ratio (a) is unfavourable, this may be due to unfavourable ratio of (b) or (c) or both. If it is due to unfavourable ratio (b), the following further analysis would help to locate the weak areas.

(i) Cost of Production to Sales
(ii) Cost of Distribution and Marketing to Sales
(iii) Cost of Administration to Sales.

If ratio (c) is unfavourable, further analysis would help to locate the areas of poor utilisation of available capital such as:

(i) Sales to Fixed Assets
(ii) Sales to Current Assests, etc.

Capital Employed: The capital employed in business should represent the total assets available to management in the exercise of their function. The basis chosen, therefore, would be the total assets excluding any outside investments, intangible assets and liquidities. The exclusion of liquidities, i.e., cash and bank balances, may seem illogical but the reason for doing so is the difficulty in determining whether cash holdings are in fact being used within the business.

With regard to the valuation of fixed assets, current values (replacement cost) as being more representative in character of the true present value of such assets, should be adopted. Land and Buildings would be excluded from the calculation of capital employed and a notional rent, calculated on a uniform basis would be included as expenses to overcome the difficulties and anomalies which may occur to arrive at the replacement value of such assets.

Profit: Operating profit is the net profit derived from the normal manufacturing and trading activities of a firm. Following adjustments, however, have to be made.

(i) Any non-recurring income, or expenses are to be excluded.
(ii) Depreciation is to be calculated at uniform rates on current values (replacement) of fixed assets.
(iii) Adjustments for investment income and interest paid.
(iv) Abnormal losses and windfall income are to be excluded.

Ratios once prepared and used would be out of date with the passage of time. To overcome this difficulty, the ratios should be calculated on moving average basis and the participating firms should supply the data at quicker intervals, preferably say, monthly or quarterly, to make the information more useful and purposeful.

Limitations of the Concept

Maintenance of Secrecy: The management of individual firm is afraid that the business

secrets may be divulged to the competitors and they are hesitant to join the scheme of inter-firm comparison. To convince the management, organisations conducting the scheme should make special security arrangements to prevent the figures or results of individual firms falling into wrong hands, by adopting one of the undernoted procedures.

(i) Each participating firm would be identified by only codes, and the code list should be under the possession of the Director/Top executive of the organisation.

(ii) Further security measure may be taken by inducing the participating firms to furnish their own ratios and percentages prepared by themselves, but this practice has the defect that the ratios and percentages so supplied may not be accurate.

(iii) To maintain the secrecy, the ratios and data so collated should be circulated only amongst the participating firms and to no other organisation unless otherwise agreed to by the firms.

Comparability: It is argued by many that because no two firms are really alike, the inter-firm comparison is of no use. It is true that the firms are not identical, but the figures to be used should be made sufficiently comparable, by adopting the uniform definitions of terms, classifications of accounts and accounting methods. The organisations conducting the inter-firm comparison should adopt the undermentioned methods to make the figures comparable.

(i) Introducing uniform accounting and costing systems amongst the participants.

IFC is a technique by which the voluntary exchange of information on costs, performance, efficiency, prices and profits of undertakings in the same industry can be studied and oriented for better utilisation of resources leading to improved productivity and profitability.

(ii) Supplying instructions as to the definitions of the terms to be used.

(iii) Reclassifying, regrouping and rearranging the existing accounting data to make the information comparable.

Insufficiency of Data: One of the observations of Prof Miles Kennedy is about the insufficiency of data. Financial figures available in the published annual accounts have removed the veil of secrecy under many heads. Schedule VI (Parts I & II) of Indian Companies Act enforces to show the comparable information in Profit and Loss Account and Balance Sheet. If greater details are available from Profit & Loss Account and Balance Sheet, the Inter-firm Comparison would have been still more successful.

It would create difficulties to allocate expenses under Revenue and Capital Account and also to find out the replacement cost of various assets because the assets are of various age groups.

Cost of Introducing Inter-firm Comparison: Management may not be interested in this scheme, because the cost of introducing the

It is true that no two firms are exactly identical; but the figures to be used should be made sufficiently comparable by adopting uniform definitions of terms, classifications of accounts and accounting methods.

system would be high. Initial cost would be less in these industries where uniform costing and accounting system has been enforced. The introduction of Cost Audit Record Rules, in India, is a welcome feature in this direction, as it is leading towards maintenance of uniform records, whereas such Rules have been imposed by the Government. It would be a step in the right direction if such measures are also introduced in other industries in our country, which will ultimately help not only in Inter-firm Comparison but also in national accounting.

Scope of Applicability

People are under the impression that this technique can only be applied in manufacturing concerns. It has, however, been proved that it can successfully be applied to trading organisations as well. This technique has successfully been carried out in wholesale grocery shops in Holland and Switzerland, food wholesalers in Canada and different other trading organisations in Europe and America.

Application in India

Erstwhile Managing Agency firms conducted some sort of comparative studies regarding the utilisation of productive resources of their own jute mills even before mid-fifties. In late fifties, the Indian Jute Mills Association invited a leading cost consultant from the U.K. to devise some sort of uniform costing system for its member units. His suggestions were accepted only by a few group management. In 1961, National Productivity Council appointed a study group for jute industry. One of the terms of reference was "To collect information regarding comparative costs in the various mills and spot the broad causes of such variations." The study group opined that the potentialities of this technique should be explained to the management and the IJMA's satistical unit with the help of other organisations should try to introduce the technique gradually.

In India, perhaps the first comprehensive study in this regard was conducted in mid-sixties by Prof Miles Kennedy, the then visiting Professor in the Indian Institute of Management, Calcutta, in respect of jute industry. In this project 18 jute companies were studied from 1960-1965 and the objective was not only to discover which mills were more profitable but to ascertain why some mills were more profitable than the others. In the first part of the project the following data were found out:

(i) Return on Capital Employed

(ii) Relative Cost

(iii) Asset Turnover

A second project was then taken up in which the following further data were prepared:

(i) Spinning and weaving efficiency

(ii) Utilisation of manpower and other available facilities

This study was not very much informative for want of basic data.

Some comparative surveys are being conducted by the Government of India through the undermentioned organisations:

(i) Tariff commission conducts some sort of comparative surveys to fix the price.

(ii) Bureau of Industrial Costs and Prices conducts the type of Inter-Firm Comparison to fix the prices of commodities. Recently they have fixed the prices of coal.

Cost Audit, possibly first of its kind, has been introduced in India. It tries to seek answer to the question "why there is cost differentiation within an industry" by means of data that will be available from cost audit report. The Government of India has introduced Cost Audit Record Rules in thirteen industries till now. Twin objectives are served with Cost Audit, viz., (i) to introduce uniform system of accounting and costing and (ii) in the industries where the record rules have been ordered to find out by means of Inter-Firm Comparison the reasons for (a) Cost differentiation and (b) Variation in productivity.

Textile industry has introduced Inter-Firm comparison to guide their constituent units. The Textile Research Associations collate the information received from the different member units and prepare tables of the performance of different units periodically. These tables are circulated among the members for their self-assessment and guidance to take necessary steps. They even provide advice to the member units for improving their productivity and profitability.

Relatively very little has been known regarding this concept in India. No positive step has been taken either by the Trade Associations or Government of India in this regard. So far as the comparability of data in respect of Public Sector undertakings is concerned, Bureau of Public undertakings can take positive steps in this regard. Data in respect of Public Sector Steel factories, Chemical factories, Mines and others can be furnished to the Bureau without any hesitation by the units concerned. If the Government take initiative in respect of its own undertakings, other trade associations would not hesitate to convince their members about the utility of such technique.

People are under the impression that IFC can only be applied in manufacturing concerns. It has, however, been proved that it can successfully be applied to trading organisations as well.

It will be for the centralised body like National Productivity Council to take the lead like the Centre of Inter-Firm Comparison in U.K. The technique of Inter-Firm Comparison if introduced in our country, will not only help in eradicating the price rise, erosion of capital, political pressure on the location of industries and various other socio-economic ills, but also streamline the national economy by providing better statistics for organised sectors and help the Government and the Planning Commission to prescribe proper remedial measures after diagnosing the real maladies of the economy. □

IFC: The Intangible Factors
A Tentative Framework of Analysis

Dr P Chattopadhyay*

In this paper the author emphasises the need for knowing and judging inter-firm differences in intangible factors. The paper identifies some of the intangible factors that influence the performance of an organisation and attempts to juxtapose the intangibles related to different firms by way of various indicators. The importance of such comparisons for improved performance is also underlined. The paper discusses various organisational questions relevant to such comparison and draws references to questionnaires as a practical guideline.

THE behavioural scientists have used Inter-Firm data generally for illustrative purposes or as individual cases. Not much has been done to help managements benefit from the experience of other firms in the line or in other lines. Preoccupation with building up concepts and theories has pinpointed their attention on firms as species of a genus. This is important and necessary. But so is the need for knowing and judging the inter-firm differences in intangibles, mainly behavioural factors to help firms improve. Inter-Firm Comparison stresses the possibility of uses of a firm's information on the subject for improving the situation in another firm. Learning by each other's experience underlines the essential mutuality of interest of firms participating in Inter-Firm Comparison.

Objective

This paper has a three-fold objective. First, it traces and stresses the need for classifying and explains briefly some of the intangible factors that influence the performance of an organisation directly or indirectly. Secondly, it makes an attempt to juxtapose the intangibles[1] related to the different firms by way of indicators of various types, mainly as an illustration. Lastly, it underlines the need for such comparisons leading to an improvement in both qualitative and quantitative aspects of performance. Some of the organisational questions regarding such comparison are discussed in the paper. Brief reference is made in this context to a questionnaire as a practical guideline. It is hoped these may be found helpful by managements in forewarning them, nay, forearming them, about the conditions that exist through different signs, symbols and symptoms. These become manifest in various forms of internal tension and, finally, of open conflict within the organisations only

*Director (Research), Institute of Cost & Works Accountants of India, Calcutta.

1. Some of these factors have been dealt with earlier. Cf. *Inter-Firm Comparisons : Problems and Possibilities*, Department of Business Management and Industrial Administration, Delhi University, 1965.

much later and if left unattended. This paper, *inter alia* assumes that an industrial unrest before becoming so shows various signs and symptoms which, if properly traced and analysed, can help managements in diagnosing the ailment properly and in taking such actions that would take account thereof before it was too late. A large number of instances in different industries in various parts of the country have underscored the point that knowing the reasons beforehand and acting on them in proper time would have averted many strikes and lock-outs. Insensitivity of management was a major cause behind many of them. Prescience would have been much less costly than the malady in fact became. Prevention, after all, is better than cure. However, the effectiveness of preventive measures is not always obvious, particularly as long as there is no serious trouble. This is, however, beside the issue.

Covert Signs

Apart from this rather negative approach, creativity in an enterprise requires that proper conditions are created to enthuse the employees to put in their best. It is a matter of considerable significance but hardly realised. It is indeed something more than so-called organisational harmony and inter-personal amity. In fact, in a creatively surcharged atmosphere, people in some corners of an organisation may find the going far too tough and tension-ridden. It is, therefore, a moot point as to what to look for at a moment and over a period of time, to innovate and dynamise the growth of business or just to pull on in an atmosphere of harmony or to spoil the atmosphere through undesirable disharmony and backward-looking approaches. The choices are, of course, much more complex in practice and the alternatives are never quite clear-cut; the point, however, remains that managements have to define their tasks on a canvas on which dots and dashes of various kinds and depths are far too many that invariably tend to blur the picture.

IFC Shows the Way

One of the simpler methods of knowing the way of dynamic progress is to examine what others in the line are doing and with what effect. This is the basic idea behind Inter-Firm Comparison. The question here is why firms should disclose their strengths and weaknesses to competitors. The reasons are quite a few and are relevant to all kinds of Inter-Firm Comparison. First of all, it does not cut across the competition among firms. Secondly, the names of firms are not shown to competitors at all as they are given code numbers. Thirdly, even the best firms may have weaknesses in certain areas which they want to know and cover up. Last but not the least, Inter-Firm Comparison is voluntary among the participating firms, based on demonstration of mutual benefits arising therefrom.

In the context of intangibles, this is more significant because these factors, as symptoms, have a knack of remaining hidden behind many other factors till finally showing up as an ailment As yet, not much is known about the intangible factors in Indian enterprises including behaviour pattern of top, middle and lower level managers and those of supervisors and workers of different categories. Wide divergence in these patterns is, however, discernible easily. Whatever little indications are available show highly-disconcerting trends even in the well-reputed and commercially successful large-scale enterprises.[2]

2. Cf. The study on motivation of middle level managers in a large enterprise by NR Chatterjee, Department of Busines Management and Industrial Administration, Delhi University (unpublished)

Indeed, the distinction between good management and bad management made in common parlance vanishes when one takes these trends into serious reckoning.

Intangibles : Classification

From the point of view of the present discussion, intangibles connote those factors that are not directly incidental to production and distribution as goods or services but are primarily concerned with morale and motivation, attitudes and aspirations of employees both as individuals and as groups at all levels in the enterprise and secondarily, with organisational and interpersonal behaviour, manifest in communication, collaboration and control, written or otherwise. Indeed, both personal and group characteristics account for the esteem in which workers hold the managers at various levels and, in turn, managers hold their colleagues, bosses and subordinates. The question of morale among managers and their subordinates has not been stressed as much in Indian enterprises as desirable. Motivations have also been rather indifferent for various reasons in both public and private sectors. In most cases, the status of morale and motivation has not been identified as to whether morale is high or low and why; and whether the right kind of motivations exists and how these can be reoriented to desirable ends or directions. It is, however, not enough only to know them once for all. Surveys should be on a regular basis. Inter-Firm Comparison on a continuing basis can effectively take account of these questions, both as causes and effects, as also in their impact on the performance of the enterprise like finance, marketing, production, etc. Attitudes of managers[3] and employees in an enterprise can be seen from different points of view. First, attitude towards methods, quantity and quality of production, distribution, etc. Secondly, attitude to managerial scientificity in the context of divesting ownership from control, structure of organisation, methods of recruitment, delegation of power *vis-a-vis* duties, decision-making process, etc. Thirdly, attitude known from different policies adpoted by management towards the internal and external public. Lastly, application of modern management techniques for various purposes of management is itself an indication of managerial objectivity and professionalism.

Gap : Profession and Practice

In our country, there exists a gap between profession and practice in management insofar as many managers talk tall about various modern management techiqnues which they do not apply in their organisations and so render only lip-service to scientific management and its cause. In many others, scientific management is neither professed nor practised. In the aforesaid conditions, juxtaposition of these factors related to different firms is likely to result in a kind of demonstration effect which may not be quite precise and pinpointed but may be a good indirect indicator, specially in conjunction with other factors of performance commonly taken into account in such comparison. Comparison of individual and group behaviour of different firms may be made in different ways with reference to the formal and informal frames of relationships in vogue. Mutual esteem and *esprit de corps* or what Tead calls "collaborative creation", can be assessed and ranked as between firms in different ways evolved by behavioural

3. See, for instance, the PEP study on attitudes of British managers entiled, *Thrusters and Sleepers*, Allen & Unwin, London 1965. A similar study has been conducted among top managers of public sector enterprises in India by Laxmi Narain as reported in the press recently.

scientists in varied situations. The leadership function of management is relevant here. For purposes of comparison, these factors would require to be classified in a standard form and questions corresponding to these factors grouped in such a way that answers to these in exact questions expecting opinionated answers from the addresses broadly refer to the understanding of behaviour and enable assignment of weights to each answer to the questions under each factor. This is necessary, for, otherwise divergent answers, and rather out-of-track, would come in the way of determining the state of affairs in this respect in the firms under comparison within an acceptable range of error. In fact, the questions may be asked indirectly related to the factors to be assessed because straight answers may not be given to indicate likes or dislikes or any other intimate matters on which a personal opinion is to be passed. Such opinions may be vouchsafed by cross-checking questions to other workers, managers and supervisors.

Morale : The Foundations

For an assessment of morale among firms it may be appropriate to underline the individual contributing elements. A fairly-vivid picture of the functions of morale has been given by Field Marshal Sir William Slim[4]. According to him, morale is "that intangible force which will move a whole group of men to give their last ounce to achieve something, without counting the cost to themselves; that makes them feel they are part of something greater than themselves". He tabulates three foundations of morale, namely, spiritual, intellectual and material, in the same order. Though stated in the context of an army campaign on the Burma Front during World War II, these foundations appear to have general relevance in all conditions in which group efforts are led to the realisation of a common purpose. Under *spiritual*, Slim lists four factors, viz., (a) there must be a great and noble object; (b) its achievement must be vital; (c) the method of achievement must be active, aggressive and (d) the man must feel that what he is and what he does matters directly towards the attainment of the object. The *intellectual* foundation relates to three aspects. First, he must be convinced that the object can be achieved with reasonable effort. Secondly, his sense of belonging is to be sustained by the efficiency of the organisation seeking to attain the object. Thirdly, he must have confidence in his leaders, tenable by reason, apart from feeling alone. The *material* foundation involves three questions. The man must feel that he will get a fair deal from the superiors and from the organisation. Secondly, his tools and equipment must be the best available in the organisation. Lastly, his living and working conditions must be made as good as they can be.

Deliberate Creation

High morale of the people in an enterprise is a matter of deliberate creation by the management. In fact, every action of management either contributes to or detracts from the existing morale. Thus, the management must realise that its task is very delicate and its actions are watched with keen interest. Morale, when high, manifests itself in high efficiency in the given conditions coupled with discipline in such a manner that the organisation is not only efficient but it also looks so. As one sees in the army, discipline involves precise knowledge and understanding of the source where to look for direc-

4. *Defeat Into Victory*, Four Square Edition, Reprint 1965, pp. 179-180. Motivation is not discussed here discretely; in short, it means team-work in action towards reaching the goals of the organisation. Perhaps, it is that factor which distinguishes a group from a crowd.

tion, which provide the conditions in which performance takes place and where to report performance of the task assigned. High morale also accounts for pronounced loyalty of the workers to an enterprise, in certain cases even cutting across loyalty[5] to individuals who may be managers or even owners. Indeed, there are different types of loyalty, some of which are at variance with each other. Morale explains the fact that at times under extremely trying conditions, highly commendable performance is turned out by the individuals who are inspired by the example that even though conditions are anything but ideal, there is no absence of sincere and effective desire on the part of management to improve the conditions and that management shares the difficulties in which workers are placed at a moment in time and over time. On the contrary, even though the conditions may be good otherwise, they may be marred by indifferent attitudes of management.

Interpersonal Communication: Problems

A key to management in an enterprise is interpersonal communication[6], spoken and written, formal and informal, and vertical and horizontal. Growth in size, ever-increasing complexities in production, distribution, financing and personnel spheres and managerial scientificity have given communication the key role, in any type of activity in which the efforts of the individual are linked with those of others as if in a chain. Through communication, the objectives, policies and work programmes in an enterprise find fruition. Various types of communication circulating in the enterprise may be known in different ways. Before going into the types, it will be proper to recall definition of communication, which is "the capacity of an individual or group to convey ideas and feelings to another individual or group, and where necessary, to evoke a discriminating response".[7] In communication, therefore, both conveying of ideas and feelings on the one hand and evoking a discriminating response on the other, are important aspects for consideration. In this context, several studies in the advanced countries have underscored that similar words are understood differently by men at all levels and each word has a typical association in the minds of different men. This is tantamount to tight-rope-walking, having to strike a balance between the need to convey an idea or feeling and than to guard against creating any undesirable reactions. In India, this problem is extremely tricky. There are words which are highly respectable in some parts of the country but derogatory in some others. Even the manner of addressing people are different in different areas. In such cases, the contents of communication require to be understood with reference to the composition of employees regarding their linguistic groups, social strata, level of education, religion etc.

Efficacy of Communication

It is a matter of common experience that even the same idea or feeling has to be communicated in different ways to different groups or even individuals, both vertically and horizontally. In both written and spoken communication, it is important that the communicator knows what he is talking about and that he believes in it himself. Bluffing or insincere communication runs the risk of boomeranging. Whether the

5. See, for instance, "Aims of Loyalty in Management: Some Conflicting Issues", *Economic Times*, October 22 and 23, 1964.
6. Ernest Bormann, *et al*, Interpersonal Communication in the Modern Organization, Prentice-Hall, Inc., 1969 specially chapters 3 & 4, pp. 39-77.
7. Eric Moonman, The Manager and The Organization, Pan Piper, London, 1965, p. 27

language is sophisticated or not, as long as it is coming from the heart and is no mere lip-service, it tends to have its effect, today or tomorrow. Here one has also to accommodate the styles of communication among peers, with bosses or superiors and with the subordinates. In all these, however, communication should exude dignity of the individuals on both sides and the acceptability of the cause behind or the purpose. Language and expression apart, communication should command respect of those addressed. Its frequency and focus are both important aspects that partly determine how these are treated and what action follows.

Instrument of Instructions

Indeed, an example of what should never have been done is the issue of "instrument of instructions"[8] by the government department to the public sector enterprises in India. *Prima facie*, government should not have issued such instruction because in law and in practice, the enterprises are different from government departments and as shareholders government cannot by law intervene in day-to-day matters of these units. The instrument also fails on grounds of sincerity, delimitation of purpose, brevity of expression and, above all, consistency. Excessive verbiage and absence of recognition of the professional competence and quality of those addressed, even to the extent of undermining them, marred what could have been a highly effective method of making the viewpoint of the government clearer. Issued by the government, this instrument carried no authority to act upon. It was self-contradictory insofar as the instrument issued in 1958 had the last lines as fellows:

"The duties and responsibilities stated above are purely for the guidance of the company and in having been mentioned therein do not by themselves convey any specific delegation of authority or direction from Government."[9]

After five and odd pages of '*do's* and *don'ts*,' the instrument conveys ultimately the feeling that these pages could as well have been left unread. The instrument is not much more than a rehash of the Memorandum and the Articles of Association and a repetition of some of the much talked-of desires of the government. Hind-sight should now tell us that much of this was superfluous and so, a waste of effort.

Leisure for Top and Middle Managers

A highly-potent but equally-tricky area of Inter-Firm Comparison is how the time available with top and middle managers is spent in an organisation. It has been said that "the wisdom of a learned man cometh by opportunity of leisure". If the managers—top and middle spend all their time fussing round, as busybodies going into every detail of everything that is happening in an enterprise, their own jobs viz., managing, are likely to go by exception. Managing implies planning, coordinating, motivating and controlling the efforts put in by a team as a team for creation of utilities. Managers must have time to themselves to ruminate, to foresee and to plan future action for dynamic growth, for countering strategies of the competitors and the substitutes and for improving on the performance of the past and the present. On the surface, the impression given to outside viewers

8. SS Khera, Government in Business, Asia, Bombay, 1963. However, reference to the "Instrument" is not only uncritical but also recommendatory of the contents thereof. Cf pp. 144-148.

9. Though we have seen the original circular dated December 10, 1958, the instrument bearing another date has been reproduced in SS Khera *Loc. cit.*, which may be referred to. The undertakings to which the quoted circular relates is different from that we saw. Apart from minor verbal changes, they are similar in purport.

may be that of idleness. Having busybodies at the top is, however, ultimately much costlier because they spend time on jobs or matters which do not require as much professional competence and which a lower-paid executive could attend.[10] In addition when the time is spent running about and dabbling into this or that, little reserve energy and mental inclination remain to devote into matters which others cannot do and are not expected to do by reason of hierarchical position, professional-technical competence or individual ability.

Cases are many in which high abilities are underutilised or misutilised in Indian enterprises of both sectors and in government offices. Delegation of powers and decentralisation of responsibilities take care of the underlying need for keeping top and middle managers relatively free to plan ahead and to effect innovations of different kinds. The written schemes of delegation of powers and actual powers wielded may show gaps. The actuals may be known from the type of control in vogue, reports that pass from one end to another and the notings in concerned files, apart from the opinions of the managers and others concerned. Thus, these aspects of time allocation for various purposes can be seen both from the point of view of time allocated to different jobs by managers and that of the differential sophistication attained in planning, innovations effected in production, products, marketing and distribution and the competitive position enjoyed by the enterprise *vis-a-vis* the status of the market. The types of policies pursued by the management would be one of the additional indicators in this respect. *Management in jitters* or *management by fits and starts* betrays a lack of *will to manage* in managers and an innate desire in them to remain technicians. The notion that everybody else is incapable, has a far-reaching negative effect from which many of our enterprises suffer now.

10. An excellent discussion on time planning may be found in Carl Heyel, *Organizing Your Job in Management*, AMA, 1960. Chapters 1 and 2 pp. 17-42. See also Rensis Likert, *The Human Organization*, McGraw-Hill New York, 1967, Chapter 5, pp. 78-100.

The Questionnaire: Prior Information

In an Inter-Firm Comparison of the Intangible factors, the questionnaire plays a crucial role. The questions asked and the kind of replies elicited should be thought of beforehand, so that the answers converge into a common focus on the aspects of an organisation and its functions that are under scrutiny. This is very important when we consider that many of the questions may be asked only indirectly related to the subject. The questions may be based on a prior knowledge of the organisation and some of its essential characteristics. In the Indian condition such knowledge may be concerned with—

(a) Whether it is a company, firm of unitary concern.

(b) Whether it is under family or group control.

(c) Whether management is hereditary or otherwise.

(d) Whether it is profit-earning or loss incurring.

(e) Whether its management comprises professionally trained people or otherwise.

(f) Whether it has a reputation on production, marketing, finance etc.

(g) Whether it operates in a competitive market or otherwise.

(h) Whether its organisation structure was a result of some planning or pre-thinking or it just grew of its own over a period on an *ad hoc* basis.

(i) Whether its management and workers come from same or similar groups of societies or from dissimilar ones on the basis of
  (i) Language
  (ii) Geographical region
  (iii) Professions
  (iv) Religion
  (v) Occupations
  (vi) Income Strata
  (vii) Education
  (viii) Age Group, etc.

  If so, what is the composition among managers and workers on the basis of these factors.

(j) What is the nature of the market: competitive or non-competitive; ancillary or open; monopolistic or monopsonistic; domestic or export markets; controlled or uncontrolled prices.

(k) Whether the organisation pursues a policy of dymanic growth with or without diversification or is happily sustaining its existing market and profit.

(l) Whether the organisation manufactures its products at a high, medium or low level of technology, turning out simple or complex products in response to demand or in anticipation of it.

(m) Whether the organisation applies modern management techniques and philosophies for decisional purposes; if so, the various techniques that are applied with samples or cases.

Written and authenticated replies may be sought to these questions, assisting in determination of the situational features of each participating firm. Manuals and procedural orders should support the replies given along with a note on such changes therein that were effected during the last three years or so and the factors that led to such changes in procedures, etc. In certain organisations, organisation charts, schemes of delegation, span of control and communication and reporting are prepared from time to time in a formal manner. These documents help in judging the inter-firm differences in practices of management and the underlying attitudes to various organisational questions. They also help in framing the questions to be asked and in understanding replies that may be given. Both are quite delicate matters and require sensitive handling. Improper handling may create rather unwarranted replies and even undesirable consequences apart from wrong conclusions. The addressees may even require induction before replying to these questions. The informal communication pattern may be known from personal discussion with addressees.

Questionnaire: Need Hierarchy

Maslow's theory of *need hierarchy* should be highlighted in a questionnaire seeking to underline the individual needs *vis-a-vis* the provisions made for incentives at different levels of employees and other significant questions affecting motivation and morale of managers and workers. At each level of the *need hierarchy* several questions may be asked. The following are illustrative[11] of the type of questions that may be incorporated in the questionnaire.

MIDDLE MANAGEMENT

Need Hierarchy	*Questions*
A. Self actualization	1. What is your concept of yourself ? 2. What do you expect from the job?

11. RS Davar, *The Human Side of Enterprise*, Progressive Corporation, Bombay, 1969, p. 183 (adapted).

Need Hierarchy	*Questions*
	3. What is the situation at home and with your colleagues? How good are your relations?
	4. Is your compensation plan appropriate looking to your tax position and reward in proportion to your contribution?
	5. Has the top management brought in outsiders on a higher scale?
	6. Have you got an adequate staff which leaves sufficient time for you to think, relax and be creative?
	7. Does the work really challenge your abilities? Or is it easy and routine?
	8. Do you have freedom to set the goals and reach them in the way you deem best? Or, is there too much of interference to make you feel slighted?
B. Esteem	1. How are you treated in the organisation?
	2. Are you shown respect for your abilities and leadership?
	3. When you come up with a brilliant idea, are you given publicity? Or, does your boss take the credit?
	4. Are you criticised just like that or given insincere pats on the back?
	5. How do you react to status symbols? Does your organisation overlook symbols you want, such as title, car, etc.?
	6. What do you feel about your job? Do you think it is very important? What do others think of your job, in your view?
C. Belongingness and Love	1. Have you received a fair deal from your superiors and fellow managers? Or, do you think favouritism has affected your prospects?
	2. Do you have responsibility commensurate with your authority?
	3. Have you been encouraged and/or sponsored to become a member and to attend seminars and conferences of professional and trade associations?
D. Safety	1. Do you receive support when needed?
	2. Are you taken into confidence of your superior managers or kept in the dark?
	3. What is the security of your job, here and elsewhere?
E. Physiological	1. Are you paid adequately to cover your physiological requirements in terms of your needs in the context

Need Hierarchy	*Questions*
	of your family, rising prices, scarcities, etc?
	2. Are you staying in company's house or hired accommodation? What kind of accommodation is this?
	3. Where are your children receiving education? Are these good schools /colleges, universities/institutions? What are the expenses you bear per month?

Apart from other factors the concept of need hierarchy stresses that financial incentives are not enough in all cases. Given as sops to extract more work these incentives after reaching some point of effectiveness slide back. Much more potential is the incentive package in which financial and non-financial incentives are provided according to the needs in each case. Proper attitude must be combined with incentives for effect.

These are indeed much more significant than they look. For example the *incentive effect* of most incentive schemes appears rather indifferent for various reasons, particularly in conditions in which such payments are expected by their recipients. The statutory bonus payable to the workers under the Bonus Act should be more logically treated as wages. This does not imply spurring of efforts to raise productivity. For motivational purposes both management and workers would require more sensitive treatment as to their needs of various types. In our country, this issue is almost completely ignored in the enterprises of both private and public sectors. Determining the impact of incentives is, therefore, an imperative in the context of various such schemes that are put into effect. Here, Theory X and Theory Y of Douglas McGregor may also be seen in action as to how managers view the workers. In turn, how workers view the managers is also an important question. Questions asked to managers and to workers may let it be known as to whether they believe in their mutual roles as perceived by themselves and by each other, leading towards *Theory X* or *Theory Y* or towards some point between them. Of course, the policies of recruitment, promotion, development, remuneration, mechanisation, etc., would have something to do in this regard. Here, the management style should also be considered a significant factor as to whether it is democratic, participative, bureaucratic or autocratic in regard to different issues requiring decision-making. One point should be stressed here. Management may remain autocratic under the garb of any of these types. Disclosure of the reality of administrative onemanship should not be expected in a direct form.

In a number of enterprises, there are people in different positions who have sought and achieved self-actualisation in activities unconnected with those of the organisation. Careful note of these people should be made and discussion sessions with them may bring out factors generally brushed aside or soft-pedalled in the enterprise. In Calcutta, for example, some of the best known young Bengali poets, novelists, essayists, serious research workers in various fields of literature are clerks, executives and salesmen; many are Government servants among people of this category. Indeed, in many cases, their attainments in their chosen fields are far greater than of their bosses. Many of them use pseudonym and become better known in their pseudonyms than in their own. The organisations

do not always recognise the meritorious services of these people. Focus of the organisation being limited to its techno-economic operations, one may understand the standpoint taken by it; however, something better than the present state of indifference could perhaps have been provided. In other countries, the fate of people like these is much better and organisational recognition encourages the employees and motivates them to better performance. Of course, players and sportsmen find better recognition than many others. But even the recognition to players has come rather late in the day.

The questionnaire should incorporate questions seeking to know about the entire person of the employee rather than only that part which is related to the organisation's activities. It is necessary to appreciate the "Organisations, as systems of hierarchically ordered, interlocking roles with rights and privileges, reciprocal expectations, and shared frames of reference, contain tremendous forces for stability or change in the behaviour of individuals or subgroups. Change processes need to be designed to harness these forces for creating and supporting change".[12] In an organisational situation in industry and business, one has to run faster and faster to remain at the same place. A thrusting organisation thus cannot afford to remain static. To get the best of circumstances that change fast, it has not only to respond to the changing environment but also to anticipate. Motivational forces of the desirable kind have to be generated and directed to required lines by deliberate effort. Inter-Firm Comparison is a means to this effect.

12. FC Mann, "Studying and Creating Change: A Means to Understanding Social Organization", *Research in Industrial Human Relations*, Industrial Relations Research Association, No. 17, 1957, p. 162.

Questionnaire: Grievance Procedures

In many organisations, there are no formal grievance procedures for settling grievances of individual workers or other employees arising for different reasons. Such grievances are not general enough to be taken up by the trade unions and would require settlement at the level of the worker and the concerned officers. In some organisations, however, grievance procedures are formally adopted and the management and the workers accept the procedures laid down in the formal frame of reference. In such formal procedures, generally the immediately superior boss is addressed with respect to the particular grievance and if he fails to come at a settlement within the prescribed time period, the worker is allowed to go to higher authorities for seeking redress. The steps above, the immediate superior in relation to the worker, are laid down in the formal procedure along with a time period within which a settlement should be reached. In the procedures, it is also laid down as to what types of grievances should be dealt with by what level of officer in the organisational hierarchy. If these grievances are not redressed in proper time, there is a likelihood that these grievances would turn into disputes. This acts as a caution to the officers dealing with such grievances and the likelihood that failure to redress these grievances might reflect on the efficiency and calibre of the officer concerned, there is a genuine concern for redressing these grievances before they mature into disputes.

In the scheme of Inter-firm Comparison, the grievance procedures may be taken into serious cognizance. The questionnaire issued in this behalf should seek information as to whether the procedures are formally laid or not, whether the time target is adequate for settling the grievances, whether the number of grievances arising within a particular time

in view has been too many, and whether the grievances have a tendency of taking a general character to be ultimately handed by the trade union concerned in a process of collective bargaining or other negotiations. Inter-Firm Comparison helps the participating firms to determine whether such a procedure should be formally laid down or not and whether it is detailed enough to accommodate various types of grievances and decision-making, leading to settlement of grievances.

Inter-Firm Comparison also helps in appraising the impact that the grievances create in the organisation in different ways and the ways of reducing such impact. In many ways, redressing these personal grievances of individual workers or other employees would help management to avert disputes in a manifest form. It is possible that in a scheme of Inter-Firm Comparison even the best firms receive benefit in view of the fact that the individual bits and pieces of such procedures may be relatively better or worse in these firms *vis-a-vis* the others and they are afforded an opportunity to further improve on their procedures while the relatively less effective firms on this score would find it convenient to know how others are handling these grievances and thereby minimising loss arising out of disputes of various kinds.

In our country, some of the large-size public sector enterprises have formal procedures for redress of grievances. Even here it is possible that there might be inter-firm differences and that the formally laid down procedure is not followed in letter and spirit. In such situations. the weaknesses of these firms would be pointed out in the course of comparison. It is not enough as to how management sees the effectiveness of the grievance procedure, it is also necessary to know how the people affected by procedure view it.

Human Asset Accounting

According to Rensis Likert,[13] human assets refer both to the value of the productive capacity of a firm's human organisation and to the value of its customer goodwill. He mentions two firms of similar size in the same business having identical equipment and technology but one of them produces and earns more than the other because its personnel is superior to the other's with regard to variables such as,

i) level of intelligence and aptitudes;

ii) level of training ;

iii) level of performance goals and motivation to achieve organisational success;

iv) quality of leadership;

v) capacity to use differences for purposes of innovation and improvement, rather than allowing differences to develop into bitter irreconcilable, inter-personal conflict;

vi) quality of communication upward, downward and laterally;

vii) quality of decision-making;

viii) capacity to achieve cooperative teamwork *vs.* competitive striving for personal success at the expense of the organisation;

ix) quality of the control processes of the organisation and the levels of felt responsibility which exist;

x) capacity to achieve effective coordination; and

13. Cf *The Human Organization : Its Management and Value*, McGraw Hill Book Company New York, 1967, p. 148.

xi) capacity to use experience and measurements to guide decisions, improve operations and introduce innovations.

The estimation of the value of customer goodwill cannot be made accurate. However, from opinion surveys it is possible to assign values of such goodwill particularly with respect to the differential sales achieved in given conditions faced by all the participating firms in the same market. The method of enhancing this goodwill is, of course, not one but many. Inter-firm differences in customer goodwill can be known from a comparison based on opinion surveys of different product-brands, the attachments of customers to particular products for various reasons and the dependability and reliability characteristics. Likert explains in some detail about customer goodwill and suggests that customer goodwill and the value of the human organisation within the enterprise should be reflected at their present value in every financial statement. According to him, this can be done by drawing upon the methodological resources created by socio-psychological research[14].

Questionnaire : Supportive Behaviour

The principle of supportive behaviour as enunciated by Likert[15] is as follows :

"The leadership and other processes of the organization must be such as to ensure a maximum probability that in all interactions and in all relationships within the organization, each member, in the light of his background values, desires, and expectations, will view the experience as supportive and one which builds and maintains his sense of personal worth and importance."

The relationship between the superior and the subordinate is a crucial aspect of application of this principle in practice. Supportive behaviour of a group binds one to what is called group loyalty. Development of personality of the individual in relationship with others in the group is a key aspect of supportive behaviour. It has been found that group loyalty coupled with high performance goals results in productivity higher than in other cases. In the circumstances, it is important to know how supportive is the behaviour of individuals in the group and whether the superior's behaviour is seen as supportive by the group. In ascertining this behaviour the following questions may be asked which are equally applicable to the superiors and subordinates:[16]

1. How much confidence and trust do you feel your superior has in you? How much do you have in him?
2. To what extent does your boss convey to you a feeling of confidence that you can do your job successfully? Does he expect the "impossible" and fully believe you can and will do it?
3. To what extent is he interested in helping you to achieve and maintain a good income?
4. To what extent does your superior try to understand your problems and do something about them?
5. How much is your superior really interested in helping you with your personal and family problems?
6. How much help do you get from your superior in doing your work?

14. Ibid, pp. 151-152
15. *New Patterns of Management*, McGraw-Hill, New York, 1961, p. 103
16. Likert, *The Human Organization*, pp. 48-49

a. How much is he interested in training you and helping you learn better ways of doing your work?

b. How much does he help you solve your problems constructively—not tell you the answer but help you think through your problems?

c. To what extent does he see that you get the supplies, budget, equipment, etc., you need to do your job well?

7. To what extent is he interested in helping you get the training which will assist you in being promoted?

8. To what extent does your superior try to keep you informed about matters related to your job?

9. How fully does your superior share information with you about the company—its financial condition, earnings, etc., or does he keep such information to himself?

10. Does your superior ask your opinion when a problem comes up which involves your work? Does he value your ideas and seek them and endeavour to use them?

11. Is he friendly and easily approached?

12. To what extent is your superior generous in the credit and recognition given to others for the accomplishments and contributions rather than seeking to claim all the credit himself?

Linking Up

The answers received in response to questions given in the questionnaires addressed to managers, supervisors and other employees as also to selected outsiders such as customers and suppliers would require a close examination as to how complete the replies are and whether further discussion with the addressees would be necessary. The replies would then be cross-checked with reference to addressees belonging to different levels in the same organisation so that the features of individual enterprises in this respect emerge in some clear outlines. These features, and some individual replies also in such cases as incentives, would require to be linked up with the tangible aspects such as productivity and profitability. Juxtaposition of these data of one firm *vis-a-vis* others would then bring out differences that are necessary to be noted for further scrutiny and interpretation with respect to a firm's performance. An assessment of the variations as between firms compared and the factors accounting for these variations in performance should be done on a professional basis for avoiding hasty conclusions or inadequate understanding of the implications. It is thus preferable to include behavioural scientists in a team of experts concerned with inter-firm comparison so that the diagnosis of weaknesses and remedies bear the stamp of composite appraisal. Rapport with the addressees on a continuous basis would be essential. Trust and confidence regarding the information given and anonymity should be guaranteed for success of such comparison.

Incidentally, among the various techniques in the process of emergence are Sensitivity Training or T Group, Behavioural Models, Organisational Planning, Systems Analysis, etc., some of which are now being applied in several large enterprises in our country belonging to both private and public sectors. Employee counselling is also gaining ground. While these are hopeful signs of a growing consciousness, much is required to relate them to the main body of performance appraisal. Planned, deliberate thinking has to go into probes conducted in this area. A composite of multi-disciplinary expertise would be required to deal with all these problems at the same time. □

Composite Accounting Criteria for Inter-Firm Comparison

GD Roy*

Composite Accounting Criteria signify development of a single index which may represent overall efficiency of a firm. The author feels that Composite Ratio derived from a judicious selection of ratios offers great possibilities for Inter-Firm Comparison. A Composite Ratio does not in any way undermine the respective importance of individual ratios. On the contrary it seeks to prove a viability of its own by indicating a 'tendency'. The Composite-Ratio Study is meant to help the management while remaining complementary, and not competitive, to individual ratio analyses.

COMPOSITE or aggregate accounting may be said to consist of finding out a single index which may represent the efficiency, or otherwise, of the overall activities of a firm. Attempt to find out such an index has often been made, while comparing the performances of a firm or business unit relating to one period with those of it relating to another.[1] The index is usually made of the weighted average of some important or representative ratios.

Inter-period Comparison of Performance

In order to find out such an index, a base period has, first of all, to be selected. The activities in the said period are obviously expected to be normal or ideal. It is possible that the period is associated with some important development in the activities of the firm itself or some major change in the business and economic activities of the country in general. The principle followed is, more or less the same as that adopted in selecting the base-year for the preparation of index number of prices. But it is often difficult to pick up any period in the life of a business which may be considered normal or ideal or suitable in any other respect. Therefore the choice is more or less, arbitrary. On the whole, the activities of the selected base-year act, as though, as a common denominator with reference to which activities of other years may be compared.

Next comes the turn for the choice of the ratios. Here, the maximum amount of prudence in making correct observations and perfect judgements is required. "It is particularly emphasized that one particular ratio used without reference to other ratios may be very misleading".[2] As for instance, a high current-ratio

*Reader in Commerce, Calcutta University, Calcutta.

1. GD Roy: A Survey of Accounting Ideas, Alpha Publishing Concern, Calcutta, 1963, pp. 472-74.

2. Yerston, Smyth & Brown: Advanced Accounting, Vol. II, the Law Book Co. of Australasia PT. Y. Ltd. 1954, p. 362.

loses much of its significance, if it is not, at the same time, backed by a high quick-ratio. Similarly, a very high quick-ratio may mitigate, to some extent, the depressing effect of a low current-ratio. In this way, instances may be multiplied to any number. To obiviate this, it would not surely be wise to select any number of ratios as a remedy; in that case, the very task of finding out the average may be unmanageable. A judicious selection of the ratios has, therefore, got to be made from all possible considerations. One point, however, has always to be kept in mind. The ratios should be so selected that changes only in one particular direction, increase or decrease, may indicate the same trend, favourable or unfavourable, for all the ratios. That is to say if 'increase' is favourable for one of the ratios, it must be so for all. or, if 'decrease' is favourable for one of the ratios, it must be so for all. The results are apt to be vitiated if, say, increase of one of the ratios listed, while decrease of another among them, make a favourable or unfavourable change.

Last of all, the weights have to be determined. This task also is not very easy. It is unlikely that there may be complete unanimity in the matter. In any case, the guiding factor will be the order in which the different aspects of the business-activities are emphasised. It is not only the weights, but also the ratios themselves, that are selected in accordance with this principle. Broadly speaking, these aspects may be, profitability, liquidity, capitalisation or, say, growth. The greatest weight is given to the ratio which is likely to have the greatest amount of influence on the particular aspect that is given the highest emphasis. The weights of supporting ratios are also chosen on the basis of the importance given to a particular phase of the broader aspect. After the base-year is fixed nad the ratios and their respective weights are determined in this way, the weighted average of the ratios of the base-year is calculated. Considering that the weighted-average of the ratios of the base-year, thus derived, is equal to 100, the weighted average of the ratios of other years are calculated in the same proportion. The weighted average of the ratios of each year is, in this way, treated as an index of over-all business activities of the year concerned. The index is evidently an example of a 'composite ratio'.

The performances of two periods of a business are, according to usual practice, compared by the help of a number of ratios. But the results are likely to remain mixed up in such a large volume of details. Moreover, if the results are found comparatively favourable, in certain respects, in one year, they may be quite opposite in other respects in the same year. As a result, no comprehensive idea may be formed as to the progress, or otherwise, of a firm in any particular period. But a properly worked-out composite ratio may be a better alternative in the face of these difficulties. The very look of it will impress on the mind a clear and comprehensive quantitative idea as to the progress of the firm. The ups and downs of all the component ratios will at once be reflected in the composite-ratio in accordance with their respective importance. Moreover, though a single ratio may often be misleading, a composite one is not likely to be so. The misleading imports of all single ratios are expected to be ironed out by the 'resultant' impact of all the components of the composite ratio together.

Nevertheless, it is not by any means claimed that there cannot be any doubt as to how far a composite ratio may be reliable or significant. After all, the selection of both the component ratios as well as their respective weights, is the result of individual observation and judgement. In spite of all cautions that may be exercised in making the selections, the chance of their being arbitrary to an extent cannot be entirely ruled

out. Above all, the very idea of appraising business activities by a single index, however convenient it may appear, may be challenged. What may be questioned is not only the feasibility of the process, but also its utility. In fact the knowledge of an index, however clear and comprehensive, cannot possibly come to any help in budgetary control and cost control, the two pivotal tools of management.

What may be stated in favour of the composite ratio is that it has been conceived of for indicating a 'tendency' of and not measuring exactly the quantitative aspect of certain state of things. So the presence of an element of arbitrariness in the choice of the radicals, even if unavoidable, cannot altogether be harmful. On the other hand, much improvement is expected to be made in the computation of the ratio, by research and study depending on repeated experiments. Secondly, it may be true that the proposed composite ratio cannot have any direct use in budgetary control and cost-control. In that respect the individual ratios are admittedly much more effective and helpful. But the actual result of the budgetary control and cost-control may be known at a glance only by the help of the suggested composite-ratio. Thus, the composite-ratio does not in any way undermine the respective importance of the individual ratios. On the contrary, it seeks to prove a viability of its own for a different purpose.

Application in Inter-Firm Comparison

If the idea of a composite-ratio is found useful in case of inter-period comparison of the activities of a firm, it becomes all the more so with reference to the inter-firm comparison of their respective activities. In case of the latter, comparative analysis by individual ratios are likely to become much more difficult. In the former case two measures have to be considered: one for each year, of a particular ratio. But now, for one ratio, one has to consider as many measures as there are number of firms. Use of averages may reduce the details, but cannot avoid more complications. Comprehensibility is further lost under more difficult circumstances and it is adversely affected by greater conflicting situations. Accordingly, the composite-ratio seems to be admittedly more useful as a ready reference in case of Inter-Firm Comparison. But, what is interesting is that as it may appear to be more useful, its preparation is obviously found to be equally more difficult. That the difficulties in preparing a composite-ratio for Inter-Firm Comparison are more widespread and deep-rooted may be evident from the following tentative scheme. It is intended to illustrate how a composite-ratio may be found out for Inter-Firm Comparison in the case of five jute mills.

(*i*) *Participating Firms*:

It is imperative that the firms participating in the scheme should belong to a particular trade or industry, or a section thereof. Otherwise, the comparison cannot be expected to be meaningful. A Central organisation is necessary for collecting and processing information supplied by each individual firm. All firms shall follow the same procedure in producing the information about their activities. They must fully understand every item of information thus supplied in the same sense. In short, the pre-conditions are the same as are required for Inter-Firm Comparison by individual ratio-analysis. In fact, as already said in case of interperiod comparison of the activities of the same firms the importance of the individual ratio are in no way undermined in their respective functions. The composite-ratio study is meant to help the management while remaining complementary, and not competitive, to individual ratio analyses. The compo-

site-ratio is expected to serve, as already stated, as an index of inter-firm activities which may be comprehensible at a glance. It is, however, desirable that the firms should have a common understanding regarding its implication in every case. That will evidently depend upon the knowledge of how the composite-ratio was prepared in case of the participating group concerned. The central organisation may also furnish this implication in a note while sending their findings in a report to each individual firm. Five jute mills have been selected here for our experimental investigation.

(*ii*) *Selection of Ratios*:

Inter-firm comparison depending on ratio-analysis recognises importance of selecting ratios and using them intelligently. The nature of the industry will evidently influence both the selection as well as intelligent use of the ratios.[3] The Centre for Inter-Firm Comparison in England considers in all cases the ratio of profit to capital employed or what may be said earning ratio as the primary ratio.[4] It is not unjustified because profit is not only the aim of management but the index of its performance as well.[5] But "from this ratio has been derived a 'pyramid' of subsidiary ratios reflecting the influence of various operational factors".[6]

The implication of the primary earning ratio is likely to be misleading as already pointed out unless conclusion regarding it is drawn with reference to the subsidiary ratios. There lies the need for a composite-ratio. Otherwise the earning ratio itself could have been used as an index. But as the scheme is merely an outline, the ratios subsidiary to earning ratio are not being considered in calculating composite ratio. As our aim is to get the overall activities of a business represented by an index two more primary ratios have instead been taken into account. If profitability has been improved it requires to be seen whether liquidity has been maintained or not. Similarly position of capitalisation has to be verified as against a change in profitability or liquidity or both. So the other two primary ratios that have been used as components of the composite-ratio are current ratio and proprietary ratio. The supplementary ratios of both these primary ratios have also been kept out of consideration. Thus the composite-ratio has been calculated below with only three primary ratios, i.e. Earning Ratio; current Ratio Proprietary Ratio and each ratio has been calculated on the following basis:

(a) Earning ratio $= \frac{\text{Profit}}{\text{Capital Employed}}$,

in which

Profit = Net Profit + interest on debentures and loans − interest on investments.

and Capital Employed = Equity Capital + Pref. Capital + Reserve + retained earnings + Debentures + long term loans − intangibles (i.e. goodwill, Prely. Exp. Dr. balance of P & L Acc Deferred expense, etc.).

(b) Current ratio $= \frac{\text{Current assets}}{\text{Current liabilities}}$

(c) Proprietary ratio $= \frac{\text{Proprietary fund}}{\text{Total Assets}}$,

in which

Proprietary fund = Equity capital + Preference Capital + Reserves + Surplus − Intangibles.

and Total Assets = Fixed assets + Current assets − Intangibles.

3. Brown & Howard: Principles of Management Accounting, Macdonald & Evans Ltd., London, 1966, p. 103.
4. Ibido, pp. 103-105.
5. Joel Dean: Managerial Economics, Prentice Hall (India) p. 1.
6. Brown & Howard: p. 103

The said three ratios of five jute mills have been calculated for the years 1967 and 1968 from their respective balance-sheets and profit and loss accounts on the basis as intimated above. They are given in Table 1 below:

Table 1

Ratios for the year 1967 and 68

Mills	*Earning ratio*		*Current ratio*		*Proprietary ratio*	
	1967	1968	1967	1968	1967	1968
A	*.10	.07	*3.52	3.97	.67	.73
B	.06	.04	1.99	2.87	.36	.42
C	.49	.03	4.37	5·61	.27	.25
D	.05	.06	7.60	5.87	.34	.33
E	.10	.07	2·09	2.06	·31	.39

*Ratios marked with an asterisk are medians of each type of ratio in the year concernod.

(*iii*) *Weights*

Profitability has evidently to be given the highest importance at least in case of private sector industries. Accordingly the earning ratio is given the weight 3. Current ratio, which is considered next in importance, is given the weight 2. The proprietary ratio bears the weight[1].

(*iv*) *Base Period*

Suppose the year 1967 is taken as the base period. But that is not enough. The question that arises is that ratios of which firm would be considered the ratios of the base period. It is very difficult to pick up any one of the firms as, what may be called, the 'representative' firm. Opinions are sure to differ as to the criteria for choosing the 'representative firm'. One way out may be to take the average of the ratios of each kind of all the firms in a given year. But arithemetic average is one which is only computed but has no existence in reality. That is why the Centre for Inter-firm Comparison depends on first quartile, median and third quartile in case of inter-firm ratio analysis.[7] For avoiding complications only the median of each ratio in the year 1967 is taken as the ratio of the base-year. The medians are marked with an asterisk in Table 1. They are treated as equivalent to 100 in each case and the ratios of each group are revised in the same proportion by multiplying them by a fraction $\frac{100}{\text{median}}$. The revised versions of the ratios of each firm are now multiplied by their respective weights. The aggregate of the products is divided by the total of the weights (=6), and the result in each case gives the composite ratio or index of the firm in relation to the composite-base-ratio being equivalent to 100. The working is shown in Table 2 on page 201.

It might have been observed that, though the medians of the ratios of the base-year are actuals what may be considered the base-firm is really imaginary. The said imaginary firm virtually makes the 'representative firm'. It seems to be a better arrangement as the ratios of the said 'representative firm' consist of the 'medians' of the actual ratios of the existing firms. The composite ratios have been worked out above on the basis of the method usually used in compiling index number of prices. Other methods may also be used. As for instance Parkinson used the weights as percentages of their sum (sum of the weights actually used was, therefore, always 100) with other necessary modifications of minor nature.[8]

7. J. Batty: Management Accounting, Macdonald & Evans Ltd. London, 1966, pp. 430-31.
8. BB Parkinson: Accountancy Ratios in Theory and Practice, Gee and Comp. (Publishers) Ltd., 1951, pp. 74-79.

Table 2

Inter-Firm Comparison Results Showing Composite-Ratios

(The original ratios are taken from Table 1)

Mills	Year	Revised weighted Earning-ratio (Original ratio $\times \frac{100}{\text{median}} \times$ Weight)	Revised weighted current-ratio (original ratio $\times \frac{100}{\text{median}} \times$ Weight)	Revised Weighted Proprietary ratio (Original ratio $\times \frac{100}{\text{median}} \times$ Weight)	Aggregated Revised Weighted ratios	Composite ratio (Prev. Column ÷ Total Weights 3+2+1=6)
1	2	3	4	5	6	7
A	1967	$.10 \times \frac{100}{.10} \times 3 = 300$	$3.52 \times \frac{100}{3.52} \times 2 = 200$	$.67 \times \frac{100}{.34} \times 1 = 197$	697	÷6=116
	1968	$.07 \times \frac{100}{.10} \times 3 = 210$	$3.97 \times \frac{100}{3.52} \times 2 = 226$	$.73 \times \frac{100}{.34} \times 1 = 215$	651	÷6=109
B	1967	$.06 \times \frac{100}{.10} \times 3 = 130$	$1.99 \times \frac{100}{3.52} \times 2 = 113$	$.36 \times \frac{100}{.34} \times 1 = 106$	399	÷6= 67
	1968	$.04 \times \frac{100}{.10} \times 3 = 120$	$2.87 \times \frac{100}{3.52} \times 2 = 163$	$.42 \times \frac{100}{.34} \times 1 = 124$	407	÷6= 68
C	1967	$.49 \times \frac{100}{.10} \times 3 = 1470$	$4.37 \times \frac{100}{3.52} \times 2 = 248$	$.27 \times \frac{100}{.34} \times 1 = 79$	1797	÷6=300
	1968	$.03 \times \frac{100}{.10} \times 3 = 90$	$5.61 \times \frac{100}{3.52} \times 2 = 319$	$.25 \times \frac{100}{.34} \times 1 = 74$	483	÷6= 81
D	1967	$.05 \times \frac{100}{.10} \times 3 = 150$	$7.60 \times \frac{100}{3.52} \times 2 = 432$	$.34 \times \frac{100}{.34} \times 1 = 100$	682	÷6=114
	1968	$.06 \times \frac{100}{.10} \times 3 = 180$	$5.87 \times \frac{100}{3.52} \times 2 = 334$	$.33 \times \frac{100}{.34} \times 1 = 97$	611	÷6=102

Table 2 (Contd.)

1	2	3	4	5	6	7
E	1967	$.10\times\frac{100}{.10}\times 3$ $=300$	$2.09\times\frac{100}{3.52}\times 2$ $=119$	$.31\times\frac{100}{.34}\times 1$ $=91$	510	$\div 6=$ 85
	1968	$.07\times\frac{100}{.10}\times 3$ $=210$	$2.06\times\frac{100}{3.52}\times 2$ $=117$	$.39\times\frac{100}{.34}\times 1$ $=115$	442	$\div 6=$ 74

Similarly, Sengupta illustrated a method in which the weighted averages of the original measures of the ratios of each firm in each year were later on revised on the basis of the same for the base-firm in the base-year being considered 100.[9] The results, in the latter case may slightly differ for obvious reasons.

Table 2 shows the composite-ratios as worked out. They speak for themselves how they represent the overall business activities of firms. Each composite-ratio can at an instance not only be compared with the corresponding composite-ratios of other firms in the same year but with that of the same firm also in a different year. Thus, a firm can form immediately an idea about how it has fared in comparison with other firms in any year and what improvement it has made over its activities in the previous year.

It is not in any way claimed that composite-ratios as computed above are faultless. They are more likely to be defective because the process of computation has been shown only in an outline as an illustration. While discussing inter-period comparison of the same firm, some of the drawbacks have already been pointed out. But there is one advantage in case of the latter. The system of accounting and the nomenclatures used are, more or less, the same from year to year in case of the same firm. But that uniformity cannot be expected when a number of separate firms is involved. Such uniformity is essential in case of Inter-Firm Comparison even by ratio-analysis, not to speak of composite-ratio mechanism.[10] Component ratios have also limitations.[11] As already pointed out, as a single item, they may often be misleading. A composite ratio, which is the resultant of a number of ratios, may only be expected to make up these limitations. In fact, if the number of ratios taken is larger, they are judiciously chosen and developed and the weights are fixed by repeated experiments. composite ratios can offer good potential for Inter-Firm Comparison. □

9. S Sengupta: A Text Book of Advanced Accountancy, (Annex), p. 18

10. The Chartered Accountant—Vol. XII, Part XI, May, 1964 article by SN Cooper, pp. 550-558.

11. The Chartered Accountant—Vol. XIII, Part—II, August, 1964 article by LR Rao, pp. 51-53.

Diagnostic Survey of Inter-Sectoral Indices: A Study of Public and Private Sector Enterprises

Dr DS Ganguly*

The general picture of macro-analysis of the public enterprise performance on a comparative level of the private sector seems to be discouraging. This kind of analysis suffers from lopsided view of performance factors inasmuch as it lays more emphasis on business efficiency than economic efficiency in the wider spectrum of social objectives of public enterprises. Because of differentials prevalent in different facets of industries, a number of factors can upset the diagnostic analysis in a study of Inter-Firm Comparison. Non-comparable data can result in variances in the process of evaluation of performance. A uniform application of efficiency criteria for all types of enterprises is a faulty notion of performance audit. It is desirable to distinguish between industry that would go to strengthen a segment of economy with long-term effectuation and an industry that may vie with the private sector on a competitive level of commercial gains. No doubt, with possible constraints a kind of pragmatism can be invested so that comparative analysis proceeds with rationality.

In a study of Inter-Firm Comparison, a host of complexities tend to upset the diagnostic analysis due to differentials prevalent in different facets of industries. Non-comparable data play a good deal of variances in the process of assessments and conclusions. Nevertheless, differentials of variables and measure-components of firms are never treated as a staggering phenomenon to throw out a comparative inter-industry or inter-sectoral analysis. With possible constraints, a kind of pragmatism has to be invested so that the analysis can proceed with rationality, though no conclusion can claim a universal acceptability. A distinction is sometimes made between economic efficiency and business efficiency of an enterprise which notion stems from social objectives and private motives behind an enterprise[1]. But this distinction is, more often than not, misplaced inasmuch as in a wider spectrum of developing economy with a socialist bias social objectives and private objectives can hardly vary widely. Yet a notion of distinction seems to be hovering around the approach-mark of efficiency indices of an industry where sectoral belongingness becomes pertinent.

Macro vs Micro Analysis

Inter-Firm Comparison can be said to be the technique of evaluating economic performances of comparable enterprises in a given time to

* Professor & Head of Dept. of Commerce, Burdwan University.

1. Amey LR : The Efficiency of Business Enterprises, 1969 p. 148

indicate optimum-base of an enterprise in a given condition and diversification-flow for maximisation of results. This notion of Inter-Firm Comparison has been extended from inter-industry level to intra-segment and inter-sectoral domains within a comparable range. The conceptual evaluation of performance, whether within a particular segment of industry or on inter-industry basis or inter-sectoral approach, have to embrace a great many tools to modulate the prevalent variances in crucibles of uniformity or base-model to make the audit-study meaningful and acceptable. In India, the growth of public sector enterprises has offered a convenient opportunity to make a comparative study on the level of respective efficiency of the public sector enterprises and the private sector enterprises on a macro-level and on a micro-level in a limited way. The general picture of macro-analysis of public enterprise performance on a comparative level of the private sector seems to be discouraging and a great amount of disparaging comments are poured upon the public sector on the score of its poor performance. The following table reveals the picture:

Table 1

Investment and Ratio Analysis of Top 100 Companies

	Government Companies		*Non-Government Companies*	
	1969-70	1968-69	1969-70	1968-69
No. of Units	22	19	78	81
Investment (In crores)	1306.67	1078.07	595.23	554.49
Ratio of Profit before Tax/Loss				
(i) Paid-up Capital (P.C.)	0.56	0.17	32.94	30.57
(ii) Net Assets (P.C)	0.20	0.06	8.29	7.74
(iii) Sales/Main Income (P.C.)	0.38	0·12	7.34	6.99

Source : Indian Institute of Public Opinion, Quarterly Journal No. 69, p. 22.

Table 2

Profits in the Public Sector

(28 Major Public Sector Enterprises Representing 80 per cent of Capital Employed)

Year	*Profits before tax (Rs. Crores)*	*Capital employed (Rs. crores)*	*Percentage Return* ($\frac{2}{3} \times 100$)
1	2	3	4
1966-67	48.0	1384.3	4.2
1967-68	50.4	2018.2	2.5
1968-69	80·8	2476.1	2.5
1969-70	97.2	2996.8	3.2

Source: Bureau of Public Enterprises.

A close study of the above figures on a comparative level of the two sectors reveals that the efficiency demonstrated by the public sector compared to that of the private sector leaves much to be desired. The mounting capital investment in the public sector enterprises have been showing a declining profitability ratio with negligible favourable swing, however, in particular years due to particular reasons. The private sector enterprises under consideration had a capital input of Rs. 595.23 crores in 1969-70 as against Rs. 1306.67 crores in the public sector with profitability ratio recorded at 32.94 for the private sector as against 0.56 for the public sector. Surplus creating companies in the public sector has recorded profitability ratio at 16.74 as against the corresponding area of the private sector at 36.17.

Rationality of Public Sector Investment

This kind of comparative ratio analysis, it is argued, suffers from lopsided and myopic view of performance factors inasmuch as it tends to lay emphasis on business efficiency rather than economic efficiency in the wider spectrum of the objective functions of public enterprises which

are to be juxtaposed with social attainments of the enterprises. Public sector enterprises are said to be saddled with additional objectives which are counted as social rather than commercial. Built-in economic gains, such as asset building, widening of employment-base and pace-setting of growth, deserve to be taken into account as hall-mark of assessment of public enterprises. Indeed, there can be hardly any sharp difference of opinion over the socialistic judgement theory of performance of an enterprise. But here one is confronted with polemics of efficiency-function of an enterprise as to the areas of emphasis in the audit of performance.

Public sector investments in India have been pushed ahead on the score of a few shortcomings of the private sector. Firstly, the notion of social marginal net product as against private marginal net product concept of an enterprise has to be reckoned with as the key-note in the public sector investment decision. Secondly, as a curative measure of economic imbalances the investment criteria of the public sector are pertinent. And thirdly, regeneration and growth stimulus aspects of the public sector receive an overriding consideration in the public sector investment decision. None of the three parameters seems to be overtly present in the conception of the private sector investment. While conceptually the soundness of the public sector investment criteria can hardly be doubted, it would, however, be really worthwhile to take a note of the gap between the objective functions of public enterprises and the resultant performance.

Efficiency Indices

(i) RATE OF RETURN APPROACH: Growth of economy does not depend on the inputs alone as they are by themselves incapable to breed up the economy unless other ponderables are made to move in the desired direction as aides to growth economy. The investment decision aims at accomplishing some positive criteria and in the public sector they are socially biased. The logic of capital input must be sustained by economic reasonings of incremental returns[2], optimisation concept to bring about a balanced economy and positivism of growth-potential, and the attainments of these coherent factors can only justify capital investment. The investment rate in the public sector industrial undertakings has risen to an enormous extent which will be evident from the following table:

Table 3

Pattern of Investment in Public Enterprises

(Industrywise)

Industry	(Rs. in crores) 1964-65	1967-68	1969-70
Steel	890	1179	1419
Engineering	355	833	1020
Chemicals	198	350	489
Petroleum	241	378	399
Mining & Minerals	158	273	368
Aviation & Shipping	101	143	185

Source : Government of India—Annual Reports on the Working of Industrial and Commercial Undertakings of Central Government.

It will be pertinent now to study the indices of the public sector and the private sector enterprises on a comparative level for judging about the attainment of efficiency criteria of investments, both on macro-level and micro-level. The greatest emphasis is laid on the capital output ratio, although there is a good deal of difference

2. Amartya Sen : "Profit Maximisation and the Public Sector", John Mathai Memorial Lecture, Kerala University, 1970.

Table 4

Performance of Government Undertakings 1958-1965

(In terms of percentage)

	Public Sector				*Private Sector*			
	58-59	60-61	62-63	64-65	58-59	60-61	62-63	64-65
Gross Profit/Capital employed	5.36	5.00	6.75 (1.84)	5.78 (3.92)	10.59	12.62	14.33	15.42
Gross Profit/Sales	7.60	7.87	9.47 (4.94)	8.48 (8.91)	10.37	10.72	11.65	11.72
Net Profit/Net Worth	4.27	4.36	6.08 (—1.50)	5.31 (2·63)	9.77	10.50	9.78	10.67
Dividend Paid-up Capital	0.33	0.83	0.70 (0.25)	1·12 (0.40)	8.63	11.64	10.35	10.83

Note :—Figures in brackets are inclusive of Hindustan Steel Limited.

Source : Economic and Social Research Foundation, New Delhi, pp 20-21

in the concept of capital employed.[3] But this ratio analysis is considered to be the watchword in the audit of performance. The position spelt out by Table 1 is revealing where comparative performance of the public sector and the private sector enterprises are well pronounced. A trend of comparative results may be clear from Table 4.

(ii) ASSET-BUILDING APPROACH: It is often argued that mere profitability ratios cannot hold out a proper picture of performance as mediate rather than immediate factors of growth can probably make out strong parameters of efficiency judgment and one of them is asset-building capacity of investment. Asset building indices can, of course, be reckoned as strong logistic of capital investment, and a look at the picture will be a worthwhile study (Table 5).

It is evident from the above figures that the public sector undertakings have recorded a large volume of aggregate assets in terms of value and the percentage of aggregate net assets to capital comes to 281.7 in 1968-69 and 285.0 in 1969-70 and the corresponding figures in the private sector comes to 394.7 and 400.0. Obviously the above picture is not free from inadequacies as the number of units studied is only a few and a great many have been left out of the universe of statistical compilation. Nevertheless, the above figures are to be reckoned with as important indices of measure-factor. It becomes pertinent to consider how the assets in the public sector have been built-up to such an extent with a much less volume of paid-up capital. Assets can be built up either from retained profits or loan capital apart from paid-up capital. It is indeed an

3. For example: Reserve Bank of India takes "net assets" of a company as the total of capital employed. The Bureau of Public Enterprises takes gross block less depreciation plus working capital as the total capital employed. The Tariff Commission defined capital employed as net assets comprising fixed assets and current assets used in business less current liabilities and provisions. Federation of Indian Chamber of Commerce considers Net Worth and Debt as constituting total capital.

Table 5

(Rs. in crores)

	Government Companies			*Non-Government Companies*		
Year	*No. of Units*	*Paid-up Capital*	*Aggregate Net Assets*	*No. of Units*	*Paid-up Capital*	*Aggregate Net Assets*
1968-69	19	1078.07	3037·10	81	554.49	2190.67
1969-70	22	1306.67	3722.73	78	595.23	2365.29

Source : IIPO *op. cit.* p. 22

indication of financial soundness when assets accumulate as a result of internal resources generated through profits earned by enterprises year to year. Statistical data in this context of internal resources in the public sector may throw light on the source of accumulation of assets (Table 6).

Table 6

Internal Resources of the Public Sector

(Rs. in lakhs)

Year	*Generated by number of Units*	*Depreciation*	*Retained Profits/ Losses*	*Total Internal Resources*
1966-67		8108	(—)593	7515
1967-68		11328	(—)909	10419
1968-69	40	13416	752	14168
1969-70	43	14612	4791	19403

Source : Annual Reports on the Working of Public Undertakings.

The above table clearly indicates the poor position of retained profits as internal resources build up component. Moreover, there are public undertakings where the accumulated losses have far exceeded the amount of paid-up capital as per Table 7.

Table 7

Public Sector Companies Incurring Cumulative Losses More Than Their Paid-up Capital

(Rs. in thousands)

Name of Co.	*Paid-up Capital as on* 31-3-70	*Cumulative losses up to* 31-3-70
Heavy Electricals (India) Limited	50,00,00	53,76,32
Mining & Allied Machinery Corpn. Ltd.	20,00,00	26,47,07
Hindustan Photo Films Mfg. Co. Ltd.	5,82,00	6,24,48
Central Inland Water Transport Corpn. Ltd.	1,85,00	3,89,95
Tannery & Footwear Corporation of India Ltd.	15,00	48,18
National Buildings Construction Corpn. Ltd.	1,52,50	1,99,14
Total	79,34,50	92,85,14

Source : Government of India—op. cit.

The above undertakings can, therefore, be left out of the scene of internal resources generation whereas some of the undertakings such as air corporations, oil corporation and shipping

Table 8

Percentage Debt to Total Capital Employed (Public Sector)

Unit	1964-65	1965-66	1967-68	1963-64 to 1967-68
National Coal Development Corpn.	55.09	61.54	59.25	59.49
National Minerals Development Corpn.	29.59	n. a.	45.57	45.22
Fertiliser Corpn. of India	38.71	51.08	51.69	48.16
Fertiliser & Chemicals	56.64	66.86	78.94	67·13
Hindustan Steel	48.99	47.22	56·75	50·22
Heavy Electricals	67.71	65.18	86.51	72.45
Hindustan Machine Tools	40.07	47.89	50.11	47.57
Indian Oil Corpn.	17.39	57.63	54.91	60·64

corporation, have obviously proved themselves to be internal resources generating concerns. But when paid-up capital and retained profits cannot cover up the volume of aggregate assets, obviously the attention has to be focussed on loan capital as linkage with assets in an enterprise. Table 8 speaks out the linkage of debts with aggregative assets formation. The corresponding ratio in the private sector industry is given in Table 9.

The growth of assets in the public sector can, therefore, be taken to have a positive bearing on the debt capital of the undertakings which on a micro-analysis of percentage debt to total capital ranges from 45 to 78 in the public sector whereas in the private sector the corresponding figures being from 20 to 50. Hence from the point of view of indices of aggregate assets, the position of the public sector does not indicate any gratifying picture. A look into the components of stock of capital goods in the enterprises can well impart an idea about the acquisition rate of different types of capital assets. The overall inventory position in Table 10 can be treated as an indicator of trend of growth of inventory holdings in the public sector.

Table 9

Percentage Debt to Total Capital Employed in the Private Secotor (Industry-wise)

Industry	*No. of Units*	1963-64	1965-66	1967-68	1963-64 to 1967-68
Mining	5	33.97	36.37	41.73	37.33
Chemicals	24	43.99	44.10	46.72	44·90
Basic Industrial Chemicals	11	49.73	49.61	52.14	50.36
Pharmaceutical Products	7	25.65	34.79	38.12	32.31
Basic Metal Industries	13	37.91	34.21	41.02	38.05
Machinery (Electrical & Non-electrical) and Metal Products	49	45.02	46.31	53.85	48.23
Petroleum Refining & Products	4	30.16	23.26	21.55	25.50

Source : Tables 8 & 9—Economic & Social Research Foundation, New Delhi : Top 300 Companies.

Table 10

Overall Inventory Position of Running Concerns in the Public Sector

(Rs. in crores)

	1965-66	1966-67	1967-68
No. of Enterprises	40	44	55
Raw Material, Stores & Spares	230·0	363·0	422.0
Works in Progress	84.0	63.0	84.0
Finished Goods	44.0	166.0	305.0
Other Items	22.0	42.0	62.0
Total	380.0	634.0	873·0

Source : Annual Reports on Working of Industrial & Commercial Undertakings of Central Government

While the above statistics hold out the increasing rate of inventories in the public sector, a comparative view of the public sector and the private may well be taken from Table 11. These figures unmistakably spell out the excessiveness of inventory holdings in the realm of the public sector and this is obviously a weak link in the public sector economy of the country as a high percentage of capital gets locked up which tends to ignore altogether the opportunity cost of capital. The position of components of aggregate assets of Heavy Electricals India Limited set out in Table 12 may be illustrative of the matter:

(iii) CAPACITY UTILIZATION APPROACH: Capacity utilisation process depends on aggregate supply factors of production pressed into the enterprise simultaneously with capital inputs and capacity creation. Capacity utilisation being a function of factor inputs may not be fully accomplished due to bottle-necks that may be beyond the control of the enterprise authority. But recurrence of idle capacity or underutilisation of capacity marks out a positive symptom of malady in the enterprise and prophylactic is called for. Admittedly, successive doses of capital inputs in the public enterprises tend to augment capacity of the enterprises. It will be profitable to look at the rate of capacity utilisation to get a picture of under utilisation of capacity as a parameter of audit of performance of the public sector enterprises (Table 13).

Table 11

Ratio of Inventories to Sales

(In percentage terms)

Public Sector 28 *Major Companies*				*Private Sector*		
Industry Group	1966-67	1967-68	1968-69	*Industry*	1964-65	1965-66
Steel	63.2	68.1	56.1	Iron & Steel	28.2	29.8
Engineering	23.2	235.6	172.7	Non-ferrous Metals	36.0	33.1
Fertiliser	51.4	53.0	55.4	Electrical Machinery	30·0	32.9
Mining & Minerals	78.3	54.7	43.0	Machinery other than electrical	40.9	41.2
Petroleum	20.1	27.2	37.8	Basic Industrial Chemicals	33.9	32.4
				Cement	28.8	28·3

Source : HPO Quarterly Journal No. 65, p. 47 & V. Dagli : A Profile of Indian Industry p. 301.

Table 12

Aggregate Asset Position of Heavy Electricals India Ltd.

Base 1960-61 = 100

Period	*Gross Fixed Assets*	*Net Fixed Assets*	*Inventories*	*Gross Capital Block*	*Net Capital Block*
1960-61	100.0	100.0	100.0	100.0	100.0
1963-64	258	240	852	293	276
1966-67	304	242	2000	402	346
1967-68	324	250	2921	474	469
1968-69	344	257	3792	543	463

Source : Lok Udyog, March '71 p. 1388

Though the rate of capacity utilisation is higher in the private sector than in the public sector but obviously the public sector has been picking up. Hindustan Steel, for instance, has shown capacity utilisation at 89 per cent in steel ingots, 91 per cent in finished steel and 100 per cent in pig iron for sale during 1970-71. Taking into account various constraints under which the public enterprises function in India, no serious gap in the capacity utilisation in the public sector can be attributed though a sense of complacency is out of question in the existing position. When the record of capacity utilisation does not hold out a very discouraging picture the reasons for low rate of return must be ascribed to some other phenomena and expenses ratio may denote the position in a limited way, as high ratio of expenses should be reckoned as a major factor in the culmination of poor results in the realm of the public sector. A look at the expenses ratio may show up how increasing expenses ratio has gone to frustrate expectations from the public enterprises (Tables 14).

Table 13

Percentage of Installed Capacity Utilised

Public Sector (Major Industries)			*Private Sector*		
Unit	1969-70	1970-71	*Industry*	1964-65	1965-66
Hindustan Steel:			Chemical & Chemical Products	74.8	74.1
Bhilai	75	77			
Rourkela	61	56			
Durgapur	51	38			
Hindustan Machine Tools	47	40			
Heavy Eng. Corpn. Ltd. Castings	61	43	Basic Metal Industries	75.1	66.9
Hindustan Antibiotics (Average)	82	67	Machinery except electrical machinery	92.3	73.5
Fertiliser Corpn. of India (Average)	76	68	Petroleum & Coal Products	93.7	87.7
National Coal Dev. Corpn.	81	80			

Source : Annual Reports & V. Dagli Op. cit p. 26
(Average taken at simple average method)

Table 14

Expenses Ratio of Major Public Sector Industries

	1966-67	67-68	68-69
Hindustan Machine Tools	85.4	98.5	98.9
Heavy Electricals	127.9	120.1	109.2
Heavy Engineering Corpn.	248.2	319.7	181.2
Hindustan Aeronautics	91.9	90.0	90.0
Hindustan Steel	n.a.	122.4	181.5
Fertiliser Corpn. of India	95.9	88.8	86.4
National Coal Dev. Corpn.	92.9	93.2	90.7
National Minerals Development Corpn.	96.5	104.2	103.1
Indian Oil Corpn.	96.6	96.5	95·5

Source : IIPO Quarterly Journal 65

High expenses ratio tends to eat away the gross value added and the net output in the public sector is much less than that in the privat sector which will be evident from the Table 15.

The statistical figures of comparative performance of the public and the private sector industries are, however, only indicative as the data are based on non-comparable components and factor differentials which tend to vitiate proper appraisal of performance on a comparative level. Considering the inadequacies of parameters, the above reading can only be taken as suggestive of areas of weakness in the public sector calling for remedial actions.

Investment Decision: Choice of Technique

Although the various symptoms are apparent but the diagnosis of the malady of the public sector is rather difficult in an objective way. A great deal of disparagement of public enterprises exists due to a good deal of misplacement of efficiency criteria as against that in the private sector. Apart from the nascency of industrial ventures in the public sector a good deal of social objectives are attributed to the public enterprises to be accomplished. Excessive parliamentary scrutiny sometimes stifles the management to take the expected initiative and the management of the enterprises has to look up to the administrative ministry for clear directions remaining free from entanglement in consequences. Nevertheless it would be worthwhile to dilate on the approach-factors for projecting the efficient conduct of the public enterprises and also bringing about a rationality in the future investment decisions in the realm of the public sector.

Table 15

Gross and Net Output (Value Added) in Government and Private Undertakings

(Rs. in crores)

Year	*Net output*		*Gross output*	
	Government	*Private*	*Government*	*Private*
1958-59	17.11	160.76	69.22	603.73
1960-61	27.71	259·24	133.34	1046.67
1962-63	42.99	330.27	208.54	1400.00
	(56.90)		(280.89)	
1964-65	64.54	430.97	357.42	1656.92
	(112.34)		(564.34)	

Source : Annual Reports and Annual Survey of Industries

The induced investment in the public sector in India more often than not, does not stem from a rational analysis of priority judgment opportunity, cost of capital, cost-benefit equation and optimisation concept of the projects. A good deal of time-lag and lead time in the realm of factor inputs tends to activise the projects in an altered scene much different from that originally counted in conceiving the projects pushing up initial costs and costs of operation due to various bottlenecks developed in process of time. Successive doses of capital have accelerated capacity creation without much consideration of supply-factors and market demand of products (the qualitative aspects being ignored). These are the general impressions about the public enterprises. While some of the facets are true, some are, however, the result of misgivings about the inner working scheme of the enterprises and also from the point of view that commercial profitability is an adequate criterion in evaluating industrial projects due to various "imperfections" of the market.[4] And a commercial loss in the public sector enterprise may be a social gain.

In the matter of investment decision both the public sector and the private sector are confronted with problems of choosing the fields of investment on a balanced judgment as between capital-intensive core and heavy industry with long gestation period and employment-oriented industry with earlier fructification prospects. A thick investment of concentrated establishments *versus* the thin investment process of wider coverage therefore comes to the fore calling for a wise investment decision.[5] Investment in the field of employment-oriented industry does not always subscribe to the ideals of economic reasonings and it is largely induced by exigency of the situation. The line of thinking that would guide the area of investments in the private sector can hardly differ very widely from that in the public sector as both the sectors are functioning in the same environment under an accepted idealism. Still a difference between the private motive and social objective comes in no small way. The private sector has had to think in terms of exploiting the area of second line of industry that would subserve the interest of consumers at large, that is, production of basic commodities, such as, food products, textiles and piece goods, general engineering goods, drugs and pharmaceuticals, housing materials and low-cost durable consumer goods. This would ensure investment of moderate dimension, wider dispersion of industrial establishments, deconcentration of economic power and infusion of social attitude to business in the domain of the private sector.

Public sector has to ensure growth of infrastructure towards creating industrial opportunity and exploit the fields of basic and core sector of industrial economy. Here, the opportunity cost of capital has to be adequately weighed. A question generally crops up whether the public sector should now cry a halt to further investment process due to poor returns registered so far as well as the characteristics of inelasticity of the existing projects from the point of view of employment, production and pricing. It is pertinent to note that the volume of employment in Hindustan Steel Limited remained almost static during the last three years like the traditional industries in the private sector which are rather showing declining employment curve.[6] But the

4. UN Industrialisation and Productivity Bulletin 15, p. 5.
5. GM Meier : Leading Issues in Economic Development, 1970 p. 342.
6. PN Dhar (Ed) : Wages and Productivity in Selected Indian Industries by JN Sinha & PK Sawhney.

public sector economy being a continuous process, investment cannot be halted and when investment becomes inevitable as a growth process of economy a sound judgment in the choice of technique becomes imperative. For example, if steel industry has got to be expanded on the score of attaining built-in industrial base, the question arises whether investment should go towards expansion of the existing plants or in sponsoring new projects. If the decision on industrial location is not influenced by political attitude and also spatial consideration does not set a limit to the expansion of the existing steel plant, capacity may be raised by additional investments in the existing plants and this may ensure lesser costs of investment and speedier production than in the case of choice for new projects where civil expenditure and time-lag may prove to be less economic, given the same efficiency factors in both cases.

In the investment decision, another problem comes to the fore, namely whether to conceive a big-scale industry with high volume of capital and factor inputs and managerial skills involved or medium-scale industry with less capital and factor-inputs dimension. Big-scale industries in India have posed many staggering problems as to their economic viability. It would be better if investment decision is now directed to medium-scale industrial establishments that are easily manageable and where dispersion scheme may be effected without difficulty as to the dimension of the industry. The idea of mini-steel project is a welcome innovation from the point of view of resources and manageability. In other sectors also units of medium dimension should be conceived for the sake of satisfying the tenets of factor inputs, dispersal measure and wider employment.

Attributes of social objectives and commercial efficiency at the same time to the public enterprises, more often than not, seem to be ill-juxtaposed, and this phenomenon gives rise to misjudgment of efficiency of the public sector. A uniform application of efficiency criteria for all types of enterprises is a faulty notion of performance audit. When commercial viability and social tenets of an enterprise are mingled together, the latter should get a better deal in the appraisal of performance. Hence it is necessary to distinguish between industry that would go to strengthen a segment of economy with long-term effectuation and industry that may vie with the private sector on a competitive level of commercial gains. Fertiliser industry and light engineering industry are illustrative of this distinction approach as the former would tend to mould the agrarian economy of the country in a better shape whereas the latter may be treated as a supplement to the existing units in the private sector. The efficiency criteria should thus necessarily differ in both cases.

On the whole, public sector projects should be judged from three distinct angles—(a) in what way and to what degree they are pace-setters of economy, (b) in what way and to what degree they are moulding the private sector in crucible of social motives in their economic pursuits, and (c) in what way and to what degree they are fulfilling the expectations of the society. From the point of view of the deficiency in economic performance of the public enterprises both in absolute terms and relative terms and gaps in attainments of social objectives there is enough reason for "credibility gap" in the domain of the public sector which the discerning public cannot but be concerned particularly about the logistics of public sector investment.

The logic of investment in the public sector enterprise has to be justified by virtue of project analysis both on individual level and aggregate level as the structural interdependence

of projects has got be admitted in the wider reckoning of economic judgment of investments.[7] In the project evaluation the methods and techniques should be selected on a rational basis amongst so many alternative methods such as pay-back method, fund-flow analysis, present value method, value added basis.[8] Input-output coefficient and their changes will project results over time.[9] The rationality of cost-benefit analysis should be realised as guiding factor of investment in the realm of the public sector, and also sustainability of investment should receive ade uate consideration in deciding on investment lest any investment may turn to be rueful in future.[10]

Diversification aspects should receive particular attention in the matter of investment decision to ensure fuller use of capacity, manpower, import substitution measures and innovative skill and judgment.

Disparagement: Stimulus or Hindrance!

Public investment is subject to public scrutiny and objective judgment of performance of public enterprise should never be grudged. But a rethinking is necessary about extreme form of criticisms levelled against the public enterprises both in Parliament and in public forum on comparatively small lapses. In a growing economy when the public sector has perforce to assume a leading role in shaping national economy there is need of restraint and cautiousness in throwing out hot iron of perforation; otherwise, seeds of discontent are bound to germinate in the personnel who would be prone to become mere cogs in the machine rather than levers of strength. A human approach and understanding is necessary to judge and distinguish between background situations before any bitterness is poured upon the performance of the public sector which are only beginning to pick up commercial postulates connected with an enterprise. It is general experience that lapses on the side of the public enterprises are highlighted in much more vociferous and blistering way than merited by the occasions though lapses of no lesser dimension are not infrequent in the private sector. This kind of disparagement acts as a hindrance to management rather than proving stimulative to activate management of the enterprises. "Self-denying ordinance" theory should better be demonstrated by parliament so that adequate grounds are prepared for the public to make objective judgment of the public sector performance. The case, however, for a positive line of action to register involvement of personnel with a sense of belongingness in the public sector enterprises is undeniably strong.

Need of Inter-sectoral Cooperation: Joint Sector Approach

A cohesion between the public sector and the private sector is the need of the hour in order to have a dispassionate view of inter-industry and inter-sectoral problems and plans. Mutual exclusiveness of either sector is out of question in the concept of mixed economy where both the sectors are bound to go hand in hand. Appropriate bodies should be set up at different levels to uphold the theory of inter-sectoral co-operation. The newly-conceived structural innovation of joint sector in India indeed underscores the significance of co-operative model of the two sectors to usher in a new economy in the country where the tenets of cross-fertilisation would be pronouncedly assertive. □

7. HB Chenary, in Structural Interdependence and Economic Development, T Barna (Ed) pp. 20-22.
8. Joel Dean : The Management of Corporate Capital, Ed. E. Solomon pp. 31-34.
9. GE Boon : Economic Choice of Human and Physical Factors in Production, Chapter 7.
10. P Dasgupta, in UN Industrialisation and Productivity Bulletin 15, pp. 5-9.
    SN Acharya: Investment Decisions: Methods and Applicability, Lok Udyog, Sept., 1970 p. 680

Inter-Firm Comparison: A Means to Improve Performance

OK Ghosh*

The efforts made in FCI in the field of Inter-Firm Comparison have been highlighted. According to the author, the FCI has selected 17 management ratios covering all disciplines like production, financial, sales, materials, etc. for comparing the performance of its various units. The author hopes that in the years to come, the inter-firm studies will be expanded to seek comparative figures for the fertiliser industry in India as a whole.

IN a traditionally-closed society like ours, where business has been dominated by 'families', it is not surprising that the idea of sharing business data and experience is lacking. The growth of public sector and also the opening up of the close family businesses to professional managers and participation by public is leading to the demand for maximising productivity and performance, and not merely doing better than last year, through organised sharing of data and experience.

The United States, Germany and Switzerland have been the leaders in promoting the concept of Inter-Firm Comparison. The British made a late start in the sixties. While this concept has yet to take roots in India in a formal way in operational and financial areas, it has been an accepted practice to apply the principles involved in arriving at the levels of remuneration of executives and workers. The growing interest in this area, as indicated by this special issue of the NPC journal *Productivity* will eventually lead to some organisation taking up the onerous responsibility of providing this service to the industries in India generally, although it may have to start in a selective way. The Bureau of Public Enterprises could possibly be a major participant in this as far as the public sector is concerned.

* Director, Fertilizer Corporation of India Ltd., New Delhi.

The FCI Experience

As the Fertilizer Corporation of India (FCI) expanded from two units in 1961 to five in 1971 and three getting ready to go on stream in 1972, it has been eager to inject competitiveness and comparability in the measurement of performance of units under its management. While the general remark that "No two firms are comparable" is true, what we did was to seek out areas of comparability in the FCI. The processes used are as divergent as coal and gypsum to naphtha for raw materials. Some of the units are highly labour-intensive while others are more or less fully automatic. The Units are located over a wide area, from Assam to Bombay.

agement to key areas. The graphic presentation makes visual comparison easy and effective, the statistical portion provides the basic data for comparison and the narrative portion reviews the position briefly, explores the reasons and points to areas requiring further study. An illustrative format relating to one of the ratios "BOOK DEBTS TO TOTAL SALES IN NUMBER OF DAYS" can be seen in Fig. 1. This Report is normally ready by the end of the month following the close of the quarter. This is forwarded to all the General Managers of the units that contributed data to the Report, to the Directors of the Corporation and to other top management personnel at the Central Office. The Director (Finance) of the Corporation in a forwarding note to the General Managers and the Directors draws attention to the more important findings and seeks follow-up action from the General Managers.

Conclusion

The absence of a proper institutional arrangement for the sharing of data and information among the fertilizer industries in India, especially between Public and Private Sector Units, has forced us to limit the study and review to FCI Units. This has, however, one added virtue. The management style and the systems and procedures which provide the environmental factors are uniform in FCI and hence the ratios are comparable. This encourages General Managers to accept the findings and look for areas of improvement to reach the best FCI performance. Our next step is to enlarge the study to include a few units from outside FCI but within Public Sector. Our ultimate goal is to seek comparative figures for the industry in India, as a whole.

INDIA IN THE YEAR 2000—WILL OVERTAKE CANADA IN 30 YEARS

Among the fifty most important countries in the world, India will rank second in terms of population and ninth in terms of Gross National Product (GNP) in the year 2000. This is the gist of a projection published recently by the Swiss magazine *Vision*. It estimates India's population to reach 922 million in 30 years from now, second only to China with 1,037 million. The Soviet Union and the US will occupy third and fourth rank respectively.

India's GNP (at 1967 prices) will increase from $ 45,900 million in 1967 to $ 92,200 million in 1980 and $ 235,000 million in 2000. It thus will overtake Canada which by that time will reach only $ 200,000 million. The US will continue to occupy the first rank, according to the Swiss study, with a GNP of $ 2,635,000 million, followed by the Soviet Union, Japan and West Germany. China with $ 363,000 million will move up to 6th place and overtake Great Britain. However, while overtaking highly-developed countries due to its rapid industrialisation, India, with the world's second largest population, in terms of GNP per capita will continue to rank only 48th in 30 years from now. Here obviously, is one of the weak points of the Swiss study as it takes for granted that India's population will continue to grow at the present rate.

India's GNP per capita will rise from $ 90 in 1967 to $ 136 in 1980 and $ 255 in 2000. The most spectacular progress in this field will be achieved by Japan. Ranking 20th in 1967, it will move to 4th by 2000 and reach $ 6,540. Occupying the first three positions will be the US ($ 9,250), Sweden ($ 7,740) and Denmark ($ 7,110). Apart from Japan, the most successful nation in Asia will be South Korea whose GNP per capita will be increased sevenfold, followed by Taiwan with a five-fold increase. In conclusion the study says that while tremendous progress will be achieved, even in thirty years from now half of the world's population will live in severe poverty.

Accountancy Ratios and Balance Sheet Interpretation

S Ramaswamy*

In considering the state of affairs disclosed by profit and loss accounts and balance sheets, it is frequently helpful to make use of accountancy ratios. Ratios can be either "structural" or "trend". Structural ratios are those consisting of two different items from the same set of accounts. "Trend" ratios tabulated for a series of years—are, however, more helpful as these show whether the state of affairs which the particular ratio portrays is improving or deteriorating.

ACCOUNTANCY ratios may be interpreted on one or more of the following ways:

1. By examination of trends within the same business over a period of years.
2. By comparison with yardsticks based on knowledge of relevant conditions and/or commonsense.
3. By comparison with yardsticks derived from inter-firm comparisons.

This will reveal *inter alia*:

1. Capital and profit sufficiency
2. Solvency and credit standing
3. Over or underinvestment in plant and other permanent assets
4. Over or underinvestment in working assets
5. Financial efficiency, generally.

Accountancy ratios must be interpreted with care as they often give a very misleading picture if considered in isolation of other available data. They must not be considered as a *substitute for judgment*. They are clues rather than conclusions and incite enquiry rather than prove. The ratios covered in these notes are the ones commonly used by Accountants and analysts, and the conventions are those usually adopted.

A Simple Balance Sheet

The explanatory notes which follow may be more clearly understood by reference to the diagrams which are attached. In these diagrams the various points are illustrated by drawing up the appropriate balance sheet, in horizontal form, to scale, i.e., the various items are shown as blocks, sized in proportion to their assumed monetary book value. A balance sheet, in simple broad headings, together with some of the more important parameters is shown in Fig. 1.

* Professor, Financial and Management Accounting, NITIE, Bombay-76

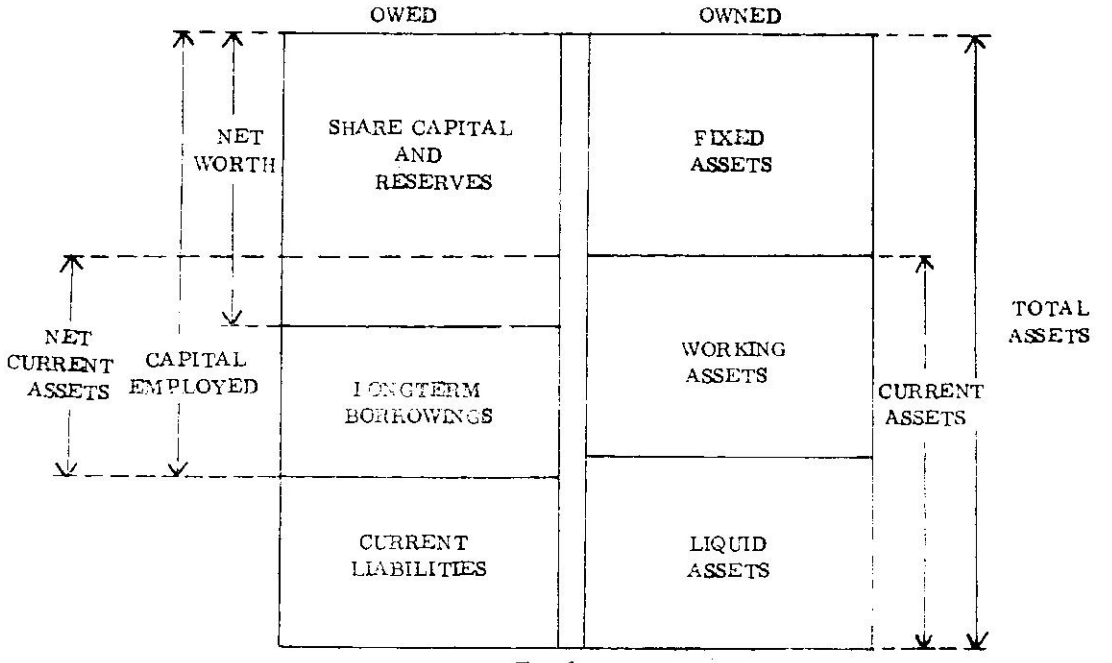


FIG. 1

NOTES: *There often appears an item "INTANGIBLE" assets shown below fixed assets. This represents such items as goodwill, Patents, Trade Marks. Where intangible assets are excluded from total assets, the latter is referred to as total Tangible Assets and NET WORTH as Tangible Net Worth.

*Net current assets are also referred to as NET working capital.

RATIOS

Current Assets to Current Liabilities (known as the "Current Ratio" or "Working Capital Ratio"):

Working capital represents the excess of current assets over current liabilities and it can be assumed that these are likely to be realised and met respectively within a relatively short period. This ratio, therefore, gives a measure of the ability of a company to meet its current obligations, to increase its volume of business and to be in a position to take advantage of opportunities as they arise:

Ideally the ratio should be 2:1 or greater:

Liquidity Ratio

An even more effective test of liquidity is the ratio of Liquid Assets to current liabilities. The exclusion of stocks removes from the calculation

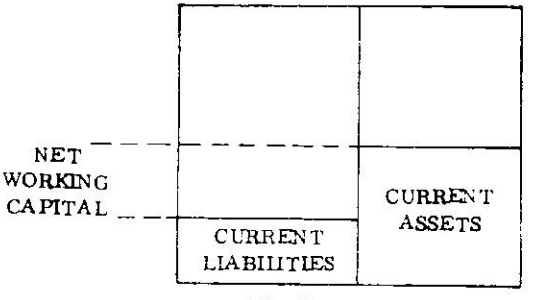


Fig. 2

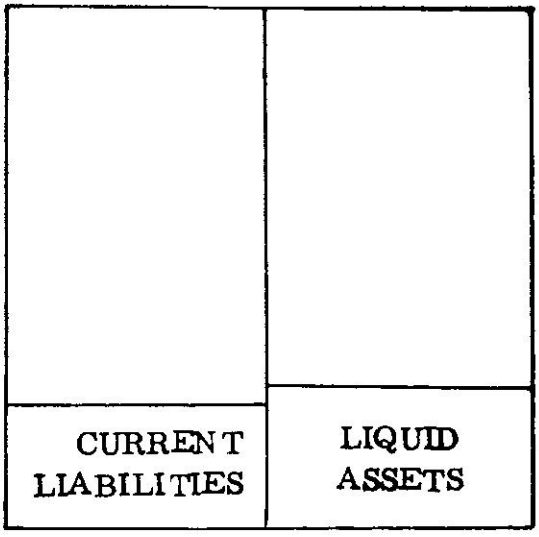


FIG. 3

any funds which may not be too readily realised. The ratio is calculated as

$$\frac{\text{Liquid Assets}}{\text{Current Liabilities and Provisions}}$$

and is considered satisfactory when it exceeds 1 : 1. The claims of creditors are accordingly covered by liquid resources where liquid assets are taken to be cash and short term debtors only, the ratio is referred to as the "Acid Test".

Current Liabilities to Tangible Net Worth

This contrasts the funds that creditors temporarily have at risk in a business. If intangible assets exist, the TNW will be less than the figure for Share Capital and Reserves by an amount equal to Intangibles, in the form of debts, with the funds permanently invested by the owners or shareholders. Since the invested funds, that is the tangible net worth, serve to guarantee the liquidation of creditor liabilities, it is evident that the smaller the tangible net worth and larger the liabilities, the less security do creditors normally have. Where a commercial or Industrial concern has a tangible net worth between Rs. 1 00,000 and Rs. 10,00,000 its operations should be carefully analysed if the current liabilities exceed two-thirds the tangible net worth. If the tangible net worth exceeds Rs. 10,00,000, its affairs should be studied closely if the liabilities exceed three quarters of the tangible net worth.

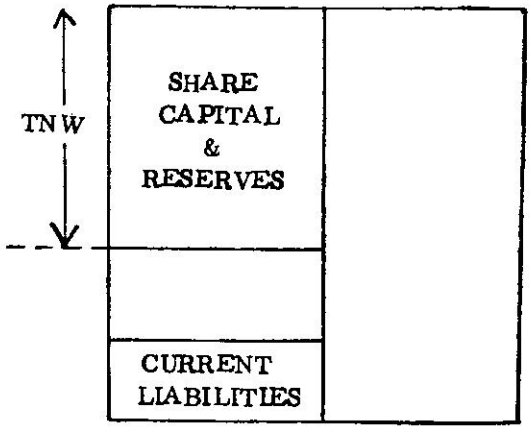


FIG. 4

Total Liabilities to Tangible Net Worth

For the majority of commercial and business enterprises, the figure of current liabilities and total liabilities are one and the same. Only when a mortgage, an issue of debentures or other obligations have a maturity of more than one year, is there a difference between the current and total liabilities. This ratio is an extension of the ratio of current liabilities to tangible net worth, where a business has long-term liabilities, and should be calculated in addition to and not in lieu. A ratio of total liabilities to tangible net worth in excess of 100% is rare. If the total liabilities exceed 100% of TNW, it clearly shows that creditors have more stake in the business than the shareholders or owners.

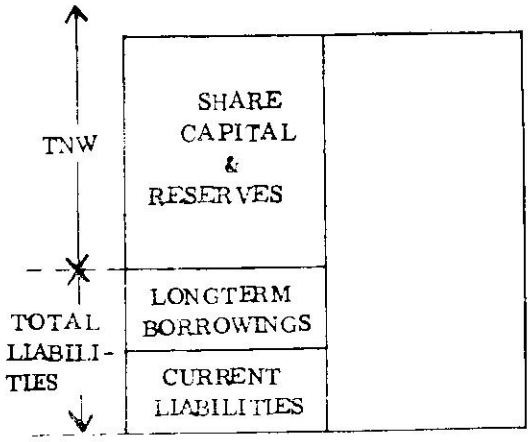


FIG. 5

Loan Capital to Net Working Capital

Where long-term liabilities exist (e.g. debentures) this Loan Capital of a commercial or industrial business enterprise should not exceed the net working capital, if the financial condition is to be considered sound. Where the loan capital exceeds the net working capital the relationship invariably is unbalanced. Under such circumstances, the entire capital is tied up in non-current assets and the concern must operate currently from day-to-day, on long-term borrowed funds. The interest charge on the funded debt can be a severe competitive handicap in itself. On the other hand, it may be of extreme benefit to equity shareholders by reason of the high gearing.

Fig. 6 depicts a situation where loan capital is greater than NWC and shows clearly that where this is so the entire share capital is tied up in fixed assets.

Fixed Assets to Tangible Net Worth

For every line of commercial and industrial business activity there is a certain proportion of the tansible net worth that may typically be

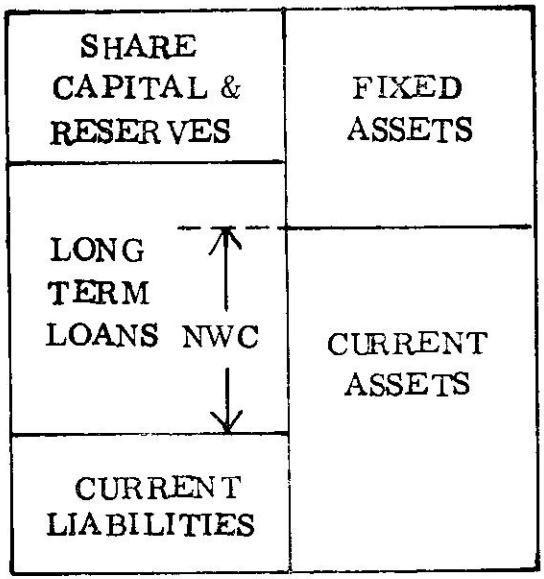


FIG. 6

invested in fixed assets. A smaller proportion is a favourable feature. A higher proportion is unfavourable for two simple reasons:

(1) The annual depreciation charge that must be assumed in the profit and loss account is proportionately heavier than for competitors.

(2) If the fixed assets are very heavy, the concern has either a low net working capital (see Fig. 7) with subsequent overtrading or a loan capital to furnish adequate net working capital (see Fig. 8).

The ratio of fixed assets to tangible net worth except in a fast growing business normally is between two fairly static items; therefore, this relationship in a particular business enterprise usually will change relatively little from one year to another. When a business enterprise has a tangible worth between Rs. 2 lakhs and Rs. 10 lakhs, experience has shown that its condition should be carefully analysed if the

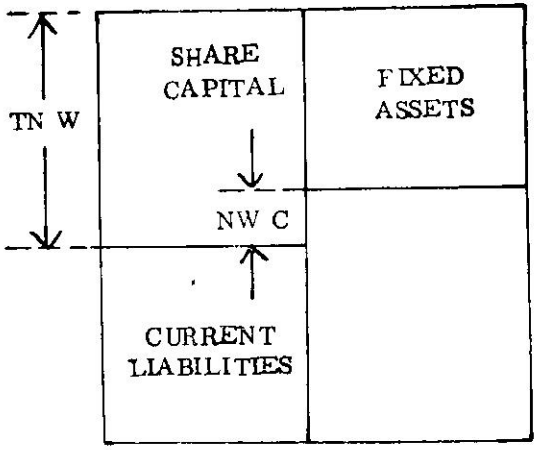


FIG. 7

depreciated book value of its fixed assets is more than two-thirds of its tangible net worth. When the tangible net worth exceeds Rs. 10 lakhs, the affairs of the concern should be followed closely if the depreciated book value of its fixed assets totals more than three quarters of its tangible net worth. Smaller percentages are, of course, proportionately more favourable.

Net Sales to Stock

Stock consists of Raw Material, Work in Progress and Finished Stock. The term "Inventory" is used, especially in American publications. Heavy or excessive stocks are to be avoided just as much as over-investment in fixed assets and large liabilities. Constant attention to these three items is of the utmost importance in the continuous successful operation of every commercial and industrial business enterprise. A heavy or excessive stock is a drag on a business concern and can result in heavy losses due to obsolescence, changes in style, perishability and constant price fluctuations. No overall standard can be set for the ratio of net sales to stocks. The stock at the end of the financial

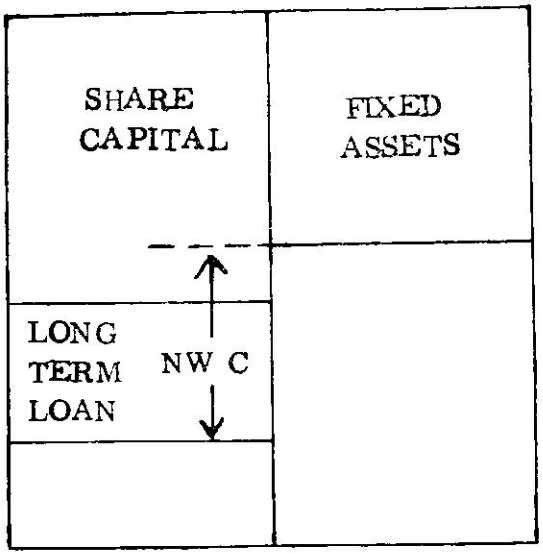


FIG. 8

year is normally at its lowest, so one must expect the highest ratio at that date. Ratios between $2\frac{1}{2}$ and 4 on average stock and between 5 and 7 on closing stock can normally be accepted as satisfactory in most of the manufacturing business.

Stock to Net Working Capital

The ratio of net sales to stock must be supplemented by the ratio of stock to net working capital to prevent a dangerous state arising where the ratio of net sales to stock is maintained as a constant, but net sales and stock are both increasing rapidly. The relationship between stock and working capital is between one variable, the stock, and one item that changes generally very moderately from one year to another, the net working capital, so that there is a relatively fixed basis for comparison which has unusual significance. For every line of business there is a normal volume of rules in relation to net working capital, and a normal relationship of net sales to stock. When a concern begins to

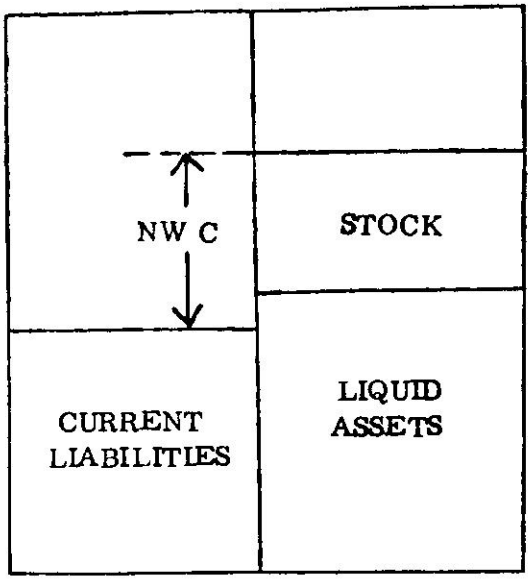


FIG. 9

handle a greater volume of business than might be considered normal, then these greater sales must be obtained on a proportionately smaller stock and the size of the stock must bear a certain definite relationship to the net working capital. Otherwise liquidity suffers and therein lies the danger of the overtrading situation. This can best be explained by considering the two associated diagrams.

In Fig. 9, the value of stock is in good balance with NWC. Fig 10 represents a very typical situation resulting from a greater volume of business. Stock has increased in line with an increase in sales volume. Liquid assets in the form of debtors have also increased (more customers). However, creditors have increased too (more purchase). The NWC has not changed and the ratio of stock to NWC has, therefore, increased sharply. Reference to the diagram shows clearly that when the ratio of stock to NWC is increasing, the liquidity ratio, namely liquid assets to current liabilities must be decreasing. Both ratios in fact become 1 : 1 together.

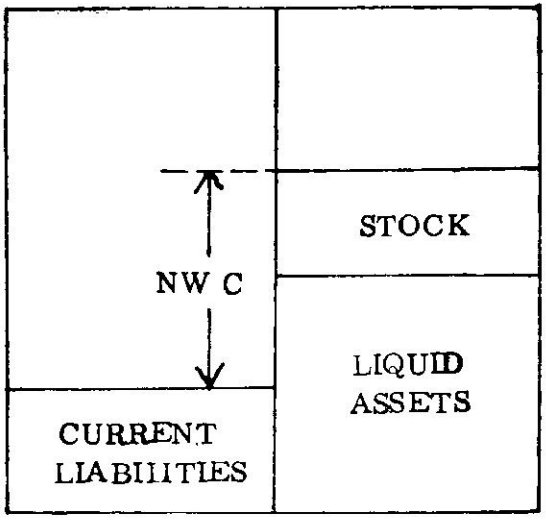


FIG. 10

When a business is operating on a tangible net worth between Rs. two lakhs and ten lakhs, wide practical experience has indicated that extreme care should be exercised, even though the ratio of net sales to inventory is in satisfactory relationship, if the inventory is greater than three quarters of the net working capital. When the tangible net worth exceeds Rs. ten lakhs, the inventory should be no greater than the net working capital.

Average Collection Period

The one immediate measure of the qualitative condition of receivable is to compare the average collection period, based upon the volume of net sales, with the terms of sales used by the particular business enterprise. The formula for computing the average collection period is:

$$\frac{\text{Accounts Receivable + Bills Receivable (incl. those discounted)} \times 365}{\text{Net Credit Sales for 1 year}}$$

The average Collection period should be no more than 1/3 or 1/2 greater than the net selling terms of a particular business that normally sells its goods on credit account. If the average collection period is more than one-third greater than the average net selling terms, then additional information should be obtained to ascertain if sales were bulked more than normally during the 30 or 60 days exceeding the balance sheet date, or it should be ascertained exactly what position of the receivables are past due and for how long. If stock is turned over 6 times per year (i.e., once every 2 months) and the average collection period is 1-1/2 months, a working capital, sufficient to finance 3-1/2 months purchases is required.

Net Sales to Tangible Net Worth

The ratio of Net Sales to Tangible Net Worth indicates the activity of the investment in the business. A high ratio may indicate an excessive volume of business and the consequent overuse of credit. On the other hand, until a dangerous point is reached, it may indicate considerable economy and skill in operation. The solution to overtrading exists in the investment of additional funds. An alternative could be to reduce the net sales, but only when they do not fall below the break-even point.

Net Sales to Net Working Capital

It is not unusual to come across a situation where the ratio of the net sales to tangible net worth is in satisfactory proportion, but the ratio of net sales to net working capital is quite excessive. Such a condition is the direct result of a top heavy investment in fixed assets, leaving rather a moderate net working capital. The ratio of net sales to net working capital which should normally be maintained varies between manufacturers, wholesalers and retailers in different types of industries. The standard can

Net Sales to Net Working Capital

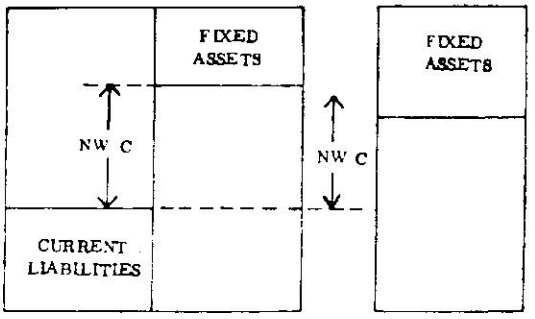


FIG. 11

only be estimated by a comparison with similar industries. The ratio tends to be high among those businesses which handle a large volume of sales in relation to their tangible net worth on account of short terms of sale. The ratio also tends to be high amongst those divisions of trade where the investment in fixed assets is the highest as in such cases, the net working capital is generally low.

Net Profit to Tangible Net Worth

The Net Profit to Tangible Net Worth ratio reveals what the management has earned on the funds invested in the business, and proves as a guide to the investor as to whether an investment in this concern is worth the risk in relation to what he could earn in a "safe" investment. Generally speaking, those enterprises that show the highest percentage Net Profit to Tangible Net Worth not just for a single year but over a sustained period of time, are naturally the most highly regarded.

Net Profit to Net Sales

There is a widespread acceptance of the view that the volume of net sales is the most important element in obtaining net profits in a business. Net sales above "break-even point" normally

result in increasing net profits as long as the plant is being operated at top capacity and top efficiency. Additional volume above this point would involve the erection of an addition to the plant or a new plant altogether, all of which would then bring a sudden increase in fixed charges, or a rate of diminishing return.

It is this specific knowledge applied to each business enterprise that is essential for the most effective sales operation. The measure is the rate of Net Profit to Net Sales, which is complementary to the ratio of net Profit to Tangible Net Worth. This ratio also demonstrates competitive power of the firm. □

PERFORMANCE REDUCED TO FINANCIAL TERMS

The principal difference between the successful and unsuccessful, or between the professional and the unprofessional, is the results produced—not in terms of total number of activities, hours worked, effort expended, and so on, but in terms of constructive achievements which benefit the enterprise. It has been said that managerial performance consists of intangibles and cannot be measured or evaluated.... Actually, there are scores of specific performance indexes that provide relatively accurate yardsticks: number of customer complaints, production costs, unit costs of handling and transporting products, share of market, ratio of inventory to assets, net profit as a percentage of sales, employee turnover, equipment downtime, unfilled orders, percentage of deadlines missed, performance against standards or forecasts, return on investment, and many others. What better indicators can there be of performance against established goals? What easier way of insuring that the imperatives of management are being effectively discharged?

In the final analysis, performance must be reduced to financial terms. Overall company performance is implicit in the profit and loss statement given to the board of directors, to the stockholders, often to the employees, and, of course, to interested members of the public at large. This report is the most significant indicator of how well the company has been managed. Thus it becomes the most convenient means of evaluating the success of the chief executive and his management team.

—Roy A Killian in *Harvard Business Review, Jan-Feb. 1972*

Ratio Analysis & Inter-Firm Comparison : Some New Emphasis

SK Chakraborty*

Ratio analysis in financial terms along with a few dimensions which appear to be essential in today's context has been discussed. Net value added has been suggested as a better ingredient for ratio analysis in assessing managerial performance. Schemes of ratio analysis can be utilised for Inter-firm Comparisons within industries and even for inter-industry comparison. Reference has been made to some of the studies done in India.

ABSOLUTE figures do not tell much. They need to be related to certain other relevant figures. Only then they become more meaningful. However, ratios are not a new concept or basis of analysis born in an industrial era. Ratios, in one form or another, have been used ever since man moved from hunting to the agricultural mode of living. Secondly, many ratios, being pure numbers, can be compared for different units of physical or monetary measurement across industries or national frontiers.

RATIO ANALYSIS

Cautions in Using Ratio Analysis

Even at the risk of harping on the trite it is worth repeating the following statements:

(a) Since all performance areas of a business are interlinked, ratios must be studied against a comprehensive background, and not in isolation.

(b) Ratios for a firm will be meaningful if only these are continuously compared over a number of years. A time-series of ratios is most desirable.

An attempt is being made in the following discussion to bring out the relevance of the first note of caution.

Sources of Ratio Analysis

There are basically two sources of data for calculation of ratios, namely,

(a) The published accounts based on the Companies Act. They yield the Profit and Loss Account ratios, Balance Sheet ratios and Mixed ratios.

(b) Internal cost and other technical records that provide detailed ratios regarding technical and/or physical performance.

Ratios in (a) are important in the final analysis—but they are concerned with only $\frac{1}{8}$th of the ice-berg, the visible tip of business, as it were. What goes on within the invisible $\frac{7}{8}$th may only be revealed through (b).

* Professor, Indian Institute of Management, Calcutta.

Ratio Analysis and Technical Productivity Commercial Productivity

The subject of Productivity inevitably occupies the stage in discussions on ratio analysis.

Productivity is essentially a technical concept relating output to input (s). Physical measures of output and input may be expressed as ratios of technical success, although problems are literally countless in so doing.

Moreover, technical productivity does not automatically lead to better financial results because commercial productivity may be quite poor.[1] Again, a technically inefficient firm may be financially affluent because of higher commercial efficiency contained in monopoly situations of varying degrees.[2] The ultimate emphasis, as below, is on financial productivity, although technical or physical productivity analysis is needed to explain the former.

Measure of Output

Whichever way we wish to measure productivity, i.e. either (a) financial results as a whole, or (b) its two components of commercial and technical productivity, some measure of output is indispensable. The following alternative measures of output are available :

(a) Physical output.
(b) Sale value.
(c) Profit.
(d) Net Value Added.

1. R Brech: 'Productivity Measurement—A Means of Gauging the Efficiency of a Large Multi-Unit Organisation', in *Inter-firm Comparisons —An Incentive to Productivity*, OEEC, 1957, p 251.
2. FA Wells: 'The Relationship Between Physical and Financial Productivity Comparisons' —OEEC Symposium, op. cit, p. 342.

Regarding (a), many problems have to be faced e.g., different product lines, different processes like labour or capital intensive ones, varying product quality, etc. have to be all properly weighted and provided for in finding the aggregate output. Standard minutes, or standard manhours, or standard machine-hours—which again are subject to varying interpretations—have to be used to express such aggregate physical output. Output so measured is appropriate for *technical productivity* measurement.

As regards (b), *turnover* does not really so much represent a firm's own output *per-se* as the result of many external constraints and opportunities. It looks better as an indicator of *commercial productivity* which is only one component of overall financial productivity.

As regards (c), *profit* is the residual element after all prior charges have been met. Besides, it is also influenced by many non-controllable external variables. Moreover, if there is a loss, does it mean that the firm has no output or a negative output ? In the first case no productivity index or ratio can be calculated. In the second situation the ratio would be negative. Also, profit figures are notoriously sensitive to divergent applications of accounting conventions. Consequently, although profit is considered in the end to represent the overall *financial success* of the enterprise, this item as a measure of output explains little.

Finally, *net value added* (Sales Revenue—Consumption of Material and Services bought from outside) is the economist's idea of national income which is (Wages and other Remuneration+Charges for Capital+Rent+Profit). Materials consumed in the production process do not constitute a part of either the firm's net value added or the nation's income. This concept of NVA here is termed by Sewell Bray elsewhere as

'production value'.[3] From the above definition of net value added it is clear that even a firm incurring accounting losses is most likely to have a positive net value added, i.e. an output figure so long as sales revenues exceed materials consumed. NVA is also free from many of the problems of arriving at a composite physical output figure on the basis of individual product groups. However, for a multiproduct firm, where different products are expanding at different rates, the individual net outputs will have to be weighted by the value added for either the base or current year.[4]

NVA has also the advantage of being readily derived from the published accounts. And, unlike profit, NVA is unaffected by notional rents or interest where own land or capital is employed in business and from variations in depreciation methods. To this extent, when one comes to inter-firm comparisions, comparability is unimpaired. Of course, like profit NVA is unable to overcome distortions caused by inventory valuation methods. However, NVA does, by and large, faithfully reflect the commercial success of the business since it is the difference between sales revenue and material costs. Commercial acumen—both in product and factor markets—is revealed through NVA (ignoring, of course, differential impacts of inflation in either market, and internal wastages of materials, etc). And, insofar as material costs incurred are a function of technical productivity, NVA reflects this aspect of performance also.

NVA and Correction for Inflation

This correction is necessary because historical cost does not represent true cost in times of inflation (or for that matter during deflation). True cost is the value of money in an alternative use today. For assets this means the current replacement cost which is much higher than the historical cost. Value represented by historical cost is less than today's replacement value.[5]

Therefore, additional depreciation needed to cover replacement cost of fixed assets should be set off against NVA. Similarly, there is also undercosting of goods sold because of purchases and stocks of raw materials. Opening stocks have to be *upvalued* from the average date of acquisition last year, say 30.9.71, to account for average price inflation of 110 on this year's average date of 30.6.72. The index could be, say 110/95. Again, closing stock would on average have been bought, say on 30.9.72, when price index is 115. This has to be downvalued by the index 110/115 to bring it to 30.6.72. Thus, the cost of goods sold should be increased.[6]

It may, however, be argued that since NVA is only (Sales Revenue—Material Costs) why should fixed assets depreciation be adjusted against NVA? In fact, it could be claimed that NVA avoids getting trapped in the contentious jungle of replacement depreciation, and therefore helps a greater degree of comparability. Against this argument the reason for the adjustment appears to be to show the real worth of NVA in terms of ultimate profit, other elements being given. Higher the real NVA, higher the real profits (or lesser the losses).

NVA and Capital Employed

The familiar ratio indicating overall managerial success in an enterprise in financial terms is:

3. F Sewell Bray: 'Accounting Ratios for the Purpose of Inter-Firm Comparison—A General Survey', OEEC Symposium, op. cit., p. 242.
4. Brech, op. cit., pp. 253-4.
5. Brech, ibid, p. 256.
6. This simple calculation has been taken from WT Baxter's 'Inflation and Accounts' in *Modern Financial Management*, eds. BV Caresberg and HC Edey, Penguin, 1969, pp. 61-63.

$$\frac{\text{Profit}}{\text{Capital Employed}} = \frac{\text{Profit}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Capital Employed}}$$

The determination of the relevant profit and capital employed figures for this ratio is quite complicated. Much depends on the aim or purpose of the ratio. Moreover, this ratio apparently fails for a unit that is incurring losses, or is in the first few years of its inception and thus yet to show a profit. Hence, the NVA figure, after the adjustments mentioned above, solves at least some of the major problems besetting the numerator of the ratio. The revised version is:

$$\frac{\text{NVA}}{\text{Capital Employed}} = \frac{\text{NVA}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Capital Employed}}$$

About the second component ratio i.e., the capital turnover rate, more will be said later.

NVA and Other Ratios

Taking up the NVA/Sales ratio, the following chain of useful ratios may be examined.

(i) $\left(1-\frac{\text{NVA}}{\text{Sales}}\right)$—This ratio will give the extent of materials consumed related to sales.

(ii) $\frac{\text{Outside Materials}}{\text{NVA}}$—This ratio indicates the extent of NVA coverage for materials consumption.

(iii) $\frac{\text{Sales, Wages, etc. varying with Production and Distribution}}{\text{NVA}}$—This ratio shows the number of times NVA covers the payments made to the manpower factor.

(iv) $\frac{\text{Variable Overheads}}{\text{NVA}}$—This ratio indicates the number of times various supporting expenditures varying with activity level are covered by NVA.

(v) By adding the numerators of ratios (iii) & (iv), we get all the variable costs of operation other than materials. But materials have already been deducted from sales to get NVA. So, (NVA—Variable Operating Costs) is the marginal coster's 'Contribution'. Thus, the next ratio is:

$$\frac{\text{NVA}-\text{Variable Operating Costs}}{\text{NVA}} = \frac{\text{Contribution}}{\text{NVA}}$$

(vi) To bring the fixed overheads or fixed operating costs into the picture the following ratio readily comes to mind:

$$\frac{\text{Fixe Overheads}}{\text{NVA}}$$

(vii) To complete the sequence,

$$\text{Ratio (v)}-\text{Ratio (vi)} = \frac{\text{Contribution}-\text{Fixed Overhead}}{\text{NVA}} = \frac{\text{Profit}}{\text{NVA}}$$

The above sequence of ratios is more meaningful than the conventional profit/sales ratio because profit is the residual element after all prior claims on the net output or value added by the firm have been met. Thus, for the year ended 31st March, 1970, the consolidated Profit and Loss Account for Hindustan Steel Ltd. showed a loss of Rs. 104.7 million. The conventional return on capital employed ratio becomes useless in such a situation. Using relevant figures from the P&L A/c, we find that net value added by HSL in 1969-70 was Rs. 2,126 million, i.e. [Sales—(Raw materials consumption+Purchase of finished and semi-finished goods+Stores and spares usage+Power and fuel)]. The NVA/Sales ratio was 55.7%. The major fallacy of the Profit/Sales ratio is that it reflects the firm's contribution to only one component of national

income or factor of production. Critics seem to attach no importance to the contribution made to other components of national income by HSL and similar units. It is certainly not intended to argue that profits are to be ignored since they constitute the resources for growth from within. The point being emphasised is that the profit should be considered as one among other components of output generated by a firm, particularly for one which is in a situation like that of HSL.

The second segment of the return on capital employed, i.e. Sales/Operating Capital Employed for HSL for the year 1969-70 was nearly 2/5. The 'operating' capital employed figure was derived thus: (Fixed Assets+Current Assets—Current Liabilities). The amount was Rs.9,133 million. So,

$$\frac{\text{NVA}}{\text{Capital Employed}} = \frac{\text{NVA}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Capital Employed}}$$

$$= 55.7\% \times 2/5 = 22\% \text{ (approx.)}$$

As a measure of overall managerial performance in managing the assets of HSL., we feel this measure is much more cogent and relevant than a Profit/Capital Employed ratio, which in this situation turns out to be a meaningless negative ratio. As distinct from the managerial viewpoint, Profit/Sales ratio is, however, more significant for taxation purposes. Yet, in a realm of value added tax this ratio may lose its pre-eminence for fiscal purposes also.

Capital Employed

Derivation of a meaningful figure here is also faced with problems like the following:

(i) The treatment of assets like Goodwill, Patents, Deferred Revenue Expenditures is one such problem. While Goodwill and Patents are genuine assets, although intangible and non-operating, deferred revenue expenses (preliminary expenses, discount on debentures etc.) are not assets by any standard.

(ii) Investments in shares, bonds, government stock, etc. are not assets employed in the normal manufacturing/selling activities of an organisation.

If the items mentioned in (i) and (ii) are excluded, then we have *total operating assets employed.* Even now some adjustments may be needed to exclude valueless current assets still persisting in the Balance Sheet, e.g., old debtors' accounts and obsolete stock items.

(iii) The next problem is: do we take fixed assets at (a) book values i.e. historical cost: or (b) book values, less depreciation on historical cost to date; or (c) replacement value today, less depreciation adjusted for replacement cost.

Alternative (a) is sometimes preferred because it prevents distortions due to varying depreciation methods employed by firms. But this is inconsistent with profits net of depreciation used in the numerator. Hence alternative (b) is advocated by most. But (b) does not take care of other inconsistencies, e.g., assets acquired at different costs in different years, inadequate depreciation on historical costs, etc. This cost factor vitiates comparisons between older and newer units, the latter naturally having higher cost capital items and higher depreciation even on historical cost basis. Finally, even after all such considerations, the asset values are far from the economists, valuation of asset by capitalising all future net cash earnings attributable to it to the present.

(iv) Another problem faced, after having considered the earlier one is: do we deduct current liabilities from total operating assets employed? The normal practice is to set off current liabilities to arrive at capital employed. The logic seems to be that the amount net after paying off current liabilities is effectively the sum employed in business operations. But, there appears to be an equally important argument for not netting current liabilities. After all, these items also provide funds to the business. And from year to year there is a minimum below which these items do not tend to go. Hence, no deduction is warranted. Whichever viewpoint is accepted, the important caution to adopt from year to year, and from firm to firm is that, the same interpretation should be used.

(v) Finally, comparisons between divisions within a decentralised organisation becomes difficult because of the difficulty in isolating the capital employed over which the division has control, and over which it has none. This is a thorny problem in the implementation of the 'investment centre' concept for control purposes. Any method of allocation, however sophisticated it might be, cannot be shorn of arbitrariness.

Profit

Some of the problems connected with profit have been cited earlier. NVA was, therefore, suggested as a better ingredient for ratio analysis in assessing managerial performance. Therefore, after building up the NVA ratios we may now go back to working out the conventional profit-related ratios. Like operating capital employed, many problems of adjustments have to be faced here also. Thus:

(i) Should income from share investments, or fortuitous profits from exceptional transactions, etc., be included in profits? These are not operating incomes reflecting managerial performance in using the operating assets of the business.

(ii) Is not the profit figure an inflated one because depreciation on historical costs only has been charged?

(iii) Why should interest on long-term loans and debentures, and tax charges be set off against revenue, before calculating profits? These charges do not again reflect managerial performance in using business assets.

(iv) Where there are quasi-autonomous divisions in a decentralised structure, divisional profits are affected by inter-divisional transfer pricing policy. How do we ensure that such pricing policy, which can have as many bases as the number of companies, or varying bases even within the same company, is equitable and mirrors truly the profits earned by each division?

It is usual in practice to allow at least for items (i) & (iii) in arriving at what is called 'operating profit'. This is consistent with 'operating capital employed' mentioned earlier. The two expressed as a ratio indicate overall managerial performance in common parlance.

Ratios for Owners and Financial Management of the Company

Here it appears that ratio $\frac{\text{NVA}}{\text{Capital Employed}}$ is not any more useful than the conventional Profits/Capital Employed ratio. In fact, the latter is more relevant and useful. With appropriate adjustments to both the numerator and denominator, this ratio can gauge the success of

financial management, as distinct from overall management, of the business. And at the same time it will produce relevant indices for the ownership capital of the business.

Capital employed from the owner's viewpoint is different from the figure derived for assessment of managerial performance. Instead of looking at the assets side of the Balance Sheet, we now need to scan the liabilities side. Ownership capital employed or 'net worth' is [Equity capital (paid up)+all Retained Earnings or Reserves attributable to the equity shareholders]. Non-distributable reserves or capital reserves may or may not be included in 'net worth', depending on management's intention about their use. Thus, if these are to be issued as bonus shares, then perhaps they constitute a part of net worth. But if these reserves are to be absorbed in say, retiring debentures or preference capital at a premium, they should better be excluded from net worth. Development rebate reserve may be included in net worth only to the extent that it is written back to general reserves after the 8th year of its creation, as decreed by law. Finally, for the sake of completeness, it is necessary also to assess the real value of the company's net worth because of persistent price inflation. Thus, a recent study under the auspices of the Calcutta Management Association has shown that for the Jute industry almost 95% of its net worth was eroded in real terms because excess dividends over and above real profits were paid over the years. Other industries presented a similar, though relatively less dismal, picture.[7]

With regard to profits also we have to make several adjustments to reach an earning figure attributable to the ownership shares. If we take the 'operating profit' derived earlier for managerial performance assessment as the starting point, the following adjustments are necessary:

(i) Include investment income because, although this does not flow from operating assets, it reflects the astuteness of the company's financial manager in managing a lucrative investment portfolio. And, of course, this income goes to the pool wherefrom equity shares get their return.

(ii) Deduct tax, debenture and loan interest, and preference dividend from operating income. Tax is a necessary prior charge because shareholders do not get any return unless tax liability is fully met. Debenture interest must be deducted because not only is it a piror charge; it also represents the success of financial management in creating such a mix of long-term financial resources as to take advantage of 'financial leverage' in the interest of equity shareholders. Preference dividend must also be set off because this is a claim having priority over equity dividend.

(iii) Consistently with arriving at the 'real' value of net worth, the earnings available to equity shareholders should also have taken care of the higher depreciation charges necessary for preserving the fixed assets base of the firm during inflationary periods.

(iv) The problem of internal transfer pricing in connection with divisional profit measurement and performance appraisal does not arise here. We are concerned with total earnings of the company and the part of it which is attributable to equity capital.

7. JS Kalotra: 'Protecting the Real of Value', *CMA Article of the Month*, November, 1971.

The basic ratio following all the above refinements is:

$$\text{(a)}\ \frac{\text{Earnings Available to Equity Shares}}{\text{Net Worth}} \times 100$$

This ratio reflects simultaneously both the preservation and furtherance of the interests of the company's risk bearing owners, as well as the success of the financial management of the firm. This ratio also links effectively the two basic statements in published accounts, namely, the Profit and Loss Account and the Balance Sheet. Both the numerator and the denominator influence each other over a time-span.

Several supplementary ratios to (a) above may be suggested.

$$\text{(b)}\ \frac{\text{Earnings Available for Equity Shares}}{\text{Payments to all Fixed Interest Capital}}$$

This ratio will reflect the extent of usage of the financial leverage factor for boosting earnings per equity share, after allowing for tax deductibility of fixed interest charges.

$$\text{(c)}\ \frac{\text{Fixed Assets}}{\text{Net worth}}$$

This ratio will show the extent to which fixed assets are being financed by equity interests. The higher this ratio, the more the fixed assets are being financed by loan and/or preference capital. Both these sources have a prior stake in the fixed assets, when it comes to the crunch, over the equity interest. If the ratio is 1, it means all fixed assets are being supported by equity capital. The existence of fixed interest funds may then be of a much lesser or nominal extent. If the ratio is less than 1, then it may mean the non-existence of any long-term fixed interest bearing finance in the firm. Situations such as these indicate the security and stability of the firm from the equity shareholders' viewpoint. However, reality would show a value for this ratio to be normally more than 1. As stated earlier it is not good and efficient financial management to have no fixed cost capital sources in the firm's financial structure. Depending on the circumstances of the firm, however, a ratio in excess of 1 may, after a certain point, impair the stability of and confidence in the firm itself.

$$\text{(d)}\ \frac{\text{Fixed Interest Capital}}{\text{Net worth}}$$

This is a complementary ratio to ratios (b) & (c) above. Up to a stage, a higher (d) ratio will mean higher (b) and (c) ratios as well, and *vice-versa*. This ratio also very largely suggests the level of average cost of capital of the firm. Fixed interest bearing capital is cheaper than equity funds. Therefore, up to a certain limit, the average cost of capital will come down as the value of (d) ratio goes up. And obviously, the average cost of capital is one of the indices of financial management performance.

Ratios Based on Funds Flow Analysis

So far, one group of ratios presented above has dealt with the internal operational efficiency of the firm in terms of Net Value Added. The other group of ratios highlighted the wealth-generating performance of management in relation to: (a) the aggregate, operating assets employed, and (b) the net worth belonging to the equity shareholders. Both groups of ratios reflect financial rather than technical productivity.

There is, however, every justification for another group of financial ratios based on funds flow analysis. The reason is: wealth or profit generation and maintenance of solvency are not synonymous. Profit is calculated on the accrual accounting principles. So, in the long run it should coincide with actual cash or liquidity generation. But in the short run there can be

substantial gaps between profits and liquidity—even a highly profitable firm may face the danger of insolvency. Funds flow or cash flow analysis is intended to highlight the pattern of liquidity generation and absorption within the firm from period to period.

Unfortunately, law does not yet require the publication of funds flow statements in the published accounts. Some companies present a columnar form of Balance Sheet, where all items on the left side of a T-form Balance-Sheet are put under the heading, 'Sources of Funds'. Similarly, all items on the assets side are put in the lower section of the columnar presentation under the heading 'Applications of Funds'. This is not to be confused with the funds-flow analysis we are talking about here. The following example will make this clear. Hence, the directed wherewithal and impetus for ratios based on this source have been absent. However, there are hopeful signs in this respect inasmuch as some companies do present this information, *albeit* for a couple of years only. The increasing awareness about better liquidity management approaches is also expected to play up the importance of funds flow analyses. This may be the right time for indicating some ratios based on funds flow statements.

We will use the published accounts of Voltas Ltd. for the year ended 31st August 1970, for illustrating the funds flow ratios. Incidentally, this company presents its Balance Sheet in the columnar form, with the kind of descriptive headings mentioned above. As given below, a funds flow presentation is quite different from this type of columnar Balance Sheet. The analysis shows the generation and use of funds during the year ended 31.8.70. This has been done by comparing the relevant opening and closing figures of the Balance Sheet and Profit and Loss Account, and by analysing the schedules following these statements.

Sources	*Rs. Lakhs*
1. Internal Funds From Operations:	
Profit Available for Appropriation	100.64
Add, Depreciation written off in 1969-70 (a non-fund or non-cash charge)	53.45
Add, Development Rebate Reserve in 1969-70 (a non-fund or non-cash charge)	1.60
	155.69
2. Internal Fund Through Sale of Assets	0.49
3. External Funds: Additional Secured Loans	215.00
Total Funds Available	371.18

Applications	*Rs./Lakhs*
1. Additional Plant and Equipment	41.09
Less, Reduction in Capital Work-in Progress	6.45
	34.64
2. Additional Investment	13.88
3. Repayment of Unsecured loans	16.07
4. Dividends paid	30.30
5. Increase in Working Capital	276.28
	371.17

(Note: Reduction in capital work-in-progress could have appeared as a source of funds also in the *Sources* section.)

It will be noticed from above that many movements of funds have taken place during the year which are not at all reflected in the profit

figure e.g. repayment of loans, buying additional equipment, etc. However, such movements in the short-term have an immediate impact on the company's liquidity or solvency position. Similarly, in the context of funds flow analysis, profit, after adjustments, is only one among other sources of funds—although the major one. Even in a concern which has incurred a loss, after adding back non-cash charges like depreciation, there may still be a *positive figure for funds from operations*. And it is this figure which is most crucial for the ratios suggested below.

Rs.

1. $\frac{\text{Internal Funds From Operation}}{\text{Total Funds}} = \frac{155.69}{371.18} = 42\%$

2. $\frac{\text{External Funds}}{\text{Total Funds}} = \frac{215.49}{371.18} = 58\%$

3. $\frac{\text{Acquisition of Fixed Assets}}{\text{Internal Funds}} = \frac{34.64}{155.69} = 22.4\%$

4. $\frac{\text{Other Investments}}{\text{Internal Funds}} = \frac{13.88}{155.69} = 9.0\%$

5. $\frac{\text{Payment of Loans}}{\text{Internal Funds}} = \frac{16.07}{155.69} = 10.5\%$

6. $\frac{\text{Dividend Payments}}{\text{Internal Funds}} = \frac{30.30}{155.69} = 19.1\%$

Total (3+4+5+6) = 61.0%

Thus, although the generation of funds from internal operations during 1969-70 has been well below 50 % of total funds, yet the operations during the year were such as only 61 % of these internal funds were utilised in the expansion of assets, retirement of liabilities and payment of dividends. The balance of 39 % of internal funds along with the whole of external loans, has gone to bolster the year's working capital position. This is healthy insofar as working capital represents short-term liquidity. (But who knows, this amount of working capital may be far too excessive). So, we can have another ratio:

Rs.

7. $\frac{\text{Increase in Working Capital}}{\text{Balance of Internal Funds}} = \frac{276.28}{60.80} = 4.5$

The reciprocal of this ratio gives a figure of 22 per cent coverage of working capital increase from internal funds left after other applications. This ratio indicates the extent of coverage given to working capital increase by internal funds. And the complementary ratio is:

Rs

8. $\frac{\text{Increase in Working Capital}}{\text{External Funds}} = \frac{276.28}{215.00} = 1.3$

However, had Voltas launched a massive capital investment programme during the year the picture could have been very different. Given the internal and external funds as these have been, heavy fixed capital investment might be financed only by the depletion, i.e. conversion of working capital items into liquid cash to finance the investment. In that case reduction of working capital would have appeared as an additional source of funds. Dividend payments may not have been feasible. Nor possibly could loans have been repaid. Thus, a system of ratios built along the above lines could generate extremely useful guidelines for capital expenditure, dividend payment, and loan repayment policies. Needless to add, to be of real benefit such ratios should be built over a number of years.

Ratios for Working Capital Management

Ratios (7) and (8) in the preceding section refer to the financing of working capital. Although they are helpful to the extent that one knows the degree of dependence for working

funds on outside sources, there is much more to working capital management.

The two usual ratios of 'Current Assets/ Current Liabilities' and 'Liquid Assets/Current Liabilities' are in our view inadequate tools for working capital management. These ratios have been evolved with the security of short-term creditors in primary focus. Hence, the text-books norms of 2:1 and 1:1 respectively for the two ratios just mentioned. But these have scant empirical validity.

The functional importance of working capital to a business is for *meeting all the operational expenses* incurred for supporting a certain level of activity during the year. This view of working capital seems to be more relevant and positive than the usual net working capital definition of 'current assets less current liabilities'.

The concept of 'operating cycle' has to be introduced at this stage. Depending on the technical and commercial characteristics of a firm, a sum of money employed in operations (not fixed investment) at a certain point of time will come back into business again after a certain interval. This time-span is the sum total of (i) materials acquisition and storage period, (ii) conversion period, (iii) finished goods storage period and (iv) debtors realisation period. If this cycle lasts, say 60 days, then every unit of working capital repeats the cycle 6 times during the year. And supposing the total annual opertional expenses is expected to be Rs. 3,60,000 the working fund required to support this would be Rs 3,60,000÷6, or Rs 60,000 only. So, the working capital requirement can be estimated, given the working capital turnover rate. Shorter the operating cycle, smaller is the working capital amount needed to support a given level of operational expenditure.

NVA correctly focusses on the key-result variable of increasing added value in order to increase profit. To maximise profit we need to maximise Added Value. IFCs with NVA-based ratios will help achieve this objective.

Such required working capital estimate may be computed from the published accounts for any year-end. This estimated requirement could then be compared with the average actual working capital employed in the business during the year. The latter may be derived conventionally from the Balance Sheet by netting current liabilities against current assets, both at the beginning and end of the year, and averaging the two quantities. Such a comparison would show whether actual working capital employed has been in excess of or less than the amount derived from the operating cycle of the business. This approach is surely more analytical, more tailor-made to take care of the specific operating characteristics of each business. Hence it is likely to be more productive in the management of working capital.

The following system of ratios, based on the above approach may now be suggested:

(1) $\frac{\text{Net Materials Acquisition and Storage Period}}{\text{Total Operating Cycle Period}} \times 100$

(2) $\frac{\text{Conversion Process Period}}{\text{Total Operating Cycle Period}} \times 100$

(3) $\frac{\text{Finished Goods in Storage Period}}{\text{Total Operatirg Cycle Period}} \times 100$

(4) $\frac{\text{Collection of Debtors Period}}{\text{Total Operating Cycle Period}} \times 100$

(5) $\text{Working Capital Turnover Rate} = \frac{\text{Number of Days in Year}}{\text{Total Operating Cycle Period}}$

(6) $\text{Estimated Working Capital Need (for past year)} = \frac{\text{Actual Operating Expenses}}{\text{Actual Working Capital Turnover Rate}}$

(7) $\frac{\text{Actual Average Working Capital Employed}}{\text{Estimated Working Capital Need (for past year)}}$

Ratio number 1 would indicate the commercial efficiency of management in obtaining larger credit period from suppliers. This should reduce the net materials acquisition period, the total operating cycle period, and so improve the value of ratio number 5. However, a shorter duration of the numerator, meaning a faster rate of daily consumption of materials, may indicate either a larger volume of production, or a lower level of technical efficiency implying wasteful usage of materials.

A higher value for the second ratio will *prima facie* indicate a lower level of technical productivity. In other words, there is need for investigating why the conversion process period has increased? Has the daily rate of conversion into finished goods declined? If so, why? Has the average work-in-process during the year increased? If so, why ?

The values of both the third and fourth ratios indicate again, by and large, the commercial success or otherwise of the firm. A higher value for the third ratio would indicate that the marketing efforts are not effectively lifting off the goods from stock. Similarly, a higher value for the fourth ratio may point towards the need for toning up the credit management policy of the firm.

Ratio number 5 is the key index, and is a function of the values of the four ratios given earlier. Any decline in this ratio—this being an inverse function of the component operating cycle period—calls for improving the efficiency of working capital management along various dimensions. It is important to note the distinctive usage of the term 'working capital turnover' in this article. Conventionally it is a 'mixed ratio' expressed as Working Capital/Sales. The clear advantage of our measure of working capital turnover is that it explains *why* the mixed working capital turnover rate is low if it is so. The latter is merely a statement of fact derived from published accounts.

The last ratio would reflect partly the deliberate approach of management towards working capital—either a play-safe or a risk-taking

one. It will also partly explain the variations in return on capital employed *via* the changes in capital turnover ratio.

It may be observed here that the Directorate of Commercial Audit in the Ministry of Finance does lay down a number of 'working capital ratios' for public sector undertakings. These are:

(i) Working capital as months' value of production at cost, excluding depreciation.
(ii) Raw materials stock as requirement of months' consumption for production.
(iii) Finished goods as months' sales.
(iv) Debtors as percentage of sales.
(v) Debtors as months' and days' of turnover.

These ratios are certainly useful by conventional standards. But they are not linked with one another through the integrative concept of operating cycle of each enterprise. Consequently, they lack the kind of incisive bite as possessed by the ratios suggested above.

INTER-FIRM COMPARISONS

In the preceding pages the foundations have been laid of ratio analysis in financial terms along a few dimensions which appear to be essential in today's context. Such schemes of ratio analyses may now be utilised for Inter-Firm Comparisons within industries, and even for inter-industry comparisons. Some people like Brech sound a note of caution about such comparisons because of so many differences in the histories and environments of such units. So he says: "The value of the ratio is not so much in comparing one unit against another as in watching the progress of a particular unit over time".[8] Yet, the need for Inter-Firm Comparisons is felt because within an industry, there will be firms which are below average by industry norms. From the viewpoint of better utilisation of resources of the economy it is necessary to improve their performance standards as well; hence the coupling of Inter-Firm Comparisons with productivity.

Some Indian Studies

The need for comparable data amongst units being analysed is too evident to require emphasis. A reasonable degree of uniformity is ensured by the requirements of the Indian Companies Act in presenting information through published accounts. This explains the widespread use of such sources for inter-firm or inter-industry comparisons of commercial and financial productivity ratios. Obviously, physical or technical productivity performances are not revealed through such ratios, except quite inferentially in certain cases as mentioned under 'Ratios for Working Capital Management' The amount of time and research work needed for physical productivity measurements is enormous. The few Indian studies we have looked at do not attempt such technical ratio analysis. To that extent, some basic explanations for the pattern of financial ratios may remain concealed.

Thus, Srinivasan's study of the cotton textile industry begins and proceeds with the conventional financial ratios. However, he makes an attempt to arrive at a common measure of physical output later in his work, and utilises this for building up a series of technical productivity indices like output per worker, output per machine, etc., for both spinning and weaving.[9]

Chattopadhyay's inter-firm comparison of the public sector chemical industry is based

8. Brech, op. cit., p. 257.

9. MS Srinivasan : *Inter-firm Comparisons Textile Industry*. Emcons, Bombay, 1966.

entirely on the published accounts. While it shows all relevant indices of financial performance, physical indices are not thrown up. He has, however, gone a step further in developing inter-sectoral comparisons between public sector and private sector chemical industries.[10]

Similarly, the inter-firm comparison carried out for the jute industry by Kennedy of the Indian Institute of Management, Calcutta is also a sequence of financial ratios in three groups—profitability, costs and turnover.[11] Even here the problems of comparability of the capital employed base, the profit figure, etc., due to different historical dates of plant and equipment in an old industry like jute have not been tackled. However, this study has recognised the difference between returns on investment from the viewpoint of management performance as a whole, and from the viewpoint of equity holders. In the supplementary report an improvement was made in that the ratios were re-calculated on the basis of NVA. The NVA/Sales ratios were computed. However, the subsequent development of Cost/NVA ratios has not been quite on the lines as suggested here.

Finally, as an example of inter-industry comparison we may cite the recent *Economic Times* study of the finances of public limited companies for 1968-69 and 1969-70.[12] Six hundred and eighty-six public limited companies in the private sector have been sampled for comprehensive analysis by grouping the units into 37 industries. The whole exercise is based on consolidation of financial statements of all sample units in each industry group. In the opening article of the series, the concept of 'gross value added' has been introduced. This is defined as 'net national income+depreciation', and is equivalent to our NVA, where depreciation is included in charges for capital. The 'gross value added' figure has then been utilised only once as an index of consolidated growth of the whole private corporate sector. All subsequent ratios are in the pattern of profitability ratios and capital turnover rates. We feel that an opportunity has been missed by the *Economic Times* study to build up a statement of industry-wise ratios using the value added figure as a base. Suitable adjustments may need to be made to the scheme suggested by us, if it is considered for use in future studies. Thus, calculation of the marginal cost/NVA and contribution/NVA ratios may not be feasible from data given in published accounts. Again, a consolidated sources and applications of funds statement in 10 size-groupings has been provided. We think an additional and more useful statement of funds-flow ratios for industry groups along lines suggested above could profitably be incorporated in future. Similar worthwhile efforts may be directed towards building up a system of working capital ratios based on the operating cycle concept.

The Reserve Bank of India also brings out each year inter-industry financial comparisons for 1501 large and medium sized companies in the private corporate sector. These studies are similarly based entirely on the published annual accounts of the units. Suggestions like those offered in the context of *The Economic Times* study apply to the RBI studies as well.[13]

10. P Chattopadhyay : 'Inter-Firm Comparison of Public Sector Chemical Units', *Lokudyog*, September 1968, March 1969 and October, 1970.
11. M Kennedy : *Jute Industry Inter-Firm Comparison Report*, Report 1 and Supplementary Report, Mimeographed, Calcutta, 1966.
12. *The Economic Times*, 26th, 27th & 28th October, 1971.
13. For example see 'Finances of Medium and Large Public Ltd. Companies 1969-1970' in *Reserve Bank of India Bulletin*, April 1972.

In concluding this section on Inter-Firm Comparisons, and this article, it is stressed that the quest for uniformity has to be a ceaseless pursuit for such studies. Even if we have to go by published accounts, at least some of the non-uniformities arising out of the profit figures could be eliminated by adopting the NVA figures.* Quite a few arguments in favour of this have been marshalled above. Support for this stand is also strongly evident in a thorough and substantial research piece by Martin.[14] His search for a "universal method of measuring industrial-commercial productivity" has led him to develop the *total earnings*, concept. This he derives by deducting total materials 'throughput' cost from the net sales income. And this is precisely how NVA has been defined above. Total earnings measure the primary output in exactly the same way as NVA. Martin then develops a ratio called 'Total Earnings Productivity' given by T/C, where T is total earnings and C is the whole cost of operating the enterprise. In terms of our indices, T/C is identical to the reciprocal of the sum of ratios iii, iv & vi in section "NVA and other Ratios".

i.e.

$$\frac{1}{\frac{\text{Salaries, Wages etc.}}{\text{NVA}} + \frac{\text{Variable Overheads}}{\text{NVA}} + \frac{\text{Fixed Overheads}}{\text{NVA}}}$$

NVA correctly focuses on the key-result variable of increasing 'added value' in order to increase profit. It is no use crying about low profits without being able to lay hands on the source of profits that is value added. And in the days of unionised manpower, NVA seems to be a more realistic equivalent to the marginal coster's 'contribution' inasmuch as labour is, by and large, a fixed cost. "To maximise Profit we need to maximise Added Value. This must be the objective, and all a company's policies should be directed to this end, provided always that it does not achieve the end at the expense of its social obligations."[15] Inter-Firm Comparisons with NVA-based ratios will only sharpen the thrust of such policies.

Recently, a study on inter-industry comparison was made in U.K. based on the 1970 Census of Production figures. Ratios were constructed on NVA/Wages and Salaries basis, which is the reciprocal of our ratio (iii). By this measure the prestigious and profitable vehicles industry of U.K. appeared only in second place from the bottom. But mining, a chronically loss-making industry, ranked seventh from top in a list of altogether 19 industries.

Similarly, in Merrett's study mentioned earlier, it was found by using the VACO analysis that the Nangal unit slipped to the last position from the third rank. There could be quite rational explanations for such surprising results. But these may not be sought unless ratios based on NVA are calculated.[16] □

*S Merreth, in a recent study on Inter-firm Comparisons in the six nitrogenous fertiliser units of FACT Sindri, Nangal, Ennore, Trombay and Neyveli was faced with the problem of arriving at comparable output figures for labour productivity measurements. The various units differed in their extent of backward and forward integration. The nutrient capacity of the units could not, therefore, faithfully reflect respective outputs. Hence, 'value added output capacity' (VACO) measure of output was chosen. See "Shares in the Labour Productivity Measure, as Efficiency: Some examples from Indian Nitrogen Fertilizer Manufacturer," *The Journal of Industrial Economics*, November, 1971.

14. HW Martin: 'Productivity Costing and Control', *Productivity Measurement Review*, May, 1964.

15. RR Gilchrist : *Managing For Profit—The Value Added Concept.*, George Allen & Unwin, London, 1971, p. 12.

16. EG Wood : 'A New Light on Lame-Ducks', in *The Financial Times*, 16th May, 1972.

Financial Performance of Spinning Mills: SITRA Inter-Firm Comparison Studies

Indra Doraiswamy & TV Ratnam*

The inter-relationships between return on capital, profit, capital, labour and machine productivity, raw material cost and yarn selling price are examined. An expression for profit has been derived. The study also compares the effect of count, age and size of the mills on profit and technical efficiency of low profit mills.

INTER-FIRM comparison studies conducted by SITRA are based on balance sheet analysis and various other factors having a direct bearing on costs and profits. A special feature of these studies is the assessment of the extent to which each item of cost affects the profits in individual mills, after allowing for the differences in cost due to types of yarn produced.

The report is followed by a confidential letter to the Managing Director, highlighting the financial performance of the mill, extent of differences in profits due to various factors and changes in profits relative to other mills.

Return on Capital

The return on capital is taken as a measure of a mill's financial performance. For assessing the return on capital the profit from normal manufacturing and trading activities, before allowing depreciation, interest charges and tax is taken. As the year of reference in balance sheet is different for different mills, a correction is applied to bring them all to the calender year.

The variation in return on capital and capital employed are given in Table 1 for the 70 member mills covered in the study for the year 1968.

The return on capital averaged 12.6%, the range between mills being very high at 57%; in about 40% of the mills the return was lower than 10%. It will be of interest to see whether the level of return is related to capital considering the fact that new or modern mills will have a higher capital. It is, however, noticed that return on capital does not show any association either with capital ($r=-0.18$) or with fixed assets ($r=-0.06$). About 50% of the variation in return on capital between mills is explained by the differences in profit per spindle ($r=0.70$).

Profits

The profit is on the average Rs. 37.7 per spindle per year before depreciation and inte-

* The South India Textile Research Association, Coimbatore-14. The authors wish to acknowledge with thanks the valuable suggestions given by Mr K Sreenivasan, Director of SITRA and also the help rendered by Mr K Ranganathan and Mr R Rajamanickam.

Table 1

Variation in Return on Capital and Capital in 1968

	Average	*Maximum*	*Minimum*
Return on capital (%)	12.6	42.5	—14.5
Capital per spindle (Rs.)	325	944	119
Fixed assets per spindle (Rs.)	204	659	44

rest (Table 2). Depreciation accounted for about Rs. 20 per spindle and interest for about Rs. 17, with the result that the mills, on the average, hardly made any profits at all after depreciation and interest.

The profit per spindle differed between mills by about Rs. 160 per spindle per year. The variation is about the same either before or after depreciation and interest, since depreciation and interest are not necessarily high for mills recording higher profits.

It can be seen from Fig. 1 that about 40% of the mills incurred losses after depreciation and interest, 20% of the mills after interest, and five mills even before depreciation and interest. In view of the low profits, five mills did not provide for any depreciation at all.

Table 2

Variation in Profit per Spindle per Year in Rs.

	Average	*Maximum*	*Minimum*
Before depreciaton and interest	37.7	142.8	—19.2
After depreciaton before interest	17.4	119.3	—41.6
After depreciation and interest	0.2	101.1	—69.9

Though one could expect the profits and capital to be generally related, the association is found to be weak ($r=0.45$), since some of the new mills with high capital do not make high profits, a few of them even incurring losses. On the other hand, there are a number of old mills having low capital but making high profits.

Expression for Profits

There are a number of heterogeneous factors contributing to profit variability. But, what is of practical significance is to locate the most important of these factors, isolate their effect and assess the relative contribution of each factor. For this purpose, an expression for profit has been derived using the method of 'equivalence coefficients'; comparing a mill's performance with that of a hypothetical mill with good working conditions having the same number of spindles in different counts as the given mill.

Assuming that the production per spindle in different counts in the given mill differs by the same amount from that in the hypothetical mill, the profit per spindle in the given mill can be expressed in the form of a simple model:

$$P = \frac{M}{100}\left\{p + (Y-R)(D-1)\right\} - W - O \quad ...(1)$$

where

P= Profit per spindle per year before depreciation for the given mill (Rs.)

M= Machine productivity index

P= Profit per spindle per year before depreciation for the hypothetical mill (Rs.)

Y= Yarn sales revenue per spindle per year for the hypothetical mill (Rs.)

R= Raw material cost per spindle per year for the hypothetical mill (Rs.)

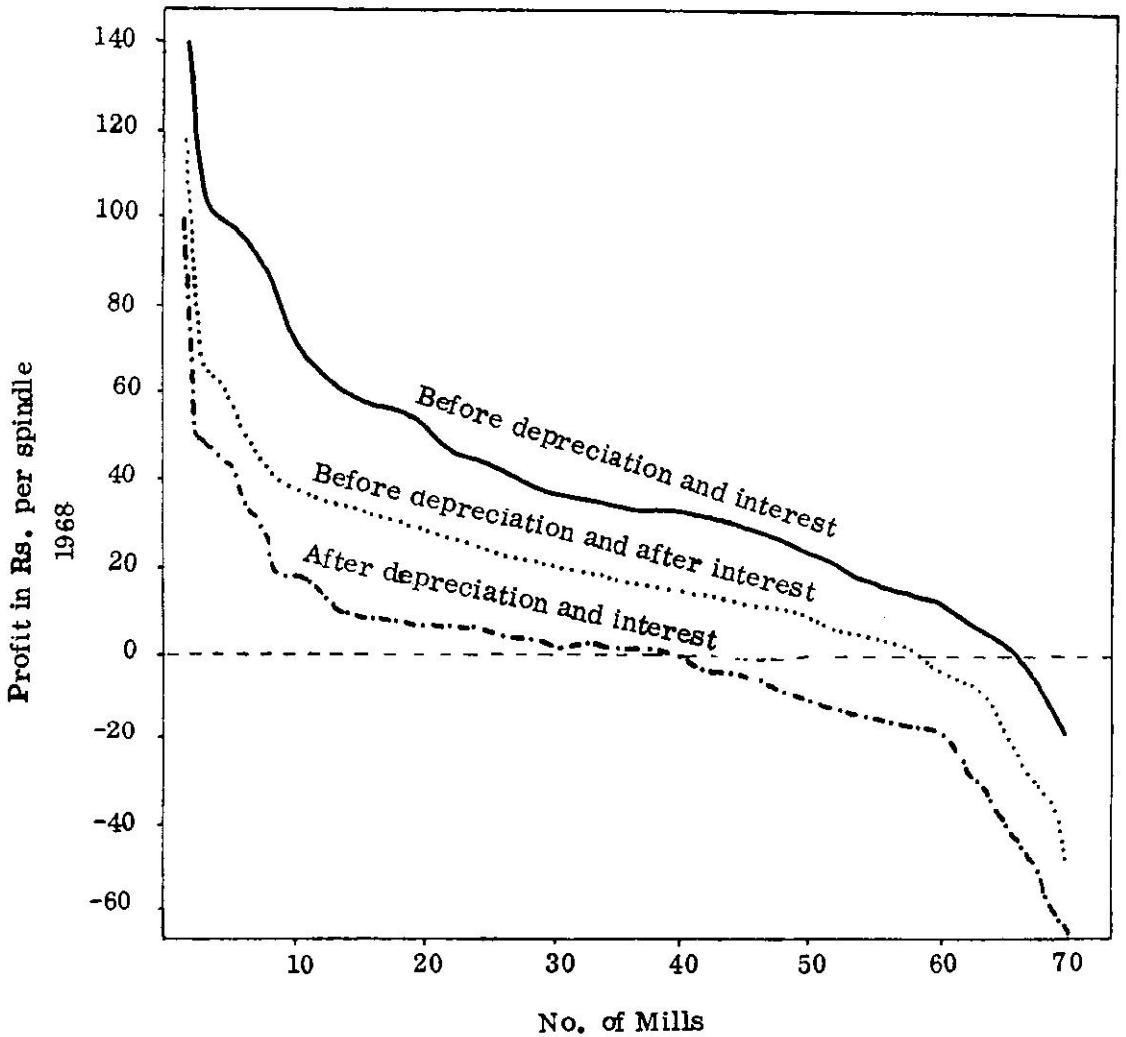


Fig. 1
Profit per spindle in different mills for 1968

D = Yarn sales revenue less raw material cost of the given mill divided by the corresponding figure for the hypothetical mill.

W = Wages per spindle per year for the given mill less that for the hypothetical mill(Rs.).

O = Other costs per spindle per year for the given mill less that for the hypothetical mill (Rs.).

For calculating W and O, the machine productivity index for the hypothetical mill is

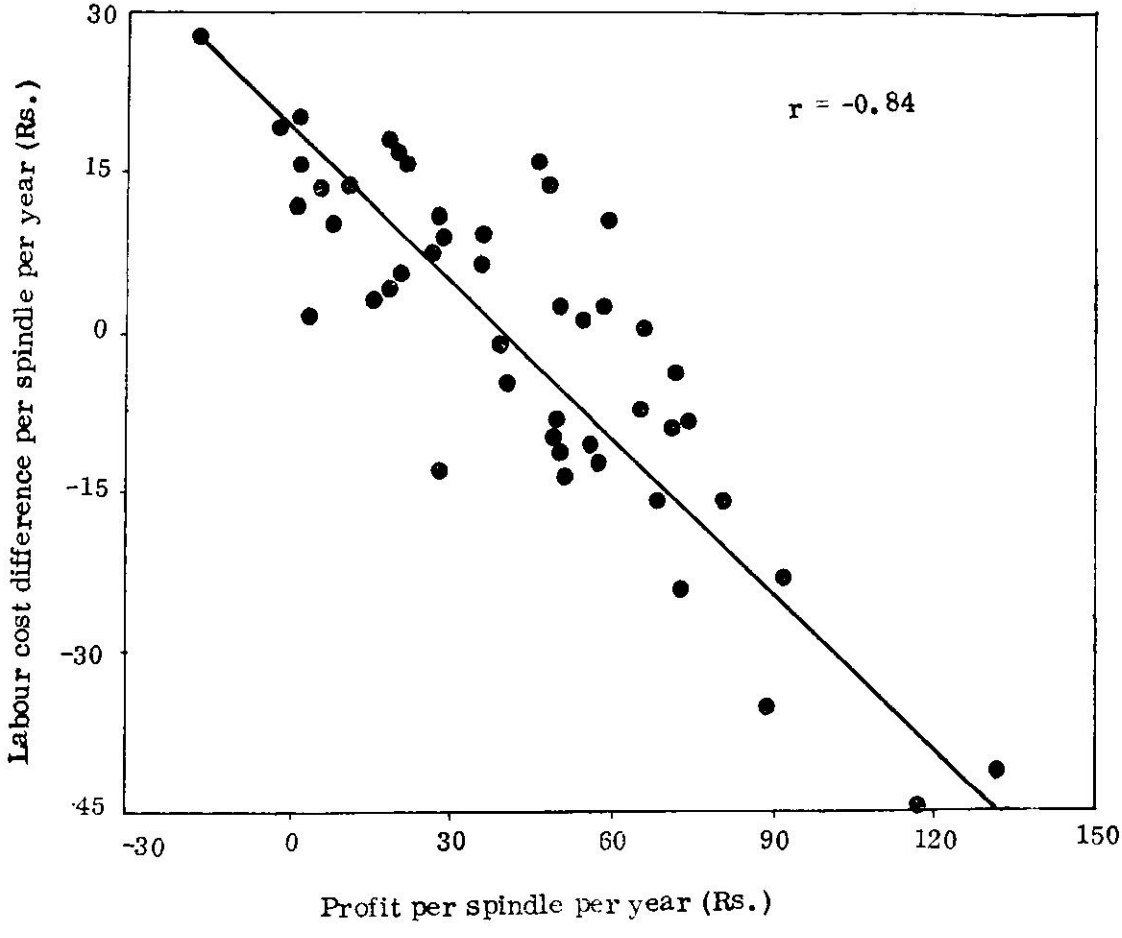


Fig. 2
Actual profit *vs* expected per spindle per year

assumed to be the same as that for the given mill. By the method of least squares, the value of P for the mills covered in 1966 survey was estimated to be 73 and that of (Y-R) to be 200. Substituting these values in expression (1),

$$P = 1.27\ M\ (1.57\ D - 1) - W - O \quad \ldots\ldots (2)$$

The profits estimated from the above expression agree very closely with the actual profits, the multiple correlation coefficient (R) being 0.98 (Fig. 2). The correlation coefficient was lower at 0.88 in the 1968 survey because of lower profits in coarse counts and very high profits in staple fibre counts.

Machine Productivity

Machine productivity and profits can be expected to move in parallel directions if the price structure remains unchanged. Between mills, the

machine productivity differs by 3.2 times (that is from 30 to 125) with on average of 71. The machine productivity, which is determined by machine utilisation and production per spindle, is highly correlated with profit per spindle (r=-0.83). Here again, the association was lower in 1968 (r=0.70) because of the drop in profits.

Labour Costs

The labour cost also has a high association with profits, the correlation coefficient being —0.84 (Fig. 3). It is significant that all the top ten high-profit making mills have very high labour productivity and all the bottom ten mills have very low labour productivity. The contribution by labour cost to profitability is high in spite of its relatively-lower contribution to production costs, because the variation in labour cost is very high. Between mills, the labour cost varies by about 5 times, ranging from 6.2% to 30.4% of the net sales revenue. In the 1968 survey the influence of labour cost was less marked (r —0.75) mainly because some of the new mills having low labour cost did not earn comparatively high profits.

Net Output Value Ratio

The net-output value ratio (D) is the third important factor influencing the profit earning capacity of a mill. If a mill pays more for raw material and still fetches relatively higher yarn price, D remains unaltered. The effect of D on profit per spindle is low (r=-0.36) because of the relatively greater contribution by machine productivity and labour cost. If the latter two variables are kept constant, D shows very high degree of association with profits, the partial correlation coefficient being 0.75.

Other Costs

Other costs, which comprise packing material, power and overheads, explain only a very small part of the variation in profits. There are, however, a few mills where these costs are very high and need to be controlled. These costs do not show any relationship with, machine productivity, labour cost or D, the 'r' value in each case being nearly zero.

Age of Mills

The age of mills is generally regarded as one of the factors affecting profits, but it is of interest to know the causes as well as the extent of contribution by each cause towards variation in profits. For this purpose, the mills are divided into three groups: started before 1947, started between 1948-1954, and started after 1955. The results are given in Table 3.

Table 3

Profits and Return for Mills Started During Different Periods

Item	*Mills Started*		
	Before 1947	*During* 1948-54	*After* 1955
Return on capital (%)	14.3	14.3	17.2
Capital per spindle (Rs.)	191	254	352
Fixed assets per spindle (Rs.)	96	163	250
Profit per spindle per year (Rs.) :			
Before depreciation	27.3	35.6	60.9
After depreciation	16.7	19.2	36.1

The profits for mills started before 1947 and between 1948-1954 do not differ appreciably, whilst the profits for mills started after 1955 are very much higher. The return on capital is also high in new mills.

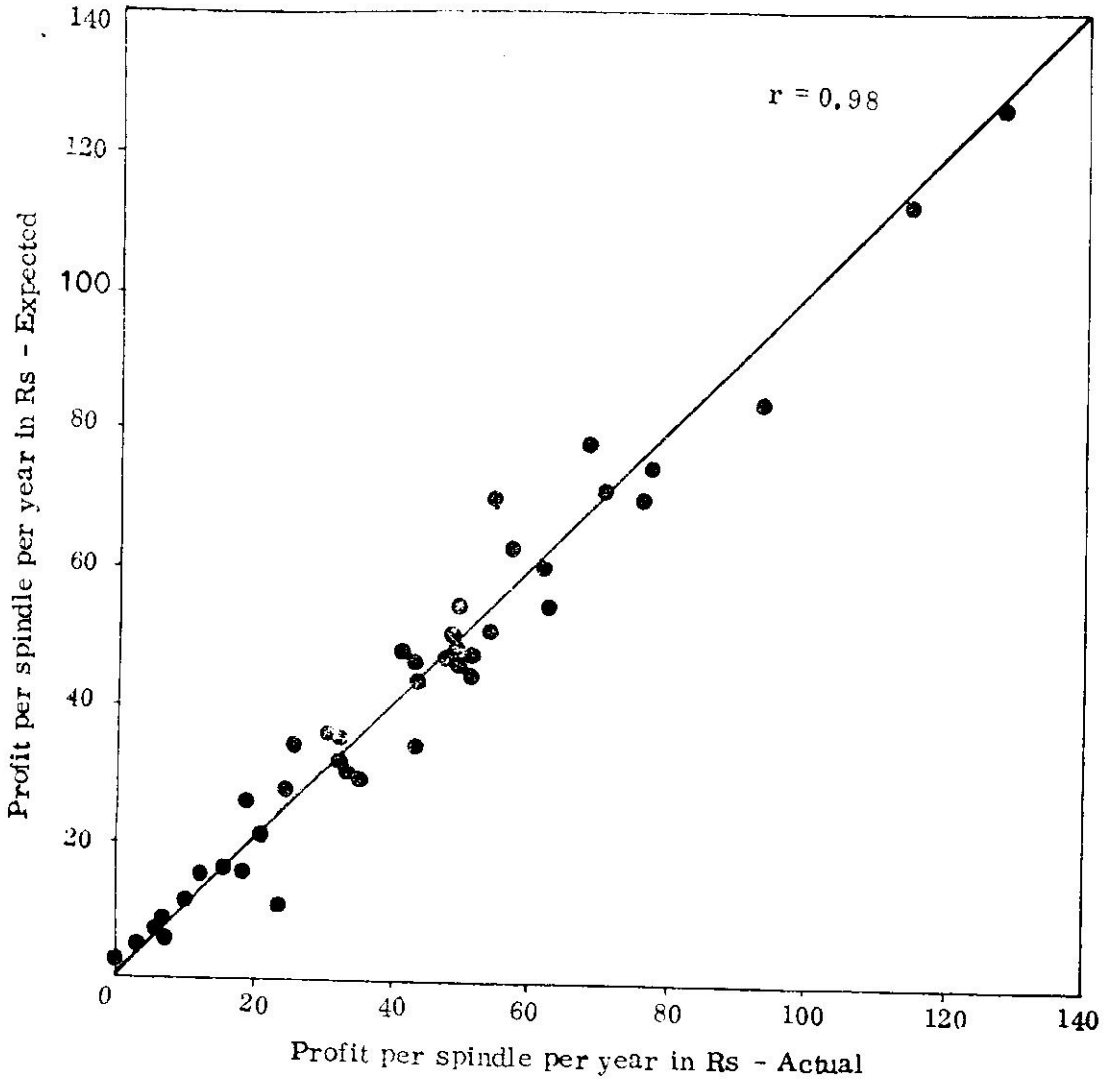


Fig. 3
Relationship between Profit per Spindle and Labour Cost Difference (W)

Lower labour cost contributes to 70% of the increased profits of the new mills. The production per spindle does not show any difference between the new and the old mills. The machine utilisation is, however, greater in new mills, which explains 20 to 25% of differences in profits. Even though the new mills spend more on raw material, their yarn sales revenue is

relatively greater and in consequence the net-output value is slightly higher. It is, however, found that the variation in profits is much greater in new mills. Also, a number of old mills earn higher profits than some of the new mills; for example nearly 30% of the mills started before 1947 earn above average profits whilst about 25% of the new mills earn below average profits.

Size of Mills

There does not appear to be any relation between the size and profit for various age groups. However, mills of smaller size generally make higher profits mostly because they are new.

Number of Counts Spun

The numbers of counts spun (more than one count spun from the same back material is single count) show a very wide spread from 0.4 to 9.5 per 10,000 spindles with a mean of 3. The number of counts spun relative to spindles is somewhat more in smaller-sized mills. High-profit mills generally spin fewer counts, 8 out of 10 of the mills spinning on an average only 1.2 counts per 10,000 spindles. It is also noticed that in 75% of the mills spinning more than 5 counts per 10,000 spindles the profit is low.

Capital-Labour Ratio

The capital-labour ratio is an indicator of how modern a mill is. A low value means that the mill is technically obsolete, whereas a high value shows that it is modern. The ratio would, however, depend on the counts spun for, as the count becomes coarser the rate of increase in capital is lower than the increase in labour.

The capital-labour ratio differs seven times between mills; the mean is about Rs. 12,000. This figure is very low as compared with mills abroad; in modern textile mills in Europe the capital-labour ratio is Rs. 72,000 to Rs. 1,20,000 and in some mills in USA it is as high as Rs. 2.4 lakhs. The profit per spindle is generally found to be associated with capital-labour ratio. In mills where the ratio exceeds Rs. 16,000 the profit is higher by Rs. 45 per spindle per year than in mills having capital-labour ratio lower than Rs. 8,000.

Comparison from 1961 to 1968

The profits have steadily decreased over the past few years and consequently the return on capital in 1968 (11.3%) is barely 40% of the 1961 figure (29.0%). This is largely due to the steep increase in raw material cost relative to yarn selling price. The dispersion in return between mills showed a small drop of 12% because of the slighly larger drop in mills having high return. But the variation relative to return has increased appreciably as the return itself has decreased.

Profit as well as return were less affected in mills in which fixed assets have increased. Mills which have expanded generally recorded a lower drop in profits before interest but slightly higher drop after interest, there being no appreciable change in return on capital. Expansion was found to be beneficial in mills recording high profits.

In mills where modernisation had been effected the fall in profits was just half of that in mills which have not carried out much modernisation. The return on capital also registered a comparatively smaller drop in modernised mills.

Average depreciation remained about the same in different years, indicating thereby that the mills more or less utilised the depreciation amount for modernisation or expansion purposes. Interest charges have nearly doubled and depreciation and interest charges accounted for less than

half of the profits in 1961 but more than 100% in 1968.

The profits showed a wider dispersion between mills due to greater drop in the 'middle group' of mills. Relative to yarn selling price the costs had increased by over Rs. 65 per spindle between 1961 and 1968; however, nearly three-fourths of this increase had been offset by increased labour and machine productivity.

Mills recording higher drop in profits have saved less on wages and raw material. Sales revenue showed a bigger increase in mills recording lower drop in profits. The total yarn sales revenue increased by 10 to 120% in individual mills.

Low-Profit Mills

In low-profit mills the reserves form only 40% of the paid-up capital. As against this in many of the average and high-profit mills the reserves exceed the paid-up capital. The capital turnover is also low in low-profit mills. In some of these mills the liabilities are five times the net worth but the current ratio is about average.

An analysis of the working of 'low-profit' mills has been made for the years 1964, 1966 and 1968. The lowest profit-making mills in each of the surveys were studied, covering in all over 30 mills. It was observed that about 90% of the low-profit mills—where salaries and wages were higher than 22% of yarn sales revenue and machine productivity index was lower than 75 and where no corrective measures were taken—had to be closed within two to three years. If these mills are to work economically, in addition to efficient management, the machinery should be modernised and renovated, and it should also be ensured that the salaries and wages are not more than 18% of the yarn sales revenue and the machine productivity index is not lower than 90.

Redistribution of workload is hardly a new device for the temporary solving of production problems, but when it saves 110 redundancies it surely is something to shout about. The Dartmouth Auto Castings Foundry at Smethwick, Staffs, is composed of three factories attached to each other. At the time the redundancies were due, workloads in each factory were at varying levels: number one was working normally, number three had some employees on short time and number two was at rock bottom.

So the company got together with the two unions involved. The final deal was a mixed bag of solutions. Fifteen voluntary redundancies were accepted. Ten people over and above normal quota of ten were allowed a 10-week unpaid holiday to visit relatives in India. This is a privilege for which five years service is the required qualification and for which there is always a waiting list. While the 20 are away, their jobs will be redistributed and returned to them on their return. But the most significant proposal in the deal is the redistribution of workload which will mean that the amount of work in factories one and three will be brought down, but at the same time number two will be bolstered up. No one will be sacked; the manning will be the same, but the number of hours worked will be reduced substantially over the three foundries, i.e., to the same number as would have been worked if the redundancies had taken place.

—*Personnel Management*, Nov. 1971

Some Thoughts on Collective Bargaining

Naval H Tata*

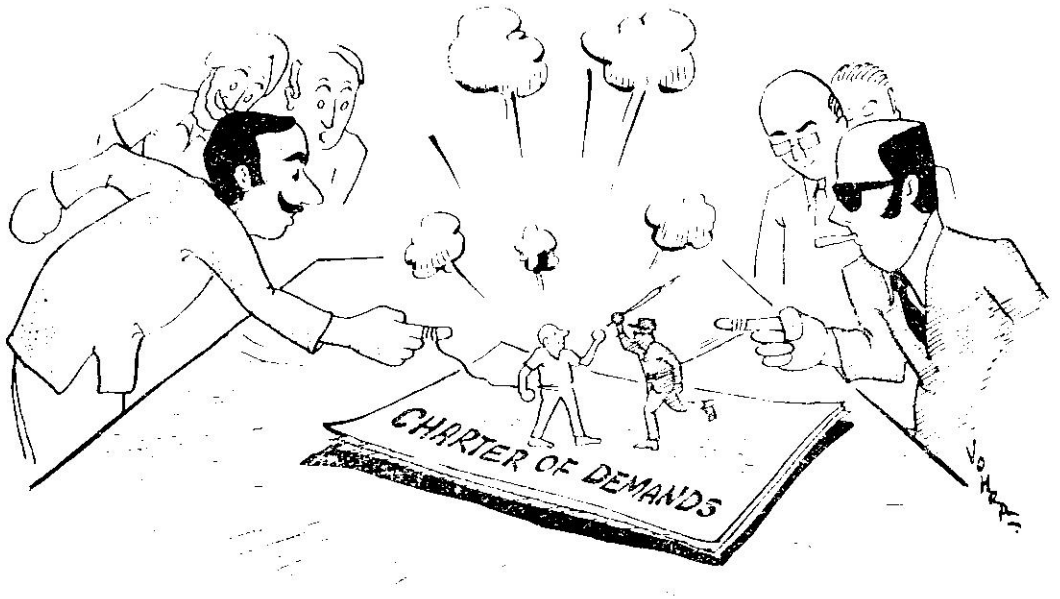
To conduct delicate negotiations with organised labour on sound and healthy principles of industrial relations, the only recourse is collective bargaining. The essential purpose of collective bargaining is to make the workers and employers appreciate each other's viewpoints on matters where their interests conflict and to reach a mutually acceptable compromise There is a feeling in the mind of large section of employers and workers that the plethora of labour legislation which dominates the labour scene in India has a definite tendency of discouraging the process of collective bargaining. Unfortunately, we have not been able to solve the vital issue of the 'representative' union as bargaining agent to the satisfaction of even the workers, leave alone the management. Absence of agreement on this vital issue has held up a potential package deal on collective bargaining, including labour participation in management, automation, sharing the gains of productivity and many other progressive measures. The author emphasises the need for more of bipartite agreements and less of adjudication, more of voluntary codes and less of labour laws, more of self-reliance on the part of employers and workers and less eagerness on the part of Government to interfere.

IN the context of our present national needs productivity deserves the greatest emphasis. Higher productivity is the end-product of both human effort and application of improved technology. It is not right to claim that all increases in productivity are entirely due to the human effort of the worker and, therefore, the employer should pass on to the worker substantial portion of the gain accruing from higher productivity. This is all the more an unjustifiable claim, when it is an undisputed fact that most union leaders have at all stages opposed modernisation of plants and introduction of improved technology.

Productivity in Context of Improved Technology

In the present era, most societies are trying to exploit economic possibilities that arise from application of improved technology in order to harness natural resources for material needs, although there may exist an oasis in the desert of human endeavour, where, in some part of the world, material progress is considered unimportant. However, in the context of universal demand for improved standards of living, there is an ever-increasing need for maximising production at minimum cost by introducing the most efficient methods. Consequently, to increase productivity presupposes exploitation of advanced technology, to which, our labour leaders are often allergic. We may carry nostalgic regrets for disappearance of unstandardised handicrafts. However, the realisation of the tremendous potential productivity of technological advance has compelled us to ignore such sentimental claims of ancient culture which idealises the lives of artisans and super-craftsmen engaged in handicrafts.

*President, Employers' Federation of India, Bombay.



It is true that social adaptation to technological changes has been a difficult process. Even the industrial revolution of Europe which introduced mechanisation had a costly social impact. All the same, the people of that age slowly and painfully learned to adapt their social institutions to technological change. It is not intended to argue this subject from any particular political or economic point of view but purely from the dictates of a desirable human aim. The only way the reluctance of the workers to adapt themselves to technological changes can be overcome would be for the Government to explain and convince them of the dimensions of production needs. The employers on their part should make the workers accept it through persuasion rather than coercion through a patiently planned and accepted change. The plan should be in a form more conveniently controlled and socially less damaging than abrupt and imposed change. To conduct such delicate negotiations with organised labour on sound and healthy principles of industrial relations, the only recourse for the employers is "Collective Bargaining". To what extent this is possible in our present system of labour relations is being discussed in the following paragraphs.

What Is Collective Bargaining?

Although there may be some exceptions amongst the employers, as a rule, we favour collective bargaining as the best method of conducting industrial relations in preference to a system of compulsory adjudication. More so, since the complex system of adjudication suffers in some States from a measure of undue influence and interference from Government. The appointment of tribunal judges is at the sole discretion of the State Governments, and whenever this power is abused by treating it as a source of patronage, the judges so appointed find it difficult to remain independent and impartial in

The only way of promoting collective bargaining is to make a sparing use of compulsory adjudication by giving an opportunity to the disputing sid[illegible] to settle their disputes mutually [illegible] as a last resort by trial of strength.

their anxiety to ensure their reappointment. This unfortunate aspect has a tendency to make State Governments adopt a partisan attitude in industrial disputes through vested interest in particular trade unions. The only way of moting collective bargaining is to make a sparin[illegible] use of compulsory adjudication by giving an opportunity to the disputing sides to settle their terms mutually and as a last resort by a trial of strength. As a compromise, the parties may opt for voluntary arbitration if they are both mindful of loss of production and submit voluntarily to the decision of a third party.

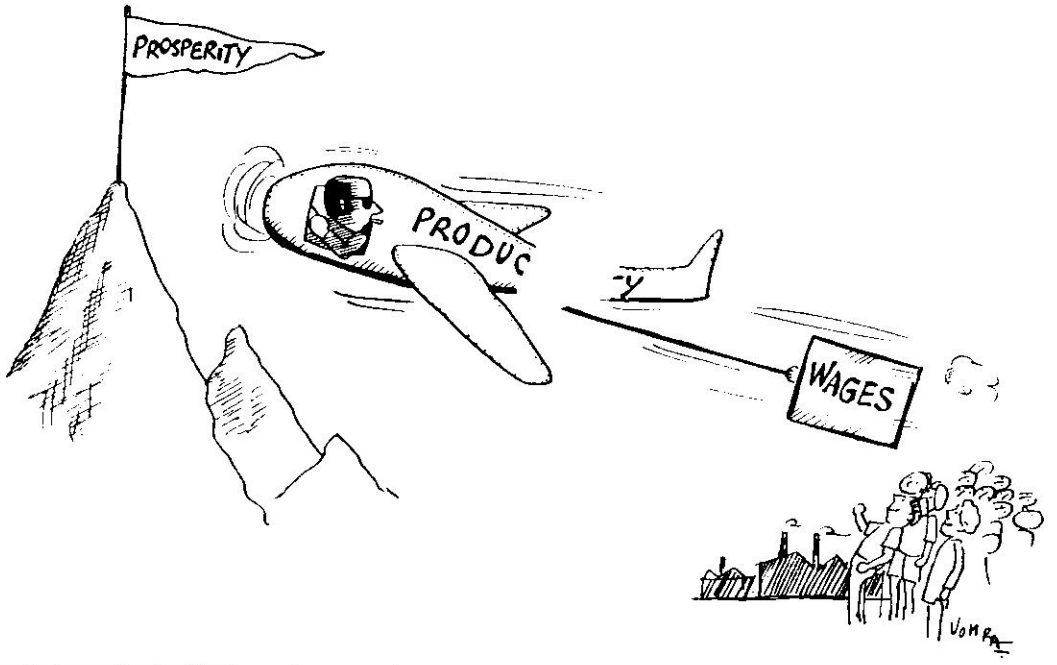
Presence of a Third Party

This writer is not one of those who believe that collective bargaining is thwarted and discouraged merely by the presence of a third party, in the form of Government or independent expert assessors. The essential purpose of collective bargaining is to make the workers and employers appreciate each other's viewpoints on matters where their interests conflict and to reach a mutually-acceptable compromise. So long as the third party merely plays the role of clarifying the views of the other two parties and to tone down their extreme viewpoints without imposing its own will on them, its presence is not only welcome but is essential in encouraging mutual negotiations. It is only when the third party injudiciously exercises its power to overrule the other two parties that its presence spells the death-knell of collective bargaining. In other words, compulsory adjudication and arbitration against the will of both the parties could be an impediment to collective bargaining. There is, therefore, no reason why Wage Board recommendations, for example, should not be described as collective agreements, when they are arrived at through a process of concilliation with the help of independent experts, but are not adjudicated by them.

By the same token the model agreements on rationalisation, and on establishment of joint management councils and the Code of Discipline adopted by the Indian Labour Conference are in the nature of collective agreements arrived at on the national level. Similarly, ILO Conventions and Recommendations in a sense constitute collective agreements at the international level. Since these instruments were evolved after full and free discussions between the representatives of workers and employers in the presence of and with the active participation of Government representatives, they undoubtedly create moral obligations on the parties concerned in terms of implementation by way of guiding principles.

Labour Laws and Their Impact on Collective Bargaining

When one considers collective bargaining as essential to healthy industrial relations, there is a feeling in the mind of a large section of employers and workers that the plethora of labour legislation which dominates the labour scene in our country has a definite tendency of discouraging the process of collective bargaining. Some rational-minded labour leaders are often heard saying that undue emphasis on legislation in our



labour-management relations has deprived trade unions of their legitimate scope for bargaining on behalf of workers and has to some extent retarded the growth of a healthy trade union movement in the country and has hindered the spontaneous evolution of good industrial relations.

It is an undisputed fact that sound and harmonious industrial relations can never be legislated. The field of industrial relations is a highly sensitive and complex field. No third party, however well-intentioned, through motivation of industrial peace, can bring about industrial harmony through intervention, just as much as healthy and happy matrimonial relations cannot emanate from operations of matrimonial courts. A collective agreement may not be perfect, but it is a satisfactory compromise between two conflicting viewpoints and has a reasonably greater probability of willing implementation than a decision imposed upon the disputants by a third party.

The plea for collective bargaining is not a plea for arbitrary freedom or for industrial strife for an indefinite period through a trial of strength but to allow both sides an opportunity to assess the degree of importance they attach to their claims in order to arrive at a reconciliation by a process of bargaining before a breaking point is reached. Both the sides stand to lose by overplaying their cards, and in such a situation reconcilation is not only highly probable, but would be genuine and lasting, even though it could be at the cost of a strike.

Of course, the State must have the ultimate right in the national interest to adjudicate compulsorily to avoid industrial strife beyond a predetermined period of trial of strength in non-essential industries and of a very short period in essential industries reserving the right to prohibit strikes in strategic industries. At least that much of graded latitude in favour of trial of strength will bring about a lasting solution even though at

the cost of some suffering and will build up a healthy trade union movement far more rapidly than would be possible under indiscriminate compulsory adjudication. If either of the parties invokes compulsory adjudication, and it is readily given under the law, there is no motivation to workers for clinging to trade union movement for strength to bargain with the management. Perhaps in a totalitarian system, both strikes and lock-outs could be completely eliminated by imposing adjudication compulsorily, but such immunity can only be at the cost of abridgement of a human right, if not a fundamental right of the workers enjoyed all over the world. Surely our democratic ideals would not tolerate it.

Having put so much emphasis on collective bargaining, the next most important question that faces management is: "With whom do you bargain?" In other words, who is the appropriate bargaining agent? Unless this issue is satisfactorily settled, collective bargaining has no meaning. Unfortunately despite 25 years of national independence, we have not been able to solve this vital issue to the satisfaction of even the workers, leave alone the managements. It is very sad indeed that even in this matter the attitude of the State Governments has been extremely reactionary, judging by the persistent protests lodged by a very large section of the unions, except those represented by the INTUC.

Unrepresentative Trade Unions

For recognition as bargaining agents, the Code of Discipline requires a trade union at the plant level to have only a 15 per cent membership and a union at the industry level in a local area only a 25 per cent membership among the workers covered. With such meagre following among the workers, the recognised unions often find themselves helpless in implementing any agreement entered into by them because of the agitation and obstructionist tactics resorted to by their rival unions. Although with such meagre support, it would be difficult for any union to deliver the goods, the employers have responded to such marginally-representative unions during the transition period, in the hope that by doing so the accredited bargaining agents will build up a progressively higher following among the workers to make future collective bargaining meaningful.

However, the very method of ascertaining the bargaining agent has not enjoyed the confidence of a large section of workers since the method of verification of membership is insisted upon by State Governments in preference to secret ballot or even the modified method of verification-cum-adjudication by Industrial Relations Commission as suggested by the National Labour Commission. Such attitude on the part of State Governments has stalled and impeded progress in the matter of recognition of unions, so vital for so many important things that flow from it by way of healthy industrial relations. It is no exaggeration to say that the absence of agreement on this vital issue amongst the trade unions has held up a potential package deal on collective bargaining, including participation of labour in management, automation, sharing the gains of productivity and many other progressive measures. And yet, employers, who feel obliged to enter into agreements with unrepresentative trade unions, both at the plant and at higher levels, knowing fully well that the workers may ultimately disown the agreement if it suits them to do so, are taking a calculated risk. Other employers are not to be blamed if they would rather opt for compulsory adjudication, instead of having such uncertain agreements.

With all their apparent advocacy of collective bargaining, the trade unions, unfortunately, have

not given any evidence of being really in earnest about it. Their declared support to collective bargaining is only a protest against the delays and the safeguards built into the adjudication system. They decry adjudication only because it allows employers to appeal against perverse awards and because it takes more time than they are prepared to wait for in giving decisions. Nevertheless, they themselves rush to tribunals and courts whenever it is expedient to do so and are never tired of demanding legislation and even ordinances on any and every subject of industrial relations.

Adjudication itself has become an institution in which Government has developed a vested interest. The Labour Ministers, both at the Centre and in the States, cannot shed the outdated belief that workers are the weaker party and that Government must ensure justice to them, that in the absence of Government intervention there would be utter chaos in industrial relations, and that compulsory adjudication of disputes is necessary in the public interest. Their reluctance to part with their present powers of conciliation and reference of disputes to adjudication was made clear when the new industrial relations machinery proposed by the National Commission on Labour was discussed in the Indian Labour Conference in November 1969 and in the Standing Labour Committee in July 1970. Even the modified machinery according to the compromise arrived at, allowing the Government to retain their present powers, has not been set up so far.

Another factor which has discouraged employers in respect of collective bargaining is the interpretation of collective bargaining by extremist trade unions to mean coercive bargaining. Consent extracted under duress can be of no value in industrial relations. Violence, ***gheraos*** and intimidation are inimical to establishment of healthy and enduring industrial relations. Some of our trade unions have yet to learn that the ability to do damage to an industrial unit is to damage the prospects and prosperity of the working classes, apart from hurting national interest.

More of bipartite agreements and less of adjudicated awards, more of voluntary codes and less of labour laws, more of self-reliance on the part of employers and workers and less of government interference can put us on the path of enduring industrial peace.

And finally I would like to reiterate what I have been saying very often. More of bipartite agreements and less of adjudicated awards, more of voluntary codes and less of labour laws, more of self-reliance on the part of employers and workers and less eagerness on the part of Government to interfere, may perhaps in course of time, put us on the path of enduring industrial peace which we need so badly to make our best contribution to the national economy. Let us hope that, through awareness of these needs, we shall attain our goal in the not-too-distant future.

(Excerpts from the speech by Mr Naval H Tata at the Annual General Meeting of the Indian Engineering Association (Eastern Region) held on 11th February 1972).

Industrial Peace and Productivity

NK Joshi*

Since Independence, various measures have been taken for promoting better industrial relations. And yet, peace has always been at stake, due to a number of reasons inlcuding emergence of politico trade unionism, Inter and Intra-union rivalries, and the price-spiral. Collective bargaining is being recognised both by enlightened managements and Trade Unions as the right medium for settlement of industrial disputes. Whereas trade unions have to ensure emergence of disciplined workforce, the managements too must treat labour as an essential input and should accord it a status of equal partners in production. A contented labour force is an asset for achieving increased productivity.

INDIA is at the take-off stage in the field of industrialisation. Under the Five-Year Plans, both public and private sector industries have consistently sprung up and have been playing their roles, competitively as well as exclusively.

In the wake of industrialisation, industrial relations have also assumed greater importance. The Labour-management relationship is becoming both an art and also a science. Numerous investigations and researches are taking place to analyse human element in the industrial complex, which is predominant in the shaping of labour-management relationships. The old theory of hire and fire does not work today. On the other hand, humane approach to labour problems, is the order of the day.

The State as custodian of peace, has to design its role in the shaping of future policy on industrial relations. Industrial peace being the ultimate objective, the State has employed numerous means to achieve this goal. During the post-independence years, the State has created various machineries, for settlement of industrial differences. It has also provided indirectly fillip to the growth of collective bargaining and to the promotion of voluntary arbitration, for settlement of industrial disputes.

Influence of Political Parties

In spite of diverse measures by the State in the field of industrial relations, industrial peace has always been at stake. The prime cause for industrial unrest is perhaps the emergence of politico-trade unionism in the country. The trade union movement is being directed by political parties, with divergent political ideologies. Politics has deeply infiltrated into the trade union movement, separating the workforce from each other on political grounds. The pure and unsophisticated type of unionism is, therefore, not finding a foothold in the present politico-socio-economic set-up of the country. Union rivalries have been growing. Trade Union feuds have frequently come upon the scene everywhere. Intra-union rivalry is yet another set-back to unfettered trade unionism in the country. The oft-seen race for union

*Labour Commissioner and Dy. Secretary to Govt. of Rajasthan, Jaipur

leadership within the same union organisation has also led to innumerable bickerings and has halted the pace of sound labour-management relations.

Problem of Discipline

The managements complain of the problem of discipline within the industry. Since rank and file is divided due to loyalties to different trade unions, and rivalries amongst unions are prevalent, managements are finding it hard to have perfect disciplined labour force within the industry. The production ultimately suffers.

It is not only the management which has stakes in the production, it as well contributes significantly to the economy of the country. If there is large-scale production, there would be plenty of wealth and the wealth so created can be fairly and equitably distributed within various sections of the economy. No doubt indisciplined behaviour on the part of workmen can jeopardise the tempo of production.

And yet, the labour alone cannot be apportioned blame for the reported malaise on the industrial field. There are some employers, who still believe in terms of labour being a marketable commodity and deal with it in the same fashion. Labour being a human factor, is susceptible to management behaviour. The employers' behaviour towards labour generally determines the type of relationship in an industry. The management must regard labour as an essential input for economic development and should accord it a status of equality for the purpose of fruitful bargaining.

Equal Partners

Collective bargaining pre-supposes emergence of strong trade unionism as an economic force. One union in one industry may promote free and unfettered collective bargaining between partners of industry. Until the managements realise that trade unions are equal partners in the industrial activities, industrial production cannot be maximised. The managements have thus to break the psychological barriers to suit the present industrial environment and to treat labour as the inevitable human force, without which production targets cannot be achieved. If labour and managements both discipline their behaviours and meet each other on an equitable and rational basis, there is no reason why production and productivity cannot reach the optimum levels.

If labour and managements both discipline their behaviours and meet each other on an equitable and rational basis, there is no reason why productivity cannot reach the optimum levels.

The one potent grouse of the labour is that it is not even paid the need-based wage. To some extent, it is true, because the ever-soaring prices have never allowed the need-based wage to be determined in the present economic conditions. The State has also to hold the price-line, to enable labour to purchase his monthly basket of necessities, commensurate with the pay packet earned by him. Frequent price-spiral has eroded the real wages of the workmen and is equally responsible for industrial strife and indiscipline in industry.

Wage Incentive

Unless the labour-wages are determined in relation to the stable state of economy in the

country, they cannot be called as standard wages. The norms for determining workloads first require standardisation of wages. To accept payment by results, wages and workloads will have to be standardised. Standard wages and standard workloads would provide the basis for formulation of work-norms. Anything beyond the standard work-norms has to be compensated through incentives. Incentives would motivate labour to give their best and simultaneously earn more. This would add to their efficiency, which in turn would result in increased productivity.

Need for Increased Productivity

Productivity has its impact on increased production. Hence, for achieving higher production, increased productivity has to be achieved, which is possible only when the workforce is otherwise fully contented. The contened Labour-force is no doubt an asset. Contentment cannot be secured merely by paying higher wages or providing fringe benefits and suitable working conditions. Contentment requires satisfaction of both economic needs and social aspirations. Labour cannot be viewed as merely confined to the four-walls of the work place. A worker is a human being and has his status in the society. The focal point in the industrial reconstruction is the human-being who is a living force. Unless treatment on humane level is accorded to him, his efficiency cannot be improved.

The main objective, therefore, in our present-day industrial structure is, to have genuine consideration for the worker and to treat him as a human being. In this context, we may have to transform our entire psychological base, and also lay down ethical codes for shaping our future behaviours and setting high standards of discipline. The country in its race for improved and technological, industrialisation should not lose sight of the inherent problems of discipline and productivity. These are based on the behavioural pattern of living human-force. It must be realised that for achieving improved production targets the human-factor has to be given its place of pride in the scheme of things, with the object of accentuating efficiency in the workforce. This, in turn, would lead to increased productivity and higher production and the much-needed industrial peace in the country. □

CONCILIATION SERVICE FOR BRITISH INDUSTRY

British trade union leaders and employers' representatives recently agreed to set up an independent conciliation service to arbitrate in industrial disputes. The functions of the service were outlined in a joint statement signed by the Director General of the Confederation of British Industry (CBI), Mr Campbell Adamson, and the General Secretary of the Trades Union Congress (TUC), Mr Victor Feather. The service starts work on September 1.

Arbitrators, a panel of whom has already been drawn up by the TUC and the CBI will only be able to step in if all sides in a dispute agree. The main aim of the service is to prevent disputes escalating into full-scale strikes.

During its first few months, the service will concentrate on disputes of major importance involving large number of workers. Later, it will be extended to handle minor industrial problems, and could eventually have regional offices with full-time arbitrators.

British Information Services

Morale: A Key Determinant of Climate for Executive Development

Harmesh C Kakkar*

Morale is a combination of feelings, sentiments and attitudes of each member of an organisation both as an individual and as a part of a group, towards job environment, colleagues, management objectives and policies, methods, procedures, etc. Morale cannot just be ordered. It is the end-result of certain conditions in and around the work situation, which foster its growth. To maintain good morale is not the responsibility of management alone, but of every member of the organisation. Maintenance of positive morale is a continuous process and requires regular attention, diagnosis and treatment. No doubt sound management policies can assure some degree of positive morale. Supervisor as the main communication link between lowest level and the management can play an important role in building morale.

ONE of the most important tasks of top management is to create and maintain the necessary 'climate' for the Executive Development. This can only be done by fostering the 'Morale' in the organisation as good and as high as possible.

Definition

There is no one opinion on morale in an organisation. Opinions differ mainly because of its intangible nature. It may be looked as a by-product, a combination of components which produces a balanced and healthy situation for people to work with self-respect and provides an opportunity for individual advancement. According to others, it is a state of mind and emotions, affecting the attitude and willingness to work, which in turn affects individual and organisation objectives. There are yet others, to whom morale is the attitude held by the individual members of a group which makes them put the achievement of group goals ahead of the achievement of personal goals.

Actually, in more precise and correct manner, one can illustrate, morale as a combination of feelings, sentiments and attitudes of each member of the organisation as an individual and as a part of a group, towards job environment, colleagues, management policies, goals, methods, procedures and organisational objectives.

Positive Vs Negative

A subordinate with high morale is satisfied with his work place, has confidence in his colleagues and superior's abilities, shows enthusiasm and a strong desire for voluntary cooperation towards the organisation's objectives, to his maximium capabilities and for the best interest of the organisation. On the other hand a subordinte with low morale, is dissatisfied with his

*Research Fellow in the Department of Administration, Lucknow University, Lucknow. The author wishes to thank Mr AS Gupta, Personnel Manager, Eveready Flashlight Company and Dr LD Joshi, Head of the Department of Business Administration, Lucknow University, for their valuable help and cooperation in the preparation of this paper.

job conditions and does not cooperate with fellow workers and superiors, rather tries to put direct or indirect hurdles in the way of smooth functioning, remains frustrated and shows lack of interest in organisation's activities, lives in search of loopholes for criticism. A man having extremely low morale is seldom expected to speak high either of the management or of the organisation.

Experience shows that often an individual with extremely negative morale, rarely continues for long with the organisation. He leaves as soon as he gets another opportunity.

It must be realised that morale, by itself, is neither positive nor negative. To put it in other words, it may be both high and low—positive and negative—at the same time. The state of morale is dependent on the composite relationship of both high as well as low morale.

Besides, researches show that it can be high at one level of hierarchy and low at the other. For example, morale among worker-class may be high in a particular-organisation and low at the executive level. Although, if such a situation continues for a long time, the probability of the worker's morale also becoming low, is not ruled out.

High Morale at All Levels

Obviously, the ideal thing for any organisation is to have highest morale at every level and in every member in the hierarchy. But it cannot just be ordered. It is the end result of certain conditions in and around the work situations which foster its growth. Such conditions may include good motivation, respect and dignity to the individual, realisation of individual differences, good leadership, sound communication network, participation, superior-subordinate counselling and such other human relations practices. To a certain extent, the state of morale reflects the appropirate use of human relations and personnel policies in the organisation.

To maintain a good morale is not the responsibility of management alone but of every member of the organisation. A superior, in his day-to-day contacts, influences the morale of subordinates. Besides, overall programmes, plans, policies and general philosophy subscribed by the top management, are also responsible for positive or negative morale.

Morale *Vs* Team Work

Some associate the concept of morale with teamwork. Both are, however, not synonymous. The concept of morale pertains to an individual and also to a group. Individual morale refers to the individual's attitudes, and group morale is the general tone of a group—department, unit or organisation.

Team-work means the smooth, coordinated and synchronised activity that characterises a closely-knit group. It is based on (1) team spirit among all members, (2) of a small group, (3) each of whom is able to make a practical contribution to the common goal, (4) who have frequent and full two-way communication in face-to-face talk to plan and evaluate group activity, and (5) continued practice in supplementing each other as team-mates.

Key Role of Supervisor

Supervisor as the main communication link between lowest level and the management can play an important role in building morale. The quality of leadership displayed by him is of vital importance in establishing the right atmosphere in a work situation. Following are some of the suggestions which can help a supervisor to play his role more efficiently and effectively.

1. Sufficient authority commensurate with responsibility should be delegated to him.
2. He should place direct emphasis on workers and only indirect on production.
3. He should encourage workers' participation in decision making and problem solving.
4. He should spend more of his time in supervision and keep work flow as good as possible.
5. He should have greater feeling of confidence in his job. For this he must have proper technical as well as human relations training.
6. He must help workers to achieve work standards and let them know, exactly what is expected of them in terms of quantity and quality of work.
7. He must show team spirit himself, respect the dignity of each worker and make effective use of individual differences.
8. He must hear and handle the complaints in effective manner and must be willing and ready to help all those who ask for it in solving any difficulty or problem.

Influencing Factors

Though morale is the result of an infinite number of separate attitudes in each subordinate, there seems to be some agreement on the factors which most strongly influence the morale, some of which are within the control of management. This infinite number of factors influencing morale can generally be classified as under:

(1) Individuals themselves.
(2) Environment outside the organisation.
(3) Management.

Individual's capacity to understand management's view point significantly affects his attitudes. His status and position within the organisation also is significant to his morale. This factor becomes more relevant in connection with the morale of factory workers who are members of a strong union and whose attitudes are largely influenced by the fact of their membership.

Most important to the morale of an organisation are its policies, procedures, communication methods and objectives, leadership by management, satisfactory organisation structure, unity of command, adequate reward and discipline.

Secondly, the environment outside the organisation, though beyond the reach of managements, considerably influence the morale. Examples of this factor are family relations, associations with friends, etc.

Most important to the morale of an organisation are its policies, procedures, communication methods and objectives, leadership by management, satisfactory organisation structure, unity of command, adequate reward and discipline.

Attitude Surveys

The systematic and periodic examination of morale is necessary to find out the attitudes and behaviour of the executives and workers, and also to review critically the policies and

Maintenance of positive morale is not a 'one shot' and easy job; it is rather continuous, complicated and complex one. It requires regular attention, diagnosis and treatment.

practices in and impinging upon the components, which are responsible for the overall climate.

Technically, such an examination is known by the name of "Attitude or opinion survey".* Such surveys are now being conducted at least in enlightened business houses. They are often conducted after a regular interval of time, which interval may be of six months or one year.

Attitude surveys are to be conducted by the professional specialists. To presume that supervisors or anyone from personnel management will be able to conduct and interpret the results correctly, will be a myth. Moreover, it is more likely that members of the organisation may not wish to give frank expression of their attitudes to the supervisor or any member of the organisation and may do so to outside expert.

Because of this reluctance to reveal their deeper feelings, attempts are made in western countries to adopt psychiatric techniques. But the use of such ultrasophisticated techniques is very restricted, they being more expensive than other techniques. However, the conduct of attitude survey is not sufficient. More important is the 'follow through' for the best results of attitude survey.

Reasons for Failure:

Big business houses spend large sums of money on attitude survey, believing it as a means of communication, as trouble spotter and as morale-builder. Their belief is seldom wrong, if the attitude surveys provide a real insight into employee attitudes. But it is a big IF. Actually, attitude surveys do not measure the attitudes hundred percent correctly. Main reasons of this may be as follows:

Defects in Questionnaire:

In spite of well-thought-out questionnaire, the general tone of the answers more often reflect satisfactory state of affairs. For the most part individuals go on record as being satisfied with the job situations. Moreover, there may be, and usually are, though unconsciously, 'wishful' questions, which are mostly positively answered.

Another possible defect in questionnaire system lies in the interpretation of answers. The answers are subject to subjective interpretation, because each specialist, who conducts the survey, naturally responds according to his own professional interests and automatically is inclined to distort the meaning of answers in that direction.

As indirectly pointed out earlier, the individual respondent answers in a way that, he thinks, will please the surveyor—especially when he is his superior. Besides, surveys elicit from individuals only momentary opinions on a multitude of specific points, and, therefore, cannot really claim to assess basic attitudes.

*The terms attitude and opinion may be different from psychological point of view, but for practical use, both can be used as synonymous.

Thoughtless and Pleasing Answers:

Answers may have been given either without giving much thought or may be intentionally "fudged". For example if the question is "Do you like your boss?" the probability is that any individual with an eye on a promotion is likely to answer "yes". There is a psychological pressure to make this reply even when the respondents are not identified. On the other hand, out of uneasiness with the unfamiliar survey techniques, the individual is tempted to 'cheat', by being 'guided' by his colleagues to write answers without himself thinking very much about the questions.

In case, the questionnaire requires a good deal of time to fill in, the individual may become impatient, and will thus be even more likely to answer with a minimum of effort, just to get the chore over with.

Unconsciously Unrealistic Answers:

In attitude surveys many answers are to be given in three to five choices. Even if his attitudes may fall somewhere in between or outside the choices, the respondent is forced to make a 'choice'. Naturally, this will not lead to sound reliance on survey.

The open-end method of questions, also, is open to question, because a few in the lowest hierarchy i.e. worker class, in our business houses, lack formal education and thus facility with words. This offers a problem to them. Unrealistic answers are not only the product of fixed choices and lack of workers' education, but also of the limited and undiversified experience they have.

Unrealised Attitudes:

Sometimes, individuals do not know their real attitudes, themselves. Besides, attitudes are hardly stable. They change with each person's continuing accumulation of experience and with his constant revaluation of that experience. Moreover, external influences directly influence the feelings and attitudes. For example, if the respondent to the attitude survey is allowed to take his questionnaire home and bring it on the following day, there is likelihood that the answers may have been influenced by the respondent's wife or his friends.

Some Suggestions

Maintenance of positive morale is not a 'one-shot' and easy job; it is rather continuous, complex and complicated one. This requires regular attention, diagnosis and treatment.

No doubt, sound policies of recruitment, selection, promotion, training and development and efficient communication network throughout the organisation, can assure some degree of positive morale. Labour turnover, absenteeism rate, accident records, wastes, and training records are significant indicators of the state of morale. In spite of their limitations, attitude surveys by experts should also be adopted for better accuracy in measuring morale.

Morale is an important ingredient for creating appropriate climate for executive development in any business organisation. Good morale among the employees and executives necessarily creates a good climate, which encourages self-development and motivates them in the right direction. On the other hand, bad morale results in bad climate which may retard the development process, and stifle executive potential. □

Devices for Promoting Office Productivity

RM Dave*

Higher office productivity, to be a constantly-practised affair, demands a mental awakening of a high order to conserve all resources and utilise them in the best manner possible. Productivity is cost-consciousness magnified and is a creed with practising managers. Herein below are certain devices for promoting office productivity which might prove useful to management. These observations have been made in a very objective and dispassionate manner after carefully analysing the environment and conditions prevailing in various business organisations.

1. USE POST-CARDS AND "INLAND" LETTERS, WHEREVER POSSIBLE

Inland stationery as well as printed post-cards can be utilised for effecting savings on stationery, typing labour and postage. Post-cards and inland letters are generally used only in the Shares Department of a company office.

2. USE THE REVERSE OF INCOMING LETTERS AND OFFICE COPIES OF OUTGOING LETTERS FOR SCRIBBLING PURPOSES, BEFORE SELLING THEM AS SCRAP.

Circular file papers are found being used for scribbling purposes but the reverse of incoming letters and office copies of outgoing letters are not used. While even circular file letters are used by a few executives, some of the other subordinate staff use writing pads as well as costly papers for scribbling purposes. It is doubtful whether any substantial amount could be realised by selling them as scrap. This might not only ensure economy in stationery but also bring some scrap value. In business offices, there are generally large-size and medium-size scribbling pads. For certain purposes, however, even small-size scribbling pads could be introduced and the typist as well as the department concerned could be instructed about judicious use of the writing pads.

3. TYPE ON BOTH SIDES OF PAPER

Typing on both sides of the paper for outgoing and inter-departmental communications may be resorted to.

4. RETAIN NO MASTER FILE COPIES

Of course, in big concerns, master file copies might not be so much useful. While endorsing copies to other persons or departments, some-

*Secretary, Ahmedabad Mill Owners' Association, Ahmedabad-9.

times no mention of the purpose of endorsement is made. It is a good practice to mention the same.

5. Use as Much Cyclostyled Material as Possible

Cyclostyling machine must be kept under constant use and should not be entrusted to any inexperienced person who wastes a lot of ink and stationery and brings out copies not in the required standard having correct impression. Two persons should be trained for this job and they must not only be responsible for taking out copies but must be responsible for the upkeep and cleanliness of the machine and as it happens generally in big offices, some extra allowance might be given for this purpose to the person concerned as a special incentive.

6. Upkeep of Stationery

Stock-piling of forms and stationery to such an extent that the paper goes brittle with lapse of time should be discouraged. The excess stock must be utilised before ordering new stationery. Responsible officer must be in charge of purchase, issue and stock of stationery in order to ensure greater economy. Sometimes indiscriminate buying and issuing goes on and only a despatch clerk is put in charge of the above three functions excepting that of purchasing, which is being done without any policy or without fixing the stock levels.

No form should be introduced unless it justifies its existence. Specimens of the forms be collected from progressive offices and adopted with suitable modifications relevant to the concern.

7. Write Only When Obligatory

Optimum use of telephone and telegraphic facilities should be made. However, sometimes personal calls and unnecessary calls keep the line engaged and cent per cent use of telephone cannot be made for real important office work. Strict check needs to be exercised on the telephone operator and personal calls must be discouraged as far as possible. Use of modern office equipments promotes efficiency. Installation of telex machine helps immediate disposal of urgent matters. It would be advisable to use telex messages instead of telegraphic and telephonic messages, since it will be more expeditious and cheaper too. Strict control should be exercised on the indiscriminate booking of trunk calls; quite often for less important reasons or without taking into consideration the urgency of the matter.

8. Use Window Envelope

Use of window envelopes would save a lot of time and labour involved in typing envelopes. Errors in addresses can be also eliminated by adopting this practice since the person who checks the writing on the letter will also check the address and it is quite possible that he might not check the envelope. The despatcher would also not have to look after this part of the work and it would ensure greater efficiency.

For Head Office/Branch correspondence master envelopes should be used and relevant papers should be punched together. As far as possible, kraft-paper should be used. If the practice of using pre-punched letters and office copies is introduced, most of the filing clerk's work would be saved since the punching will be done by the stationers.

In statements, avoid columns and linear indications, which saves considerable time of the typists. Cheaper quality paper should be used for drafts, internal memoranda and notes.

In order to make a proper utilisation of the red portion of a typewriter ribbon, type out drafts

and internal memoranda in red. Retain office copies only where you must. If no office copy is required, it need not be typed at the first instance.

9. Never Rush Through any Work, Unless the Consequences are Dire, Because the Extent of Inaccuracy Varies Directly With the Volume of Rush Work

This point must be stressed since it is the usual practice to rush through any work and subsequently to repent about inaccuracies, which cannot be helped on account of increasing volume of rush work. Ways and means to lessen the rush work should be devised. However, when consequences are dire this practice has to be resorted to.

10. Use of Forms

Apply Review-Technique to forms and attempt reduction or elimination. Existing forms must be thoroughly examined and compared with the similar ones in vogue with other companies and make changes only if vitally necessary. Reverse of obsolete forms should be used for rough work. Pile up all existing obsolete forms at one place from where distribution must be made to various departments for use for rough-work. Wherever practicable, eliminate card-board backs to forms.

11. Re-use Files and Folders Left Empty After Destruction of Records: Re-use Teleprinter Carbons for Typewriter Use

Periodical checks by the heads of department would reveal what records require to be destroyed and after the same is destroyed, the empty files and folders must be re-used. Telex carbons should be collected and stored for re-use by the typists.

12. Use Shredded Paper as Packing Material and Re-use Packing Cases

This practice if adopted would prove advantageous. Use of cellotape instead of gum must be encouraged because it consumes lesser time. Instead of clips and pins, use of staples should be introduced because it is more economical. Lot of clips and pins are wasted.

13. Maintain a Flying Squad That Will Do All Jobs During a Period of Major Absenteeism or Peak Periods

There is greater absenteeism and greater turnover of clerks, officers and typists. In most of the progressive companies flying squad is maintained ready for taking over charge from any person who desires to leave the organisation at short notice or for meeting emergency requirements or overload in a particular department.

14. Insist on a Written Requisition Every Time, Except For Urgent Requirements.

It must invariably be the practice to insist on written requisition every time for enabling correct official records being maintained of the requisitions.

15. Provide Two, Three or Four Muster Rolls

Instead of one big muster-roll, two, three or four muster-rolls should be provided especially in big offices located at different floors in the same building. One on each floor would avoid delay in signing muster-rolls and waste of time for going from one floor to another. One of the commonest and most apparent manifestations of poor office productivity is delay. There can be countless causes of delay but that does not imply that the evil defies solution.

16. Poor Office Arrangement

On account of poor office arrangements there is delay in work. The department concerned may be located at one place and the persons in charge may be sitting at different places. Peons may not be available as and when required and the officers might be required to perform peons' work very often. It is not because of less strength of peons that this difficulty arises but sometimes it is because of lack of adequate control and proper distribution of work.

17. Poor Visual (Non-Visual) Control. Which Means That No Targets Are Fixed for Disposal of Matters

For disposal of matters, targets should be fixed and office procedures must be properly stipulated, in absence of which everybody manages things in a way be likes best following his own procedures which generally result in poor administration.

18. Executive Should Not Disturb the Clerks in Their Work Too Often

When urgent information is required every now and then, the entire working of the department concerned is upset. To avoid this, there should be proper planning of work.

19. Heavy Absenteeism Indicating a Low Morale

Low morale is indicated in certain organisations not only by large-scale absenteeism but also in various other ways. This is indicated by the general attitude of the staff to the work, their output, attendance, sense of insecurity or general indifference.

20. Irrational Workload

Irrational workload is a common malady in many an office. Some people may be found overworked. There are others who have no work and while away the time under one pretext or the other. This matter must be examined very minutely and before making any fresh recruitment of any type of staff, workload of the persons who are already working should be assessed and properly re-distributed. If it is found that there is no necessity for bringing in a new hand, it must be avoided. In the absence of scientific assessment of workload, a person is recruited for the odd job and it is found that he has no work after two months. This is neither good from the point of view of organisation concerned nor from the point of view of the person. Besides, it adversely reflects on the reputation of an organisation. People very badly in need of job would join it and after a week or so, they might be disillusioned and make an attempt to leave.

Irrational workload is a common malady in many an office and must be examined before deciding to make any fresh recruitment.

21. Unauthorised Visitors to the Office, Consuming Workers' Time

Plenty of unauthorised visitors are either seen in the visitors' room or sometimes they have an audacity to disturb the people at work. They sit near the seats of the clerks and chit-chat and disturb those who do work with concentration. No disturbance by the outsider must be allowed. They should not enter the place of work unless authorised by the Sectional Head.

22. SENSE OF INSECURITY OR A FEAR OF CHANGE OF JOB WITHIN AN ORGANISATION FINDS REFUGE IN THE BACKLOG SYNDROME WHEREBY WORKERS FEEL SECURE AND ARE ALWAYS ABLE TO SHOW MANAGEMENT THAT THEY HAVE ENOUGH ON HAND.

This practice is prevalent in almost all organisations. Close observance of the working of some of the members of the staff in an organisation reveals that instead of indirectly allowing them to develop a sense of insecurity or fear of change of job, administration should inculcate security and assurance by establishing and enforcing sound management practices which would allow for exceptions in rare cases only. In other words, greater care need be taken at the time of recruitment. Having once recruited a man, a sense of insecurity should never be allowed to prevail upon his mind which would affect his efficiency and which might make him resort to this practice.

A treatment of productivity may not be complete without a concluding reference to the Hawthorne Investigations carried out in the Relay Assembly Room of Westinghouse Electric Company of America. In that room, there worked an informal group of girls who kept up the tempo of high productivity despite changes (deterioration) in working environment and exceptional measure to give no bonus for above average performance. Productivity declined when, for experimental purposes, the informal group was disintegrated although better working conditions in higher wages were provided. It proved that the most important factor in productivity is still the human being and that a compact, informal group of workers can accomplish the optimum even under trying conditions. Thus, the focal point of productivity is a group of contented, dedicated workers, and its ultimate aim is their prosperity through a more-efficient management. □

SPACE UTILISATION IN OFFICE

When more personnel are recruited, it is a must at that time to properly consider whether to select any other place or to use the same floor space to accommodate the new personnel. If the policy of the Management is to follow the former, it will result in an increase in rentals, increase in consumption of electricity and lack of coordination between all departments, apart from a fall in profitability. When the management prefers the latter, it will produce good result if a careful space utilisation programme is followed.

When such a programme is introduced care should be taken that space should not be jammed in such a manner as to deter the smooth working of the business. The top management should give cautious approach as to the use of business equipment, stationery, furniture, by each personnel and the minimum floor space to be occupied by him for working—If the total floor space of the business unit is sufficient for the accommodation of all existing and new personnel, the new personnel may be housed under the same roof with the existing personnel.

—*Office Management*, July-August, 1971.

Measuring Coding Error in Mechanical Data Processing

RK Nandy

Coding of information is the first stage towards its processing work by mechanical means. Usefulness of processed data depends on the accuracy in coding. Unless coding is done meticulously the data obtained become fallacious and lose its value. Of course, total elimination of errors in coding is not possible; it can, however, be minimised through various steps. The magnitude of this error can be measured by using the concept of 'Entropy' as propounded by Dr CE Shannon in 1948.

DATA processing is an integral part of information storage and retrieval. Sheer necessity of handling a growing volume of data led to the invention of various mechanical equipment to make the work of data processing quicker and less laborious. As the volume of data grew larger and more varied, the need for better and faster machines began to be felt. Gradually, sophisticated machines were put into use. Mechanisation of data processing has eliminated manual efforts and injected speed and accuracy.

In the process it has created some problems too. Present-day automatic data processing work is very complicated, consisting of a number of stages. Coding is the first stage of the whole data processing work embodying in itself the most important stage. The intricacies of coding do not usually receive sufficient attention. Coding work has been pushed to a secondary place in the whole complex of data processing work; yet, mistakes in coding lead to wrong results and faulty conclusions. Coding represents the halmark in communication between man and his machine.

Identification of Problem

Quantification of information begins with converting it into numeric codes which are then transcribed on punched cards, paper tapes, or any electro-magnetic device depending on the data processing equipments. Coding in data processing work is very much similar to sending a coded message in communication engineering. The only difference is that in the former a human brain is at work in coding an information and recording it, in the latter some machines are at work. In both the cases, however, there are chances of coding wrongly. Unless the errors

*Division for Scientific & Technical Personnel, CSIR, New Delhi-1.

The author wishes to thankfully acknowledge the encouragement given by Mr K Ray, Scientist Incharge, of the Division for Scientific and Technical Personnel, CSIR and the helpful suggestions given by Dr A Ghosal and Mr P N Choudhury, Scientists, Research, Survey and Planning Organisation, CSIR.

committed in coding are eliminated before data transcription stage the whole work of data processing will be a mere shadow fight. There are various possibilities of committing an error in coding involving human elements. These errors are not easy to detect unless coding instructions and coding frames are so designed as to make it a fool-proof affair. But no amount of perfection in coding instructions and careful coding can produce a cent percent correct code.

However, the fallibility of a particular coding programme may be tested by measuring the magnitude of error, and the coding programme revised in order to achieve allowable limit for coding error. This paper suggests a method for measuring the coding error and illustrate it by the data on scientific and technical manpower studies.

Case Study

In processing data on scientific and technical manpower, coding poses a complex problem. Unlike other types of socio-economic studies such work needs coders to possess thorough and up-to-date knowledge of scientific and technical subjects, industrial developments in the country and nature of economic activity of the whole scientific community. Simple errors committed in coding magnifies errors in calculating various estimates of statistics. In effect, coding can be an important source of bias. Like other non-sampling sources of variation, errors arising out of wrong coding requires careful study and steps need be taken to avoid, neutralise or correct them. In statistical practice the problem is one of balancing the biased and unbiased errors without ignoring or neglecting either, so that the final error falls within tolerable limits. The only way to reduce the biased error is to eliminate or reduce it at its source; in case of coding, at the coding stage itself.

Errors in coding arise due to various reasons. It may so happen that a coder is not able to decide on the code to be used for a particular information. Some coder may put a wrong code and some other may exclude it altogether recording it as "not given" category, thereby reducing the sample size. In either case, the coder commits an error. The question is: to what extent either of the coders is wrong?

The following illustration on salary distribution will provide an answer. The method of collection of information regarding scientific and technical personnel is largely through mail. Each concerned individual mails the filled-in cards which contain the relevant particulars. It is quite common to find that when information is sought about the total monthly emoluments, the information is furnished as "basic + other allowances" basic pay is given in Rs and amount of other allowances is unspecified, or when basic pay is asked, total emoluments is mentioned. The effect of this error can be highlighted by considering a hypothetical sample of 100 persons, where it is assumed that four persons mentioned Rs. 250 plus other allowances and another two Rs. 350 plus allowances as total emoluments instead of furnishing information as regards their actual total salary. While coding these 6 cases two persons may code them differently—one coding their pays as total pay viz., Rs. 250 and Rs. 350, other totally ignoring these 6. Let us see what happens in these two different cases. Assuming the correct total salary in the first 4 cases to lie in the range 300-400 and in the latter 2 cases to lie in 400-500 we calculated the median pay.

TABLE 1

Salary Grp. (*Total pay Rs./m*)	*No. of persons in each group due to*		
	Correct Coding	*Wrong Coding*	*Eliminating persons with wrong information*
100-200	8	8	8
200-300	25	29*	25
300-400	52	50*	48*
400-500	12	10*	10*
500-600	3	3	3
Total	100	100	94
Median pay	333	326	329

TABLE 2

Organisation	*Persons under each organisation due to*					
	Correct Coding		*Wrong Coding*		*Eliminating the doubtful cases*	
	No.	*P.c.*	*No.*	*P.c.*	*No.*	*P.c.*
Teaching	8	14.3	8	14.3	8	14.8
Research	4	7.1	2*	3.6	2	3.7
Mfg. Ind.	10	17.9	10	17.9	10	18.5
Technical	12	21.4	14*	24.9	12	22.2
Trade & Comm.	2	3.6	2	3.6	2	3.7
Other	20	35.7	20	35.7	20	37.0
Total	56	100.0	56	100.0	54	100.0

*The asterisks indicate wrong figures due to erroneous coding. The errors have important bearing on the study of organisational mobility as well as proportion of employed population in types of organisations.

It appears from the above table that it is better to eliminate the erroneous information. But there is certain objection to it. The risk of unbiased error increases, resulting from reduction in sample size. However, to tackle the situation the philosophical attitude that 'no information is better than wrong information' is to be adopted.

Biased errors are unidirectional—either consistently positive or consistently negative. In case of a situation as illustrated with median salary the true value will be higher than the estimated value. Let us cite another instance where the proportion of employed population in different types of organisations is required to be estimated. In such a case there is a possibility of bias in case of Research and Technical types of Organisations as also in Manufacturing Industries and Trade and Commercial organisations.

Nevertheless, serious errors are committed when level of qualification is coded wrongly. A study of utilisation of scientific and technical manpower then gives a distorted picture. Thus many filled in forms on careful scrutiny reveal the true level of qualification which might be ignored by a less-alert coder. One example will clarify the point. Many respondents mention Part I A of A.M.I.E. as level of qualification in engineering. This should not be taken as any qualification. Similarly mere submission of Ph. D thesis does not entitle one to a Ph. D degree.

Coding is all the more full of vagaries if the forms containing furnished information are not scrutinised before coding, which one is tempted to avoid because of time involved in the procedure. The above illustrations make it amply clear that lapses in coding give rise to errors to be reckoned with.

Time *ex-consequenti* expenditure involved in coding is considerable. As few as only six filled-in forms or questionnaires involving 80-columns of punched cards can be coded per hour. Thus an average coder can code up to a maximum of 40 such forms in a day. Therefore, about 25 man-days are required to code only 1000 forms. Whereas the tabulation of these 1000 forms will take a maximum of 4 to 5 hours, if a simple sorter-counter machine with a speed of 20,000 cards an hour is employed, it will take another 4 or 5 hours to decode and prepare the basic tables for analysis. If an electronic computer is used this is accomplished in a fraction of the above time and if required the printed results can be obtained easily. This gives some idea of what tremendous effort goes behind coding.

Entropy

The error in coding cannot be completely eliminated as it involves human judgement and there are coders with different levels of intelligence. However, it can be kept at a minimum, adopting certain measures which will be enumerated later. This paper attempts to find out the magnitude of error inherent in a particular coding programme, assuming that all the possible measures have been adopted to keep the error at minimum level. An attempt has been made here to utilise the concept of Entropy, propounded by Dr CE Shannon to solve the problems in communication engineering. Entropy in Communaction Theory is the measure of information and is associated with the amount of freedoms of choice one has in constructing messages. Thus by definition Entropy is expressed as $H = -K \Sigma p_i \log p_i$ .....(1) where K is a constant depending on the length of the message i.e. the number of symbols, and p_i is the probability of occurrence of the *i*th symbol.

With reference to coding under consideration we can concieve that the codes produced by human coders using their brains has a parallel in sending a message in communication engineering. Therefore, we may attempt to find the entropy of the coding procedure using equation (1). The items of information which are the subjects of coding then form a set of symbols, each one having a definite probability of occurrence. When the set of symbols are independent the equation(1) reduces to $H = -\Sigma p_i \log p_i$ .....(2).

Similary, if each information (in coding) becomes independent of the other, i.e., code for one is not influenced by that in any other, equation (2) remains valid. Therefore, equation (2) represents the entropy of the coding procedure where p_i is the probability that *i*th item of information occurs. We propose to modify the event by simply saying p_i is the probability that *i*th item of information is coded wrongly. The probability of a correct code will then vary from item to item. Theoretically speaking, i.e., if all the items of information are supposed to be of similar nature (involving same kind of judgement and brain work) and there is no variation between coder to coder then the probability of coding an item of information correctly will be 1/n where n is number of alternative codes used in that piece of information out of which only one is a correct code. But in actual coding this is far from the truth. Let Ht be the actual entropy to expect in an ideal coding procedure and Ho the actual entropy calculated on the basis of a sample. Then $Ho - Ht = -\Sigma p_{io} \log p_{o_i} + \Sigma p_{t_i} \log p_{it}$ .....(3) where $p_{it} = \frac{ni-1}{ni}$, ni is the no. of codes for *i*th item of information. p_{io}, the fraction of sample with wrongly coded *i*th item of information. The result computed from equation (3) will be called error 'e' inherent in the coding procedure.

Illustration

The coding programme used in a recent study on IIT Engineers who are registered with the National Register maintained by the Council of Scientific and Industrial Research in their 'Indians Abroad' section is used as an illustration. There are 19 items of information covering 28 columns of punched cards. Some information (such as Highest Degree obtained from IIT, Location of IIT, Subject of highest IIT Degrees, Year of going abroad just after obtaining a degree from IIT, Employment, if any, before going abroad and Total Pay therefrom) need careful consideration before coding. Some information (such as Registration No. Year of birth, Returned from Abroad or Not Returned, Duration of Stay Abroad, Year of Last Information, etc.) need only normal attention for coding.

Now we set out to calculate p_i^t, i=1,2, . ., 19. Let *i*th item have n possible codes out of which only one will be a correct code for a particular IIT graduate. Therefore, the probability p_i^t of wrong code for the *i*th item will be=(n-1)/n. According to our illustration then we have

$p_1^t=0$, $p_2^t=0$, $p_3^t=\frac{8}{9}$ $p_4^t=\frac{4}{5}$, $p_5^t=0$, $p_6^t=\frac{9}{10}$, $p_7^t=\frac{3}{4}$, $p_8^t=\frac{9}{10}$, $p_9^t=\frac{1}{2}$, $p_{10}^t=0$, $p_{11}^t=\frac{10}{11}$, $p_{12}^t=0$, $p_{13}^t=\frac{10}{11}$, $p_{14}^t=\frac{7}{8}$, $p_{15}^t=\frac{5}{6}$, $p_{16}^t=\frac{8}{9}$, $p_{17}^t=\frac{10}{11}$, $p_{18}^t=\frac{1}{2}$, $p_{19}^t=0$.

$$H_t=-\sum_{i=1}^{19} p_i^t \log p_i^t$$

$=-[\frac{8}{9}$ (log 8 − log 9) $+\frac{4}{5}$ (log 4 − log 5) $+\frac{9}{10}$ (log 9 − log 10) $+\frac{3}{4}$ (log 3 − log 4) $+\frac{9}{10}$ (log 9 − log 10) $+\frac{1}{2}$ (− log 2) $+\frac{10}{11}$ (log 10 − log 11) $+\frac{10}{11}$ (log 10 − log 11) $+\frac{7}{8}$ (log 7 − log 8) $+\frac{5}{6}$ (log 5 − log 6) $+\frac{8}{9}$ (log 8 − log 9) $+\frac{10}{11}$ (log 10 − log 11) $-\frac{1}{2}$ log 2]

$=0.44262$.

We choose a sample of coded forms. The sample is checked for errors in coding and the p_i^0 is calculated for the *i* the item, i=1,2 ..,19.

$p_1^0=\frac{1}{20}$, $p_2^0=\frac{1}{30}$, $p_3^0=\frac{1}{8}$, $p_4^0=\frac{1}{15}$, $p_5^0=\frac{1}{50}$, $p_6^0=\frac{1}{20}$, $p_7^0=\frac{1}{5}$, $p_8^0=\frac{1}{15}$, $p_9^0=\frac{1}{30}$, $p_{10}^0=\frac{1}{10}$, $p_{11}^0=0$, $p_{12}^0=0$ $p_{13}^0=\frac{1}{50}$

and the rest are 0's i.e., there are no mistakes. Then,

$H_0=\frac{1}{20}$ log 20 $+\frac{1}{30}$ log 30 $+\frac{1}{8}$ log 8 $+\frac{1}{15}$ log 15 $+\frac{1}{50}$ log 50 $+\frac{1}{20}$ log 20 $+\frac{1}{5}$ log 5 $+\frac{1}{15}$ log 15 $+\frac{1}{30}$ log 30 $+\frac{1}{10}$ log 10 $+\frac{1}{50}$ log 50

$=0.70582$.

We calculate

$e=H_0-H_t=.2632$

Thus e is minimum and $\to 0$ as $H_0 \to H_t$, i.e., in order to have a minimum error in a given coding procedure we must aim at getting observed entropy as close to the theoretical entropy as possible.

Conclusion

Analysis of data aided by data processing machines is erected upon manual coding with its usual fallibility. Therefore, it must be emphasised that building up a team of efficient coders is an essential pre-requisite for better results. The importance of keeping the error in coding to a minimum level, notwithstanding the system of machines used for processing the data, is thus highlighted.

The more deductive the information is, the more errorprone the coding will be. Direct coding and rigorous checking ensure better results. □

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Value Engineering

A Case Study

AS Bedi*

Advantages accruing from the application of Value Engineering have been brought out through an actual case study in an engineering industry. Having successfully implemented value engineering programme at design stage, the firm under study plans to introduce this technique in other areas like purchase, maintenance, production engineering and office management.

VALUE Engineering is that Functional Approach to a problem which distinguishes it from all other cost reduction or cost prevention programmes. Value Engineering is an organised effort directed at defining the function of a system, assembly, sub-assembly or a single component and then speculating different alternative methods of achieving that function at the lowest cost. Final product will have either same or better performance at lowest cost or IMPROVED PRODUCT AT COMPETITIVE COST.

A Case Study of Engineering Firm

The Value Engineering team of the firm works on ad-hoc basis and consists of 5-6 members who meet regularly to take part in discussions. These members belong to different departments like Foundry, Production Design, Purchase and Cost Estimation. The whole value engineering work is co-ordinated by a Value Engineer.

The actual example taken here is a sub-assembly used in the main assembly of 3/4 inch Gun Metal Gate Valve.

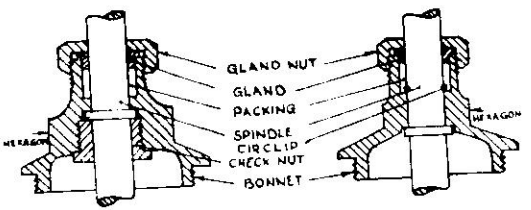
The example is dealt in the following six basic steps of Value Engineering Methodology.

1. Product selection
2. Information gathering
3. Defining the function
4. Speculating the different alternatives
5. Evaluation of the alternatives
6. Selection and implementation

Product Selection

The item selected was a high-volume-low cost type. Annual requirement was about 80,000 nos. Also from experience, it was presumed that the item could be simplified and yet provide required or even better function at a lower cost. Potential for reliability, less time for machining and assembly and reduction of rejection rate due to foundry defects appeared feasible.

*Leader Engineering Works, Jullundur



Before VE
Cost Rs. 6.25

After VE
Cost Rs. 5.45

Fig. 1 Sub. Assembly of 2" Gate Valve

Information Gathering

All details of this product like cost structure, process charts adopted in foundry shop, machining shop and assembly shop, production records and weight of each component were collected. Drawings of sub-assembly and each component comprising this sub-assembly were drawn. Also, related specifications of the product given in national and international standards were noted down.

During this phase it was observed that material cost was about 70% of the total cost. The major objective, therefore, was to reduce the unnecessary material.

Defining the Function

This is the key-stone of the methodology. Each function is defined in a verb and a noun form. This two-word definition of different functions defines the problem very clearly and also, a quantitative evaluation becomes possible.

In the case under discussion the basic function of the complete assembly was ascertained as follows :

Some fluid was going in and the same fluid was coming out of the valve and the valve could be used to allow this 'flow' to pass or it could be used to stop this 'flow', In this case fluid taken was water at maximum pressure of 200 psi at room temperature.

So in this case the noun preferably a measurable quantity is 'flow' and the verb is 'control'.

Water at maximum 200 psi—CONTROL FLOW—Water at max. 200 psi. The functions of the other parts were tabulated in the following chart in Verb-Noun form.

Drawing No. ——

Part	*Function*	*Notes*
Bonnet	(a) Hold — pressure (b) Guide — spindle (c) Retain — gland assembly	Max. pressure is 200 psi
Checknut	(a) Check—vertical movement (b) Allow—rotation	Movement is of spindle
Spindle	position-seat	
Packing	Prevent-leakage	Leakage around spindle
Gland	Press-Packing	
Gland nut	Retain-gland	

FUNCTION-CHART

Speculating Different Alternatives

Alternatives are now blasted to achieve different functions part by part. This is the real creative stage of Value Engineering. All types of alternatives and suggestions given by the members of the team are noted down, without discussing or criticising any idea at this stage. Criticisim at this stage inhibits the free flow of ideas. Many times ideas apparently looking simple and silly can prove very useful. Such types of sittings are commonly known as Brain-Storming sessions.

Persons outside the team should also be welcomed to give their suggestions. Suggestion boxes to receive the suggestions can be introduced and awards can be given to useful suggestions to create more enthusiasm and a cost-consciousness among all employees.

Evaluation of Alternatives

After collection of different alternatives these are analysed critically from the point of view of practicability and relative cost. National, International and Company Standards are referred to at this refining stage.

In the case under reference, selected alternatives are given in the comparative chart and are also shown in the figure. A difference of Re. 0.80 per piece in cost price was achieved.

The same idea was utilised in similar valves of other sizes.

COMPARATIVE CHART

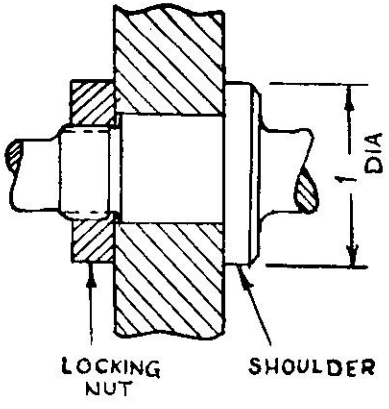
Material, Manufacturing Processes, Rejection Etc.

Part	*Before VE*	*After VE*
Bonnet	Gun metal casting (85/5/5/5) was done. Machining was all over surface and also hexagonal ends were milled for wrench fitting. There was lot of rejection due to pin holes and blow holes etc. and also due to leakage under hydraulic pressure.	Forged from brass. Due to forging finish lot of machining avoided and also milling at hexagonal portion became unnecessary. Rejection rate came to almost zero.
Check Nut	Lot of rejection due to gun metal casting. All over machining was done on capstan lathe.	Check nut was replaced by a steel circlip. By using a circlip whole sub-assembly was made very compact. Also production in the assembly shop increased.

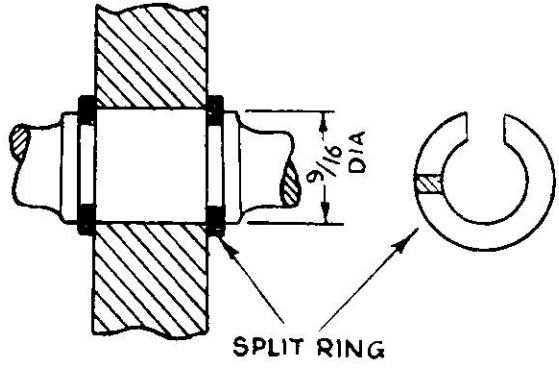
COMPARATIVE CHART (*Contd.*)

Part	*Before VE*	*After VE*
Gland, Gland nut and spindle.	Gun metal casting was used (except in the case of gland which was already from brass rod). There was lot of rejection due to foundry defects like shifting, blow holes, pin holes, etc. Shifting was main defect. Also complaints from customers due to breakage of spindles.	Taken out from extruded brass rod. Machined on single spindle Automatic Lathe (Traube), which resulted in less rejection, many times increase in production, more accurate dimensions which further led to interchangeability of parts and standardization.
	More machining and material waste.	Customers' complaints were almost eliminated as strength of extruded brass rod was almost double the strength of cast gun metal. Also due to this fact, diameter of spindle was slightly reduced. This way whole sub assembly became compact.

SOME MORE COST-SAVING IDEAS



Before VE

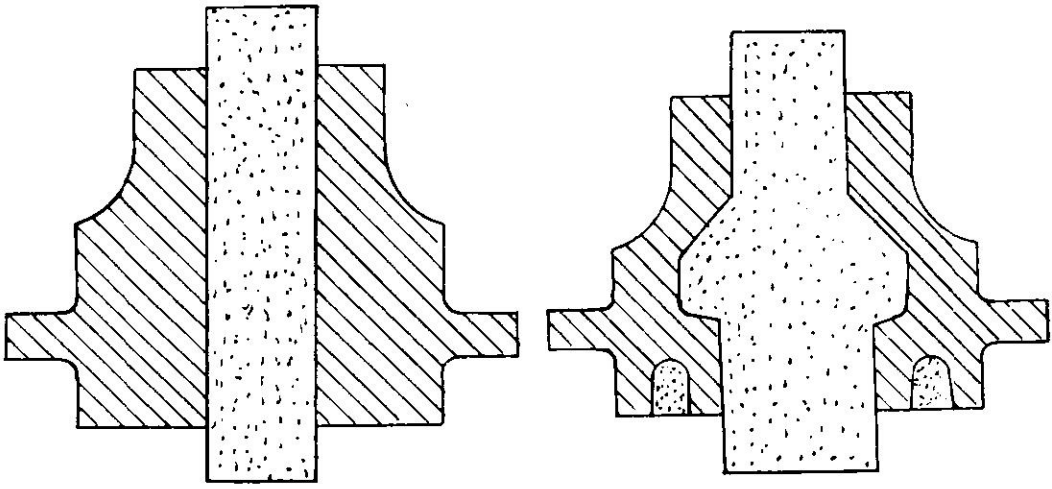


After VE

Fig. 2

(a)

Split rings were used to replace shoulder and locking nut. A lot of material and machining cost were saved as previously stock diameter used was 1.1./16 inch and now only 5/8 inch stock diameter was used.



Core Shape Before VE

Core Shape After VE

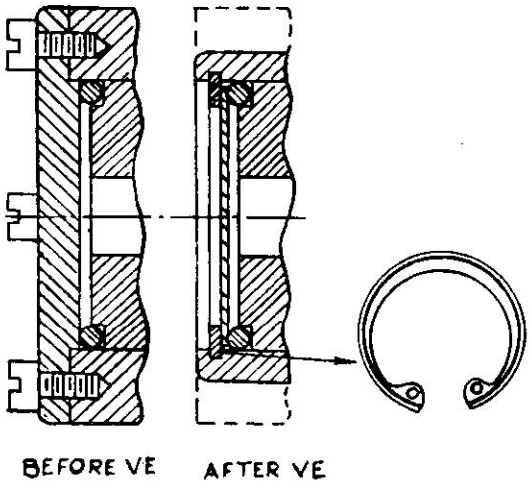
Fig. 3

(b)

This was a bonnet of 3 inch Gun Metal Globe Valve. It was designed originally with a straight 5/8″ diameter core through centre.

There was about 20 per cent rejection due to foundry defects like shrinkage.

By changing the shape of the core, more uniform section was achieved in the casting. Excessive material and machining cost were saved. Moreover, the uniform section resulted in a much stronger casting.



← Fig. 4

(c)

Retaining ring replaced expensive bolted cover plates, eliminated drilling and tapping operations. It reduced thickness of housing also assembly, and the dissembly process became faster.

American Management Consultants' Philosophies and Attitudes Concerning Assignments in Developing Countries

Dr Narendra K Sethi* & Aly Maasarani**

The purpose of this paper is three-fold: (1) to present the ideas, philosophies and opinions of American management consultants concerning engagements abroad; (2) to show how American management consultants could help in introducing and expanding consulting services in developing countries; and (3) to explore the government's role in helping to expand the use of management consultants overseas.

THE traditional method to provide for the shortage of technical and managerial talents in the developing countries of the world was through the direct employment of an expert or a consultant in a top managerial position to run the enterprise and/or the project. When these nations gained their independence their most feasible approach was to engage a consultant or a specialist for a short-term assignment. There existed, however, different opinions, philosophies, and conditions which have guided American management consultants in their decisions to accept engagements in developing nations. Exploring such philosophies is the center of attention for this paper.

Methodology

Two research techniques were utilised: personal interviews and a questionnaire survey. The objective of the personal interviews among management consultants was to gather basic materials and information and to get expert consultation to be utilised in designing a questionnaire. Two separate questionnaires were designed: one was mailed to seventy-three management consulting firms,[1] and the other to eighty-one individual management consultants. Out of the total of 154 questionnaires mailed,[2] ninety-nine responses were received, a return of sixty-three per cent. The responses were finally reduced to forty-two completed questionnaires, with twenty-nine received from individual management consultants, and thirteen received from management consulting firms.

*Professor of Management and Chairman, and **Assistant Professor of Management, St. John's University College of Business Administration, Jamaica, New York 11432.

1. This total included: Fifty-four Association of Consulting Management Engineers (ACME) member firms, and nineteen American Management Assoiciation (AMA) member firms.

2. In 1961, the questionnaires were mailed to management consultants of all nationalities who had been engaged in any of the developing nations of the world.

The surveyed opinions in answer to the philosophical questions entertained in this study are presented in three sections:

I. Management Consulting Philosophy Concerning Assignments in Developing Countries;

II. Expanding the Overseas Activities of American Management Consultants;

III. The Role of Governments in Helping to Expand the Use of American Management Consultants Overseas

I. Management Consulting Philosophy Concerning Assignment in Developing Countries[3]

In order to discover the general pattern of management consultant philosophy toward assignments in developing countries, an effort was made to survey the ideas, philosophies, and opinions of the participating management consultants concerning the engagements abroad.

The question asked was: *Please make a brief general statement concerning your firm's philosophy in accepting assignments abroad, as reflected in actual practice. What is your philosophy concerning work now and in the future?*

All the participating management consulting *firms* (100%) and a great majority (86%) of the participating *individual* management consultants answered this question.

To help toward a better understanding of the different philosophies of management consultants an effort was made to classify and present those philosophies in different groups. Each group represents the same (or a closely-related) prevailing philosophy or concept. It should be noted, however, that the different groups should not be considered as exclusive. The fact that a management consultant holds certain concepts to be important does not mean that he would disagree with the philosophies and/or recommendations expressed by the other consultants. The grouping does indicate, however, that there are various schools of thought regarding what philosophies or recommended actions (regarding the question under consideration) are considered of greatest importance by the consultants of each particular group.[4]

The answer to the question (what is your philosophy concerning work abroad now and in the future?) indicated that there existed five different and somewhat conflicting philosophies as follows:

The philosophy of the *first group* was to consider themselves fortunate to have been sent abroad (or to accept overseas assignments) because they could help the countries that need help and could help people who were trying to help themselves, while at the same time the consultants would benefit by broadening their experiences and by learning from the peoples and officials of the countries in which they worked. One management consultant stated that he was interested in work abroad for the personal satisfaction, prestige, and pay offered.

The *second group's* philosophy emphasised the growth of consulting work abroad in the future. This group was interested in such growth and would like to continue to participate. Some management consultants expressed their

3. The philosophies and or recommendations discussed throughout this paper are not only related to the Middle Eastern countries, but they are also related to other less-developed nations, because the consultants surveyed (the population of the study) including management consultants who had been engaged in less-developed countries other than the Middle East.

4. The same order will be followed throughout the section where the recommendations of the consultants will be classified and presented in different groups.

sense of duty saying that when accepting assignment overseas the consultant should do his best to effectively advise the other countries by hard work with honesty and patience.

The *third group's* philosophy was that they would accept work overseas only if they were sure that they could offer valuable services, and that they had the qualified personnel to do the job.[5] One management consultant, however, believed that American management consultants could offer valuable assistance to the overseas clients in the business fields, such as management, marketing, advertising, packaging, processing, trading and financing, rather than in the technical fields in which many French, German, and British firms were entirely competent and much less expensive than United States firms.

The *fourth group's* philosophy indicated that they would participate in work abroad to contribute to the welfare of mankind, to prevent dangers of war, and to promote world peace and understanding. One consultant even suggested that the aid to the less-fortunate countries should be greatly increased through tax increase and the release of consultants by the advanced nations.

The *fifth group's* philosophy was that no evidence existed of a need for management consultants abroad. One consultant added, "When such a need looms, then we will do something about it."

II. Expanding the Activities in Developing Countries of Management Consultants

The success of any overseas assignment was held to depend on both consultant and client, since each party had to contribute a share of the work necessary to carry out the terms of the agreement. The expansion of American management consulting activities in developing nations was likewise held to depend upon the effectiveness of the cooperation between American management consultants and the clients overseas.

The following sections of the study present suggestions of American management consultants regarding: (A) the roles of management consultants, and (B) the roles of clients overseas—both in introducing and expanding the services of American management consultants in developing countries.

A. Role of American Management Consultants in Expanding Their Services in Developing Countries

It was discovered that most clients were found to believe that the consulting fees of European management consultants are much lower than the American charges. Overseas clients also were found to believe that most American management consulting firms employ costly personnel who tend to develop elaborate plans whereas something simple might be more appropriate. Third, overseas clients, as in the United States, were discovered to have the belief that they cannot afford large expenditures for consultant's advice. All these beliefs of the overseas clients resulted in a tendency for the client to recruit the needed consultants from Europe, especially from West Germany. Recently, however, securing assignments overseas has become a highly-competitive activity for the American management consultant due to the fact that the Russian consultants began to appear at an ever-increasing rate to satisfy the demands of the low-income nations. The Russian policy was to reach the developing nations by sending experts and consultants in various fields of

5. This is Article IV of ACME's Code of Ethics. See: Association of Consulting Management Engineers, *Professional Practices in Management Consulting*. Rev. ed. (New York: ACME, 1966), p. 94.

speciality through all possible means (technical and economic aid, loans, scholarships and fellowships) in order to replace the Western consultants in such nations and also to win political support for the future.[6] It might be added here that the Russians were using both economic and political startegy to increase the number of their consultants in the developing nations, and that American management consultants had to face these problems and to compete in both areas if they were interested in doing business abroad.

Could American consultants meet the challenge, if not for their own business growth, then for their own nation, and if so, how?[7] An effort was made in this study to find the management consultant's answer to these questions. The question asked was: *Assuming that U.S. consultants are virtually out of the market owing to Soviet and West German competition, can you recommend ways in which the American management consultants might expand their activities in developing countries?*

All of the participating management consulting *firms* (100%) and the majority (83%) of the participating *individual* management consultants answered this question. Management consultants' recommendations fall into six groups.

The *first group's* recommendations was that to expand their activities in developing countries, American management consultants should assume more responsibilities by looking beyond the limits of the immediate problem(s) they have been engaged in, evaluating the need for additional programmes, and helping the client to see the need for expansion.

To expand the American consulting activities overseas, the *second group* of recommendations was that a successful demonstration of modern management techniques and of the advantages of the services offered should be made to the client. One consultant added, "If the American firms do an excellent quality job, their reputation should keep them in the forefront for future foreign assignments."

The *third group* of recommendations was for American management consultants to gain a knowledge of the language and a general historical background of the country overseas, and to become a part of the social community and to take up social contacts with the local people. One member of the group gave the advice for consultants to retain their integrity and identity without at the same time identifying themselves as members of foreign enclaves.

The *fourth group's* recommendations was that American management consulting firms

6. In 1954, Communist aid to developing countries of the free world did not exist. In 1958, however, the aid reached half a billion dollars, and in each of 1960 and 1961 it exceeded the one billion dollar mark. "In more than 20 under-developed nations around the world, from Cuba to Afghanistan to Indonesia, some 9000 technicians from the Soviet Union, Red China, and Eastern Europe are pouring it on—surveying, constructing, training advising." *Business Week* (January 27, 1962), p. 88. In 1968, the total Soviet investment in the Arab countries of the Middle East exceeded $ 5 billion. In addition to the Soviet military advisors, there are more than a thousand Soviet Civilian technicians, advisors, engineers, and specialists in economic aid in Egypt, and over 1500 technicians and experts in *Algeria*. An estimated 800 to 1200 Soviet Military and civilian advisors in Syria, with lesser number in Iraq. Hanson W. Baldwin, "Military Balance of Power Viewed as Unchanged Since the 1967 War," *New York Times* (March 16, 1969, p. 24.)

7. One consultant stated in the course of an interview: "We are not interested in overseas assignments, we have more business here, more than we could possibly meet."

should publicise their specialised services directly to clients overseas through brochures and personal visits to acquaint prospective customers with the specialised services of the consultant. One consultant stated that individual consultants should always keep themselves informed about the type of demand for consultants overseas.

The *fifth group* of recommendations came from seven management consultants each of whom recommended one course of action to be taken if American management consultants wanted to expand their activities overseas. One consultant recommended that in his assignment (work overseas) the consultant should be honest in charging fair "fees" (as the overseas client sometimes does not know what a fair fee is) and practical (according to the circumstances and according to the resources and capital available) in his recommendation of another consultant. Establishing the consultant's residence overseas where he was to work was the recommendation of the third consultant. The fourth consultant recommended that individual management consultants could expand their activities overseas by "maintaining contacts, after return to their own country, with nationals of the country in which they have served." The fifth consultant stated that consulting is a new concept in the Middle East; therefore, he recommended that consultants have to gain acceptance of this new idea if they want to expand their activities in such areas. Believing in the cause and objective of American foreign aid the sixth consultant advised that American management consultants should support the Agency for International Development (AID). The last consultant said, "There should be a better developed coordination between different international aid organisations as well as between their experts in the same country."

The *sixth group* of recommendations came from three management consultants, each of whom recommended four to five courses of action to be followed by American management consultants serving overseas. As the reader will see, some of these actions have been discussed above. The first consultant said:

(American management consultants should:)

1. So far as possible keep away from the diplomatic set and get out in the country where the work and problems are located.
2. Don't aim too high! You can't lift a man who has never owned a home into a competent, mechanised private farmer overnight. But you can start him on the road through better soil, practice, instruction, marketing, etc.
3. Get to know the people immediately concerned with the problem—as well as the Minister of the Department concerned—personally!
4. Personal contacts are extremely valuable here as elsewhere.
5. Don't run crossways to the accepted customs of the country.

The second consultant recommended:

(American management consultants should):

1. Set up foreign branch.
2. Employ qualified local or European men with good background.
3. Supply technical data from home office (USA) files.
4. Supply highly qualified supervisors from USA.

The third consultant advised:

(American management consultants should:)

1. Undertake turnkey operations.
2. Use in conjunction with fund sources which emanate from U.S.

3. Aid overseas installations in which U.S. firms are partner or owner.

4. Price is of no importance since consulting service costs are miniscule compared to manpower and money expended on a given plant and should be purchased based on the imagination and creativity of those performing the service.

Two consultants had no recommendations to offer. One of the consultants, however, stated that the reason for not having large consulting operations in the Middle East was because those countries have been unwilling to secure competent American professional advice, even though the added expense would really result in long-term savings.

The other consultant believed that the advanced consulting techniques could only be applied to the West, and not to the underdeveloped countries. He further recommended that the consultant in his work should show the people how to do the task by doing it and not by report writing.

B. The Role of Business Clients Overseas in Expanding American Management Consulting Activities in Developing Countries

To discover the role of the overseas client in expanding the activities of the American management consultants abroad, the question asked of the participating management consultants was : *Can you recommend ways in which business clients overseas* (as distinct from overseas governments) *could and expand the practice of consultants in developing countries ?*

Sixty-two per cent (62%) of the participating management consulting *firms* and forty-two per cent (42%) of the participating *individual* management consultants answered this question. Management consultants' recommendations fell into three groups.

The *first group's* recommendations was that business clients overseas use and expand the practice of management consultants by maintaining contacts with their respective embassies and with other agencies such as: chambers of commerce, employers, associations and trade unions, and with nationals who were educated or held degrees from abroad. One consultant recommended that business clients overseas should be provided with a clearnig service (which would furnish information concerning consulting services offered in the United States, for example) which could be sponsored by American or international agencies.

The *second group* of recommendations from management consultants was that clients overseas should always use competent services of well qualified consulting firms. This excellent service in turn "would result in the expansion of use of management consultants, "because the results of one project would demonstrate the values that could be expected of such services for future projects.

The *third group* of recommendations came from three individual management consultants. One consultant recommended that business clients overseas should make provision for the supply of the goods and equipment they needed from abroad. Another consultant recommended that clients should define the problem of specific projects, outline the objectives of such projects and ask consulting firms to submit proposals. A third consultant recommended five courses of action to be followed by business clients overseas. His recommendations were :

1. (The client should conduct studies) internally in all of the functions rendered by consultants.

2. (The client should exert effort) in studying US and other foreign markets (to learn what services are available).
3. (The client should consider the consultant service of) product design and development.
4. (The client should make efforts toward) utilisation of international financing techniques.
5. (The client should consider the services of management consultants in) developing the format of techniques for building an industry or industry in general within a given country.

III. Role of Governments in Expanding the Services of American Management Consultants Abroad

The governments of the countries both of the consultant and of the client have a role in expanding the services of the consultant abroad. This section presents the role of the United States Government. It is followed by a second section which deals with the role of the client's governments.

A. Role of US Government in Expanding the Services of American Management Consultants Abroad

In order to know how the US government could help expand American management consultants' activities overseas, the following question was asked: *Can you recommend ways in which your government can facilitate and expand the activities of consultants in developing countries* ?

A great majority (92%) of the participating management consulting *firms* and a majority (76%) of the participating *individual* management consultants answered this question. Seven groups represent the recommendations as reported by the participating management consultants concerning the role of the United States government in expanding the services of American management consultants abroad.

The *first group* of recommendations was that the United States government should plan to use more American management consultants (and consulting firms), in its foreign aid programmes. One consultant, however, criticised the present United States Foreign Aid programme, since it emphasised only military and economic development for less-developed nations. He suggested that the foreign aid programme should provide for social development in such nations, thus securing a balance in dealing with problem areas and at the same time providing for the expansion of consulting activities.

The *second group* of recommendations was that the United States Government should select the consultants well in advance (at least three months) in order to provide for training programmes in language, in cultural and historical background of the people, and in politics.

The *third group* of recommendations was that the United States Government should be highly selective, sending overseas only competent consultants and consulting firms with good reputation. One management consultant, however, disagreed with the selection method of the United States Government, saying, "We (American management consultants) do not agree with the way many government agencies recruit consultants for work abroad and do not respond to their invitation." Another management consultant disapproved of the selection methods of the United States Government and suggested that an international organisation such as the

United Nations should recruit consultants for the United States and let the United States Government pay the cost.

The *fourth group* of recommendations was that the United States Government should try to conduct surveys in the various fields, such as economic, industrial, and agricultural, in developing nations to show the need for management consultant services in those countries, and then provide for such services.

The *fifth goup* of recommendations expressed the belief that precise agreements as well as reciprocal agreements to avoid double taxation between the United States Government and the governments of less-developed nations were necessary, and that each party should live up to such agreements. Such agreements would guarantee the expansion of American consulting activities.

One consultant, however, advised that the United States Government should, "Make certain of the ways, means and willingness of the host government to carry out the plan in expanded form."

The *sixth group* of recommendations was for the United States Government to put great emphasis on public relations through the present media and through new media such as: American Aid programme consultants (AID) and American officials in embassies.

The *seventh group* of recommendations come from six management consultants each of whom recommended one course of action to be taken by the United States Government to facilitate and increase the activities of American management consultants in less-developed countries. One consultant recommended that the United States Government should stop providing American housing overseas for American experts and consultants. Another consultant recommended that the United States Government should "revise the method of compensation to include less 'gravy' and any plutocratic advantages and habits in the country of assignment, but assign awards for recognition of achievement after the termination of the contract." A third consultant believed that the United States Government should, in his words, "facilitate release of consultants from industry without detriment to prospects at home (United States)." The fourth consultant recommended that the United States Government should, as he put it, "provide (for) greater continuity and follow up activities (for consultants' services)." A fifth consultant believed that the United States Government should be sure, before providing for the expansion of consulting activities overseas, that such activities would benefit the country itself. In his words, "Let the (United States) Government see the value of the work and how it is related to the welfare of the country." The last consultant recommended that the United States Government should "have a better and closer contact with the international organization and their own experts." Finally, however, one consultant disagreed with the idea that the government should contribute to the expansion of the American management consultants' activities abroad. In his words, "(I) do not believe (that) this is the responsibility of the United States Government."

B. Role of Overseas Governments in Introducing and Expanding Practice of American Management Consultants Abroad

American management consultants found it difficult to suggest which plans or steps could be followed by overseas governments in doing their part toward introducing and expanding

the consulting activities in their countries abroad. Conditions vary from country to country, and no definite plan(s) could be recommended to be followed by any country. An effort, however, was made in this section to obtain the recommendations and philosophies of the participating management consultants who had experience working either in the Middle East or in any other developing nation. The question was asked: *What steps do you recommend for the overseas governments to take to introduce and expand the practice of US management consultants in the developing countries* ?

A majority of both management consulting *firms* (77%) and *individual* management consultants (73%) answered this question. The recommendations of management consultants concerning this question could be classified into eight groups.

The *first group* of recommendations was that overseas governments should send one of their officials on a mission to the country of the consultant to study and evaluate the consultant's performance, and to decide whether such consultants could help their home country overseas. The *second group* of recommendations was that overseas governments should conduct or sponsor a training programme or seminar for their nationals in order to prepare such nationals to carry on by themselves (in the long run) the management consultation. One management consultant outlined a suggested training programme this way :

> Select a group of intelligent, educated nationals and then set up a joint-venture where the US consultant organises and trains a national management consulting group. The governments would have to pay the US consultant well for giving of their past and vast experience and probably would have to subsidise the assignments for 3-5 years to get acceptance of consultants. At the end of 5 years the nationals could carry on by themselves if carefully selected and trained.

Another management consultant suggested that trained nationals should take the initiative when he said, "Key people (nationals) who have had some training or other experience in the U.S.A. are good resource people to tap initially."

The *third group* of recommendations was closely related to the second group. This advice was that overseas governments should conduct a training programme for their officials to help them to recognise the usefulness of the technical assistance aid which could be received by their government, thus preparing those officials to have a better sense of responsibility and to use effectively, and benefit from, such technical aid.

The *fourth group* of recommendations was that the overseas governments should furnish, and make available to the consultant(s) (both before and after selection) all information and data concerning the project(s) they are supposed to work on. Thus the consultants could know what was expected of them and prepare themselves for it.

The *fifth group* of recommendations explained how overseas government should go about the recruitment of management consultants. The first consultant advised that overseas governments should follow the recruitment procedures of the United Nations. Another consultant suggested that overseas government should request a list of competent consultants from United States agencies or from an international agency, A third consultant recom-

mended that client governments should maintain a representative in the United States for recruitment. He explained his recruitment method this way :

(1) Make known exactly what consultants can and cannot do.
(2) Have qualified personnel to aid in drawing up job specifications.
(3) Have a representative in the U.S. to solicit bids from a group of qualified firms.
(4) Counsel the client in his selection from many bidders.

The *sixth group* of recommendations went along the same lines as the fifth group, by suggesting another method for the recruitment of management consultants. The suggestion was that overseas governments should utilise the embassies for the selection purposes. However, one consultant suggested the use of United States embassies, while another consultant suggested the use of government's own embassies.

The *seventh group* of recommendations was that overseas governments should request and apply for more consultants through the Technical Assistance Aid programme.

The *eighth group* of recommendations came from four consultants, each of whom recommended one course of action to be taken if overseas governments wanted to introduce and expand the practice of management consultants. One consultant said, "(Overseas governments should expand the use of management consultants) by utilising their services in government sponsored projects." Another management consultant recommended that "(Overseas governgovernments should expand the use of management consultants) by easing restrictions on technicians abroad." The third consultant recommended that the overseas government coordinate the work of foreign consultants. As he put it :

> Coordinate the work of foreign consultants by establishing boards or committees. Make to the consultant the work in similar fields of previous consultants available. Do not just file recommendations, but discuss them at least with the consultant, and implement.

The last consultant advised that overseas governments should, as he put it, "cut red tape."

Conclusions

After surveying the philosophies and attitudes of American management consultants concerning assignments in developing countries, the following conclusions could be drawn :

1. The dominant philosophy among American management consultants toward overseas assignments was that real assistance to less-developed nations is a professional duty.

2. Management consultants could expand their activities overseas by evaluating the client's future needs for consultant services.

3. Overseas clients should familiarise themselves with the consulting services available in the United States.

4. The United States government should survey the needs for management consulting services overseas and make provisions for the supply of such services.

5. Overseas governments should prepare their own nationals to be professional management consultants. □

Application of Operation Research to Production Problems

Chander Bal*

With the passage of time the production technologies are becoming more and more complex and sophisticated. The managements, to be successful, have to keep themselves abreast of these developments. Operation Research techniques offer a few of the powerful tools for problem solving in these areas, which the managements cannot afford to neglect.

MANAGEMENT has been defined in very simple terms as getting things done through the efforts of other people. This function includes all those in charge of supervising the work of others. It extends right down the line from top management—responsible for the operation of the entire organisation—to the foreman—responsible for performance in a Section. Management has the responsibility for coordinating and directing the activities of the various levels of in-line, and staff-organisation. To perform this function effectively, management must anticipate changes, plan for and adjust to changes. It must also be sensitive to changes inherent in the operations through technological developments, competitive action or Government regulations. It require plans to be put into effect immediately when changes in the total business atmosphere are noted.

Long-range Planning

To develop plans for immediate implementation in the event of change, managements require advanced long-range planning. This planning must be carried forward for each Section or segment of the organisation. Thus, marketing must have a plan to counteract introduction of a competitive or substitute product, or a revision in competitive pricing schedule. Production must be flexible to respond to market conditions. The accounting function must be capable of identifying an unfavourable cost trend, and finance must be capable of meeting the additional capital requirements.

Production Problems

The activity of all segments of a production organisation are inter-active. Thus a change in the level of activity of one segment of an organisation must be communicated to and reflected in the activities of others. Decisions affecting the over-all system of performance are vested in top management of a production organisation. Problems in the field of production and inventory control were, thus, the first to be examined by Operation Researchers, as staff functionaries. Also, production and in-

* Asstt. Divisional Manager, Minerals and Metals Trading Corporation, New Delhi.

Problems in the field of production and inventory control were the first to be examined by operation researchers. Major variables in such problems as scheduling the use of machines and maintaining adequate inventories being quantitative made the work of operation researchers measurable.

ventory problems were more tractable than marketing problems. The actions and sentiments of human beings count much less on a highly-automated production line than in the market place. And the major variables in such problems as scheduling the use of machines and maintaining adequate inventories are quantitative; the variables being prices, cost, quantity and time. All these factors made the work of Operation Researchers measurable and as such easier.

Production Organisations are complex in structure and responsibility. Decisions affecting the company's operations are frequently made on all levels of the organisation. Encouraged as they were with initial successes, Operation Researchers extended their sphere of investigation to subordinates also in this line of decision making. It is the purpose of this article to consider three main areas of production, which form a major part of a production executive's responsibilities, and to indicate in brief the operation research developments applicable to improved decision making in these areas. The areas are : Development, Manufacturing, Planning and Plant Operations.

Development

The position that a product occupies in the market is of prime interest to management of a production organisation. The share of the market which a product enjoys together with the general trend of the market are a measure of the total success of the product. It is possible that the demand for a product could increase while the general trend of economic activity is decreasing. In either event, management needs to be alive to this changing condition and must be in a position to react, if necessary, to assure its competitive position. Market Research is conducted to assess the changes in demand as well as the products that will be required in future. This research may indicate a need for redesigning of the existing products or a need for entirely new products. This may encompass all activity from new-product development to simple product redesigning, improvement or model differentiation.

Each development project is complex. It contains hundreds to thousands of inter-dependent tasks, many of which are single-occurrence tasks. Control of timing and expenditure on this type of work is extremely difficult. The traditional project planning and scheduling procedures having been found deficient, were replaced by "Critical Path Method" of project scheduling and control. Under this technique a high degree of co-ordination is obtained if the planning and scheduling information of all project functions is combined into a single master plan. This technique has been used successfully on such production projects as:

—New highway construction;
—Planning and launching a new product;
—Research and engineering projects;
—Scheduling of ship-construction and repair.

CPM/PERT techniques can be applied to consideration of detailed tasks in a project. It can be applied to grouping of related tasks and considering these as a single task in the overall project. CPM is useful for development of either a management type concise report or a detailed working report. It is useful in describing projects of varying complexity. The method is equally suitable for smaller projects, which can be analysed by the matrix method, or larger projects which may require a computer to perform calculations.

The OR teams have assisted in the design and installation of control data handling and information systems. They have worked with Research and Engineering groups in designing experiments, in guiding development through analysis of anticipated cost and performance and in running field and production line test programmes to discover causes of product and process failures, as well.

Manufacturing Planning

Planning is the act of formulating the proposed method or procedure. The value of planning to a production organisation cannot be underestimated. To direct or at least influence future operations through today's plans, it is necessary to plan all aspects of organisational activity. Research and development, inventory control and manufacturing planning are examples of advanced planning.

One of the repetitive problems constantly confronting management of a production enterprise is that of inventory. Pressures are exerted by the marketing or sales department to reduce to the minimum the delays between sales or demand and the delivery of the product. Other pressures are exerted by the controller to reduce the investment in inventory, while the production department is under preassures to maintain the manufacturing costs at the minimum. The objectives of each department are in the best interest of the organisation, yet these are conflicting and cannot be met simultaneously.

There is no doubt that through logical analysis, systematic evaluation, and extensive testing of solution, OR can effectively demonstrate its utility in solving production problems.

Operation Research teams have been successful in establishing the models of these conflicting situations. The generalised model or the minimum cost equations are the examples of simplified expressions of difficult relationships in production problems. These models contribute towards solution of inventory problems.

In the manufacturing and assembly field, the derivations of mathematical models to represent a system known and applied for over fifty years, gives insight into better and more effective scheduling. Application of computer to the solution of the mathematical model permits rapid evaluation of time requirements with different levels of production.

Plant Operations

To this point, discussion of OR centred on its application to development and planning. There are important areas for consideration with respect to future conditions from a point of view of an operating plant. The immediate problems, which may be the cause of high costs, hence lower profits, are more pressing.

Machine resources allocation and assembly line balancing problems are equally applicable to considerations of current problems. The amount of analytical development in this area has been extensive. There are models applicable to continuous and interrupted demand under varying conditions. Replacement problems have been studied and models developed, considering the salvage values, expense functions and revenue functions. Scheduling problems arise when existing facilities must be allocated to many tasks. Some of the problems studied by OR teams in this area are :

- —Transportation
- —Allocation of land, capital and labour for establishing an enterprise
- —Allocation of raw-materials to match market requirements, fuel-oil blending etc.
- —Location and capacity of branch plants, warehouses, and distribution points and the analysis of the operation of transport-fleet.

The above are examples of more general types of assignment problems encountered in linear programming. Queueing Theory or Waiting Line Theory is a technique for studying the build-up of queues or waiting lines at a servicing facility as related to the capacity and serving characteristics of the facility and the characteristics of the demands for services. A newer model, is also available to the solution of problems involving production, transportation and overtime simultaneously. Simulation Model is available as a last resort for solving problems, which cannot be solved by any of the above mentioned technique. Simulate, if nothing else works.

Conclusions

The concepts advanced by OR may in many instances be simple to understand. The mathematical techniques for the construction of the models and the mathematical skill for the solution of the models are, however, too advanced for common understanding and this is the reason that managements have been slow in their adoption. Moreover, development of OR to production applications has, to a large extent, been in the theoretical stages. Interest has, however, been evinced in the last 2-3 decades in the developed countries like USA, Canada, UK, Japan and West Germany, in the application of OR to the numerous production problems. As new applications were made, new variations of the established techniques were found and new ways of deriving solutions established. It is during this short span of time that these countries have been able to revolutionise their production apparatus and attain the highest standard of living for their people.

There is no doubt that through logical analysis, systematic evaluation, and extensive testing of the solution, OR can effectively demonstrate its utility in solving production problems.

APPROPRIATE TECHNOLOGY FOR RAPID ECONOMIC GROWTH; Appropriate Technology Cell, Ministry of Industrial Development, Government of India, New Delhi. Pages 160; Price not mentioned.

A seminar had been held under the auspices of the Ministry of Industrial Development in *April 1971* on 'Appropriate Technology". The publication contains the proceedings of the seminar.

Thanks to Dr EF Schumacher and the late Prof. DR Gadgil, the concept of intermediate technology or 'the Appropriate Technology' has received considerable attention and operational relevance in developing labour-surplus but capital-scarce countries like India. Nevertheless, the term had generated certain amount of confusion as well.

The papers presented at the seminar and the subsequent discussions have sought to remove some of the misunderstandings about 'Appropriate Technology'. Besides a working paper, prepared by the Ministry of Industrial Development, there were as many as 10 papers dealing with selected problems. Contributors included, among others, Lord PMS Blackett, Mr AD Moddie and Mr Maurice Frydman.

Conceptual issues like definition and methodology and fields of applications have well been discussed by Mr MK Garg. Mr TP Singh has further elaborated some of these theoretical questions and the progress of the application of 'Appropriate Technology' in India, illustrations being drawn largely from the 'Common Production Programme' adopted in cotton textile industry. Mr SK Dey urges the need for a national organisation for popularising appropriate technology.

The setting up of the Appropriate Technology Cell in the Ministry of Industrial Development is an explicit recognition of the urgency and the importance attached by the Government to promote the idea of Appropriate Technology in industries wherever feasible. The Cell is reported to have already identified certain industries in this connection. Its work will gain further momentum with the need for identifying more industries suitable for the adoption of 'Appropriate Technology'.

In fine, the Seminar has sought to bring together a galaxy of eminent experts and others concerned with the subject and enabled the

participants to exchange views on various aspects of the problem. Although belated, the Ministry has done well to make this material available to a larger readership and practitioners as well. The papers contributed do not appear to have reached the expected standard of theoretical base and analytical depth through empirical evidence. The bibliography given at the end will go a long way in filling in this gap in an otherwise lucid exposition of the concept of 'Appropriate Technology'.

—KSV MENON

BANGLA DESH ECONOMY—PROBLEMS AND PROSPECTS: Edited by VKRV Rao, Published by Vikas Publications, Delhi-6. Pages 199, Price Rs. 24.

This book, edited by one of India's most distinguished economists, should constitute essential reading material for all planners and policy makers not only in India but also in Bangla Desh. The lucid introduction by Dr Rao makes valuable suggestions besides summing up succinctly the contributions of various experts on different aspects of Bangla Desh economy. The organisation of panel discussion on "The Economic Prospects of Bangla Desh" which finally resulted in the present publication could not have been more timely.

The book rightly starts with tracing the causes of glaring disparity between the former wings of Pakistan. As the author of the opening article says, there was no earthly reason why the growth rate of the Western wing should have exceeded that of the Eastern wing. The two parts of Pakistan were roughly equal in terms of income, resources, industrial and even agricultural development on the eve of independence in 1947. That West Pakistan leapt ahead in the race for economic prosperity could only have been due to man-made factors. The latter are attributed to trade, aid and investment policies biased more in favour of the West rather than the then East Pakistan.

Of greater interest to a student of international trade, are the two chapters devoted to gains from trade and an analytical examination of the issues involved in the likely economic relationship that is bound to be forged between India and Bangla Desh in the aftermath of the independence of the former. The first of these chapters looks into the possibility of India serving both as a market for Bangla Desh goods and a supplier of those requirements which formerly came from West Pakistan. It also advocates diversification of agriculture and increased production of paper newsprint and timber in Bangla Desh. The author of the second paper paints on a much wider canvas. This paper goes into the possible specific fields where India and Bangla Desh could co-operate. Some of these areas which could be taken up jointly by the two countries include hydel power, flood control and inland waterways. The possibility of the formation of a jute and a tea community is also discussed. Dr Rao himself has strengthened this line of thinking by suggesting extension of co-operation to agricultural growth, power development, combined effort in scientific research and technology and a joint attack on problems of foreign trade and aid.

The experts who have dealt with the subject of economic co-operation assume a relationship of absolute equality between India and Bangla Desh. Even the faintest impression of any encroachment on Bangla Desh sovereignty

should be avoided. This is the constant theme running through several papers. There should be no attempt at extension of Indian influence in Bangla Desh warns one author with all the emphasis at this command.

One whole chapter has been devoted to treatment of land reforms in Bangla Desh and its socio-economic implications. Last but not the least, the problems presented by the reconstruction of the economy of Bangla Desh on an immediate basis and their impact in terms of Indo-Bangla Desh co-operation are also covered. Statistical appendices highlighting different aspects of the economy form a valuable part of the whole exercise.

A publication of great topical interest, it should be of use to the student and the scholar, the administrator and the policy maker alike. It is the first authoritative book on the Bangla Desh economy written by a group of distinguished economists who are widely known for their scholarship and objectivity. However, one would have very much wished that a more elaborate treatment were given to economic co-operation between India and Bangla Desh and its implications not only for the rest of the sub-continent but for the whole of South and South East Asia.

—SS MEHTA

WEALTH FROM KNOWLEDGE—A STUDY OF INNOVATION IN INDUSTRY by J Langrish, M Gibbons, WG Evans and FR Jevons; Published by Macmillan Press Ltd., London 1972. Pages 469; Price £ 4.95 net.

An important input that is increasingly being recognised as essential to economic development is what is variously termed as 'knowledge' or 'technology'. Developing nations who are just starting on the road to industrial growth are beginning to realise that in the long run, it is absence of this input that is the real block to their rapid growth. Labour is plentiful and adequate land is available in these countries; capital though scarce is somewhat mobile and can be obtained both from the developed countries and through international agencies. Knowledge, however, is an input whose availability and quality is proving to be more baffling and intriguing.

In this context, a number of questions arise: how is basic knowledge transmitted to have an industrial impact? How is it transformed to form the basis for further growth? What type of knowledge is suitable for developing countries? How does one go from invention to innovation and what are the factors that foster such innovation? Lord Blackett, the eminent scientist, has often spoken of the innovation Chain; the 'innovation gap' between the developing and developed countries is now seen as the key to the problem of further growth. Even in the advanced countries such as UK and USA, there is a great deal of concern as to the environment that is necessary for developing innovation. In the UK, a high-level Committee headed by Sir Solly Zuckermann has gone into this problem and in the USA a team appointed by the Department of Commerce has discussed the problems relating to technological innovation. Even in India, this is a matter causing serious concern and hence the book under review which deals with this subject is particularly to be welcomed.

The book which is a revised edition of an earlier work written in 1958 takes the annual Queen's Awards as the basis for drawing a number of conclusions in regard to the problems

of technological innovation. These awards which have been made annually since 1966 are based on the report of a Committee under the chairmanship of Duke of Edinburgh. The purpose of the scheme is to recognise outstanding achievements by Industry either in increasing exports or in technological innovation. The emphasis of the awards is on the *use* of new technology rather than discovery or invention. Taking the awards made in 1966 and 1967, the study at the University of Manchester arrived at 84 innovations which have been given awards under this scheme. These were then studied in depth and useful conclusions drawn from them which form the subject matter of the book.

Part I of the book discusses qualitatively the results obtained from the case studies while Part II provides quantitative data on the same subject. Part III which forms more than four fifths of the book, details 36 case studies selected out of the 84 which were considered in the course of this programme.

The qualitative conclusions are grouped in Part I under a number of important aspects. The first one which is dealt with is regarding the sources of technological innovation. Where does innovation start and how does one pick up a particular subject from a host of competing topics. The study makes it clear that innovation is *not* invention. The latter is only a part of the overall process, although it is true they are mixed up in a mutually causal relationship: each is part cause and part effect of the other. The study reveals that a new process is the outcome not of a single point event but is the result of a convergence of many strands of events. For instance, in analysing the sources of 25 innovations made by Du Pont, a firm noted for its technical progressiveness, it was found that only 10 of them were based on discoveries which could be attributed to the employees of the firm.

Another aspect dealt with in the study is the role of the individual in innovation. How far is the concept of the 'Independent inventor' valid in the 20th century? The study reveals that while in the case of inventions the role of the individual was particularly great, in the case of innovation, it becomes much less important; in fact, the very words 'independent innovator' is, according to the study, almost a contradiction in terms. For technological innovation, there must be interaction between ideas and the institution. There is, therefore, need for a proper institutional environment if the innovation is to have a fruitful impact.

Another point which has been discussed is the question of size of the research groups: should they be large teams or should they be small. On the one hand, a large team provides necessary background and inter-disciplinary skills which seem to be essential for the complex problems of modern technology; on the other hand they suffer from the disadvantage of communication problems and lack of effective contact between the members of the group. The overall conclusion of the study is that question of optimum size of research teams cannot be given clear crisp answers and management has to decide in each case the number and type of personnel that should work on a particular problem.

The study also dealt with inter-action between the Industry and Research undertaken in the Universities and Govt. laboratories. It found that the impact of the latter has been much more than the research conducted at the universities. More generally, it found that for fruitful inter-action between organisations, it is necessary to have some degree of coinci-

dence of overlap of the objectives of the concerned Institution: 'Rarely is it enough for an Institution like a University or a Govt. Laboratory merely to make results available in the hope that someone will use them.'—a useful advice to many of our own research personnel in the country.

The programme also dealt with the role of basic science in innovation and came to the conclusion that the transition from 'pure' knowledge to wealth is less simple and direct than is normally supposed. "Science does work economic miracles, but it acts in a rather mysterious way its wonders to perform". The study found that the economic benefit may not always accrue to the country where basic research has been done. In fact, there is no simple correlation between the output of basic knowledge and the national economic benefit, which is perhaps the explanation why expenditures on R & D are not always a criteria for the growth of a country.

The problems involved in the transfer of technology are also dealt with in the programme. An important conclusion that the study brings out is the fact that the transfer is often effected through personnel rather than agencies and a great deal of luck plays in the impact of such a transfer. It also brings out the fact that quite often the inter-action between two apparently dissimilar disciplines may be more fruitful than those which seem to be alike. The study confirms the conclusion of Price that just as Science builds mostly on other Science, so Technology builds on Technology.

The study also deals with the role of marketing in R & D. Should we make what we sell or sell what we make—is the basic dilemma for most industrialists. The conclusion of the study is that there must be a synthesis between some kind of need with technical possibility. The way in which this synthesis can be effected varies from industry to industry and is conditioned by individual motivations, organisational pressures as well as social, economic and political factors.

Part II which quantifies the above conclusions is interesting in that specific percentages are given for the various conclusions. One interesting item which is dealt with in Part II is the relative importance of the Discovery 'push' (DS) and the 'Need' pull (NP) in stimulating innovation. The study reveals that while numerically the need pull is more important, large and significant technological changes are more due to the effect of the discovery push. Again, small firms tend to rely more on discovery rather than need identification and the role of the 'top person' is more important in a small firm.

Part III gives 36 case studies on a variety of subjects ranging from automatic transmission systems, anti-biotics, baking processes, gas turbines, semi-conductors, television camera, computers, etc.

The subject dealt with in the book is of particular interest to India where there has been a great deal of concern on the poor impact of industrial research on economic growth. Some years ago, it was estimated that barely a fraction of 1% of the industrial output in the country is attributable to the patents taken out by our research personnel working in the national labs. Although the situation has since improved, the vast majority of the patents filed in the country still are by outside organisations and individuals. There has been in recent months a re-thinking on the needed orientation of research in the industrial labs and

the type of personnel that should be built up so as to have the maximum impact.

The book deserves a careful study by all those concerned with scientific research and industrial development. Perhaps, a similar analysis conducted in this country would be of interest to identify the factors that operate in our own environment to stimulate 'innovations' as a source of prosperity.

— DR RAM K. VEPA

MANAGING TO ACHIEVE QUALITY AND RELIABILITY by Frank Nixon, Published by McGraw-Hill Publishing Company Limited Maidenhead, Berkshire, England. Pages 290+ xvi.

The book is presented in six parts: The Basis of Successful Industry (three chapters); Industrial Enterprise (three chapters); Evolving the Product Specifications (five chapters) Converting Concept into Reality (three chapters); Ensuring Customer's Satisfaction (two chapters) and For Action by Management (two chapters). In addition, it includes two appendices entitled: The Quality Policy and Plan of Metalurgica de Santa Ana, SA and Techniques for the Manager.

The emphasis throughout the book is on the total quality functions and its management. The basic purpose of the book, according to the author, is: "the evolution of good and reliable products is the responsibility of technical and professional men, engineers and designers.. It is the prime purpose of the book to show how the efficiency of every industrial company, indeed its chances of survival, can be greatly improved by establishing a better mutual understanding of the roles and responsibilities of managers and engineers". The book rightly highlights that the companies which have succeeded are those which have been able to manage and co-ordinate the technological functions involved in design, manufacture and servicing, into a single unified system, aiming to achieve customer's satisfaction through the right mix of quality, reliability and cost.

The practical manager will find in this book a useful listing of various activities with due emphasis on the technological and managerial aspects which will enable him to develop and co-ordinate his activities with those of others in the organisation. Another interesting aspect of the book is the clear development of the historical perspective of the modern quality and reliability concepts.

In his enthusiasm and eagerness to emphasise the technological and management aspects of the quality reliability problems, the author has expressed opinions, particularly with regard to statistical quality control and application of statistical and mathematical techniques in reliability, which at best reflect author's strong personal views, and may not find general acceptance. Instead of giving the impression that these techniques have either delayed or hampered the growth of quality and reliability development, if the positive aspects of these techniques had been presented, the value of the book would have been further enhanced. It is now increasingly being recognised, particularly in the developing countries, that SQC techniques can be successfully applied and looked upon as an effective consolidator of technology. The views of the author may thus leave rather a wrong impression on the minds of engineers in an organisation. In this context, it may be worthwhile to quote from In-

dustrial Specifications by EH Mac Niece published by John Wiley & Sons, New York, 1953:

"During the last two decades, the impact of science upon business has had both immediate and fundamental values. These have led to the adoption of new techniques, new materials, and, most important of all, new ways of thinking about management and engineering problems....

"Some of the greatest changes have come from the adoption of concepts involved in statistical quality control. Once their possibilities were understood, a chain of reactions followed. Products began to tell what was happening in a process. Equipment changed to meet requirements, and requirements were translated into new specifications—specifications which made sure that raw materials would lead to desired results once they were introduced into the manufacturing process. These reactions disturb some people at first, but they soon improve relationships between purchasers and suppliers".

—MVV RAMAN

THE ECONOMICS AND MANAGEMENT OF SYSTEM CONSTRUCTION by George Leon; Published by Longman Group Ltd., London, Pages i-xiv+234, Price £ 5.00.

In the days of rapid industrialisation in developing countries like that of India particular need is felt for housing due to heavy influx of people in urban and industrialised areas. The conventional methods of construction are generally slow and time-consuming. It is, therefore, that systems of construction which increase the speed are essential if the housing in urban areas is to keep pace with the rapid urbanisation. Industrialisation also results in increased cost of labour in addition to general scarcity of skilled workers. It, therefore, becomes essential to devise rationalised construction methods to obtain maximum productivity and bring about over all economies in constructions. The book effectively deals with this aspect of economies and management of systems construction.

Industrialised system building is based on rationalisation at planning, design and production and correction stage, thus economising on time, cost and speed of construction. This book deals with various facets of prefabrication and the economies.

In the first chapter, review is made for the various existing systems for residential and industrial buildings prevalent in various countries. The various systems are classified as precast concrete frame system, cross wall construction, framed structure of steel, timber etc., load bearing panels for boxshell construction, composite systems, *in situ* concrete systems, box constructions or composite three-dimensional units.

The second chapter deals with Architectural aspects of serial run mass-produced parts for typified buildings. The dimensional co-ordination is also explained in this chapter. Details about building physiques for sound and heat insulation, water penetration etc., are dealt in brief. The tensification in prefabrication for planning site layouts and building design call for special attention of the planner.

The design details for different systems are explained in brief in the third chapter. The

details of time study given for production, transport and erection of prefab units is of special interest. The joint details and tolerances of prefab. elements is also dealt with in details.

Chapter four contains in brief the general factors influencing design of standard components such as type, shape, materials, weight, junction, details, degree of standardisation proction, transport, erection methods, etc.

Chapter five discusses principles of Economies in component production, and deals with economies of mass-produced prefab components for series production. This may lead to capita intensive organisation which may uptake site labour and increased productivity. Details of economies of optimum size for site factory, stationary unit for mass production of prefab units are also given at length in this chapter. The various factors influencing costs are also mentioned. The optimum capacities for such factories is also given for 400 dwellings and 1000 dwellings per year.

The sixth chapter, 'Programming and Control of Site Mechanisation and Erection Operation' deals extensively with the economies of erection and handling equipment costs. The details of operating costs for tower cranes and other equipment are also explained. This chapter is of specific importance as a guide for selection of equipment and plant for setting up prefab factory.

Chapter seven deals with simplified tendering and contract procedures. Economies of industrialised systems building necessitates the early cooperation of designer and contractors for efficient pre-planning of a project in all its aspects in order to commence & complete the works with minimum of delays and variation from completed drawings and specifications. As a result, more effective methods are essential for obtaining competitive tenders to substitute costly, time-wasting and inefficient methods now generally adopted. Further, the standard costing methods and estimating procedures could be evolved for various building items for standardised building.

The eighth and the concluding chapter throws light on future trends, suggestions and conclusions. The necessity for research and development aspects of architectural requirements, design details, production methods, grade of mechanisation etc. for mass-produced building components requires immediate attention to achieve mass production economies so that the demand for such houses is accelerated. Certain problem areas for research and development are focussed in the form of suggestions.

The book will be of immense use to the engineers, architects, contractors to provoke thinking in terms of rationalised building techniques. The economies aspects, considering all areas of prefabrication such as standardization, production, erection etc. will be helpful in revolutionising traditional construction methods.

— KG SALVI

AGRICULTURAL PLANNING AND CO-OPERATION by Dr RN Tewari, Published by Sultan Chand and Sons, Delhi. Pages 100+x, Price Rs. 15,

Dr RN Tewari, with the help of his colleague, investigators has made a study of the agricultural planning with regard to high-yielding varieties and the cooperative structure in the

country. The present research is based on field work in Rajasthan but the conclusions may have wider applicability. The authors have critically examined the extent to which the existing planning procedure can be accepted as truly dynamic and realistic and how far the cooperative structure in the study support the HYVP. The Study also investigated whether the new programme has any relationship with the size of the farming or any caste bias.

In the opinion of the authors, the whole process of HYVP planning is, by and large, a one-way traffic emanating from the top percolating to the bottom through many formal bodies and committees. It is basically a seed-fertiliser revolution in the planning of which water management and multiple cropping have received little priority. This deficiency is visible at all levels. It is also revealed that the targets fail to show a range for good and bad seasons. Water control and conservation is a neglected phenomenon even in the semi-arid zone where the HYVP programme was taken. The programme has been spread over as vast an area as administratively possible which tantamounts to thinly diffusing the scarce resources in terms of personnel and material.

The authors have also focussed attention on the failure of the cooperative structure, credit availability and impediments in the growth of private trading in inputs like seeds and fertilisers due to monopoly of the public sector. In the opinion of the authors, the cooperative structure has, by and large, failed to meet the needs of the programme.

The authors have also made some suggestions for improvement of the programme. It is, however, doubtful whether the suggestions, such as, creation of district production board and bodies like that will be very effective. In the opinion of this reviewer, in a programme of this type which aims at agriculture based on costly inputs, it would be very essential that chief man responsible for the programme in an area should be a technical man, well-versed in the new technology and all the agencies responsible for the various inputs should be made responsible to him.

It is an interesting study and serves as a window on the achievement of the HYV Programme in Rajasthan. Some of these lessons may also be applicable to other States.

—DR JS KANWAR

STUDIES IN GREEN REVOLUTION edited by GS Pohekar; Published by the United Asia Publications, 12, Rampart Row, Bombay-1. Pages 52+vi tables; Price Rs 5.

This book is a collection of six studies on the green revolution in India which were originally published in the Annual Number of "Industrial India". The contributors, according to the Editor, are eminent economists who look at the green revolution from their own specialised and distinctive angles.

The first study is by Mr VS Vyas on "Green Revolution—A Promise & the Problems" in which he has described the spread of new High Yielding Varieties Programme (HYVP). He is of the opinion that this programme is localised only to the areas which have assured rainfall or dependable irrigation, "Progressive" farmers and developed cooperative institutions for tackling the problems of credit and input supplies. The programme needs to be expanded and the "spread effect" of this programme has to be encouraged by avoiding concentration of bene-

fits in fewer hands. Taxing the additional income of the farmers benefiting from this programme and investing at least a part of this income in building up the infra-structure in the backward regions are the measures suggested by Mr Vyas to achieve this spread effect.

Mr SS Madalgi has contributed a study on "Small Farmers in India & their Problems". According to him there are about 162 lakh small farmer households in India and they cultivate only 218 lakh acres, thus giving an average per household area of 1.3 acres. He has suggested increasing the size of unit of cultivation, increasing the efficiency of cultivation by ensuring adequate and cheap supply of resources and creation of non-farm employment opportunities as the three-fold measures to rehabilitate these small farmers.

The third study "Let us Keep Going Faster to Prove Green Revolution," contributed by Mr Mahesh Chand, indicates that while there has been an increase in the yields of cereals little has been done for pulses, sugar-cane, cotton, jute, tea and tobacco.

Mr TPS Chawdhari in his study "The Green Revolution in India" has examined the impact of germ plasm evolution, brought about by "Dwarfing" genes, on agricultural production. These dwarf varieties have paved the way for Green Revolution as they utilise efficiently the prevailing biological conditions—temperature, day length, solar intensity, water, soil and agronomic practices—in the tropical countries. The new varieties, however, call for a complete change in technology and not merely the application of higher doses of standard inputs. This brings in the problems, mainly relating to the need to achieve greater stability in terms of crop output and financial returns. These problems can be tackled by research, by framing suitable price policies, and by the development of Industrial uses for the agricultural products.

The linking of agriculture with industries is the theme of the study "Agro-industries in India-Measures to Boost Their Growth" by Mr SB Sakhalkar. This linking is necessary to avoid problems caused by the movement of vast population of rural unemployed to the cities. The need of the hour is to give special emphasis to agro-industries which are less capital intensive and which generate greater rural employment and thus supplement agricultural activities. The development of agro-industries, however, needs to be facilitated in under-developed areas by providing adequate means of communication, power and technical education. The Departments of Industries should also create "Management Units" whose function will be to render co-ordinated service to the rural entrepreneur at his doorsteps.

The sixth study "How Green is the Green Revolution" by Mr GA Pai is probably the most statistics-oriented one in this book. According to him the Green Revolution is confined to only 20% irrigated area and to the production of wheat and gram both in terms of productivity and total production. There has been a large-scale diversion of cultivated area from cash crops to food crops and one of the reasons for this diversion is Forward Trading system prevailing in cash crops. It will be beneficial to abolish Forward Trading and to organise marketing of cash crops through Marketing Co-operatives, financed by the Nationalised Banking System. It is interesting to note that, with the help of the statistics given in this study, Mr Pai has shown a fall in the *per capita* consumption of cereals, pulses, edible oils, sugar, and cotton cloth in 1967-68 as compared to the 1964-65.

The studies compiled in this book are written in a language which is in general free from the technical jargon and is intelligible even to the "non-specialists". Explanation of the abbreviations used, provision of source material for all the statistical tables given in the book, and a little more diligence in proof-reading to eradicate printing mistake would have, however, added to the value of the book.

—DR RATTAN SINGH

PRICE TRENDS IN INDIA by Dr SB Agarwal, Published by Sultan Chand and Sons, Daryaganj, Delhi-6. First Published 1972, Pages xv+234. Price Rs. 25.

The nature of the inflationary process and the policy instruments for its control depend upon the institutional setting of a given country. These would naturally be different in a pure competitive economy from those in an economy with complete centralised planning. The institutional setting that we are concerned with is that of a mixed economy where government expenditures are more or less autonomous and planned, while the economic decisions in the private sector of the economy are governed by the price system as modified by the policy instruments of the Government. Of course, one set of decisions is not independent of the other set; the two interact as a result of the interdependence of the two subsystems.

One of the basic causes of inflation in developing countries is excessive government-fixed investment in relation to the propensity to save and the given tax system. The monetary complement of this phenomenon is excessive credit creation by the Central Bank in favour of the Government. The inflationary effects of excessive government investment are thus aggravated with a temporary or permanent imbalance between food supply and its demand.

The author of the book under review has tried to analyse the causative factors as also the remedial measures for price rise in this country. Trends in prices of certain articles have been examined in relation to the data pertaining to the period from the First Five Year Plan to the middle of the Fourth Plan. The study being an investigation during the course of his doctoral dissertation work, the author claims to have updated the statistical material.

The book bears the brunt of laborious work for probing in a subject where many an economist would fear to tread particularly when it comes to the giving of policy prescriptions. The author has made a difficult task easy by marshalling the twelve chapters in a logical sequence though adopting the cafeteria approach while dealing with the problem of inflation.

No one would dispute the causative factors of inflation as described by the author. These are the expansion in money supply, reliance on deficit financing, emphasis on heavy industry and projects, abnormal increase in non-developmental and defence expenditure, and continuous increase in bank credit. It is true that uptrends in prices have been the combined result of all the factors which ultimately affected the demand for and supply of commodities. The increased cost of production further pushed up the prices.

The author's analysis of price trends in the last two decades shows that there is no positive and definite relationship between commodity prices and growth of net national output. Between 1950-51 and 1967-68 the net national

product at constant prices rose from Rs. 8,850 crores to Rs. 16,520 crores, recording a rise of 86.7 per cent over the seventeen years. The annual growth rate in the net national income thus works out at 3.8 per cent; whereas the corresponding growth in the per capita national product has been only 1.6 per cent as against an annual rise in the general index of wholesale prices of 3.9 per cent.

Going through the chapter on price policy and planning, one comes across opinions of various economists on the subject but then the author has not been able to give his own analysis and views on it. This chapter like other ones is also full of quotations from various publications.

In the concluding chapter, after having dismissed possibility of any relationship between changes in prices and changes in production of manufactures, the author says that "The inflationary pressures can be subdued if resort to deficit financing 'the painless mode of raising finances', is generally avoided and the tax structure is also reconstructed." He recommends increases in land revenue and imposition of agricultural income tax. "Thus to ensure an adequate rate of economic development and of national and per capita income, the use of appropriate machinery is necessary so that monetary stability may be rendered possible and inflationary price trends which are in evidence may be checked." In this context, the author perhaps does not appreciate that monetary and credit policies can at the most tend to correct inflationary pressures brought about by an autonomous speculative demand for inventory investment. In other situations they cannot be expected to compensate for the effects of excessive fixed investment or food imbalance.

What happens to income distribution in inflationary situation has not been dealt with in the book. A study in this direction would have revealed striking phenomena of the effects of inflation in this country. The present study, in any case, does highlight the fact of the ever-increasing inflationary situation in this country ever since the planning period began after independence.

— NAVIN CHANDRA JOSHI

INERTMEDIATE ECONOMIC STATISTICS by Karl A Fox; Published by Wiley Eastern Pvt. Ltd., New Delhi. Pages 568+xii, Price Rs. 21.75.

The title of the book "*Intermediate Economic Statistics*" itself gives a fairly good idea of the contents thereof. The author has dealt with the various applications of statistical theory to economic problems in such a simple manner as to make it possible for a student with some mathematical background to follow the contents with ease. The author hints in his Preface that he was prompted to write this book mainly because he has observed that graduate instruction in econometrics tends to emphasise statistical estimation theory in isolation from economic research problems. Judged from this angle the author has achieved the objective.

The presentation in the book has been uniformly very good. Almost every chapter provides interesting reading. At times one might feel that the discussion is tending to become a big drag and also that some ideas find repetitions but the author could not, perhaps, help it since the style of presentation in the book at several places follows class room lecture pattern.

The book consists of 14 chapters and from beginning to end the reader finds the standard in respect of mathematics quite simple (though it rises slowly and steadily from chapter to chapter). The author has taken care to see that the mathematical portions do not interfere with the fluency in presentation. One needs to go through only the list of important equations and glossary of symbols added towards the end of the book to convince himself that the standard of mathematics is not high. In the preface as well as towards the end of Chapter I where he gives, in brief, the plan of the book the author has clearly indicated which of the portions can be skipped over if necessary by students of different standards. In fact, there is only one chapter (No. 12) which provides somewhat high standard in mathematical presentation but the reader may, if necessary, skip over this chapter and proceed to 13 and 14, In several of the chapters, the author has conveniently taken the strictly mathematical derivations to the appendices in order that they may not interfere with ease of reading.

The first three chapters explain in the simplest language, possible, what is economics, what is statistics and how statistical theory finds application in problems faced by economists. Illustrations have been lavishly given in almost every chapter so that the reader may not get stuck up in the portions containing equations. All the concepts used in the book have been fully explained in the relevant chapters and wherever necessary even with the help of illustrations. A few statistical tables which are relevant to the methods developed in the book are also added towards the end of the book in order to make the book complete in all respects. Also, at appropriate places in the book the author has dwelt on the controversies between the business cycle analysts and the proponents of the new macro-economic synthesis which, besides providing an insight into the modern trend in economics, incidentally relieve a bit of monotony arising out of the theoretical portions and equations.

The latter half of the book particularly chapters dealing with economic models, should be useful for workers in Government Departments in economic ministries. The book should prove an asset for such Government officials as well as to students of economics with some mathematical background.

— DR G RAMACHANDRAN

MODERN-MANAGEMENT TECHNIQUES IN EDUCATIONAL ADMINISTRATION, Published by Asian Institute of Educational Planning and Administration, New Delhi. Pages 542+viii; Price not mentioned.

The Asian Institute of Educational Planning and Administration organised a regional seminar in New Delhi on modern management techniques in educational administration. Some of the eminent educationists and management experts presented their papers which are compiled in this volume. The volume is divided into two parts. Part I is the reproduction of the lectures delivered by the speakers covering different management techniques as applied to administration in general and to educational administration in particular. Application of Behavioural Science Approach and Quantitative Methods have been discussed in greater details. With a view to emphasising the growing need of management techniques in educational administration, some of the areas like personnel, O & M, etc. have also been touched.

Behavioural Science group put forth the opinion that educational administration is a part of over-all public administration, though the difficulties in this area are far-reaching. To be more specific, for the successful employment of the management techniques to educational administration, there are several criteria and constraints that must be considered carefully. Quantitative experts took the view that educational administration has to deal with diversified problems and in the existing situation it attempts to reach a solution without understanding the problem. Also, it makes mistakes with regard to cost and time factors. There was also a feeling that Systems Analysis has great relevance for effective and efficient educational administration. Operations Research technique can be utilised but it will, as was the consensus, call for a sustained research and new formulations and methods. Significance of PERT & CPM, as has been illustrated in one of the papers, bears a testimony to it.

With regard to personnel management, the participants strongly feel that any model operative in business organisation, should be operative in government organisation and certainly be practicable in educational administration. A good description of what is involved in "delegation of power" is given in this paper. On Performance Budgeting and PPBS, the participants from outside Asia strongly feel that PPBS should be extensively used in educational administration because it has achieved success in USA and UK. But some participants from Asia have highlighted the difficulties and limitations of adopting it to Asia till the institute of planners and administration take a lead and train enough personnel for the same.

This volume also deals with the subjects like O & M and management for change. The treatment of the subjects is quite general and self-explanatory. In view of the ever-growing complex institutional system, the use of computers has also been highlighted in one of the papers.

Part II deals with the discussion on different papers submitted by the participants in the seminar. All these discussions highlight the criticism as well as the difficulties about the application of management techniques to educational administration. In generality, the consensus was in favour of proper application of these techniques.

In the opinion of this reviewer, the performance of the seminar is in the nature of arousing awareness of applying management techniques in educational administration. The seminar could serve this limited objective only. A symptomatic reference has been made about certain techniques but in totality it falls short of an integrated approach needed to comprehend the entire field of educational administration. The emphasis has been on a few techniques/approaches and not on the basic decision areas.

Broadly the participants carried themselves with the obsession of techniques like OR, systems analysis, and behavioural approach. In fact, in view of the problems of educational system and its administration in Asia particularly India, mangement methods, if applied in the field of educational finance, placement, planning, coordination, etc., would show better results in the immediate context, This seminar was of course a very short one and can, at best, be taken as a ground-preparing type. It has served its purpose, howsoever limited it was. In fact, it has set the ball rolling and in the times to come, in few seminars more, the other aspects with all purposiveness, embarracing the entire contextuality, would be tackled.

—MP GUPTA

INTERNATIONAL TRADE AND DEVELOPMENT—SELECTED INTERNATIONAL DOCUMENTS Published by Indian Institute of Foreign Trade; Pages 358, Price Rs. 25/-.

The U N Conference on Trade and Development (UNCTAD) has come to stay as an important body to identify problems and prospects of trade promotion and economic collaboration between the developed and developing sectors of the world economy. It is timely indeed that the Indian Institute of Foreign Trade, as a national unit for dissemination of information about UNCTAD, has taken lead to bring out all important documents pertaining to the three conferences of this UN Organisation so far held. The utility of the publication is universal and all the interests connected with the field of international trade and development either within India or abroad should find it a handy reference.

The documentation contained in this publication traces the genesis of UNCTAD and reproduces the resolution adopted by the Nineteenth Session of the UN General Assembly in December 1964. It then contains the Charter of Algiers which was adopted by the Ministerial meeting of the Group of 77 developing countries in October 1967 and laid down a uniform approach for the developing world in seeking solutions to the problems faced by them in trade expansion and economic progress. The publication then reproduces major resolutions, declarations and other decisions at the Second UN Conference on Trade and Development held in India. It also delineated international development strategy for the Second UN Development Decade.

The publication covers the Lima declaration adopted by the Group of 77 developing countries at the Second Ministerial meeting in November 1971 in preparation of the Third UNCTAD. Further the report of the Special Committee on Preferences and the general declaration made by Socialist countries of East Europe in relation to the Generalised Scheme of Preferences were reproduced. Finally, the publication details the provisional agenda for the third UNCTAD with suitable annotations that were prepared by the UNCTAD Secretariat.

It would be helpful if the Institute can bring out a revised edition of this publication incorporating the Resolutions passed and Decisions taken at UNCTAD III also. Further the actual progress made in terms of action taken on the Resolutions passed by the three conferences of UNCTAD can also be detailed in the revised edition. As it is, the publication nearly contains resolutions and decisions but not the progress in fulfilment thereof.

— VDN RAO

PROGRAMMING AND CODING OF DIGITAL COMPUTERS by Philips M Sherman, Published by Wiley Eastern (P) Limited, New Delhi, Pages 444: Price Rs. 19.50.

This book on computer programming is written for persons already possessing some basic grounding in computers and serves as a good refresher. It contains a good number of references and collection of exercises at the end of each chapter. The presentation of the subject matter is quite logical and sustains the interest of the reader. It is particularly usefu

for those who are being introduced to assembly languages. The examples chosen are particularly useful for the training of system programmers. The book also contains a good account of the language barrier, and the Fig. 3.6 on page 63 gives a clear explanation of computer organisation. Chapter IV of the book deals very ably with the number system, the binary arthmetic and the actual system and their relative merits and demerits.

This is a good introductory book on assembly languages. A good example of non-numria data processing also is given. The chapter of INPUT/OUTPUT is quite interesting. as also the example of dynamic storage.

The book, however, has some minor drawbacks. For example, standard symbols for flow charts have not been used. Also, a hypothetical computer is discussed while it would have been preferable to think of simulating problem on an actual machine. The chapter on artificial intelligence is rather sketchy. There could have been a few more examples on game playing. Also, it would have helped the reader a great deal if explanation had been offered as to why sorting is done and if the assembly process had been elaborated and some discussion included on symbol table.

In conclusion it may be said that this book is very good for computer programmers and systems analysts. It cannot be recommended to beginners in the field with absolutely no previous knowledge of mathematics and even elementary idea of data processing.

--- PR SRINIVASAN

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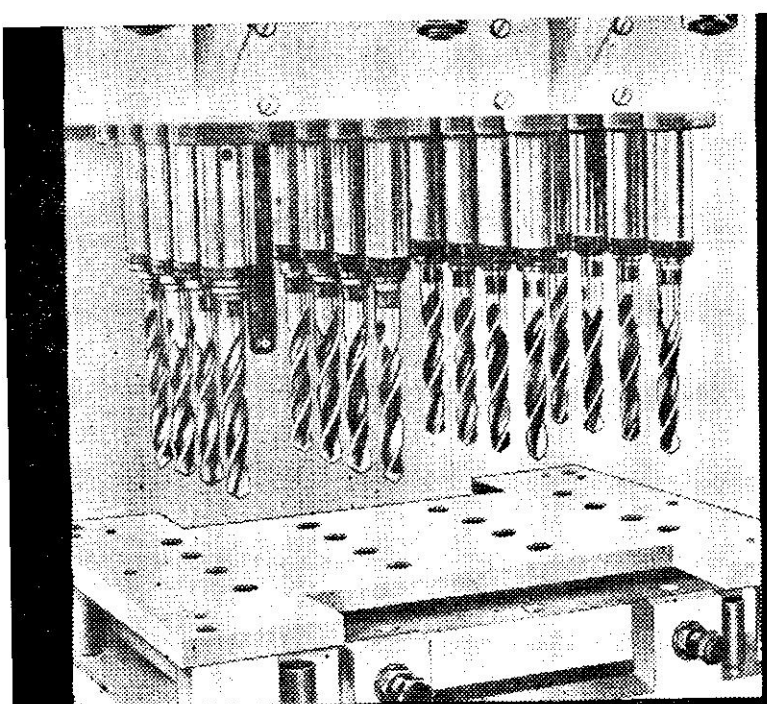

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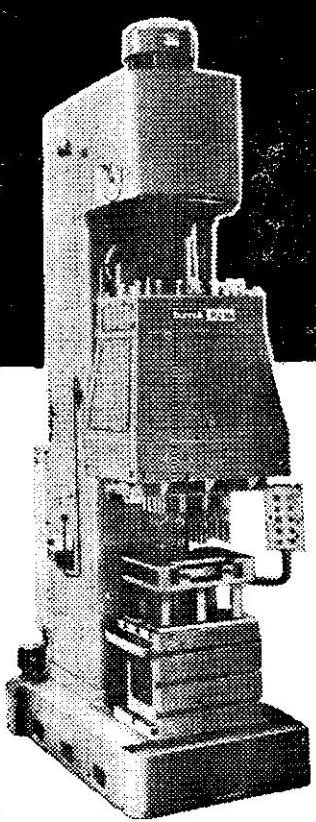

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