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Productive Work Culture —The BHEL Case

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This paper focusses on the efforts of BHEL, in creating a productive organisational climate. In the Productivity Year BHEL was awarded the Silver cup for Best Productivity Performance in the year 1982-83.

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Introduction

Our Honourable Prime Minister Shri Rajiv Gandhi in his first broadcast to the nation, called upon the nation to evolve a goal oriented system; a new work ethic, a new work culture, in which the emphasis is on result orientation rather than being procedure bound.

In Search of Excellence

The question that has been occupying the minds of all, be at the Corporate sector, the Government sector, the Private industries and individuals, is what would make people result oriented and contribute their best towards building of the nation. This question is becoming all the more important because of the intrinsic inter-dependence between the individual and that of the community in which he functions. Whenever an individual is contributing his best to whatever job that is allocated to him, he is directly raising the value added in the society. When the entire environment is set for excellence, and excellence is the objective of each individual, organisation and the country, then there is a snow-balling effect in build-up of value added in society.

This can be achieved only with the commitment of all concerned and faith and belief in the search for excellence.

Environment of excellence can be created only if

certain fundamental values are inculcated in the organisation such as a willing co-operation between all concerned. The emphasis should not be on what the organisation can do for the individual, but on what the individual can do for the organisation. Merit must be recognised and performance must be respected.

The need for establishing a culture of results has always been there. It is the awareness of the need for such a culture leading to higher productivity which has become the focus of recent times. This is all the more relevant in a developing country such as ours where resources are scarce. With this in mind the Seventh Five Year Plan has rightly emphasised growth, equity and social justice, self-reliance, improved efficiency and productivity.

BHEL Experience

Productivity efforts in **BHEL** took a decisive shape when our late Prime Minister Smt. Indira Gandhi declared 1982 as the Productivity Year. We realised that productivity is an attitude of the mind and building this attitude required total commitment from the top management team which believed in developing an organisational culture of excellence rather than look upon productivity as a one time exercise. As a result of this the concept of productivity has taken deep roots in the organisation and has not only been the cause of effecting savings in the company by way of cost reduction, but is also becoming a way of life with us.

Forerunner of the BHEL Productivity Movement-Joint Labour-Management Decision

We realised that the basic requirement for introducing the productivity culture in the organisation called for active participation of the labour in this movement. The long history of BHEL's healthy consultative process effected through its joint committee (the Top labour-management negotiating body) provided an excellent forum to discuss openly the proposed productivity programme. A special session of the joint committee was held in 1982 at Hyderabad for this purpose. It was first of all agreed by all participants that the meeting will discuss productivity exclusively and not convert this into another forum for discussing staff demands and grievances. I must say that the discussions were kept at a high level and the labour side came up with very useful and constructive suggestions. The question "Why Productivity Movement"! was discussed threadbare. At the end of the discussions we all felt that we were already participating jointly to raise Productivity. We recognised that while we had already started productivity oriented process there was need to re-affirm, our firm belief in the continuous improvement of productivity in the organisation. We decided to embark on 3-5 years productivity improvement programme. This joint pronouncement opened the doors of mutual trust and became the forerunner of the BHEL productivity movement.

Corporate Productivity Group

Involving over 70,000 employees of the company in a movement of this kind was a stupendous task and could be achieved only through an appropriate implementing agency. Accordingly, we had to create a formal Productivity Department headed by a Productivity General Manager who was assigned the prime responsibility of providing the thrust to the productivity efforts in the company. The role of the Productivity General Manager was to act as a catalyst for change by creating an environment conducive to attain productivity improvements. The Productivity General Manager spent considerable time communicating with managers and other employees, organising meetings/talks and seminars, researching and disseminating productivity improvement ideas and materials and in general training and facilitating employee involvement throughout the company. The productivity General Manager enjoyed the fullest support of the top management.

Unity Productivity Cells

The divisions were split into convenient responsibility centres with a Productivity Co-ordinator in each work area. The divisions identified a panorama of projects for productivity improvement. Once the projects got crystallised, the divisions set for themselves monitoring mechanisms suitably designed for each. The projects covered were not only in the traditional fields allied to production but covered such areas as services, office administration and the like.

Productivity-A-Continuing Exercise

To enable sustaining the productivity movement the organisation is currently engaged in linking the productivity efforts with the following :

—Making productivity reporting a part of Corporate Management Information System.

—Inclusion of Productivity Improvement as a part of Annual Budgeting Exercise.

—A process of Public recognition in terms of an annual Divisional Award for the best groups has been launched.

—Intensive training.

Training

We feel that creating an awareness of Productivity Improvement is extremely important, hence training has been given enormous attention. The Divisional training centres and the Corporate Management Development Institute re-oriented their programmes laying greater stress on Productivity Improvement. Intensive training of artisans and supervisors is done at the operating units. Usage of teaching aids like close circuit television, slide projector, overhead projector, films and charts has made training highly effective.

Recording of messages from top management for larger dissemination has made a tremendous impact on productivity improvement thrust. The success achieved by us has encouraged us to extend the training programmes to the entire population of the company including supervisors and all levels of executives. These are currently under execution. As of now, about 33,000 employees have been covered under the Productivity Training Programme.

Communication

With a view to facilitating the spread of productivity culture, effective communication was established through seminars, workshops and conferences and a quarterly journal "Productivity Movement in BHEL" reporting the productivity achievement was launched.

Quality Circles

Another direction in which our employees could be actively involved in improving quality and productivity in our organisation was the introduction of Quality Circles, a concept which originally took birth in Japan. A modest beginning was made in 1980 with 5 circles in our Hyderabad Unit. We have today around 1000 Quality Circles involving approximately 10,000 employees. Our experience with Quality Circles has been that it has helped in developing in our employees a sense of achievement, a sense of responsibility towards improving the quality of performance by establishing their goals consistent with the company's larger objectives. This provides them the opportunity to develop themselves to bring about a participative culture and to feel fully involved towards enhancing the total quality and productivity in the company.

The Success of our Efforts in Improving Productivity

An assessment of the productivity efforts in BHEL showed an addition to the net profit of the company to the tune of one and a half per cent of turnover in tangible terms, and qualitative improvement in many areas like :

—Improvement in Working conditions

—Reduced down time of machine

—Reduction in rework/rejection

—Reduction in manufacturing cycle time

—Increased safety

—Improved cash in flow

—Quicker flow of information through computerisation

—Reduction in inventories

—Reduction in work load of critical machines by off-loading them to non-critical machine through process of improvements

—Reduced operator fatigue due to process improvement

In quantitative terms, 4123 projects were undertaken by BHEL during the VIth Plan period resulting in a saving of nearly Rs. 56 crores. The value added per employee rose from Rs. 0.49 lakhs in 1980-81 to Rs. 0.76 lakhs in 1983-84 and is expected to further go

up from Rs. 0.78 lakhs in the current year to Rs. 1.35 lakhs at the end of the VIIth Five Year Plan. In the same period, the inventory in terms of days per unit of turnover, declined from 299 days in 1980-81 to 189 days in 1983-84, and is expected to reduce from 150 days in 1984-85 to 120 days in 1989-90.

As a result of the measures initiated and successes gained due to a shared concern for productivity in the organisation, BHEL was awarded the Silver cup for Best Productivity Performance in Heavy Engineering sector for 1982-83. It is indeed heartening that again this year two of BHEL Divisions BHEL, Tiruchy for the Best Productivity Award in the Power Generating & Distribution Equipment Group & BHEL, Bhopal for sustained Productivity Efforts have been recognised by NPC for their outstanding effort. Productivity has an inexorable linkage with safety. The Sword of Honour of the British Safety Council for Excellence in Safety was also awarded to BHEL divisions. This award for 1983 went to the Tiruchy Division while for 1984 three divisions, namely Tiruchy, Hyderabad and Bhopal have bagged this coveted distinction. At the same time BHEL was also adjudged as the winner of the Industrial Relations award of the All India Employers' Association for 1982-83.

Conclusion

Our sustained involvement with the productivity effort gave us new insights in the need to emphasise the right values in industry. The gains from promoting a culture of self-discipline and self-prioritisation, free exchange of ideas and participation gave us tremendous satisfaction to pursue the matters further.

None was so well productivity oriented as our late Prime Minister Smt. Indira Gandhi who knew best how to utilise time and opportunities for the progress of our country and hence I would like to conclude by quoting her.

> "Concern for higher productivity should become almost an obsession with those engaged in productive processes, whether they are managers or workers, because only by augmenting productivity can we enlarge the surpluses available for investment. This is an obligation which the employed owe to those who are yet to be employed".

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Productivity & Technology Linkages —The Case of HMT

T.V. MANSUKHANI

The paper deals initially with the growth in Labour Productivity, on which Industry had almost exclusively concentrated in the earlier stages of industrialisation. The emergence of the 'Capital' factor with technological implications immediately after the World War II, as a contributor to growth; and with it, the aggregated measure of Total Factor Productivity is also dealt with. In this backdrop, the experience of HMT is briefly outlined and the techniques used to enhance productivity with Technology are discussed by the author.

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1. Preamble

Productivity has attained a position of national focus in the post-independent era of our country. The growth targets in the successive Five Year plans envisaged a significant role for productivity in order to raise the levels of output, more so with the industrialisation of the Indian Economy. The establishment of the National Productivity Council by the Government of India in the year 1958 was again a step supporting the process. Even more recently, the declaration of '1982' as the Productivity Year by the late dynamic Prime Minister Smt. Indira Gandhi, stressed the reactivisation and energisation of the productivity movement.

The Manufacturing Sector has had an important role to play in the economic growth of the country over the last three decades of the Plan periods. The target of growth was about 5% for the Economy as a whole but the actual figure was about 3.5%, though the trends during the current Five Year Plan indicate an improved rate. In the Industrial Sector of which Manufacturing has a sizeable share, the targets for the actuals are in the region of 4.5%—however, improvements are seen during the current Plan period.

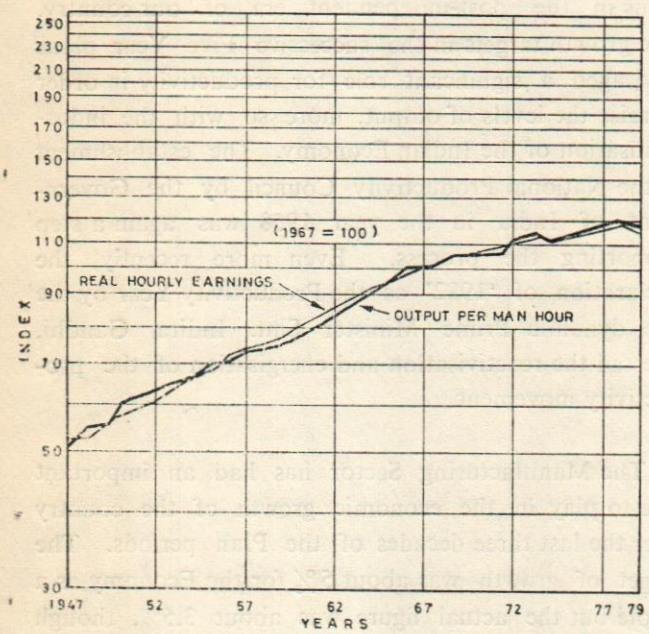
Growth in real terms is achievable with increase in the rate of output from the inputs made available, i.e.,

the output to input ratio, or in other words through improvement in Productivity. This is made possible by increase in the efficiency of utilisation of inputs in the process of production of goods or services.

2. Labour Productivity (LP)

Industrial competition in the Post Industrial Revolution period, brought in pressures to devise methods for enhancing Labour output in the frame of the inputs made available for production. This led to the establishment of standards and systems for work measurement. Even Wages were linked to the Output factor, (commonly known as the piece-rate system). Thus it is found that, historically, the real wage rate followed closely the LP trend, as can be seen from the relevant American Productivity Centre Chart reproduced in Exhibit-1

Exhibit 1



REAL HOURLY EARNINGS AND OUTPUT PER MAN HOUR
(PRIVATE BUSINESS SECTOR – USA 1947-79)

An Inter-period comparison of 'Compound Annual Rates of Growth' of LP in respect of the Economy as a whole, as well as of the Manufacturing Sector, as derived from the economic data of the leading industrialised countries, spanning particular bench-mark years, is highlighted in Exhibit-2. Also included in it, are the growth rates in India, covering the major part of the Plan periods. It would reveal a progressive growth in LP (defined by the ratio of 'Net Output' in

Exhibit 2

COUNTRY	PERIOD	1760 TO 1860 – UK / 1790 TO 1855 – USA	1860 TO 1890	1890 TO WORLD WAR I (1918)	WORLD WAR I TO WORLD WAR II (1919 – 1945/48)	1948 TO 1960 – USA / 1950 TO 1960 – INDIA	1960 TO 1970	1970 TO 1980 – INDIA / 1970 TO 1978 – OTHERS
UK	ECONOMY (AS A WHOLE)	0.9	1.1		1.5	2.2	2.8	1.8
	MANUFACTURING SECTOR	–	–		–	3	3.6	1.8
JAPAN	ECONOMY (AS A WHOLE)	–	1.8		1.4	7.2	8.2	5.3
	MANUFACTURING SECTOR	–	–		–	8.5	9.3	5.8
GERMANY	ECONOMY (AS A WHOLE)	–	1.9		1.2	5.2	4.8	3.6
	MANUFACTURING SECTOR	–	–		–	6.1	5.6	5.1
USA	ECONOMY (PRIVATE DOMESTIC BUSINESS)	0.5	1.1	2	2.2	3.6	3.5	0.9
	MANUFACTURING SECTOR	–	–	–	–	3	2.8	2
INDIA	ECONOMY (AS A WHOLE)	–	–		–	2.5	2.6	0.9
	REGD. MANUFACTURING SECTOR	–	–		–	4.2	1.9	2

COMPOUND ANNUAL RATE OF GROWTH IN LABOUR PRODUCTIVITY — %

real terms to 'Labour' employed in number). Besides, the following could be inferred that:

— there was steady improvement in the growth rates until the second World war, though, there was a drop in the rate of growth in case of Japan and Germany between the World Wars I & II;

— there was a sharp rise in the Post World War II performance level of Japan and Germany, while the U.K. and USA continued to advance at their traditional pace of growth.

— there was a general decline in the last block 1970-78 (possibly on account of the 1973 Oil crisis).

In the case of India, a good start up is noticed in the 50s' with a growth rate quite comparable with

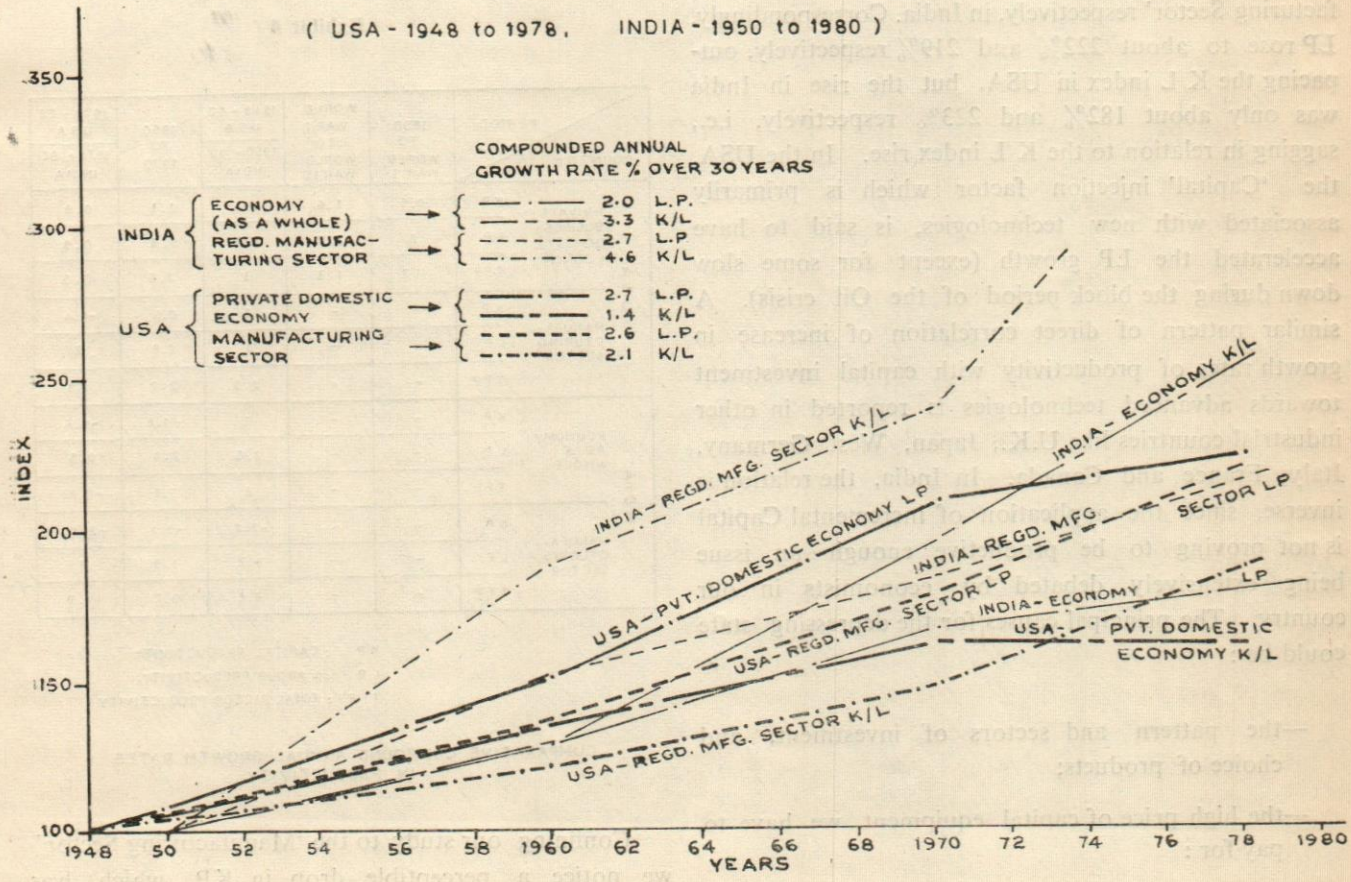
those of UK or USA in the same period—this must be largely due to the major investments coupled with the use of proven technologies, unlike in the case of the others who had to industrialise in the earlier centuries with new and untired methods and tools. The pace has, however, not been kept up in the subsequent decades, especially in the Registered Manufacturing Sector.

3. Capital Productivity (KP) and Total Factor Productivity (TFP)

3.1 Concepts

Analysts have reported that the heavy capital inputs, improved technologies and production facilities, supported by the will to perform and the all round enthusiasm were responsible for the spurt in the economic growth in the post World War II era, especially in the war-ravaged countries. The efforts are seen to have continued in the 60's and 70's. Rapid strides were made in innovations and further advancements in technologies, matched with economies of scale in operations, and novel approaches to Organisation and Systems, R and D, Quality and Reliability, Deliveries and Customer Services, all geared upto answer the challenges of growing national and global competition. The 'Capital' input factor thus brought in new dimensions to the Dynamics of Productivity along-side with Labour. In order to determine its effectiveness, 'Capital Productivity' (KP) (which is the relationship between the 'Net Output' and the 'Capital' employed, in real terms) was introduced in the system. KP and LP have come to play a role of complementarity, or even surrogates

Exhibit 3



GROWTH OF CAPITAL PER UNIT OF LABOUR EMPLOYED AND LABOUR PRODUCTIVITY

or trade-off between themselves. Hence, to determine the productivity of the two combined, a new concept of 'Total Factor Productivity' (TFP) which is the relationship of 'Net Output' in real terms to the weighted inputs of 'Labour' and 'Capital' combined, was developed.

3.2 Inter-Factor behaviour and comparisons

A graphical presentation of the growth of 'Capital per unit of Labour employed'-K/L, and LP, in USA and in India, is presented in Exhibit-3, for the periods 1948-78 and 1950-80 respectively. An almost continuous rise in Capital intensiveness i.e., K/L is conspicuous in both countries during the three decades.

In USA, K/L rose to approximately 160% for the 'Private Domestic Economy' and 186% for the 'Manufacturing Sector', against about 268% and 386% for the 'Economy' and the 'Registered Manufacturing Sector' respectively, in India. Correspondingly, LP rose to about 222% and 219% respectively, outpacing the K/L index in USA, but the rise in India was only about 182% and 223% respectively, i.e., sagging in relation to the K/L index rise. In the USA, the 'Capital' injection factor which is primarily associated with new technologies, is said to have accelerated the LP growth (except for some slow down during the block period of the Oil crisis). A similar pattern of direct correlation of increase in growth rates of productivity with capital investment towards advanced technologies is reported in other industrial countries like U.K., Japan, West Germany, Italy, France and Canada. In India, the relation is inverse, since the application of incremental Capital is not proving to be productive enough—an issue being extensively debated by economists in our country. The principal causes for the depressing state could be :

—the pattern and sectors of investment, and choice of products;

—the high price of capital equipment we have to pay for :

—spiralling costs of materials, energy and other inputs; and

—lack of efficiency and effectiveness in the utilisation of the resources.

Needless to say, the Indian experience is compared here, not with the developing countries, but with Industrial leaders of the world who have had more than a century's lead in the technology development process.

Capital in itself, can help increase the Net Output growth and thereby improve its own productivity (KP). It can, on the other hand also, by way of certain new equipment or new materials, toolings, technology, etc., help improve LP without any alteration in the Labour contribution as such, Exhibit-4 shows the trends in growth rates of KP alongside with those of LP in USA and India. The corresponding TFP growth rates too are given—all arrived at, from available publications on the subject.

Exhibit 4

COUNTRY		PERIOD	1890 TO WORLD WAR I	WORLD WAR I TO WORLD WAR II	1948-60 USA / 1950-60 INDIA	1960 TO 1970	1970-78 USA / 1970-80 INDIA
USA	PRIVATE BUSINESS DOMESTIC ECONOMY	KP	0.5	1.6	1.4	1.1	0.9
		LP	2	2.2	3.6	3.5	0.9
		TFP	1.3	1.8	3	2.6	0.9
	MANUFACTURING SECTOR	KP	-	-	1	0.6	-0.4
		LP	-	-	3	2.8	.2
		TFP	-	-	2.5	2.2	1.3
INDIA	ECONOMY AS A WHOLE	KP	-	-	1	-1.6	-0.4
		LP	-	-	2.5	2.6	0.9
		TFP	-	-	2	1.5	-0.02
	MANUFACTURING SECTOR	KP	-	-	-2.2	-0.3	-2.9
		LP	-	-	4.2	1.9	2
		TFP	-	-	0.8	0.7	-1.9

KP : CAPITAL PRODUCTIVITY
LP : LABOUR PRODUCTIVITY
TFP : TOTAL FACTOR PRODUCTIVITY

COMPARATIVE COMPOUND ANNUAL GROWTH RATES IN PRODUCTIVITY

Confining our study to the 'Manufacturing Sector' we notice a perceptible drop in KP, which has registered a negative growth during the last block period 1970 to 1978 (on account of the 1973 Oil

crunch) and consequently a considerable fall in TFP, in the USA. In the case of India, negative growth rate in KP seems to have become a feature of this sector right from the very first decade (1950-60). And with the growing gap between K/L and LP—the latter not even keeping pace with the rate of infusion of Capital (as seen in Exhibit-3), the TFP recedes into a negative growth rate which should be a cause of concern.

In a sense this culminates in the principal issue of finding solutions towards efficiently employing the incremental capital for such products and production as would facilitate use of a consummate blend of the new technologies and abundant, untrained but relatively low wage labour, keeping in view the operational economy and competitiveness. However, the environment must be conducive to discipline and dedication and must result in the maintenance if not increase in the intrinsic Labour productivity.

(All figures in real terms)

	Approximate growth rate %					HMT
	India	USA	UK	Japan	Germany	71-72
	1970-80			1970-78		to 80-81
K/L	4.9	2.3	—	—	—	1.6
LP	2	2	1.8	5.8	5.1	6.1
KP	—2.9	—0.4	—	—	—	7.8
TFP	—1.9	1.3	—	—	—	7.1
Annual Growth in Net Output	4.6	2.4	—	—	—	13.4
Contribution of Productivity to growth of Net Output (approximate)	Negative	54%	—	—	—	53.2%

4. Productivity Approach and Experience at HMT—An Outline

In the context of studies on Productivity of the Manufacturing Sector in the foregoing, an exercise in macro-level Factor productivity computations made in respect of HMT for the period 1971-72 to 1980-81, brings out the following comparison. It is, however, recognised that the same is between an individual multi-product Manufacturing Company and the Manufacturing Sector (as a whole) of some leading Industrial countries.

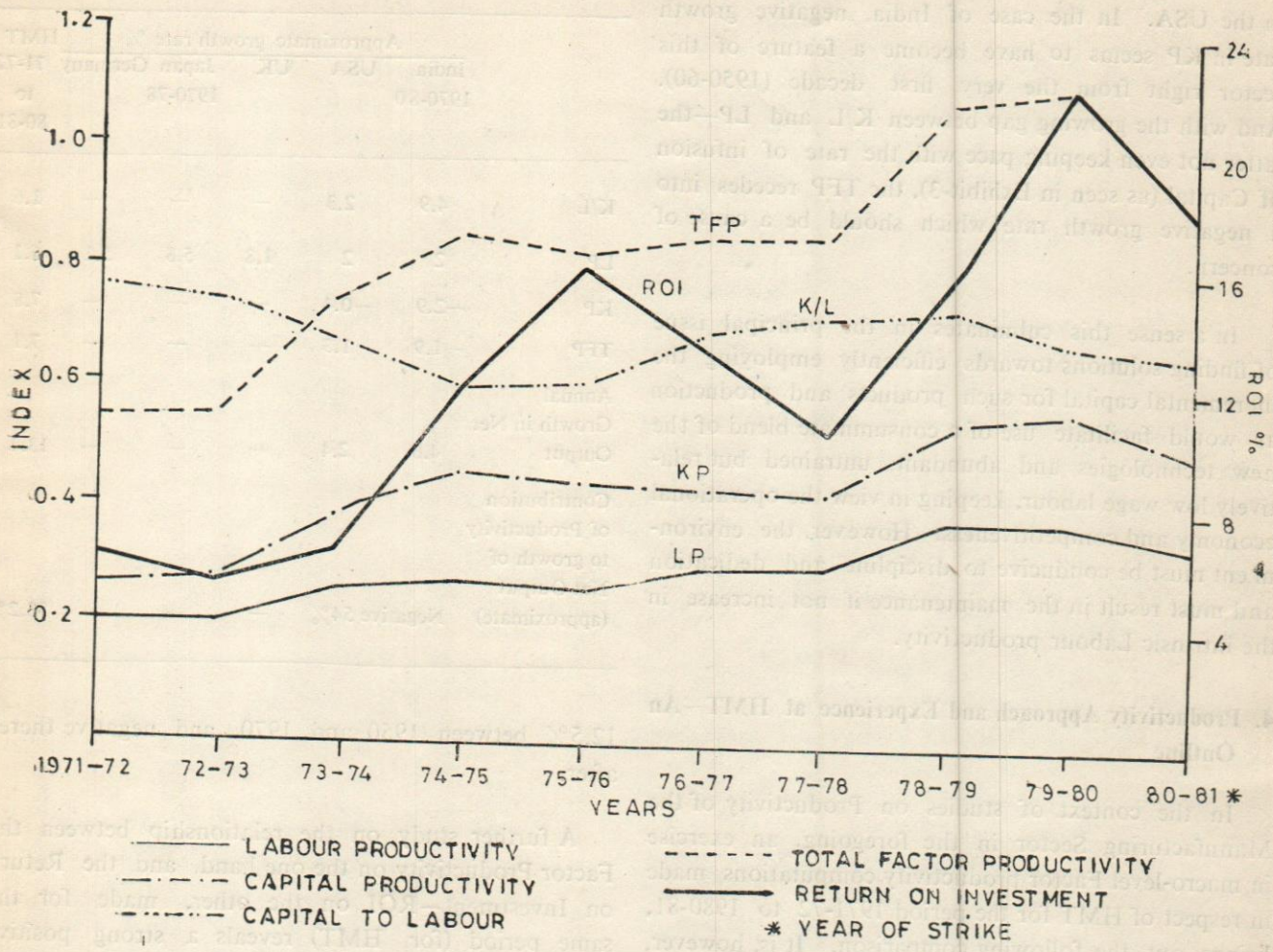
It is found in case of HMT that, despite a negative growth rate in K/L, a fairly good growth in Factor Productivity of both 'Labour' i.e., employee, and 'Capital' employed, has been sustained. According to the system of measuring the 'Contribution of Productivity to the growth in Net Output' with the TFP approach, elucidated in Prof. P.R. Brahmananda's publication, Productivity has contributed to growth in Net Output (in real terms) to the extent of about 53%. This stands in good comparison with the figures in USA, Japan and West Germany where it is reported to be over 50% and with UK where it is over 40%. The figure for India is approximately 12.5% between 1950 and 1970, and negative thereafter.

A further study on the relationship between the Factor Productivity on the one hand, and the Return on Investment—ROI on the other, made for the same period (for HMT) reveals a strong positive correlation between them—see the graphic representation in Exhibit-5. The trends in HMT's setting also, suggest that Capital injection, and its relation to the number of personnel employed, should continue to be oriented towards obtaining optimal capital as well as Labour Productivity with Technology as the focal point.

5. Productivity Improvement Techniques

Experience has shown that a wide spectrum of productivity improvement techniques pertaining to controllable resources can be employed, covering the traditional Industrial Engineering, Marketing, R & D, Behavioural Science, Organisation and Systems disciplines. They relate largely to environment—both internal and external to the organisation, and Technology. A model involving issues relating to LP, KP,

Exhibit 5



ROI AND FACTOR PRODUCTIVITY TRENDS FOR HMT

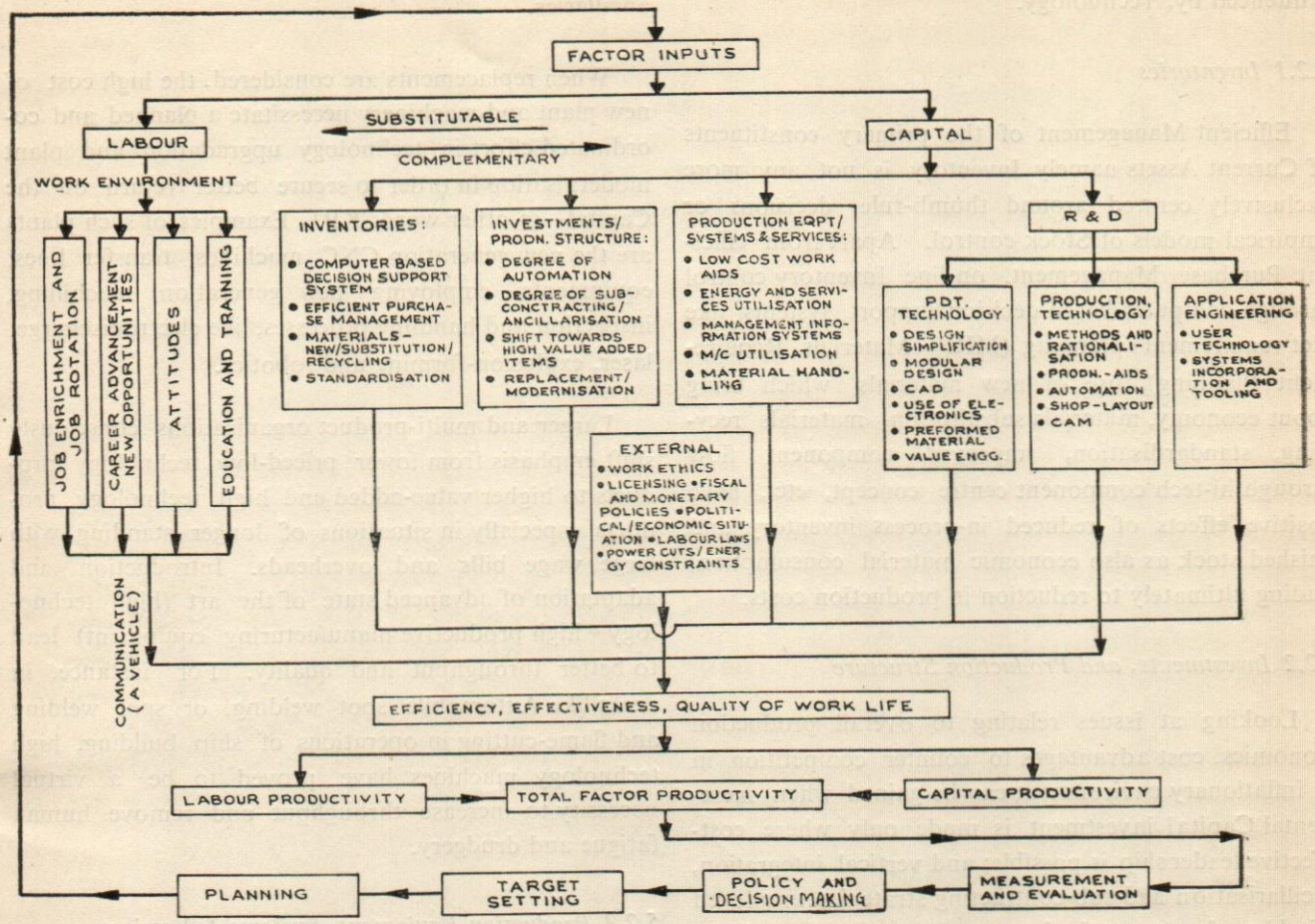
and TFP, is presented in Exhibit-6, in the framework of technological implications.

5.1 Labour Productivity

Basically, employee productivity better known in economic parlance as Labour Productivity can be raised through improvements in Efficiency, Effectiveness and Quality of Work-life of the employees, given an environment of discipline, dedication and good Work ethics without detraction from extraneous factors.

Sophistication in technology involving factory automation need not be construed as a threat to labour morale and productivity. A section of any surplus labour resulting therefrom, can be retrained to provide the necessary technical back-up services for the production systems. This throws open new opportunities like job enrichment, job rotation and career advancement for the employees, improving thereby the Quality of Work-life. Yet others can be deployed to new projects/expansions or diversification which is essential for the health of an Enterprise, to finance which the surpluses yielded by productivity growth would be available. Another feature which cannot go unnoticed is that infusion of new and advanced technologies will also serve to utilise disabled personnel to effectively participate in the Industrial production process, contributing to productivity.

Exhibit 6



PRODUCTIVITY MODEL – A TECHNOLOGICAL PERSPECTIVE

An example to be cited is the induction of a conventional Lathe operator into CNC machines exposing him to technical advancement with interesting challenges. Such technological enrichment promotes effectiveness through establishment of clear objectives; better communication on targets, performance—actuals with variances, and cause—effect data. These upgradations presuppose imparting the required education and training/retraining to employees.

External factors like Labour laws, Wage policies etc., also influence Labour Productivity. When limited or full automation becomes inevitable, policy makers have to take an objective look at the contribution of Technology to LP and improvement of employees status. Pragmatic policies with respect to Technology—Labour mix, are imperative for the economic sustenance and growth of the enterprise in a competitive environment. Government's favourable policies on import of super computers, high technology capital equipments and technology importation etc., will have a positive impact on Labour Output and yield better returns in the long run.

5.2 Capital Productivity

Declining profits, longer project gestations, increasing Capital—Output ratio trends, poor competitiveness and cost disadvantages, which afflict many segments of the Indian Corporate Sector, are symptoms of poor KP. Principal determinants of KP namely Current Assets management, Investments and Production Structure, Production Equipment, Systems

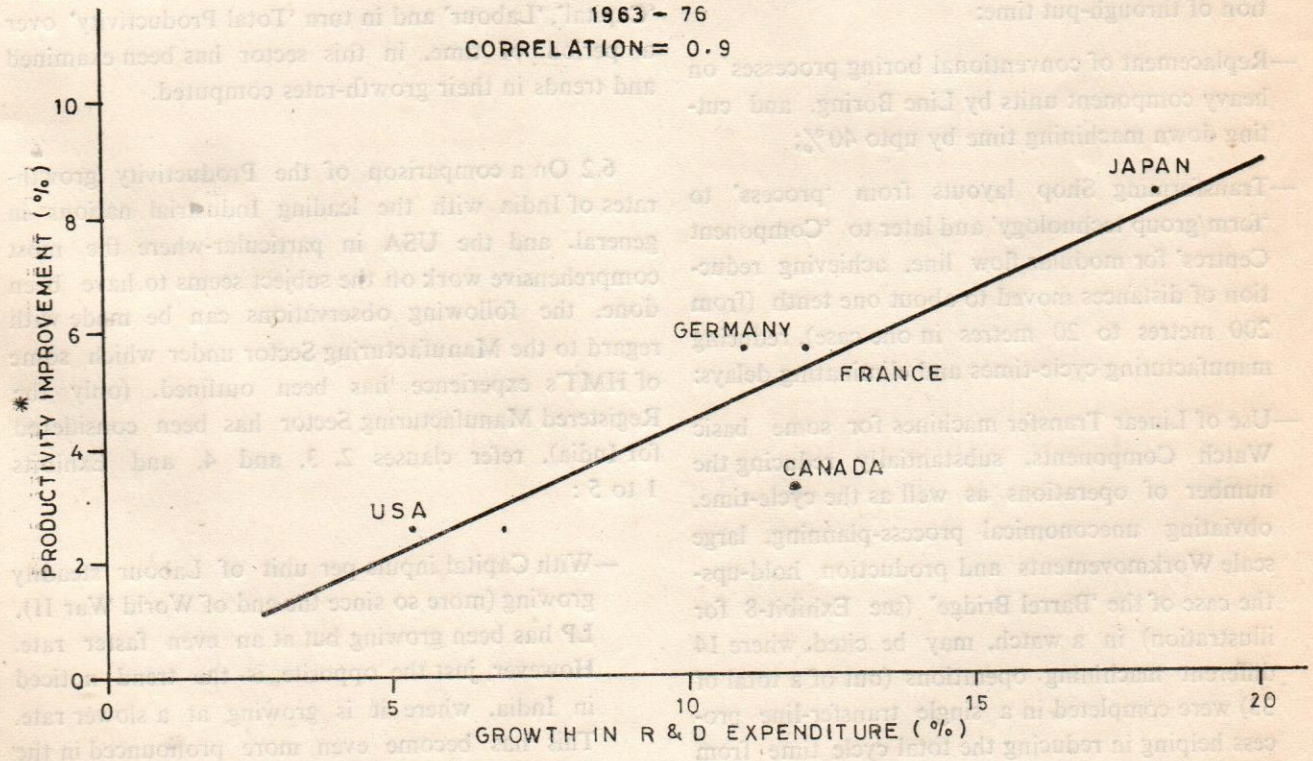
5.2.4 R & D Product and Production Technology

In a world of rapid developments and innovations, characterised by short product and technology life cycles, there is a premium on R & D to maintain the health of Industry. This is also evident from the high positive correlation between the growth in R & D expenditure and productivity improvements as experienced in countries like USA, Germany, France and Japan—see Exhibit-7. Thus productivity can be substantially improved by adequate thrust on R & D which includes the following:—

5.2.4.1 Product Technology

Innovations in existing products and development of new products/product technologies, facilitate cost reduction and quality improvement and are instrumental in exploiting existing market potential as well as entering new markets without the negative effect of sunk-costs on capital items on machinery. Design simplification, Modular Design concepts, Computer Aided Design, use of Performed materials/components, Value Engineering, are some of the proven techniques which contribute towards optimising product features, while simultaneously lowering product costs. The transformation of the Mechanical movement Watch with about 200 components into the Quartz Electronic Watch with only a fraction of the components in number, is a typical product example where not only multiple functions are available to the user, but also at considerably reduced costs. Integrated Circuits, solid state Electronics, also have not only revolutionised the scale of economies in production, but also found tremendous adaptability and application for catering to an ever widening spectrum of consumer and industrial goods production—the Two-in-ones and Three-in-ones phenomena can be cited here.

Exhibit 7



*Output per Man hour in Manufacturing

R & D IMPROVES PRODUCTIVITY

5.2.4.2. *Production Technology*

Like Product technology innovations, the R & D advances in production technology also significantly contribute to KP. Examples of new Production technologies developed are :

— Innovations in Methods and Production-aids as mentioned earlier under 'Production Equipment, Systems and Services' including CNC machining;

— Rationalisation of process and tooling;

— Use of Computer-aided-manufacturing (CAM) systems in appropriate situations; and

—Improving Shop lay outs and Materials handling.

Some of the achievements in this direction are cited below :

—Replacement of laborious 'planning' processes by 'profile-milling' as in the case of Bedways of machine tools and achieving about 80% reduction of through-put time;

—Replacement of conventional boring processes on heavy component units by Line Boring, and cutting down machining time by upto 40%;

—Transforming Shop layouts from 'process' to 'form/group technology' and later to 'Component Centres' for modular flow line, achieving reduction of distances moved to about one tenth (from 200 metres to 20 metres in one case), reducing manufacturing cycle-times and eliminating delays:

—Use of Linear Transfer machines for some basic Watch Components, substantially reducing the number of operations as well as the cycle-time, obviating uneconomical process-planning, large scale Workmovements and production hold-ups- the case of the 'Barrel Bridge' (see Exhibit-8 for illustration) in a watch, may be cited, where 14 different machining operations (out of a total of 33) were completed in a single transfer-line process helping in reducing the total cycle time from 13.8 minutes to 3.8 minutes, and improving-Quality, Interchangeability, and eventual Assem bly adjustments.

5.2.4.3. *Application Engineering*

Maximisation of customer satisfaction through 'Systems selling' is a new dimension to Productivity. In the Industrial marketing field, this will include the supply of custom-made Tooled-up machines instead of selling basic machines. Research in this area, i.e., Application engineering commonly known as User-technology, has assumed special significance branching out from Product R & D in machine tool-technology, R & D in Application engineering facilitates attainment of optimal productivity and dedication to specific types of components' production process.

6. Summary and Conclusion

6.1 Managers have come to recognise the increasing importance of Productivity, wherein answers to a number of their problems could be found. In the context of the growth in national economy, there is a large dependence on the Manufacturing Sector for achievement of its own growth targets. The behaviour of 'Capital', 'Labour' and in turn 'Total Productivity' over a period of time, in this sector has been examined and trends in their growth-rates computed.

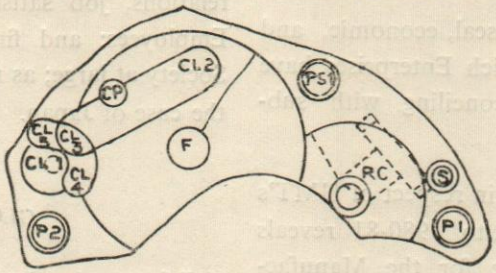
6.2 On a comparison of the Productivity growth-rates of India with the leading Industrial nations in general, and the USA in particular-where the most comprehensive work on the subject seems to have been done, the following observations can be made with regard to the Manufacturing Sector under which some of HMT's experience has been outlined, (only the Registered Manufacturing Sector has been considered for India), refer clauses 2, 3, and 4, and Exhibits 1 to 5 :

—With Capital inputs per unit of Labour steadily growing (more so since the end of World War II), LP has been growing but at an even faster rate. However, just the opposite is the trend noticed in India, where it is growing at a slower rate. This has become even more pronounced in the last decade (1970-80).

—KP in India has been negative throughout the last three decades. In USA too, it has dropped but

Exhibit 8

SL No	EXISTING METHOD	○	⇨	□	▽	▽	□	⇦	○	PROPOSED METHOD	SL No
1	COUNTER BORING FOR CLICK SCREW 'CL 1' ON FRONT TURNING LATHE									RECESSING, CHAMFERING AND DEBURRING ON LINEAR TRANSFER MACHINE	1
2	COUNTER BORING FOR RATCHET WHEEL 'F' ON FRONT TURNING LATHE										
3	RECESSING FOR CROWN WHEEL 'RC' ON FRONT TURNING LATHE										
4	STAGE INSPECTION										
5	MILLING RADIAL SLOT FOR CLICK CL 4 – CL 5' ON VERTICAL MILLING M/C										
6	PASSAGE MILLING FOR CLICK SPRING 'CL 2 – CL 3' ON VERTICAL MILLING M/C										
7	REAMING FOR CLICK SPRING RELIEF 'CP' ON BENCH DRILLING M/C										
8	MILLING RELIEF FOR WINDING PINION ON HORIZONTAL MILLING M/C										
9	COUNTER BORING FOR SCREW HOLES 'P1 – P2 BENCH DRILLING M/C										
10	COUNTER BORING FOR SCREW HOLE 'PS1' ON BENCH DRILLING M/C										
11	COUNTER BORING FOR SETTING LEVER AXLE HOLE 'S' ON BENCH DRILLING M/C										
12	STAGE INSPECTION										
13	CHAMFERING SETTING LEVER AXLE HOLE 'S' MANUAL OPERATION										
14	DEBURRING MANUAL OPERATION										
15	DEBURRING CONTOUR MANUAL OPERATION										
16	CHAMFERING CROWN WHEEL SCREW HOLE 'RC' & BARREL ARBOR HOLE 'F' MANUAL										
		14	14	2	1	-	-	-	1		



BENEFITS		
No. OF OPERATIONS	14	1
No. OF TRANSPORT	14	NIL
DISTANCE TRAVELLED (MTRS)	280	NIL
No. OF INSPECTIONS	2	NIL (IN-PROCESS INSPECTION)
No. OF STORAGE	1	NIL (THE STRIP ADVANCES FOR FURTHER OPERATIONS ON THE NEXT LTM)
No. OF OPERATORS	15	2
PROCESS LOSS %	10	5

THE TOTAL MACHINING CYCLE TIME GETS REDUCED FROM 13.8 MINUTES TO 3.8 MINUTES

COMPARISON OF EXISTING VII NEW METHOD
FOR BARREL BRIDGE UPPERSIDE MACHINING

the negative growth rate phenomenon is seen only during 1970-78.

—The TFP growth rate has also slowed down in USA and India, culminating in a negative rate in the latter during the last decade 1970-80

Whereas the decline in growth rate in the industrialised countries is largely due to the economic squeeze on account of the Oil crisis, the sagging productivity situation in India, according to Analysts, may be attributed to :

—Choice of product patterns and technologies which has not enabled optimal utilisation of Labour, and economy in the scarce Capital resources;

—Increasing costs of Capital equipment/modernisation, and spiralling costs of materials and other Inputs;

—Oft appearing infructuous costs due to chronic failures of supplies like power, fuels, services; Captive Power generation is cited as an example;

—Inadequacies in planning and execution in general, and in employment of suitable Productivity techniques at Operational levels in particular —and cost overruns;

—Certain industrial, political, fiscal, economic, and environmental factors, on which Enterprises have no control, leading to reconciling with sub-optimal situations.

6.3 Factor productivity studies in respect of HMT's performance for the period 1971-72 to 1980-81 reveals comparable growth rates with those for the Manufacturing Sector in UK, USA, Japan and Germany. The same is the case with the contribution of productivity growth in Net Output. It is also found that a strong positive correlation exists between Factor Productivity and ROI indicating that management attention should continue orientation towards optimal capital and Labour Productivity achievements with Technology as the focal point.

6.4 Productivity improvements just do not happen. Dedicated Managers and workers make it happen with clear objectives, Approaches and Communication. With a judicious mix of 'Labour' and 'Capital' and the employment of suitable techniques—a wide range of which is available, results can be achieved.

Resource utilisation—increase through efficiency, being the hallmark of productivity, it is considered important for an Organisation to draw up Productivity Programmes as an adjunct to its Corporate Plans of Budgets. These should be supported by detailed micro-level action plans in specific directions to ensure target achievements. Wage levels should have their linkage with Productivity in addition to the nature of jobs skills involved. Technological improvements should aim at Quality of work environment and Productivity in a Win-Win game by Management and Unions. As mechanisation, mass production, automation and other technological advances, require heavy Capital outlays, stress is generated on amortization, capital, time, people and facilities. When these costs rise, money becomes tight and R & D on Technology emerges as the solution towards raising the otherwise saturating KP and LP.

Success in Productivity efforts ultimately reward the Investors, the Employees and the Society at large, by way of better returns to Investors; a better pay package, career opportunities, harmonious industrial relations, job satisfaction and rich quality of life to Employees: and finally, a better standard of living to Society at large; as realised in countries abroad, like in the case of Japan.

GLOSSARY OF TERMS

(All figures taken for computation are in real terms)

Productivity	Ratio of 'Net Output'[1] (of goods and services produced) to 'Input' (of resources used in the process of production)
Labour Productivity (LP)	Ratio of 'Net Output' to 'number of employees'* (L)
Capital (K)	Net Capital Stock or the aggregate of values of investment made each year (that are available for ready employ-

*Employee hour in the case of USA and countries other than India.

	ment in production) after making adjustments for depreciation.
	—correspondingly in case of HMT it is the average Capital employed i.e., Net Fixed Assets + Net Working capital.
Capital Productivity (KP)	Ratio of 'Net Output' to 'Capital'
Factor Productivity	A general term for Labour-and Capital-Productivity, Labour and Capital being factor inputs in Manufacturing Sector.
Total Factor Productivity (TFP)	Ratio of 'Net Output' to 'Weighted inputs of Land, Labour and Capital combined' or 'Net Output' to 'Total Factor Quantity' (TFQ)[2]

(1) 'Net Output or 'Net Value Added' is Gross Value Added less depreciation; for the 'Economy' it is the sum of the Net Value Added in the different sectors (Net Domestic Products). Gross Value Added is output value less purchased Inputs such as materials, energy and fuel, components and contract services—for the 'Economy', it is the sum of the Gross Value Added in the different sectors (Gross Domestic Product).

(2) TFQ is the sum of the appropriately weighted Inputs, and can be represented as $TFQ = W_1X_1 + W_2X_2 + W_3X_3$ where the Xs are the index numbers of the factor quantities of the Inputs (Land, Labour and Capital) and Ws are the relative distribution shares of the factor rewards i.e., rents, wages and profit respectively in the base year. The factor 'Land' does not arise in the case of the Manufacturing Sector.

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Productivity in Indian Industry

P.C. LUTHAR

A culture of commitment to productivity through excellence in organisational performance is necessary not only to thrive but even to survive. This is priority number one for the larger, enlightened and long term interest of the society. Therefore, all other concerns must be subordinated to it, says the author.

P.C. Luthar is Chairman, State Trading Corporation.

The Perspective

Acceleration of communication and transport has shrunk distances and compressed time. This has led to rapid movement of men and materials across the boundaries of countries and continents. So much so that the very concept of nation-states is being questioned and, in any case, being diluted. One inevitable consequence of this phenomenon is the widening of options of customers and a trend towards the evolution of perfect markets as distinct from sheltered markets. This implies intensification of competition and brutalisation of the law of the survival of the fittest. One might aptly describe the situation as a kind of industrial olympics in which the strong shall win laurels and the weak fall by the way side to perish unsung and unlamented. This is the sense in which I have used the term brutalisation.

Competition is no longer confined to, or dominated by, price. The customer is not content any more with products that barely make do. He has means to pay more for quality. He also has access to a wide range of choices which are often global. Therefore, markets which are aggregates of customers have become more discriminating in respect of quality. Hence the prevalent preference for brand names which carry an assurance of high reliability. A person no longer wants a camera; he wants a Canon or Nikon or Kodak. He does not want a watch, he wants a Seiko or Omega or HMT.

The trend towards a perfect market is, at times, thwarted by protectionist barriers—tariff as well as non-tariff. But such barriers always attract pressures calculated to depress or demolish them. Witness for instance the wrangles at international forums, such as the General Agreement on Trade and Tariff (GATT). Our own protests against fixation of quotas for import of our textiles by various countries are another example. If we want others to let us have free and thorough entry into their markets, the others will naturally demand reciprocal charter of free entry of their products into our markets.

Then again a sheltered market militates against the interest of the consumer. This is so because the limitation of competition weakens the need and hence the incentive for improvement in both quality and price. This generates consumer pressures in favour of exposed markets.

Of course, in specific cases of nascent industries a temporary shelter against the chill winds of competition may be justifiable. But if these shelters are allowed to become permanent they stifle natural development. An incubator is necessary for a premature baby. But imagine the consequence of sealing the baby permanently in the incubator. This is precisely what happens to a cocooned industry.

It follows from the above discussion that the sum total of relevant factors make for compulsive progression towards free competition. This is the reality which industry in India has to realise for the sake of its own long term survival.

Comparative Productivity Trend in India

Against the back drop of this perspective let us examine our productivity trend. Here is a table which gives the comparative growth rates in labour productivity and Capital productivity of Indian and four other Asian countries which are often referred to as mini-Japans. The source of the information is Asian Productivity Council.

The time periods are different but it is obvious that our performance stands out in dismal contrast

Growth Rates of Productivity in Manufacturing Sector

(% increase per annum)

Country	Period	Growth Rates in	
		Labour Productivity	Capital Productivity
1. India	1. 1951-52 to 1975-76	1.44	—2.00
	2. 1960-61 to 1975-76	0.89	—0.30
2. Taiwan	1967 to 1977	10.52	9.51
3. Korea	1960 to 1977	11.20	N.A.
4. Philippines	1956-57 to 1973-74	3.6	N.A.
5. Singapore	1970 to 1977	3.6	N.A.

with our competitors in Asia. Thus, while Taiwan and Korea achieve annual growth rates of more than 10% in labour productivity our achievement in this field is limited to 1.4% and in more recent times to only 0.9%. As for capital productivity, while Taiwan during the decade 1967-77 has shown a growth rate of 9.5% per annum, our growth rate during the period 1951-52 to 1975-76 has been negative at minus 2% and during the more recent period 1960-61 to 1975-76 it has been minus 0.3%.

Our poor performance on the productivity front is further highlighted by the following facts :

* Fixed capital invested in industry and power sector in terms of constant 1963-64 prices increased from Rs. 3161 crores in 1963-64 to Rs. 14,319 crores in 1978-79—an increase of 353%. The increase in value-addition brought about by these sectors during the same period was only 142%. This implies a sharp decline in the productivity of fixed assets.

* Using the "per worker" concept, the fixed capital per worker increased by nearly 163% over the period 1963-64 to 1978-79 whereas the value-added per worker during the same period increased by only 41%.

There can be no more telling proof of the sharp decline in the productivity of investment in our industry. This is also reflected in progressive increase in Capital-output ratio. Our Incremental Capital-Output Ratio (ICOR) in 1982 was nearly 5 compared with 2.0 of South Korea. In other words the productivity of our new investment is only 40% of South Korea's.

We have to take note of these disturbing indicators which cry out for resolute corrective action.

Organisational Productivity—the sole answer to the challenge of competition

Organisational productivity is the only answer to the challenges of fierce competition. This calls for a climate of commitment to excellence and internalisation of the creed of productivity through out the organisation. The integrated approach suggested here is different from the unbiquitous pre-occupation with the fragments of the system. We talk about the productivity of labour, the productivity of capital and that of other individual factors of production. But we seldom talk about the productivity of the system as a whole which, calls for an attitudinal transformation. It is this fragmented approach which is largely responsible for the failure of the so-called productivity drives. We need a productivity movement and not knee jerk drives.

The primary responsibility for bringing about the attitudinal change of fanatic commitment to excellence lies with the management. They have not only to practice the cult but also be seen to practice it. They should transmit the message of productivity with the language of behaviours. Then, and then alone, can the cult permeate the organisation.

Let us now consider the factors of productivity which are of special relevance to our specific situation.

Management of Constraints

Circumstances can never be perfect because, among other things, the definition of perfection varies from person to person. It follows that anybody who makes his performance conditional to perfection of environment or absence of constraints is doomed to failure.

In any case, if circumstances were perfect, no management would be needed. Yet, all too often, deviations from an ideal configuration of circumstances are trotted out as explanations for failure and what is worse, explanations are elevated to the status of justification. This is perversion of the raison d'etre of management, which is, to produce results and not alibis, excuses and explanations.

The constructive response to constraints is to treat them as challenges to be met by adaptation and innovation. An apt formula for dealing with constraints is :

Prevent

Surmount

Skirt

If we have to go from Point A to Point B, let us study the map to chalk out a route which is as free of obstructions as possible. In other words, *Prevent* what you can through judicious planning.

But, then, there may be some unavoidable obstructions like, say, a hill. Climb it. In other words, *Surmount* the obstacle.

May be, the hill is too steep to climb. Go round it. In other words, *Skirt* the obstacle.

Productivity Has Both Penalities and Rewards

Making in this imperfect universe is altogether good or altogether bad. Productivity, too, evokes certain penalities. The most vexatious penality is the apprehension of shrinkage of employment consequent upon increase in productivity. Whereas this apprehension may be valid at micro level in certain situations it is totally invalid at the macro level. There is no dearth of examples which support this proposition. Experiences of Japan and of mini-Japan of South Korea fully corroborate it. Nearer home we have the examples of large scale tractorisation

and mechanisation of agriculture in Punjab and Haryana which have led to significant increase in employment rather than unemployment which was forecast so vociferously by the antagonists of mechanisation. It stands established that increased productivity and generation of investible surplus create more employment because of

(a) rise in the demand of goods and services; and

(b) spawning of new and diverse ventures.

With reference to (a)

> I recall Keynes's tongue-in-check advice to let the workers dig holes into the ground and pay them a wage for it, i.e., to make the workers produce things that do not directly contribute to well-being but indirectly, when newly created incomes are spent on non-holes.

What occurs at micro level in most cases is displacement rather than absolute redundancy. The displaced persons can be re-deployed through training in new skills. I know of numerous instances in which this has actually happened. To quote one example, the Indian Railways converted steam locomotive drivers into drivers of electric and diesel locomotives when they become surplus with the introduction of diesel and electric traction as a part of their modernisation programme. They even converted boiler makers into skilled electricians through conversion training.

Resistance to mechanisation is reminiscent of the story of Jim and Joe watching a mechanical shovel digging tons of earth in each bite. Jim rued to Joe that, but for this monster, hundreds of people could get jobs on earth digging. Joe, who happened to be more enlightend, responded that many more thousands could get jobs if only the use of hand shovels too were banned and digging were permitted only by clawing with hands and finger nails. Where do you draw the line ?

In any case even if upgradation of technology and optimisation of production techniques cause certain local pockets of redundancy we have to accept this price in the larger and long-term interest of the community. Failure to do so is fraught with decay and ultimate extinction of inefficient laggards in the race of competition. Right decisions have to be taken on balance of advantage. If avoidance of pain were accepted as the sole social objective, the bearing of children would have to be banned because it involves labour pains.

An associated phenomenon is the overmanning resulting from disproportionate emphasis on provision of jobs by the industries. Redundancy of manpower demoralises the work-force and erodes work ethic. Further, the idle energy of people tends to seek dissipation through agitations. The net result is the undermining of productivity. The answer lies in treating the industries as instruments of employment generation rather than agencies of employment.

Security

Whereas it is true that absence of security generates tension and worries which have adverse effect on performance, it is equally true that the other extreme of unconditional security breeds absolute irresponsibility. Cultists of security appear to be guided by the dictum "if security is good, more of it is better". This is a common pit fall of all fanatics. As in everything else virtue lies between extremes. Some inkage between security and productivity or a system of accountability, is essential not only for survival and growth of the organisation but also for the growth of individual. Accountability can be either self imposed or externally imposed. The former is, of course, much the better. This is the type displayed by the Japanese. And this is the reason why the system of life-long security prevalent in Japanese industry works satisfactorily there. Nobody abuses it. Unfortunately, that kind of self-discipline does not exist in our environment. Therefore, the oft-quoted Japanese example is not applicable to us. In our environment we need to link security with performance.

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The Work Ethos in Maruti Udyog

V. KRISHNAMURTHY

This paper focusses on the influence of organisational climate and work culture, on productivity. The author draws from his experience of the Japanese management.

V. Krishnamurthy former Chairman, Maruti Udyog Ltd. and Presently Chairman, SAIL.

Introduction

India has developed the capability to manufacture a wide variety of goods and to provide a range of services. This capability was developed by India over the last three decades as part of its programme for becoming 'self-reliant'. Despite this, one question is being asked more and more often nowadays—has India realised its full potential ?

Assessment made in the early fifties went to show that India had a vast potential for evolving from a state of economic backwardness to a modern nation, provided concerted and coordinated efforts were made in that direction. India has a vast land mass, endowed reasonably well with natural resources. It has a sizeable population, with the third largest body of scientific and technical manpower in the world. Thus all the ingredients necessary to make a nation great, are present. Are we on the road towards making India great? Do we utilise our resources effectively and get optimum results ?

The Importance of Productivity

Productivity is a major source of economic growth and the major source of growth in developing countries. This is because most developing nations, which are starved of capital, cannot afford to rely on sustained capital accumulation for economic growth.

Even the developed countries have been striving to achieve as much of economic growth as possible, through productivity growth. Japan, for example, has been experiencing an annual average growth rate of 8 per cent. Of this only 4 per cent, or 50 per cent of the growth, is due to capital formation and increase in the labour force. The remaining 50 per cent of the growth has come through productivity growth.

In the Indian economy, the average growth rate between 1950-51 and 1970-71 was 3.7 per cent per annum, and the average productivity growth rate was 1.8 per cent per annum. Thus 50 per cent of the economic growth upto 1970-71, was due to productivity growth. Between 1970-71 and 1980-81, however, the productivity growth rate has been almost zero. Because of low productivity all-round, the economic progress of the country has faltered. Besides, the input costs per unit of output have been increasing in India, even after inflation is accounted for. India was a low-cost economy during the 1950's, but by the 1980's, it has become one of the highest-cost economies in the world. The resultant lack of competitiveness of Indian exports is there for all of us to see.

Capital

Achieving high productivity implies obtaining as much output as possible from a given number of units of the factors of production. If we consider the three factors of production, viz. capital, technology and manpower, we see that none of them have been utilised efficiently in India. Capital is scarce in India and should be used very sparingly. But things happen in India as though capital were not scarce. The most glaring instances of this can be seen in the poor utilisation of existing resources -- in power stations, in factories—practically in every sphere. The incremental capital-output ratio (ICOR) has increased from 2.8:1 in 1950-51 to 6.2:1 in 1980-81. This is not due to a shift towards more capital-intensive industries but due to increasingly inefficient utilisation of capital in almost each industry.

Technology

Most of our industries were launched with the help of technologies secured from different foreign countries or organisations. In most recent years the government has become more and more liberal in permitting technology imports. The technology input in Indian industries has enabled the country to produce a wide variety of goods and services. But can we claim to have used these modern technologies well ? The best utilisation of these technologies should have resulted in better quality products at reasonable costs. This has not happened in most of the sectors—whether it is in the area of agriculture, infrastructure or trade—whether the technology was bought or licensed. It did not happen even in many of the FERA companies where continued foreign equity participation should have resulted in increased productivity, more reliable products and reduced costs.

We have seen massive investments in capital and liberal access to modern technology. We also celebrated a "National Productivity Year" in 1982. In terms of organisational structure, many enterprises in India have done everything. Equipment is sound, tooling and systems have been taken care of reasonably well by industrial engineers. All these efforts have not resulted in any appreciable improvement in productivity. Well, then, where exactly is the problem ?

Manpower—The key Resource

The failure to recognise and motivate human resources has been the main cause of our failure to achieve higher levels of productivity. Today it is possible to buy technology which is best suited for business. It is also possible to design and implement good management systems and procedures. But, what is not possible to buy or transplant is the dedication and commitment of the people. The most contemporary equipment and technology may be available to business, but if the human resources are not geared to utilising them effectively, these massive investments reduce to the proverbial white elephant. According to the European Productivity Agency, productivity is "an attitude of mind—a mentality of progress—it is the faith in human progress". This notion clearly views productivity as a predominantly human phenomenon, an expression of human beliefs and efforts.

It is not only in the Indian context that human

resources are so vitally important. In their book 'In Search of Excellence', the authors Peters and Waterman Jr. regard 'Productivity through People', as one of the eight attributes characterising high achieving companies. According to the authors, "if you want productivity and the financial reward that goes with it, you must treat your workers as your most important asset". This is even more true in India, because man power is the least expensive and most abundant asset. Hence increase in manpower productivity can contribute the most to overall productivity increase.

India has one of the least expensive working forces in the world. But if its productivity is also taken into account, the labour cost per unit of output is one of the highest. Thus, where Indian-made products should have been extremely competitive in international markets, low manpower productivity has rendered them uncompetitive. This shows the urgency of the need to improve manpower productivity in India. Statistics reinforce the dismal picture in India. The growth rate of value added per worker in industry was 4.48 per cent in the First Plan Period (1951-56). It declined to 2.96 per cent in the Second Plan period, and has continued to fall to just 0.4 per cent in the mid 70's. The National Productivity Council has estimated that labour productivity in industry rose by not more than 20 per cent in the 12 years between 1964 and 1976. In the same period, the fixed capital per worker rose by as much as 198 per cent. Thus injection of huge amounts of extra capital have resulted in extremely limited output.

The causes of the malaise are hydra-headed : excess manpower in many units; lack of scientific development of manpower norms; poor work commitment; lack of discipline; higher absenteeism: inadequate linkage between productivity, wages and rewards; multiple unionism; inter union rivalry and political influence; demoralisation among managerial levels; unsatisfactory industrial relations, etc.

What has to be done in an organisation is to create a work-culture which fosters productivity and creativity—a climate in which all employees are highly motivated and have ā sense of belonging and involvement in the company's activities. After all, only if the employees are motivated, would they then strive to achieve the highest standards of performance and productivity.

The motivating work environment

There has to be a conscious effort on the part of management and workers to evolve a motivating work environment in an organisation. Examples of organisations, both Indian and international, which have succeeded in creating such a productivity-seeking culture, show that there are some basic characteristics typifying such a work environment. This is particularly reinforced when we look at the Japanese organisations, which have taken a lead over the rest of the world in the area of maximising output from employees by implementing sound human resource management practices.

There is, of course, one essential element of Japanese industrial culture which has led to Japan's sizeable lead in manpower productivity over other industrial societies. That is the traditional hardwork ethic of the typical Japanese worker. The Japanese worker is able to devote his whole energy to his work, not from expectations of reward or promotion, but because he perceives work to be a means of self-expression. He is thus able to subordinate his own interests to his orgnisation's interests. Many Japanese workers often voluntarily work long hours and even work on holidays without seeking overtime payment. Sometimes a worker puts up self-appointed targets on a notice board so that he may be censured in case of non-achievement. All this means that Japanese managers are freed of the necessity to chase their employees for performing their duties. They can thus concentrate wholly on planning. Task implementation can safely be left to the workers. It also means that workers and management are equal and enthusiastic partners in the task of building up an invigorating organisation culture.

Despite the fact that it is difficult to cultivate such a work ethic in the Indian cultural milieu, there still remains a lot to be learnt from the experiences of successful people-motivating organisations, from which

several common aspects stand out :

1. Caring for each employees
2. Team building
3. Encouraging individual's involvement in company operations
4. Information sharing

Caring for each Employee

It is obvious that employees in an organisation who feel that they are taken care of, would be motivated to perform better. In such a climate, employee turnover would be minimum and long, stable employment relationships would result. It is well known that an organisation with a stable manpower base has a competitive advantage because of the weight of accumulated experience of its technicians and managers.

This factor is given considerable importance in Japanese organisations. There, the organisation-worker relationship is considered to be analogous to the Oyabun (parent) and Kabun (child) relationship in the family. This is because the organisation is supposed to care for its employees just as, in the family, the parent is responsible for the development and well being of the children. In this regard most Japanese organisations have taken care of material benefits of employees including housing, conveyance and recreational and other facilities to ensure a happy social life. There has been a conscious attempt to bridge the physical and psychological gap between the 'bluecollar' and white-collar' employees. The gap in salaries between a typical company president and an unskilled worker just graduated from high school is only 7.5 times. Systems like common company uniform, and common lunch and recreation room for all employees, are well known. A uniform promotion policy for all employees, which is unknown in most Indian organisations, implies that each employee has the opportunity to rise to the highest levels in the organisation. This means that managers have reached their positions after rising through the ranks. These practices help to inculcate among individuals in an organisation the feeling of belonging to one family and the desire to work with others towards common goals.

In India, the importance of investing time and resources in each employee's continuous development is not appreciated. That is because there are few organisations perceiving human resource as a durable asset. There are still fewer corporations which appreciate that a single employee forms the basic building block of an organisation, and therefore no human resource development effort can fail to focus on his needs. An individual's training is seen as a one-time affair at the time of his recruitment, rather than the on-going process it should be. Whenever a new technology, production process or management input is introduced, it is necessary for workers and managers to be re-trained to enable them to master it. While on the job, continuous matching of the individual with the job is necessary, and the employee could be rotated among different jobs until the desired matching is obtained. In Japanese organisations, the immediate superior would have a role to play in this process, as he expected to counsel the individual on how to perform his task most effectively.

Team Building

Many Indian organisations, both in the private sector and public sector, link an employee's reward to his merit, with the objective of fostering individual excellence. While in most cases, this objective is met, it often leads to a zero-sum game situation, when several individuals concentrate on out-performing each other. In such a case, the overall efficiency of a task group may not be high, even though it may consist of exceptionally capable individuals. Conversely, the Japanese example has shown how a team of average workers can bring about continuous innovations and productivity increases.

The major thrust of all Japanese management innovations has been to inculcate the team spirit among employees. The rationale for this is the belief that—"the whole is greater than the sum of its individual parts". The importance given to team work is exemplified by a chart with Hitachi's personnel management, on which is written :

$$\text{Group productivity} = \text{sum of productivity of individual in the group} \times \text{Efficiency as group}$$

The team spirit is inculcated through encouragement of group activities and group working. As stated by one of the leading Japanese organisations : "The basic idea behind these group activities is to heighten the worker's dignity by encouraging them to have fine team work, give full play to their originality and accumulate expertise in their specific jobs and to establish harmony between the workers and the corporate economic goals through mutual trust and cooperation so as to permit the firm to tackle innovation and to take a lead in the world".

There is an example of how effective team building can increase productivity. In Suzuki Motor Company in Japan, I found that they do not have a separate Maintenance Department for maintaining the machines. The production people maintain the machines on holidays. I do not think that such a concept may be easily acceptable to our production engineers who have been traditionally used to the idea of another department maintaining their machines for them. We are all aware of the built-in conflict which exists in our practice of having a separate Maintenance Department. Maintenance Department is always accused by the Production Department for increased downtime of machines, while the Maintenance Department accuses the Production Department of not allowing them to maintain machines because of production commitments. If the responsibility for maintaining the machines was with the Production Department themselves as in Japan, there would be no room for such accusations or excuses and no time would be wasted.

One of the most well-known of the Japanese attempts to give their team-building exercises a practical shape, is the Quality Circle. Very simply, the Japanese have shifted the responsibility for improving productivity from an industrial engineering department to the workers at large. Within the Quality Circle, each employee is thinking about how to improve productivity, quality and team work, and to solve the problems relating to his group's work. The phenomenal success of the Quality Circle in Japan can be gauged from the example of Isuzu. Isuzu's Quality Circles total 2,000 and involve nearly all the company's 17,500 employees in Japan. In 1981 they contributed 16,800 improvements in the company, saving about $ 6 million in annual costs.

Individual's Involvement

I believe that the Quality Circle has so much potential because it creates self-awareness and self-reliance among workers and a sense of total participation in the organisation's operations. I can give an example to illustrate the importance of a sense of involvement of workers in their jobs. It concerns the Volvo experience in Sweden. About a decade ago, Volvo, Sweden's leading industrial organisation, tried an experiment in human management which was a tremendous success. The basic philosophy behind the changes introduced in the production technology and the work methods, was that the work must be adapted to the people and not the other way round. The company reverted back from mass production, automation, assembly line production, to a job shop mode of production where workers could work in groups and have a sense of achievement in completing any particular task. This new system relied on team work and permitted greater flexibility and scope for creativity and innovation. The result was that employees turnover was cut to one quarter of the previous average and absenteeism to half the previous average, recruitment of new employees became easier and product quality improved.

Numerous other examples can be cited to show how most large organisations are increasingly coming around to the realisation that productivity improvements need not stem only through technology breakthroughs or management innovations. If the creative energies of all workers and managers are tapped, the small-scale improvements suggested by these individuals would add up to substantial gains in productivity. If the intangible gains in terms of employee motivation are considered, the overall benefits would be still greater. In order to obtain the enthusiastic participation of all employees, adequate authority and freedom of work must be provided to encourage creativity and innovation by each employee. At the level of the single individual, effective job design is required to ensure that the employee is provided with a certain minimum autonomy aud incentive to design

more effective and efficient methods for performing his task. At the group level, the Quality Circle forms only one instrument for involving shopfloor workers in the operations of the Company. In addition, at informal meetings of task groups or departments, which may serve as information-sharing and planning fora where past performance is reviewed and guidelines set for future performance, all individuals may be encouraged to generate ideas.

In most Japanese organisations, the Quality Circle Scheme is dovetailed into a Suggestion Scheme. Under this scheme, financial rewards are given to employees making suggestions for increased productivity and quality, and for maintaining a safe and invigorating working environment. Apart from the productivity benefits from the suggestions, it helps to develop individual capabilities and increase morale. Employees also come to discover that the best suggestions arise from group effort, and thereby teamwork is fostered.

Information Sharing

One important factor in Indian organisations which has contributed to the gap between the workers and corporate objectives has been the lack of formal communication systems within the organisation for sharing key corporate information with workers, and particularly their elected representatives. In the present situation, relationships between employee unions and managements are clouded with suspicion and distrust.

This is in stark contrast with the union-management relations in Japan. There both parties see productivity improvements as a mutually beneficial challenge and not as a negotiating point. That is not to say that conflicts do not arise. But there is always an unwritten code that these must be settled amicably at the negotiating table rather than through disrupting the company's operations. Peter Drucker talks of a strongly pro-union Toyota worker who said to him, "Our unions fight management. But yours fight the company. How can they not know that for anything to be good for the company's employees, it has to be good for the Company".

We in India should remember that workers should be treated as partners in business rather than as adversaries. This is not an easy task. Psychological inhibitions exist with both parties. But once initial difficulties are overcome, a lot can be achieved. This reminds me of the time when I became General Manager of the BHEL plant at Trichy. At that time, production had just started and unions were fragmented. There were no means of getting hold of a representative body with whom I could interact. I myself wanted some confidence that whatever I did, the other employees would be with me. At that time everybody told me that if elections were held to find out the representative union, I would have a lot of problems. After a secret ballot, a joint committee, called the works committee, was formed. It is not the works committee you are all familiar with. We went through an election after dividing the whole plant into 12 constituencies and got 12 people elected. Then we nominated 12 people from the management, including the General Manager, and called the set of 24 people as the Works Committee. One of my colleagues prophesied that the experiment would not last for more than 6 months. That was in 1966, and 18 years have passed and that is the only consultative forum in the organisation that is working extremely well. It has been serving as a very useful instrument in bringing about better understanding between workers and management. With the help of this forum we were able to bring about a total integration of the activities of BHEL, Trichy, with the larger interests of the Trichy community. We were then able to improve the living conditions of the people in the area, through building colleges, roads, bridges, and undertaking welfare measures.

Even before BHEL's expertise in constructing power stations was fully accepted in India, we thought of exporting projects. But in my own Board, I was told that I was trying to do it ahead of time. We took all my colleagues and employees into confidence and asked them whether they would be with the management in case we went ahead with the difficult job. Everybody said that we should go ahead and that they would be with us. We tried once, but failed to get the order. Then after 6 months we bid for the construction of a power station in Malaysia. We

were accepted, and we took on the work. A turn key project in Malaysia at a time when not a single power station of ours was operating in India! And still after getting the order, the first thing we did was to communicate to each employee, what the order meant to the company, to the country, and what was expected of him. On that day, every one felt proud of doing something great for the country. The job was done well and on time, and there was no complaint on the Malaysian side. It was only a question of making everyone feel that they were doing something much more than earning their salary.

I would like to refer to another development. Encouraged by the early experience in individual units, we brought in an apex body for BHEL. I was cautioned that in a multi-unit organisation like BHEL, with different unions and political affiliations, it would be difficult to form an apex body. But we went ahead. The body was formed on the basis of secret ballot, all unions agreeing to the method of selection. It contained representatives of INTUC, AITUC, CITU and all others. And across the table they did function as an effective consultative body. My own experience was that as long as we took them into confidence and explained the philosophy behind our actions, we never faced any problem in convincing them about a need for change or for enforcing certain types of discipline in the larger interests of the Company.

From the examples I have given so far, it may appear as though manpower productivity increases in isolation from other resources. That is not true. Manpower is a unique asset in the sense that, greater productivity of other resources depends largely on greater productivity of manpower. After having grown with BHEL since its inception, when I finally took over as its Chief Executive, I had the feeling that we were not operating at full efficiency. The output was not commensurate with the vast reservoir of available resources. With marginal additional investment, we would manufacture many more products, which would enable us to diversify from existing lines of business. We found that by using both our engineering and manufacturing resources, we could not only meet the needs of the power section, which we were doing already, but also of the industrial sector. Thus the steam turbine manufacturing facility at Hyderabad was used to make high-speed turbines and centrifugal compressors. By using the Bhopal facilities for power packs, Hyderabad facilities for draw works, Trichy facilities for mast and substructure and BPCL's Allahabad works for mud-pumps, we enabled India to emerge as one of the few countries of the world producing oil-drilling rigs. As a result of these and similar steps, BHEL's turnover increased five-fold over a five-year period.

I could go on listing more such experiences, but they only reinforce my contention that the key to higher productivity lies in creating a work culture in the organisation which makes a person feel motivated, with a sense of being an equal member of a family. It is not an easy task to build up such a climate, I can only say that a genuine effort would help.

The Maruti Experiment

We are making an effort to construct such a productivity-oriented climate at Maruti. In fact, we tried to bring about this environment even before the project got under way. When we started building the plant, we had large resources available. We have 300 acres of land and 80,000 square metres of built-up area as factory shed. However, when we started designing our facilities for producing 100,000 vehicles, we did not plan on the basis of 300 acres of land and 80,000 square metres of built-up area available to us. We planned exactly according to the minimum space requirement for producing 100,000 vehicles.

This emphasis on productivity when planning, has been carried further. By carefully selecting the tools, by adopting simple but highly productive technology; more importantly, by placing greater emphasis on human resources, Maruti hopes to achieve at least 8 to 10 times higher manpower productivity than is the norm in Indian automobile companies.

Conclusion

Going beyond Quality Circles and group meetings

right down to the basics, what is the secret behind the high productivity of a successful organisation ? It is simply a way of thinking of every person in an organisation—the desire to achieve higher and higher productivity levels. How to create this attitude in our organisations ? I do not think we can arrive at any inflexible prescription. It simply has to be built up painstakingly. There is a famous story of three men who were laying bricks. Each man was separately asked what he was doing. The first man replied, "Laying some bricks". The second man replied, "I am earning my living". Finally the third man said, "I am helping to build a great cathedral". Only when each person in an organisation starts thinking like the third man, can we hope to build up a healthy productivity-oriented culture.

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Productivity a Way of Life in Hindustan Lever

P.K. CHADHA

The paper elaborates on the Management Philosophy in Hindustan Lever which has helped make Productivity become a way of life in the Concern. There have been five key areas of thrust : Commitment to Cost Effectiveness, Concern for People, Culture of Productivity, Emphasis on Innovation & Training & Development. The author elaborates on each of them.

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What is Productivity ? Is it a ratio of output to input ? Or is it providing more and more of goods and services out of less and less consumption of real resources. Well, both these definitions mean the same as long as Productivity is not seen as something relating to Production only. Productivity as a concept is universal and applicable to all disciplines, be it Purchasing, Warehousing, Manufacturing, Distribution, Selling, Planning etc—in each case the attempt being to utilise resources efficiently while maintaining the quality.

Productivity is generally associated with the working of a manufacturing or service undertaking. But this has relevance to the national plane as well. Our country suffers not so much from paucity of resources except, of course, capital, as the inability to make full and productive use of these resources. And in the case of capital too, given pragmatic policies on investment, technology modernisation, capacity utilisation with adequate emphasis on improving capital output ratios of existing units, this hurdle can be overcome. No wonder then, that the Approach Paper to the Seventh Five Year Plan has accorded the same importance to Productivity as Food and Work.

With Productivity Improvement, therefore, being of such crucial importance both on macro and micro levels, we have assembled here today to deliberate on this subject. In this context, I have been called upon

to share with you the experience of Hindustan Lever in the area of Productivity Management. I have intentionally used the word Productivity Management and not Productivity Improvement since we believe that Productivity' is not only a movement but an essential Management tool comparable with others say, Finance, Marketing etc. In my talk, I would attempt to elaborate in some detail the work culture in the Organisation which we feel is necessary for a success in this area.

The first thrust in this direction in our Company started with the setting up of an Industrial Engineering Department way back in 1951. Initially, as has happened in many other industrial establishments, Productivity improvement efforts were directed towards—

* Debottlenecking production lines and improving their utilisation and efficiency
* Reducing the losses of raw and packaging materials
* Improving layouts and methods in order to reduce the number of people employed on labour-intensive tasks
* Work measurement and drawing up of incentive schemes

As the Industrial Engineering function developed, Productivity Improvement took place through studying systems and procedures like—

* Optimising batch sizes, production planning, mechanisation and automation
* Value Analysis and Quality standards of Materials
* Handling and Storage Systems
* Maintenance and Fault Diagnosis Systems for improved machine utilisation
* Office Productivity Improvement

Productivity targets are now increasingly being used in the annual budgeting exercise as well as long term strategic planning of the Company. In the most recent phase, Productivity Management involves looking at the broad policies and strategies like review of organisation structures, site development planning, drawing up of corporate strategies, modernisation of technology, innovation in Marketing, Selling etc.

Suffice to mention that we have been very successful in our efforts to improve Productivity. If one was to analyse the reasons behind the success of our efforts, one would unhesitatingly say that the Management Philosophy, the Organisational Culture and Work Ethos in the Company have just been right for Productivity Improvement.

The Management Philosophy in Hindustan Lever has helped make Productivity become a way of life in the Concern. There have been five key areas of thrust, these being :

Commitment to Cost Effectiveness;

Concern for People;

Culture of Productivity;

Emphasis on Innovation;

Training & Development;

Each of which are elaborated here.

1. Commitment to Cost Effectiveness

Our own experience suggests that for awareness on Productivity Improvement to permeate down the line, it is important that the work ethos in the Company should be one of Cost Effectiveness of operations. And this is possible only if the Managers are totally tuned into such a programme. Productivity is not only related to labour usage. Productivity is the effective accomplishment of objectives through efficient utilisation of all resources e.g. men, material, machines, capital and technology.

In Hindustan Lever, operating Managers not only draw up a list of agreed objectives but all key tasks which have a savings element attached to them are culled and collated in a time-bound Cost Effectiveness Programme. There is a continuous monitoring of performance and periodic reviews against targets. It is appreciated by all concerned that completion of such projects would result in a net accretion to Company profitability. In this manner, it is ensured that the

objective relating to utilisation of resources is closely followed up. Managers in all Functions, be it Materials Management, Manufacturing, Distribution and Selling, are encouraged to look at all elements of cost for Productivity Improvement.

In drawing up a Cost Effectiveness or a Productivity Improvement Programme, not only are targets set but detailed plans to achieve these targets are also written down. If these detailed plans are not drawn up, Productivity Improvement targets will remain a pious hope rather than something that can be achieved in reality.

2. Concern for People

It is important to recognise that human resource is a key productive resource. Success of any programme, particularly the one relating to Productivity Improvement revolves around a concern for and welfare of the employees. It has been seen, time and again that wherever Productivity has been accepted in its narrowest form of labour cost cutting, wherever wage agreements are exploitative in nature, in the name of Productivity Improvement, the long term health of the Company is affected.

In Hindustan Lever, people are acknowledged as the life-blood of business. After all, the Company's ability to raise finance, to develop new products and to market them successfully depends on the capacity of the people who work for it and their motivation to do a good job. The Company relies on the skill and dedication of its people for the success of the business. Each of the employees, in turn, depends on the Company for the training which will enable him to have a satisfying career and an adequate remuneration. An appreciation of this interdependent relationship has helped a lot in the Company's drive for Productivity Improvement.

3. Culture of Productivity

If, in an organisation, the employees are committed to excellence, if they are conscious of costs and the environment is such that people interact positively with those above and below, it is somewhat easy to instil a culture of Productivity Excellence.

It has been our experience that bringing in productivity consciousness and productivity changes into an established Unit, requires a great deal of effort. Since the work norms and the way of looking at Productivity as a means of utilisation of resources is often new, such cultural change is difficult and requires patience and perseverance. In our older factories such as Bombay and Calcutta, it needed a great deal of selling to the workforce as well as to a large body of Managers. Productivity improvements were, therefore, slow to come in the beginning, even though the potential was there.

In our newer factories at Jammu, Haldia and Chhindwara, however, we have been able to achieve very high levels of labour, material, capital and energy productivity within a few months of commissioning the Unit. Productivity improvements have been easy to achieve in these Units, firstly because Productivity needs were kept in mind right from the beginning and the Unit was designed in a manner which permitted high productivity and, secondly, the Unit is consciously staffed initially by Managers who are committed to Productivity and can work towards bringing in pro ductivity consciousness right from the beginning. Our experience in these Units which are located in the so-called No-Industry Areas and are manned by a workforce not at all used to an industrial culture, has indeed been very good.

The role of financial incentives in achieving labour productivity improvement is controversial. Some Trade Unions see Productivity Improvement as a threat to enlargement of employment opportunities. We believe, it is important for the development of a Productivity Culture that the workers perceive that they are sharing the fruits of improved productivity. We feel that financial incentive reward should not be so excessive as to cause too much uncertainty about earnings or too little that they hardly act as a motivation in the labour productivity improvement effort. Typically, we have tried to keep incentive earnings at about 30% of wages at the best Productivity levels. It has been our experience that where labour productivity schemes seek to measure an individual's or a team's effort, it is far

more successful if we reward that effort. Group schemes like department-wise or factory-wise incentives, if they must exist, should only be superimposed upon individual or small team productivity schemes.

Whereas labour productivity norms are easy to measure and must be based on work measurement, norms relating to productivity of other resources are not always easy to specify. This, we recognise, as a challenge and parameters are being constantly evolved and refined to forecast and communicate actual performance in the utilisation of these resources.

4. Emphasis on Innovation

The potential of Productivity Improvement in an industrial establishment is linked to the technology used.

Productivity Improvement takes place through two different types of programmes :

(a) Programmes which lead to a more efficient utilisation of resources using current technology and

(b) Programmes which seek to change the technology and obtain quantum increase in productivity.

Any successful Productivity Improvement Programme requires approaches in both these areas. After a period of continuosly improving productivity norms, one hits a plateau characterised by the technology that one uses. It is a fact of industrial life that unless an industry continuously modernises its plant, equipment and processes, and modernises its Management Systems, it progressively becomes more inefficient and less productive. Technological innovations, R & D efforts, new technologies which are intrinsically highly productive can provide a quantum improvement in productivity. It is with this belief that we have embarked upon a modernisation plan in our factories, and we stress on innovation in other areas of activity like Purchasing, Warehousing, Distribution, Selling etc.

5. Training & Development

An aspect which is a cornerstone of Productivity Improvement Programme is manpower training and development. The Company places a very high priority on training as it believes that it cannot afford to stand still or to stop learning new skills. Training is given to enable the individuals to make the best possible use of his ability in the task he is assigned. Training is provided in the form of refresher courses or with the objective of individuals picking up new technology. A case study on the working of Hindustan Lever will bring out the point forcefully that it is the Company's Commitment to training and upgrading of skills at all levels that has contributed a great deal to Productivity Improvement.

In summary, a lot has been done in Hindustan Lever on Productivity Management. The Company can rightly be proud of instilling in its employees a commitment to Productivity. And this culture has not come overnight. As mentioned earlier, the productivity efforts of the 50's and 60's which were mostly directed towards an improved utilisation of workers' time on the job, minimisation of human effort for a given task, looking at work place layout, fixation of work norms etc. have given way to an entirely different approach over the last 10/15 years. The scope of Productivity Improvement has altered considerably with awareness developing on the need to have the right culture and work ethos in the Company. The Managers and supervisors relate themselves to looking at costs—analysing elemental costs, particularly non-productivity costs. To help them crystallise their thinking and increase their commitment to such tasks, programmes like Cost Effectiveness and Productivity Improvement have come into vogue. Financial ratios are constantly reviewed. Organisation structures, conducive to high Productivity have been adopted. Technology is being constantly modernised largely with the help of the Company's own well established R & D setup.

And all this is happening in the Company because there is an attitude and bent of mind which strives continuously for improvements, We sincerely believe

that Managers working in industry must acquire the ability –

(a) To create an environment committed to excellence

(b) To lead a group of men and achieve a set of objectives

(c) To interact positively with people above and below and be an effective Team Member; and

(d) To innovate.

This, in a nutshell, is Hindustan Lever's Management Philosophy for Productivity Improvement.

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Measurement of Labour Productivity —The Japanese Experience

MAKIO NAKAZAWA

In this paper, an attempt is made to discuss physical measurement of labour productivity with reference to the Japanese experiences, especially focussing on the treatment of heterogeneous outputs.

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Introduction

ILO's interest in productivity goes back many years. Probably the ILO was the first International Organisation in the world which dealt with the measurement of productivity. Shortly after World War II, at the International Conference of Labour Statisticians, which was convened by the Governing Body of the ILO, the measurement of labour productivity was discussed as one of the agenda items. Following this, the ILO published some reports on the measurement of labour productivity. "Methods of Labour Productivity Statistics" (1951) and "Measuring Labour Productivity" (1969) are examples of such reports.

The approach which the ILO took focussed not only on macro-industrial level productivity measurement, but also on micro-enterprise level approaches in terms of physical measurement. This will be touched upon in conjunction with the two cases presented later on in my speech.

As far as other International Organisations are concerned, Asian Productivity Organisation (APO) has made a great contribution to the development of productivity measurement and analysis since early 1970s. Among APO member organisations, the National Productivity Council (NPC), India, has been

one of the most active and leading national organisations in the field of productivity measurement.

The approach which the APO took focusses on a value-added approach, or, in other words, total factor productivity approach, or more attractive to you, a managerial analysis in terms of overall enterprise productivity performance.

In 1981, ESCAP organised a seminar on the Measurement of Labour Productivity in Moscow, which was to introduce some measurement practices in the ESCAP region.

Despite such activities, as far as I understand, no international Standard or Recommendation concerning the method of productivity measurement has yet been adopted. From the statistical view point, labour productivity statistics is one of the most difficult areas to be tackled so that we may reach consensus among the peoples and industries concerned.

Note : At the International Labour Conference, June 1984, revision of the Convention concerning statistics of Wages and Hours of Work, 1938 (No. 63) was discussed for the first time. According to the Proposed Conclusion with a view to the Adoption of a Recommendation, which was adopted by the Committee on Convention No. 63 (Statistics), with regard to productivity statistics, it says :

"Statistics of productivity should be progressively developed and compiled covering important branches of economic activity".

Physical Measurement and Value Measurement

Broadly speaking, productivity is a concept that expresses the relationship between the quantity of goods and services produced-outputs—and the quantity of labour, capital, land, energy, and other resources that produced it—inputs. In other words, a measure of productivity is generally defined as a ratio relating output (goods and services) to one or more of the inputs (labour, capital, land, energy, etc.) which were associated with that output.

Now, measuring productivity, we can classify the measurement according to different difinitions of outputs. One is to measure productivity quantitatively, such as by weight, number of units, size; the other is to measure productivity by values expressed in amounts of money–rupee, yen, dollar, etc. The former is called physical measurement and the latter, value measurement.

Example 1—Labour Productivity-Statistical Survey in Japan.

Ministry of Labour of Japan conducted Labour Productivity Statistical Survey since 1952 to 1983. The method of this survey is mostly based on above-mentioned ILO Report "Methods of Labour Productivity Statistics".

At the early stage of this annual survey, four industries were covered, namely : cotton spinning, ammonium sulphate, cement and iron and steel. And at the peak period of the survey twenty key industries were covered.

Some of the characteristics of this survey are as follows :

(i) Formula of Labour Productivity

In this survey, labour productivity is shown by I/O (here : "I" is input, "O" is output), man-hours per unit of output.

The main advantage of this physical measurement is that they are additive. This means that the man-hours per unit of output for each production process involved in the manufacture of the product may be added to give an overall measure of productivity, whereas ordinary, labour productivity measurement formula cannot.

(ii) Treatment of Heterogeneous Products

In case of physical measurement of productivity, output should be homogeneous, however, usually a factory produces many kinds of products, which cannot be considered as homogeneous. This causes difficulties in the physical measurement of productivity.

In this Japanese survey, the heterogeneous outputs

were treated as follows :

(i) When input data (hours worked of production workers) are obtained corresponding to each product, productivity measurement is calculated by product.

(ii) Products are classified into several groups of similar or quasi-similar products, so that in each group products can be considered as fairly homogeneous. And input data are obtained corresponding to each product group. Then productivity is calculated by group.

(iii) Products are converted into some standard product by using conversion rates. In this case, productivity is measured by this converted amount of product.

Here, the focus is on this third case of treatment of heterogeneous products, by taking the cotton spinning industry as an example.

Cotton Spinning

Generally speaking, a cotton spinning mill produces many types of yarn, from coarse to fine yarn, which cannot be treated as homogeneous. So the conversion rates are necessary to get the standardised amount of product.

In this case, yarn count 20 is used as a standard product, and the output of other counts of yarn is converted into this count of yarn (20s).

The conversion rates have been calculated by Japan Spinners' Association (private trade association), based on a detailed in-depth study on "work study" and "time study".

Formula of the conversion rates is as follows :

$$\text{Conversion rate} = A/B$$

here : "A" is standard number of workers necessary to produce each count of yarn.

"B" is standard number of workers necessary to produce standard yarn (yarn count 20).

Examples of Conversion Rates (Revised in June 1975)

Yarn Count	Cotton Yarn (Card Yarn)
8	0.746
10	0.788
12	0.830
18	0.958
20	1.000
22	1.051
24	1.102
48	1.918
50	2.003
60	2.426

Converted amount of product is obtained by multiplying the conversion rates with actual outputs of each yarn count.

Here, one has to note the fact that when MOL Japan started the survey Japan Spinners' Association already had such conversion rates for their own purposes of rationalising the industry. In the past cotton spinning was one of the most important industries in Japan, and even before World War II this industry had endeavoured to improve their productivity through various studies of management techniques. At that time they did not use the word "productivity" but the idea was the same.

Because of the historical background of this industry, MOL could start the survey without much difficulty with the conversion.

Part of the recent result of the survey is as follows :

Man-hours per ton of yarn (unit : hours)

	1975	1980	1982
Total	94.14	60.27	56.92
Direct	90.78	58.20	55.04
Opening-Carding	15.04	9.44	9.52
Combing, Drawing, Roving	22.37	14.41	13.49
Spinning	53.37	34.35	32.04
Indirect	3.35	2.07	1.88

Example 2—Human Resources Management in Hospitals

It is often difficult to define and quantify the outputs of service institutions, since they usually do not produce clearly specified physical products.

What is the output of hospitals ? Number of deaths ? Number of cured ? Number of patients treated ?

In this paper I would like to show you a kind of rough measurement of labour productivity from a paper written by Prof. Ichijo, one of the authorities in the field of hospital administration in Japan.

He says, for the purpose of human resources management in hospitals, amount of work done should be considered. And number of patients treated can be considered as an indicator of the amount of work done.

In Japan, most of the hospitals treat not only inpatients but also outpatients. Of course, in terms of work-load, these two types of patients cannot be treated as homogeneous.

Prof. Ichijo says, "I use the ratio, one to three. That means one inpatient-day equals three outpatients".

The reason for this ratio is that the ratio of average medical treatment cost of inpatient-day to that of outpatient is roughly one to three, and this average medical treatment cost roughly reflects the work-load of these two types of patients.

Based on this ratio, which is a kind of conversion rate, the number of workers per patient treated per day may be calculated.

(Number of patients treated per day)
=(Average Number of inpatients per day)
+(Average Number of outpatients÷3)

This converted number of patients treated per day is an indicator of the output of hospitals.

Therefore, the number of workers divided by this output indicator can be considered as a king of productivity measurement.

Prof. Ichijo's idea is that for the purpose of human resources management (including, doctors and nurses), the above-mentioned productivity measurement is much better than other indicators such as number of workers per bed, or number of workers per institution. He also stresses that this productivity indicator should be used together with other indicators and observations which are useful for human resources management in hospitals.

Note : In the productivity measurement of Federal Government Agencies, by Bureau of Labour Statistics, US Department of Labour, a similar "weighted" number of patients are used as an output indicator for medical services.

Conclusion

The physical measurement of productivity has merit for improvement of workshop level enterprise performance. However, many experiences in a wide range of countries discourage this approach due to the difficulties of heterogeneous products and their measurement and conversion into standardised product units. We dared to tackle this difficulty in Japan in association with the management of trade, as was demonstrated by the cotton spinning case.

This has also been tackled by experts in the United States as in the case of hospital productivity measurement. Of course, one of the main schools of productivity measurement in the United States works along these lines.

While total factor productivity addresses itself directly to the people at managerial level, it is doubtful whether it appeals to the workers who are one of the main driving forces behind real productivity enhancement.

Therefore, the physical measurement due to its simplicity is more suitable to make the worker aware of the ideas behind productivity and how it relates to the day to day work situation.

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Impact of Environment and Technology on Productivity —The RCF Case

DULEEP SINGH

Modern technology and its subsequent advanced versions are essential for progress of the nation. Organisations must adopt them for higher productivity so as to pass on the benefits of the same to the nation and society, says the author.

Duleep Singh is Chairman and Managing Director of Rashtriya Chemicals and Fertilisers Ltd., Bombay.

Introduction

Productivity has come to mean growth, expansion, economic progress, general progress, general welfare and profitability all at once. The relatively higher standard of living of U.S.A. and other developed countries is the direct fruit of higher productivity in all fields. The factors affecting productivity are so interlinked that it is difficult to analyse whether increased productivity is due to organisational changes, technological advancement or better skill and effort of workmen. For example, Goodman in "Man and Automation" cites the use of tape to operate machine tool which manufactures an aircraft spare : "The time taken by conventional method was ten hours. By the computer method, ninety two minutes and actual tape-controlled machining time was fourteen minutes." On the other hand, in a department store, the degree of technology would have relatively little effect on productivity. There is no doubt that the right selection of technology, administrative and technical personnel and planned scheduling of all activities have substantial contribution to higher productivity.

Impact Upon Productivity With Technology Change

We, at RCF, have six generations of technology and the impact of changes in technology is very clearly visible. The first phase of project, known as Trombay-1, started in 1961 and commissioned in 1965.

This consists of Ammonia plant based on partial oxidation process developed by Shell with a capacity of 350T/day of Ammonia. The raw material is naphtha, refinery gas and now associated gas. The Trombay-V Ammonia Plant commissioned in 1982 is of 900T/day capacity and uses associated gas/Bombay High gas as feed stock and is based on reformer technology. The energy requirement for Trombay-I ammonia production for 1 ton of Ammonia is 8.90 Kcal whereas for Trombay-V ammonia it is 8.34 Kcal. The manpower for Trombay-I ammonia (production) department is 135 operators as against 54 operators for Trombay-V ammonia. Thus, the output per man for Trombay-I is 2.35 tons and for Trombay-V 15.10 tons. The super fertilizer project at Thal is sixth generation and is being commissioned for commercial production. The Ammonia plant capacity is 1350T/day using reformer technology and Bombay High gas as raw material. The designed energy requirement is 8.26 Kcal/ton and the manpower (production) in 68 operators. The output per man is thus 17.95 tons.

It will be interesting to see similar comparison of Urea plants :

	Trombay-I	Trombay-V	Thal (Designed)
Capacity	300T/day	1000T/day	3×1350T/day
Manpower (Prod.)	58	30	78
Output T/man	4.68	30.14	52.16
Specific Consumption			
Ammonia (Kg/T)	620	580	575
Co_2 (Kg/T)	800	760	750
Power (Kwh)	229	80	53
Water (M^3)	196	115	3
Steam (Kg)	2467	1450	1050

The significant factors for higher productivity in these cases can be identified as, but not limited to :

(i) Better process technology-single stream high capacity plants.

(ii) Better design tending towards more automation, better reliability of machinery and more instrumentation and monitoring.

(iii) Better management of plants, maintenance planning and control techniques such as use of net work techniques etc. by plant, higher management.

(iv) Computerised process control in our Thal factory plants for smoother and consistent operation with lesser manpower.

(v) Use of superior and more effective training techniques involving computerised process simulators facility available in Bombay.

(vi) High motivation of employees with feeling of satisfaction of contributing towards national development, company growth and productivity and better awareness of individual growth.

Trombay-I "Suphala" plant produces NPK 15 : 15 : 15 by 'phosphonitric' process and of capacity 1000T/day. As the plant could not be stabilized at this rate in 1965, the process had to be changed to 'phosphonitric' type from originally designed 'carbonitric' and 'sulphonitric' process. The Trombay-IV Ammonium Nitrate Phosphate plant of 1200 T/day capacity was commissioned in 1978 and produces prilled nitrophosphate of $N:P_2O_5$ :: 20.8:20.8. The manpower required for Trombay-I Suphala (Production) is 96 operators as against 112 for Trombay-IV ANP plant, thus giving an output of 8.56 T/man for Trombay-I as against 8.86 T/man for Trombay-IV. Specific specifications. The process of manufacture of Sulphala and ANP are different as also raw materials.

A similar comparison of the nitric acid plants commissioned in 1965 and 1978 reveals the impact of technology :

	Trombay-I	Trombay-IV
Capacity (T3 day)	320	750
Process Operators	19	30
Output (T/man)	15.23	22.60
Specific Consumptions		
Ammonia (Kg/T)	304	286
Power (Kwh)	310	30
Treated Water (M^3)	1.50	0.71
Steam Export (MT)	1.30	0.60

The above examples are clear indications of how technological changes can affect productivity of men and materials.

Nevertheless, we cannot underestimate the impact of skillfull and experienced workmen, organizational changes, enterprising, imaginative and vigilant managerial talents imbibed with the spirit of adventure and foresight etc. on improving productivity.

Regional Development Due to Technology

Capital intensive technologies make demands upon special types of infrastructure facilities, shape educational standards and norms, influence consumption patterns and life styles and to some extent, dictate import requirements. Their impact on the society around by way of ancillary development, employment generation, cost of living, etc. is also important as it influences social development which is, in the ultimate analysis, the result and meaning of higher productivity to the nation and people. That is why choice and management of technology is most critical for developing nations like India. While going for Rs. 1000 crores Thal Fertilizer Project, about 115 Km away from Bombay City, we had to develop complete infrastructure like rail, roads, water supply system and most important, the cultural change in attitudes and approaches of local people, who were far away from industrialised society. Man represents the highest value and his welfare is the goal of history. With respect to man, science and technology perform an instrumental function. Keeping this view in mind, we have tried our best to uplift the project affected people of Thal. In the field of education, the primary need for development, RCF's hold did not stop only at construction of school building and supply furniture, but it went one step further. It adopted few children from SC/ST category and provided lodging, boarding, uniforms etc. An expenditure of Rs. 22 lakhs on education is of little significance to RCF than the sense of fulfilment of its social obligations. Similarly Rs. 3 lakhs have been spent for constructing community blocks for local people. The back-breaking exercise of fetching water from not-so-near and unsafe wells is eliminated by providing water taps in nearby places.

Family Planning, the need of the day, is being propagated by educating the people through camps, etc. For modern farm management practices, RCF has started agricultural services to the farmers by way of experimental farm and Krishi Vikas Yojana. About 1,20,000 saplings have been planted to create lush green surroundings in near future. The cash in hand towards land occupied by RCF and assured job for one member from each family of project affected people have changed the life style of the people at Thal. About Rs. 80 lakhs have been spent towards social obligations so far.

Pollution Control

The repercussions on environment due to industrialisation are unavoidable to some extent. RCF, from its inception, has taken anti-pollution measures as a social obligation and is seriously incorporating every step in all stages to monitor and control pollution. The plants at Thal have been designed with the concept of 'zero' pollution. This has been possible because of technological advancement. Here Distributed Digital Process Control System has been incorporated. This will enable optimum operation of the plant and better handling of emergencies leading to minimum production loss. Microprocessor-based instrumentations would ensure low energy consumption and higher yield. Thus, sixth generation of technology at RCF ensures highest productivity of

men, material, machine, money and meets the social obligations through excellence in management.

Management Challenges

The development and application of new technology is self-evidently a major source of wealth, but only if it is correctly managed. Since industrialisation has gathered the momentum, especially after political independence in 1947, we are witnessing continual changes in values—values in society, in individuals, and in organisations. Now we have reached a stage where major switch in emphasis is from 'quality'. This is true in every walk of life such as office premises, environmental conditions, forests, parks, technologies, factories, demands for more leisure time to enjoy life, cars, vehicles and what not. The changes in values have had obvious impacts on organisations which have been forced to give more attention to their roles in our society, to social accounting, to long range projects, consideration of environmental control, consumerism, etc. The organisations have to be operated less and less by dictates of administrative convenience, more and more to meet the wants and aspirations of their employees. Today, more and more individuals view their work lives as one part of a broader life experience which involves not only job but family, community, social responsibility and concern for political and economic issues. We, at RCF, have realised the change in offing and firmly believe that we do not hire an employee for 8 hours of allocated work, but as a part of social sub-system, hire an individual with his family along with its inter-relations with community as a whole. This faith and practice has helped us in commissioning the super fertilizer projectal Thal as per planned schedule, in backward region of Maharashtra without much trouble and also running our older factory at Trombay with consistently higher productivity for 5 years so far along with substantial profit of about Rs. 50 crores in 1983-84.

Innovative Skills

In business/industry, the long term ability to keep pace with others, internally or internationally, or rather to overtake others will depend on innovative skills. The single largest source of innovations in R and D. Now a days R and D is more of a team effort of brilliant individuals since it involves various disciplines before the results role out to the factory. Our experience shows that it is better to involve the users—the technocrats—in actual administration of R and D. There has to be a balance between fundamental research and applied research. A strong infrastructure of R and D activity and technological capability is necessary even to be an intelligent buyer of technology from elsewhere. No country in the world can be self-sufficient, in its true sense.

R and D Activities at RCF

Realising the importance of R and D, our R and D department is being headed by senior executive at the level of General Manager having varied experience from project to commissioning, running and trouble-shooting in running plants. He is associated with engineers having aptitude for R and D and also having line management experience for several years. Our R and D has developed a fungicide with trade name 'Ziram and Thiram' and sold the know-how to three parties. The product is the linkage with the user—the farmer—for better productivity at farm. The project under implementation is N-15 production, which will help further research also. A product-Dimethylammonium Sulphate—is developed at specific request by Madras—based company. Another products under development are Ammonium Polyphosphate and Zincated Urea. The use of effluent water for irrigation and efficiency of various phosphatic fertilizers in different soils are under research. Pilot plants taken up for implementation are low chloride NPK fertilizers and manufacture of Methanol by gassification of Municipal solid waste. Institute of Science has sponsored research on study of depolluting trees, which is in progress.

Diversification Plans

Apart from this basic research, one group of engineers is exploring possibilities of diversification and growth of RCF, viz. setting up of 1350 T/day Ammonia plant based on Bombay High gas for substituting Ammonia that is being imported at

present for various fertilizer factories in the country and also 1000 T/day single stream Methanol plant being planned to be installed in Thal fertilizer complex.

R and D Expenses

The amount of money that a business should be allocated to R and D is debatable. The most practical answer is that how much the business can afford to spend, should be spent. Monitoring research expenditure is not easy but there are successful methods for analysing performance.

Quality of Human Resource

The thrust of RCF's basic philosophy of management is on its inherent faith in its human resource. With modern technologies and machineries, higher automation, computerised process controls, etc. the technical problems to be tackled are also becoming challenging. These are also giving rise to newer problems for search studies in areas such as pollution control, process/modifications/improvements, etc. This is becoming more important and critical for management in view of social problems that follow as well as several statutory regulations being made by the governments. All these make R and D work very exacting for quick results and hence the calibre of people for R and D work has to be nothing less than best the company can get with appropriate aptitude for the same.

The company has been encouraging its employees to look beyond the present horizons and has constantly sought creativity and innovation from its people. The company offers its employees a satisfying, challenging and growth- oriented career rather than mere employment. The company's basic instrument of translating its philosophy into practice is its Training Institute. To induct young engineers and MBAs in the company to make technological breakthrough, a scheme puts stress on recruitment of the best talents available in the country and after training of 18 months the incumbent is absorbed in a discipline of his choice and capacities. After practical experience of running the plants, technical problem solving, etc. the engineers with aptitude for R and D or project are absorbed in those departments.

Towards Higher Productivity

Peter Drucker stated as early as in 1956 that "from now on, our increases in productivity will depend above all on our ability to increase the productivity of non-manual worker". The number of white collar employees is increasing much more rapidly than the number of blue-collar employees. The educational level of employees is constantly rising. This is the impact of technology, automation and speedier data processing systems. This creates a natural stress between trade union approach and need of industry. But with faith in each other and convincing arguments that modernisation does not mean more unemployment but it is only a change in the nature of job, the management can sell the ideas to unions. This we have experienced on several occasions like that of installing the computer, etc. While providing a job for one man per family for project oustees at Thal, we have experienced on several occasions like that of installing the computer, etc. While providing a job for one man per family for project oustees at Thal, we have ensured the necessary educational facilities to bridge the gap of educational needs and capacities available with the local people as pointed out earlier.

Attitude of Mind

While the technology and its adaptation have a profound impact on improvement of productivity, the environment has its own contribution. Environment has, among its various components, the human resource, a very big factor, for any productivity improvement drive. The modern technology however efficient it is, has to be made to work effectively by the human resource. While several factors influence human resource productivity, it is the attitude of mind which is most vital for success of human resource. The management's challenge comes in here to appropriately orient the attitude of its human resource for higher productivity through initiative, innovation, willingness to take extra responsibilities and tackling problems, etc.

Specialisation

With the advent of modern technologies, fast technological developments in various fields, the ability to master the techniques is becoming restricted because of the explosion of knowledge and specialisation in practically all areas. Thus, while latest technology is a must for higher productivity, it brings with it the associated individual motivational problems in such cases, clash of individual and organisational needs, other associated problems of managements. The jobs and their specifications need to be tailored and carefully drafted to suit the people. The individual's qualifications required to fit the jobs have to be redrawn so as to get best people for the jobs. It will be seen that with modern technology, productivity can be enhanced by :

(i) ensuring that well trained and qualified people will be able to operate the technology at optimum conditions,

(ii) good management of human resources through appropriate motivation techniques.

From our experience, it was observed that the latter is more important and more difficult.

In fact, all such cases of specialisation can be considered as "knowledge worker". As seen in developed countries also, the management of "knowledge worker" and making knowledge productive is most challenging to management. The motivational needs of "knowledge worker" are more complicated. Hence with specialised knowledge and training in latest technologies, the management quality is, in the ultimate analysis, the crux of the matter for higher productivity in the organisations.

Pros and Cons of Technological Developments

The substantial contribution of technology as an instrument for accelerating economic development, social justice and self-reliance is now well recognised. Keeping in view the well-developed technological infrastructure, government's policies lay stress on full scope being given to the development of indigenous technology. In Industrial Policy Statement announced in December, 1977, the Govt. has clarified its policy regarding participation of foreign investment in India's industrial development which could be allowed in such areas which are determined by the Government of India to be of national interest.

ILO estimates that about 40 per cent of total workforce of 700,000,000 are unemployed or underemployed in the developing countries. More than three-quarters of the 280,000,000 in this 'poverty trap' lives in rural areas where seasonal unemployment is often extreme. This results in mass migration from rural areas to the cities, posing insoluble social, economic and environmental problems. Large scale, capital intensive technologies aggravate these problems. It is, of course, not only employment that is at stake, capital intensive technologies also make demands upon special types of infrastructure facilities such as housing, water supply, transport, etc., shape educational standards and norms, influence consumption patterns and life styles. Technology is neither economically nor culturally neutral. Different economic and social conditions demand different applications. "Advanced Technology", "Appropriate Technology", "Intermediate Technology" etc. are topics of debate and so are beyond the purview of this paper.

With modern technologies resulting in more and more automation, mass production systems, the trend is towards migration of people from rural to urban areas. Such migration leads to concentration of people in industries, organising themselves into groups, trade unions, etc. This gives rise to several organisational challenges of managing human groups, politicisation of trade unions making matters still worse. While these may be argued as 'cons' of technology, it may also be viewed as a stepping stone for development since such organised groups behaviour, their management, collective bargaining, etc. all follow certain scientific principles and are amenable to managerial skills. Thus, though the technical aspects of technological changes can be easily mastered in practice, the managerial skills needed for its effective management are difficult to be mastered.

Higher Productivity for Whom ?

Any organisation is basically a system comprising

of several sub-systems. The productivity of organisation thus depends on systems within the organisation and systems outside the organisation. Both are interactive. No system boundary is sharply defined and demarkated. Koontz and O'Donnel have classified external environment as comprising of economics, technological, social, political and ethical systems. Hellriegei and Slocum have classified external environment under cultural, value, economic and political systems. Each nation develops its own socio-cultural systems depending upon belief, faith in science, historical developments, geographical locations, etc. The technological environment is represented through availability of materials, means of transport, national laboratories, education level, etc. Political system in the environment has a major role to play affecting industry as it is the tool to change the whole social system including economic system, cultural systems, etc. No industry can live in isolation and so it is desirable to consider all the above aspects while planning for improving productivity of an organisation.

Everything has been refashioned by the man using his tools and his intelligence—every tree, every crop plant, a good many lakes and some mountains, quite aside from all that we wear, eat and use. Hence it is the man, who is always at the centre of any change and while considering the improvement in productivity through technology or by any other means, it must be for the benefit of the man. Finally, if we look at the ever shrinking world, explosion of knowledge, our massive social and economic tasks, emerging new value systems, it is very clear that management of productivity will never be simple again. Our experiences have also led us to believe that it will be always more fruitful if we focus our attention on individual's satisfaction which is generally termed as "humanizing the organisation", for better productivity.

Conclusion

From the foregoing it can be concluded that :

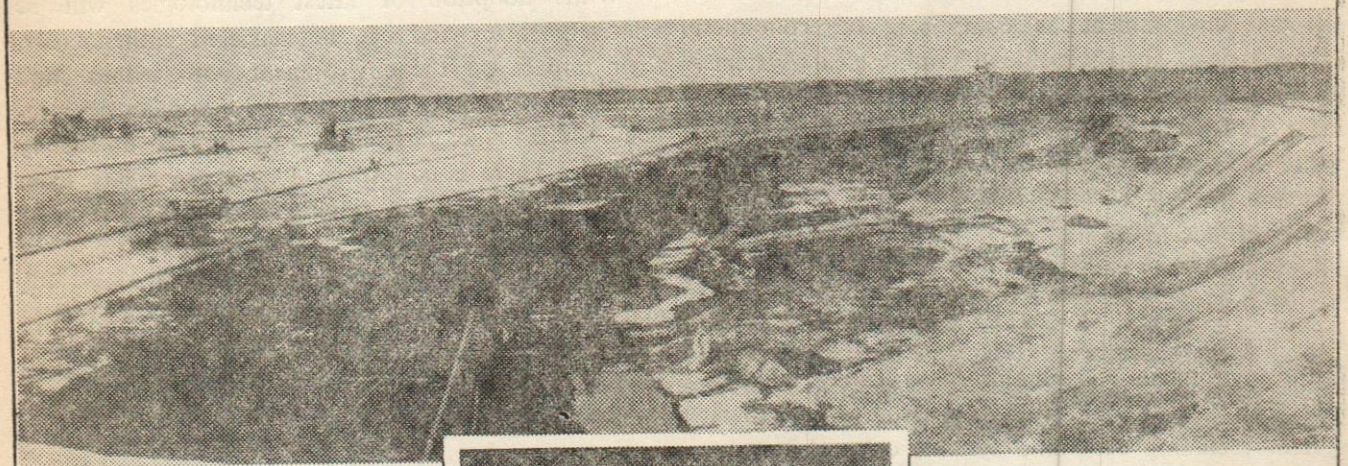
While adoption of latest technologies will be relatively easier and can be mastered rather easily, their impact on the environment both within and without the organisation is more difficult to comprehend and manage, particularly the impact on society around. There is no escape for managements from facing the problems and solving them.

With modern technologies, more and more automation etc. knowledge is becoming more and more specialised. Thus, managing such "knowledge workers" is more challenging to management, calling for their management skills.

With the mass production methods and modern technologies, there is migration of peoples from rural to urban areas, adding to the severe infrastructural problems such as housing, water supply, communications, transport etc. This is giving rise to several problems to the government, the foremost being imbalanced development of different regions which may lead to their own political problems to the government. However, the company managements can contribute their mite towards the society around from they are drawing their sustenance.

A well managed modern technology leads to higher productivity, the indicators of which are higher standard of living, more economic benefits, etc. In an industry, such higher productivity is likely to lead to industrial relations problems on sharing gains so as to pass on the benefits to all concerned including the customer, dealers, farmers, even the common man in the society. Thus, the managements would be discharging their responsibilities to the society.

Striving for excellence. Round the clock. Round the year.



"I would suggest that our priorities in the Seventh Plan should be FOOD, WORK and PRODUCTIVITY. And these considerations should guide alternative growth scenario..." Mrs. Indira Gandhi, June 4, 1984.

Here is NLC's growth scenario :

Acclaimed as the 'Energy Cynosure' of Tamil Nadu, Neyveli Lignite Corporation mines lignite, generates power, produces urea, processes lignite coke and extracts costly chemicals. The biggest in Asia, NLC's open-cast lignite mine feeds India's first ever pit-head power house. Incidentally, this is the country's only lignite-fired thermal power station. Performance in both the units, the 6.5 MT per annum Mines and 600 MW Power Station during 1984-85 excelled the rated capacities – Mines 116.76% (total excavation) and Thermal Power Station 118.67%.

The plant load factor of NLC's Thermal Power Station in 84-85 was 77.17% against the country's average PLF of 48.6%. NLC's Fertiliser Plant operated at 99% capacity utilisation.

NLC's prestigious LECO-Lignite Coke – has become a sought after industrial fuel; replacing oil, coal, coke and charcoal in electro-metallurgical, cement, carbide, tea and other industries.

Entering the 29th year of service, NLC is in the galaxy of the top ten public sector enterprises in terms of absolute profit, and has started improving its ranking – 8th in 1982-83 and 5th in 1983-84.

In recognition of this performance, the National Productivity Council awarded NLC the best performance awards for the mine and the power station and the meritorious functioning award for the fertilizer factory. With all the three operating units winning awards, this is hailed as a unique record. This apart, the mine bagged four Safety Awards, instituted for the first time by the Government of India – Ministry of Labour and Rehabilitation under the National Safety Awards Scheme.

For all-round excellent performance, NLC was also conferred about a dozen awards this including the "Udyog Ratan" award from Institute of Economic Studies, the "Humanitarian Award" by the Lions Club and the "For the Sake of Honour Award" of the Rotary Club. Crowning it all is the best Industrial Relations award from AIOE at the all India level.

Work is afoot in the first stage of the integrated second mine and second thermal power station. In the second stage to follow, the capacity of this mine will be increased from 4.7 m.t. per annum to 10.5 m.t. per annum and that of the power station from 630 MW to 1470 MW. Under active consideration is the opening of a third mine and another power station. Before the turn of the century, NLC will turn out 32 million tonnes of lignite and 3700 MW of power.

To sustain and to improve all-round excellence, the newly incepted training complex imparts and refurbishes skills among all sections of the establishment.

All of which go into the making of a work-oriented Industrial Culture in Neyveli, with NLC setting Man and Machine on the path to "Commanding Heights of Economy" with the motto "Food, Work and Productivity"

Performance of NLC at a glance from 1979-80 onwards

PRODUCTS	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85
Overburden (LM^3)	228.43	352.74	323.27	321.74	356.01	387.71
Lignite (LT)	28.97	48.01	58.76	64.01	66.35	71.09
Power Gross (MU)	2370	3175	3391	3833	3909	4056
Power Export (MU)	1768	2454	2686	3073	3027	3087
Urea (Tonnes)	1,04,908	1,34,334	98,640	1,01,211	1,24,447	1,27,960
Coke (Tonnes)	42,948	1,19,411	1,88,419	1,72,111	1,73,603	1,91,190
Capacity Utilisation-Mines I	44.5	73.9	90.4	98.5	102.1	109.4
TPS I (Percentage)	69.34	92.9	99.4	112.2	114.4	118.7
Plant Load Factor-TPS I (Percentage)	45	60.4	64.52	73.0	74.17	77.17

NEYVELI LIGNITE CORPORATION LTD
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[illegible] 607 801, Tamil Nadu

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Work Culture and Creativity in IOC

BIMAL KAPOOR

This paper focusses on the issue of productivity not from a Taylorian point of view based on work measurement, capacities and utilisation, standards for production and costing, automation, mechanisation etc., but from a perspective of process values that underlie the interface between people and the tasks they do.

Bimal Kapoor is Director (Personnel), IOC Ltd.

The evolution of Indian Oil Corporation is the starting point in the history of indigenisation of oil industry in India. Its inception marked a turning point both in the political and economic development in the country. It saw the country breaking away from the dependence on multi-national companies and taking off on the road to self-reliance in a vast range of petroleum products.

A pioneering spirit-sense of high commitment to acquire new abilities and expertise in the service of national objectives, marked the formative years in the growth of the organisation. The norms for efficiency and productivity were not mere organisational needs but emerged naturally from a motivation to contribute in a broader cause of national development. Several instances come to my mind of highly motivated members of the organisation who, despite personal hardships and discomfort, engaged themselves in the task of creating new facilities in extremely difficult environments, lacking both in basic amenities and infrastructure. In retrospect it appears to me that the major thrust to productivity movement during these initial years came from the organisation responding to the environmental demand despite the fact that its formal internal mechanics for ensuring high efficiency and productivity were still in a state of evolution and therefore relatively weak. What I mean by formal mechanics here are formal work systems, methods, work standards, etc.

My observations so far raise several questions :—

(i) What factors led the organisation to achieve spectacular results in productivity during these initial years ?

(ii) Is the proof of high productivity hitherto—nearly cent percent capacity utilisation for instance-guarantee enough that the organisation's future performance would be uniformly sustained if not improved any better ?

(iii) Is the organisation aware of the threats and opportunities and what long term strategies is it adopting to optimising productivity through optimum utilisation of manpower resources.

This presentation will cover three distinct phases and the values which guided each of these phases in our organisation's growth (i) the initial phase, (ii) the middle phase and (iii) the current phase and future strategies.

The observations in this paper are based on the findings of a survey we conducted recently in our HRD Action Research Programme. Later in this paper are described some of the survey results and our learning from those findings.

The initial phase in the growth of our organisation in terms of physical output and work commitment was of a high order. Apparently people were driven by a missionary zeal. They perceived potential for challenging work and creativity in adapting and consolidating a new technology. Each organisational member was full of ideas and zest. The organisation, in short, was characterised by an output orientation, a high super-ordinate goal commitment and in the face of outside competition a search for identity. Along with these positive features the organisation however faced a dilemma which wasn't adequately resolved. This dilemma arose mainly due to the organisation's failure to shift its focus from its immediate to long-term objectives. Evidently the organisation's appreciation of the future scenario and therefore its long-range business strategy was rather hazy.

The cumulative experience of the formative years passed on to the middle phase of the organisation's growth with the latter adding its unique challenges and problems. The organisation had grown considerably in size and geographical spread. The structure had attained several complexities. There were greater demands from customers for service, reliability and quality. The expectations of the organisational members too had changed. They were demanding opportunities for growth, autonomy and creativity at their work place. The collective motivation of the earlier years had given place to a wide spectrum of individual needs and expectations. However organisation's preoccupation with growth in purely physical terms, refining and marked expansion, technological differentiation, etc., allowed little time for long-term strategic decisions on human resource management.

Today the Corporation no doubt presents an impressive profile, largest commercial organisation in India in terms of sales turnover, ranked 38th in the Fortune List of 500 largest industrial corporations outside U.S.A., near technological self-sufficiency, etc. Evidently, these indices would suggest, among other things, an impressive productivity record. Such an assumption however begs the question—can the organisation, on the strength of its rapid development thus far, sit back in self-satisfaction and succumb to the temptation to rest on laurels and more important, is the above indices indicative of organisational health ? My answer to the first part of the question is a firm "NO" and the latter part "NOT NECESSARILY". It is my firm belief that the long-term performance of any organisation, including our own, would be determined to a very large extent by the fact whether an organisational culture exists that places a high concerned on people as a creative resource and encourages innovation, risk taking, trust and openness. Let us not forget that the astounding record in productivity in Japan was achieved by its ability to engender commitment amongst people through respecting them as a creative resource.

In our organisation the current thinking on human resource management for optimising employed performance is guided by the aforesaid assumption. The organisational diagnoistic survey, to which a reference earlier has been made, has provided future directions for action in the area of both the systems and climate. The survey data has indicated that adverse effects of

conflicts, denial and suppression of differences, lack of tolerance for ambiguity, unsupportive climate for free and uninhibited communication, etc., on the individual's capacity to perform effectively. Varying degrees and facets of stress are also evident among executives due to perceived role ambiguity, role erosion, inter role conflicts, personal and resource inadequacies, lack of autonomy, etc.

As part of our long-term strategy to optimise the management of human resources, we are currently undertaking Action Research at two of our major locations in West Bengal and Delhi. The Action Research has two objectives. Firstly, it would fine tune the existing human resource systems in the organisation and introduce new elements wherever necessary. Secondly, it aims at creating an organisational climate based on values of openness, trust, authenticity, autonomy and collaboration.

Several interventions have been made since the time Action Research began towards the end of last year. Without going into details, the focus of these actions, based on the organisational diagnostic study, is on the "person", "inter-person", "Teams", "Inter-Teams", "Organisation" and "Organisation-environment interface". Some of the major interventions and their objectives all discussed here.

Role Analysis

We discovered that the major source of stress at the individual level and conflict at the interpersonal and inter-group (inter-functional departmental) level arise from conflicting expectations amongst and between the organisational members with regard to their responsibilities and behaviours. This lack of role clarity can hinder performance and result in high, dysfunctional levels of anxiety and stress. The methodology adopted, consisted of a free and uninhibited discussion between the focal role (person whose role is analysed) and other members who have an inter-face with him on their mutual expectations and offerings. All expectations and perceptions are discussed freely in a atmosphere of trust, mutuality and openness and finally a group consensus emerges on the role profile of the focal role.

Role Analysis has achieved two very important objectives. One is that it has defined in clear and unambiguous terms the role of each organisational member and his area of contribution. Next is its powerful impact in fostering an attitude of co-operation and collaboration amongst people. The individuals learn to transcend their narrow loyalties and direct their orientation towards task accomplishment, team and organisational relationship. In short, Role Analysis has helped create new values and culture in the organisation.

Key Performance Areas (KPAs) and Goal Setting

The Role Profile of each individual served as a basis for identifying his KPAs. KPAs is a group of tasks which are critical and important to a specific job. The process of identification of KPAs involved a discussion between the focal role and his supervisor and finally validation (of the agreed KPAs) with a team of Senior Managers. Following the identification of KPAs, each focal role member, firstly by proposing himself and later through discussion with his supervisor, set for himself time-bound quantifiable goals over a specific period. The achievement of these goals would be jointly appraised at the end of the targeted period. A system of performance feedback and counselling is also being introduced.

Our hypotheses, which is supported by several research findings, is that Role Analysis and more specifically the goal-setting, besides providing objective data on development and growth needs of individuals, will have a significant impact on their motivation and performance. Further, participative goal setting allows freedom and opportunity for creativity, job challenges and job enrichment.

Behavioural Skills Workshops

As would be evident from the Action Research objectives our Corporation is in the process of adopting an open system and is therefore experiencing a massive organisational change. The course of the planned change would be affected significantly by the organisational culture and work norms. Every organisation with a growth orientation has to create cultural norms that enable its members to achieve personal

Productivity Management from time to time, form the theme of this paper. An outline of the current state of art is also covered.

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The Installed Capacity stands at 89.65 LTPA and the Company's income crossed the Rs. 600 Crore mark during 1983-84.

ACC has plants of different vintages, like Mymore in Madhya Pradesh over 60 years old and Gagal in Himachal Pradesh just commissioned in 1983. In terms of technology, there are Wet-Process plants, Semidry Units and Preheater-cum-Precalciner installations.

A Company is not to be viewed merely in terms of its tangible assets. Underlying ACC's policies are its Value Systems; its concern for

—Efficient Utilisation of National Resources

—Employee Welfare

growth and release potential for organisational effectiveness. At this point, it would be useful to describe the organisational culture aspects, as we perceive them, and the norms flowing from each of these aspects, dysfunctional at one end and growth oriented at the other. These are as under.

S. No.	Organisational Culture Aspects	Dysfunctional Norms	Growth Oriented Norms
1	2	3	4
1.	Work Standards	Restricted Output.	Excellence
4.	Differences	Avoidance Behaviour	Resolution
5.	Change/ Innovation	Resistance	Experimentation

It was our attempt to emphasise and foster the growth oriented norms through behavioural skills workshops by enabling the participants to experience self-awareness, introspection, inter-personal sensitivity and acquire diagnostic and action skills.

In conclusion it can be said that whereas specific interventions both at the level of systems and climate

—Reliable Customer Service and

—Well-being of the community.

As a leading manufacturer of cement, the Company chalks out its programmes (short term or long term) —be it Research, Anti Pollution Measures or Rural Development—in tune with its obligations to shareholders, employees, customers and community at large.

As important as the internal make-up of the Company is the environment in which it operates. Cement Industry has been under varying degrees of price and distribution controls since World War II (barring a short spell during 1966-67)—productivity improvement even becomes a condition for survival.

It will be readily seen that all the factors stated above are relevant to evolve right Productivity Management Strategies—Multiplant organisation with widespread units, diversity in age and technology, organisational ethos and the environment.

Beginnings

In ACC, Industrial Engineering arrived in 1953, as a separate discipline to be tried out in the shape of consultants. The I.E. activities were progressively intensified, and by 1963 a separate Division called "Productivity Division" was formed at the Corporate Office. The division aimed at having an integrated approach for improving productivity in all its aspects.

The Division functioned both at the plant and the Corporate level. At the plants, the industrial engineers assisted inter-alia in solving day-to-day problems in the areas of operational efficiency, cost control and design of experiments. The plant industrial engineers were under the functional control of Productivity Division. At the Corporate Office, were the Industrial Engineering, Inventory Control, O and M, Technical Audit, Quality Control and Management Accounting Sections.

One can appreciate the broad-base of Productivity Management function in ACC even two decades ago, from the typical areas of application shown in Table 1.

Table 1

Typical Areas of Application

(i) *Manufacturing operations*

Materials Handling	Quality Control Inventory
Equipment Utilisation	Control Layout Planning
Materials Consumption	Process Control
Fuel Efficiency	Value Engineering
Planned Maintenance	Design of Experiments &
Import substitution	Incentive Schemes

(ii) *Organisation & Methods*

Organisation matters	Communications
Office efficiency studies	Job evaluation
Organisation Manuals	System & Procedures
Forms design & control	Filing & Records

Clerical aids & office equipments.

(iii) *Project Planning and Control*

PERT for planning and control of new projects and major overhauls.

(iv) *Purchasing*

Linear programming models for supply of coal, and jute bags to various plants.

(v) *Management Accounting*

Relevant cost analysis to aid decisions. Discounted cash flow analysis for capital budgeting.

(vi) *Marketing*

Linear programming model for distribution of cement.

The Shift Today

Over a period of time, as with any dynamic enterprise, Productivity Management function has undergone several changes in terms of reorganisation, though the Core Structure remains similar even today. A major shift in strategy is the present emphasis on process optimisation.

For long, long years, it appears that the emphasis laid on the process aspects of our cement plants has not been adequate, i.e. not as much as on the plant maintenance. About four years ago, ACC examined the scope for improving the capacity of kilns which

are the heart of a cement plant. The initial results proved so encouraging that ACC launched an ambitious programme for productivity optimisation with the accent on process engineering. Surely, this is the best way to achieve the much-needed capacity increase for a growing concern. Investment will be small, returns will be attractive, valuable fuel could be conserved through improved thermal efficiency, the old plants could be modernised to a reasonable level and the gestation period too is small. Incidentally, ACC's Productivity Optimisation Programme is very much in harmony with the national objective and Government policy as stated by Hon'ble Union Finance Minister, Mr Pranab Mukherjee in his recent talk at a Seminar on "Management of Economic Development—New Horizons."

"The major objective of Government policy in the coming years would be to increase productivity of investments made so far, to make them yield adequate returns in the form of higher production and generate resources for further investment".

PERT as understood normally stands for Programme Evaluation Review Technique. In ACC, it may be said to have acquired a new connotation, also to mean "Production and Efficiency through Research and Technology". There is a strong support from our R and D for the Productivity Optimisation Programme as they spearhead the Process Improvement Studies at the plants.

Approach to a Productivity Optimisation Study in its typical form comprises of :—

(i) Process diagnostics on Kilns
(ii) Detailed Engineering
(iii) Capacity Balancing—upstream and downstream of kilns
(iv) Productivity Improvement of Sub-Systems
(v) Investment Analysis
(vi) Implementation
(vii) Training of plant personnel, and
(viii) Improving Plant Availability.

Evidently, it is a happy marriage of Industrial Engineering and Process Technology.

Productivity Management System

Planning for Productivity at Enterprise Level

Productivity at enterprise level encompasses in full measure the efforts of different functional areas of Management—Production, Marketing, Finance, Personnel, Material Management and R and D. Production, surely is vital, but the support activities contribute to the organisational productivity in a large measure. ACC has the practice of preparing a Master Plan every year, well before its commencement, and built into it are the performance targets of the various functional segments of Management. For example :—

—Marketing has targets to fulfil not merely in terms of Sales but by adopting appropriate distribution strategies with support as required from Management Services using O.R. Models.

—R and D has specific goals (short term and long term) to initiate and develop improved process technologies that aid in product quality improvement, energy conservation, utilisation of waste materials and so forth.

For a multiplant organisation, the overall productivity is the aggregate of the performance of individual units, Major chunks of resources are consumed at the plants and the focus shifts to the plants. When preparing the Master Plan, therefore, the targets for major productivity parameters are fixed for each unit.

To illustrate the concept of targets vis-a-vis productivity, consider the parameter of thermal energy utilisation. The fuel consumed by a plant is governed by :—

(i) Quality of coal	(Responsibility of Materials Management)
(ii) Efficiency of Kiln Systems	(Responsibility of Plant)
(iii) Transit Losses	(Responsibility of Materials Management)

The targets for efficiency of kilns systems are based on the "best achieved" during the past five years. What happens if the "best achieved" itself is not good enough and does not reflect the Productivity Potential ? Here comes the distinction between a target and a Norm. Targets are for control over the planning horizon, one year in this case. They should be challenging no doubt, but cannot be far beyond the reach of the Plant during the planning period, taking into account the prevalent condition. At the same time, it would be self-defeating to lose sight of the productivity potential. In line with our priorities for Productivity Optimisation of kilns, progressively the kiln systems are being optimised. Once the potential of each kiln is established and realised, the norm becomes the target thereafter for, the performance achieved after optimisation automatically becomes the "best achieved".

As for long-term productivity plans, mention may be made of R and D goals for new technologies, and goals of machinery Development Department for design of plants with enhanced productivity potential.

Organising and Staffing

The erstwhile Productivity Division which heralded the era of productivity management in ACC on a large scale, has undergone several changes. Productivity Department as existing now has Industrial Engineering and Productivity Optimisation Programme under its banner. The industrial engineers at plants still functionally report to this department. The functions mainly include applications of I.E. in Manufacturing Operations, assisting Productivity Optimisation Programme in plant Capacity Balancing and Sub-system studies, Productivity Measurement and Monitoring, Energy Conservation Programme and Plant availability improvement studies. The Department has close liaison with R and D who hold the primary responsibility for process optimisation studies.

The responsibility for productivity enhancement is not confined to the Productivity Department alone, but cuts across several functional areas.

Table 2 depicts the vital productivity functions coming under the purview of various Divisions. There is a certain overlap of responsibilities, but this is deliberate and has been found beneficial. After all, the best catalyst for generating urge to improve level of productivity is competition.

In line with the importance attached to process

Table 2

Productivity Related Functions Accross the Organisations

Functional Area	Productivity related functions
Operations	—Cost and technical efficiency —Maintenance Audit —Effective exploitation of Mineral resources —Quality Control —Inventory Control
Finance	—Internal Audit —Cost Control —Management Accounting
Personnel	—Labour Productivity improvement through incentives
Marketing	—Planning Distribution Strategies
Materials Management	—Inventory Control —Exploring new technologies in Materials
Projects	—Updating Technology for new and old Plants
Refractories	—Choice of right refractory lining materials for long uninterrupted run of Kilns
Management Services	—MIS —O.R. for decision making
Functional Area	—Productivity related functions —Project monitoring through PERT/CPM —O & M
Research & Development	—Process Optimisation —Technological Innovations
Productivity	—Industrial Engineering —Plant Availability monitoring —Capacity Balancing —Productivity Measurement & Monitoring —Optimisation of Sub-systems —Energy Conservation.

engineering, reorganisation at the plants is on cards, to create a new position of "Process Engineers". Compared to the past, there is an increase in the induction of qualified Industrial Engineers in the Company. Above all, there has been a major thrust in the area of functional training, which merits elaboration. Process Optimisation Studies are not a one-time exercise. The results achieved have to be sustained. There is a strong need for attitude-orientation of many operatives and others who have been manning the old plant systems for decades, without proper control aids. Possibly several undesirable practices have been embedded in the work methods. Concurrently with the Productivity Optimisation Programme, ACC has taken up in a big way, the revamping of its training systems.

Motivation

It is known that any productivity improvement programme requires establishment of a proper climate to thrive. In ACC, there is adequate Top Management support to Productivity Improvement Programmes. Acceptance by the line personnel is sought to be achieved in three ways.

(a) Line managers are sent to short programmes and appreciation courses for their exposure to productivity techniques.

(b) We have a system of interchange of personnel between the Productivity Department and the Operations Division. Line Engineers are trained in IE and they spend anything between 1 to 5 years in the Productivity Department and then go back to their line functions. By this process, most future line managers would go through the Productivity Department at some time or the other.

(c) During the in-company programmes, Senior Executives impress upen the line managers, the value of productivity improvement activities to the company.

Measurement and Control

An established organisation like ACC has several Management Control Systems, many of which do incorporate the evaluation of productivity in its various facets. It is beyond the scope of this paper to delve into the details of all the systems, and only the monitoring of certain major physical productivity factors is briefly discussed.

Measurement and Monitoring originates naturally at the Unit level. A schematic diagram of Plant Performance Analysis is shown in Exhibit 1.

Table-3 shows the productivity factors monitored by the Corporate office.

Table 3

Productivity Monitoring at Corporate Office

Factor	Periodicity of Monitoring
(i) Capacity Utilisation	Fortnightly
(ii) Energy Utilisation	Monthly
(iii) Materials Productivity	Monthly
(iv) Manpower Productivity	Monthly
(v) Overall Productivity	Once in six months

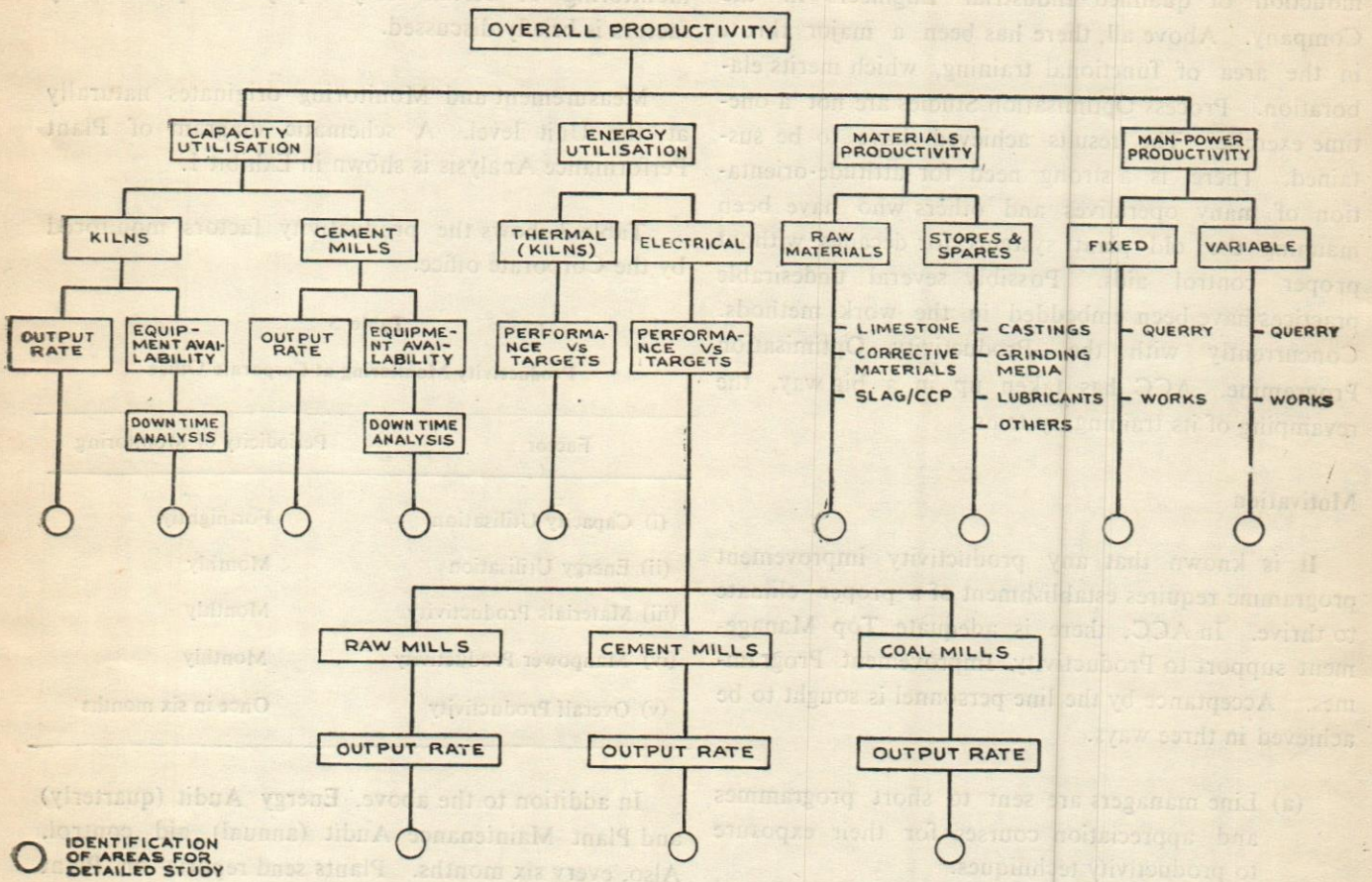
In addition to the above, Energy Audit (quarterly) and Plant Maintenance Audit (annual) aid control. Also, every six months. Plants send reports on Plant availability aspects with specific recommendations for improvement and action plans. (Some of the systems are under various stages of implementation).

Action follows identification of problem areas. Where required, specific studies are taken up for productivity improvement by the plants, with assistance from the concerned Division at the Corporate office. Sometimes the studies are initiated by the Corporate office. Progress on implementation is regularly monitored. There is also a rigorous process of evaluating the resuls of the changes made.

Outlook for the Future

From the foregoing discussion one may gather the impression that we have reached the limits of productivity. Far from it, we have a long way to go. Yet,

we are optimistic as we have the commitment. The fruits of our productivity efforts so far, provide us the stimulus to "AIM AT THE BEST AND GO FOR IT".



THE ASSOCIATED CEMENT COS. — PLANT PERFORMANCE ANALYSIS

Exhibit 1

Productivity
1985, XXVI, 2, 167-172

Strategies for Productivity Growth in Service Sector

R.C. MONGA

Any strategy for productivity growth should be designed to integrate productivity improvements process with other managerial and operating systems so that it becomes a matter of continuous concern for all according to the author.

R.C. Monga is Director, Nationa Productivity Council, New Delhi.

Introduction

After Independence, India embarked upon an ambitious plan of economic growth with a view to raise standard of living of the masses and to continue this process we are about to launch the next i.e. 7th Five Year Plan. This is the right opportunity to examine past achievements rationally and the approaches to productivity growth so as to evolve strategies for next plan. The past twenty five years have seen massive investments for stimulating production and has achieved considerable and notable success in improving and diversifying range of products required for meeting the changing needs of our society. A large number of private and public sector organisations have sprung up in the last three decades to manufacture products ranging from a proverbial pin to almost any thing one can think of. To meet the requirements of these undertakings and rising expectations of the people, the past few decades have seen rapid expan sion in the service sector—basically created to support the industrial and agricultural expansion by way of providing necessary infrastructural facilities and to provide basic needs of health, transport and shelter to our people. It has been estimated that today organised industrial sector employs about 8 million people while white collar employees account for 16 million. Productivity has been a subject matter of discussion for the last couple of decades and celebration of 1982 as the

Year of Productivity has reinforced the thrust for creating an awareness, need relevance and strategy of productivity growth.

It has been generally recognised that in our economy which is characterised by shortage of resources particularly capital and low incomes resulting in low capital formulation, productivity growth deserves a much greater emphasis while formulating strategy for economic development. In a recent published study* it has been observed that for the economy as a whole, there has been a rising trend in the capital output ratio. It has also been pointed out that productivity growth during the last decade has slowed down in many service sector areas such as Electricity, Gas and Water Supply, Foresting and Logging. Therefore, it is imperative to also closely examine and improve the productivity of the assets already created and the process of creating new assets for achieving high productivity growth rates while formulating next economic plan.

Role of Service Sector

The service sector has come to play a very critical and substantial role in ensuring achievements of production targets on the industrial and agricultural front. The generation of electricity, communication net-work, rail and road transport system and banking and other financial institutions affect the productivity performance of the agricultural and industrial sector. Some of the other services like health, family planning, housing, education, undoubtedly, are the back-bone of any development strategy for raising the standard of living of the people. Because of paucity of funds, we have not been able to create enough services and whatever has been created leaves much to be desired in terms of quality of service being provided. Lack of adequate infrastructure services has been recognised as one of the reasons for low capacity utilisation in many of our industrial undertakings. The power cuts in many of our major industrial centres is a rule rather than an exception. The plant load factor of most of thermal stations is less than 50% and power position could be improved by proper management of the capacity already created. We still have a long way to go to streamline our existing transport system and provide transport services to all areas not yet connected by any means of transport. An efficient communication and transport system can contribute significantly for high productivity performance of ths economy. The level and quality of services being provided affects the movement of goods and passengers but also increases overall cost which reduces the competitive strength of Indian Industry in the world market. Mr. Z.R. Ansari, the Minister of State for Shipping and Transport, observed that India loses nearly Rs. 700 crores annually due to extra fuel spent on bad roads at the closing function of the refresher course organised on Construction and Quality Control Aspects of High Way Enginerring' organised by U.P. State Engineers Academy at Central Road Research Institute. Something similar is the story of the quality of services provided by other service sectors of the economy. In a nutshell, poor productivity of the service sector acts as a drag on the economy.

Now let us turn our attention to another chronic problem of abnormal cost and time over-runs in completion of our projects which is a product of initial bad planning and inefficient project management. In one of the studies published in Economic Times it has been observed that since Independence there has been hardly any project in the irrigation sector which has been completed within estimated time and cost framework with some projects still under construction for more than two decades. The irrigation is not alone or unique in this respect and perhaps similar is the picture more or less of other service sectors. It is not only the cost over-runs which are important but the impact of the time over-runs on the economy. *It has been estimated that one day's delay in the commissioning of a 2000 MW Super Thermal Power Station will deprive the country of production worth Rs. 30 to 40 Crores.

Areas for Productivity Improvement

Quite obviously productivity performance of this

*Productivity in the Indian Economy By Shri P.R. Brahmanan da.

*Paper on Appropriate Project Management Systems for Capital Intensive Projects by Shri D.V. Kapur, Secretary, Department of Heavy Industry-National Workshop on Project Management.

vital sector is the determinant of the level and quality of inputs which affect the productivity of the economy. The manufacturing sector has been primarily the area of enquiry and emphasis for improving productivity performance in the past while some studies have been done in the service sector also but it has not received the desired inputs and emphasis. Generally speaking the service sector today is characterised by :

(i) Outdated systems and procedures, organisation structure, management style not suitable for quick decisions and result orientation.

(ii) Emphasis on outlay rather than output

(iii) Lack of motivation for improving productivity

(iv) Lack of senstivity to users' requirements

Since service sector has come to occupy a pre-eminent position in our strategy for development there is a need to critically analyse the available productivity concepts, tools and techniques with a view to identify, isolate and understand constraints (both internal and external to the organisations) that inhibit the growth of productivity and evolve concepts which are specific to a particular service sector and particular organisation. The tools and techniques for productivity improvement are fairly developed and have been applied in the service sector successfully. The studies conducted so far reveal that the following areas offer considerable scope for improvement :

(i) *Improvement of quality of Service*

Most of us are dissatisfied with the level and quality of service being provided and would like to make further investments to improve this but the first question which should be addressed is whether the investments already made are being utilised properly. Is there scope to improve the service level and quality with the marginal inputs? There is also a need to consider the users' requirements and make our services more sensitive to these requirements and other environmental changes. In this context it may also be stressed that the objectives of the service organisations should also include dimensions relating to quality of services to be provided to users. For example consider the case of hospital where synchronising of services being provided in OPD, and laboratories will go a long way in mitigating the difficulties faced by patients. It may also be considered whether we can provide better services by starting second shift in the OPD by making marginal inputs.

(ii) Materials Management with a view to ensure availability of materials, encouraging materials conservation and reducing inventories in organisation such as electricity boards, road transport corporations.

(iii) Maintenance management to improve capacity utilisation and availability in power station, road transport etc.

(iv) Modernising systems and procedures and upgrading technology to speed up the process of decision-making.

(v) Project management to minimise time and cost over-runs.

(vi) Energy conservation to reduce consumption.

Productivity —The Concepts

The first step in launching productivity improvement programmes is to understand what it is and how can it be influenced. Every organisation is established for achievement of specific objectives and resources namely capital, men, equipment land, materials placed at its disposal are required to be consumed for achieving these objectives. Broadly speaking, productivity concerned itself with achievement of these specific objectives as well as with the manner in which these are achieved. It involves both "doing the right thing" and also "doing them right". Comparatively "doing them rightly" component of the productivity has been over-emphasised resulting into "inputs monitoring" more closely rather than balancing optimum use of inputs for achieving desirable outputs. In service sector, this distinction between input and output has been blurred and "activities" are being considered as achievements. This happens because in many service sector organisations, output is not tangible, difficult to isolate and quantify. It must also be

stressed that qualitative aspects of the "output" must also be considered while conceptualizing productivity. It is not just the physical growth which reflects the improvement in the output but improvement of parameters such as time in providing a particular services, which are determinants of quality of service, that form an integral part of the productivity improvement process. In this context, consider the out-patients department in a hospital, time-schedule of road transport organisation, cash collection procedures, STD dialing facility, where it is not only "quantity" but quality which provides satisfaction to the user.

In a nutshell, while productivity can be defined as a ratio of output to input in its most elementary form, it's operationalisation for a particular organisation must consider nature/kind of output, their contribution to corporate objectives. and ultimately reflect the satisfaction of the user with the services being provided at optimum consumption of resources. Therefore, a productivity framework for a particular organisation must focus on :—

(i) Overall results leading to outputs reflecting the satisfaction of users requirements and organisational goals.

(ii) Qualitative aspects of the activities.

(iii) Results rather than activities.

(iv) Optimum utilisation of inputs for improving both quantity and quality of service.

Productivity Improvement Process

Productivity improvement is not a one shot undertaking. It is a continuing process of analysing and improving what is going in the organisation to meet the challenges of growth, rising expectations of users and increasing technological sophistication. Any strategy for productivity growth should be designed to integrate productivity improvements process with other managerial and operating systems so that it becomes a matter of continuous concern for all. The two prerequisites which will have a bearing on its becoming a continuous affair are illustrated in the fig. 1 which reflects the basic process of productivity growth.

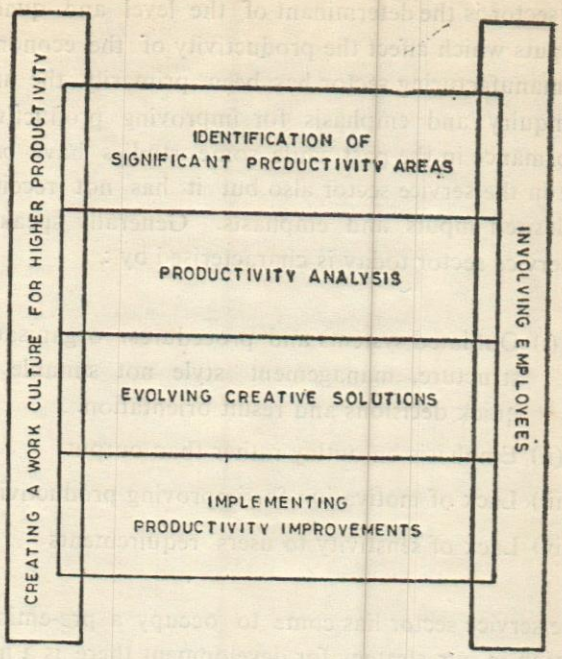


Fig. 1 Process of Productivity Improvement

(i) Creating a climate where employees can give in their best for achieving organisational goals. It has been observed that application of tools and techniques of productivity improvements will lead to optimum and desired results only in organizations where positive environment for productivity growth exists.

Chiefly "work-culture" is a product of concern for achievement of results, management style, performance appraisal and decision-making process. The "Work Culture" provides the necessary and sufficient motivation and interacts with basic organizational value system. It is both a result and determinant of the value system. The value system reflects what is most clear to the management.

(ii) Involving employees through out the process of productivity improvement is important. The Japanese experience of Quality Circles is an example of how to involve employees in this productivity improvement process. The root source of productivity and quality is the employee and his knowledge. His involvement in the productivity improvement proce ss is very vital for the long term success of the

productivity programme. The problem today is not devising ways and means of improving but getting the solutions accepted and implemented. In one of the recent * American Studies, it has been observed that successful companies consider employees as the basic prime mover of productivity. We must evolve our own programmes and methodologies to involve employees in the productivity improvement efforts, consistent with our own managerial ethos.

Role of Government

The Government has a very positive role to play in terms of creating condition necessary for encouraging productivity growth especially in service sector organisation which more or less are part or extension of Government. Most of these organisations follow government systems rules and regulations for conducting their business. The factors which inhibit the growth of productivity must be eliminated. The systems and procedures must be simplified to cut down delays in dicision-making so that managements become more sensitive to environmental changes. Some of the other issues which deserve attention recruitment, political and bureaucratic considerations in day to day operations of the organisations and in union management relations, which have a bearing on productivity and which must be critically examined to strike an optimum balance between conflicting requirements of closer linkages with the Government and functional autonomy necessary for giving a commercial orientation to these organisations. This commercial orientation should not be interpreted in terms of generating profits but in terms of utilising all assets created for the good of the common man. The evolution of a management style based on the respect for the individual, result-orientation and requirements of the user, to promote productivity need to be emphasised in the context of our social and cultural values.

Components of the Strategy

Experience has shown that any strategy for ensuring continuous productivity growth has number of components, and a multipronged attack has been launched to realise full potential. The basic components (i) process of productivity management (ii) tools and techniques for productivity analysis (iii) productivity structure for understanding productivity in the context of organisation-specific systems and goals are the three corners of a triangle with commitment forming the heart of this triangle as illustrated in Figure (2)

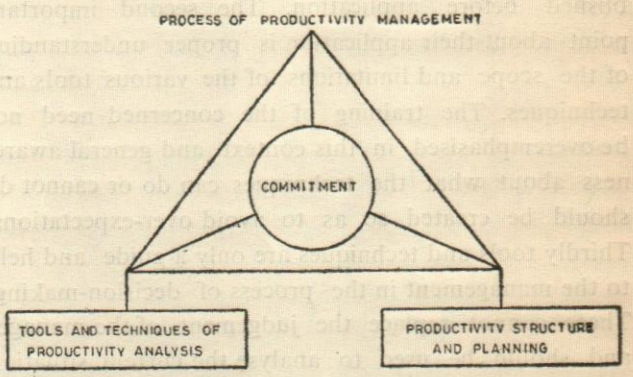


FIG. 2— COMPONENTS OF THE STRATEGY

(a) *Commitment*

A productivity improvement programme will not ordinarily succeed without the active support, and encouragement of top management. This commitment is essential as productivity improvement programme will need allocation of resources and shall be reflected in the management style as it sets the tone for others in the organisation. This commitment will be forthcoming once, we are convinced that productivity is central to the process of management and performance of the organisation is appraised by the productivity levels achieved also. Specific corporate and departmental objectives and targets in terms of the productivity performance must become a part and parcel of the overall budgeting and planning process. The basic value system should reflect a concern for the user and improving productivity should be viewed with pride rather than as an incidental activity.

(b) *Tools and Techniques*

The tools and techniques for analysis of productivity

*In Search of Excellence by J. Peter's and Robert H. Waterman Jr.

levels are fairly well-developed and have been tried and tested for their application in service sector. However, the indiscriminate use of these techniques, may not lead to desirable results. The techniques should be selected so as to tackle priority areas and should become the means for achieving ends rather than ends by themselves. Many times, in our anxiety to improve things or otherwise, we tend to make use of whatever we hear or whatever is currently in fashion. The appropriateness of the technique must be established before application. The second important point about their application is proper understanding of the scope and limitations of the various tools and techniques. The training of the concerned need not be overemphasised in this context and general awareness about what the techniques can do or cannot do should be created so as to avoid over-expectations. Thirdly tools and techniques are only a guide and help to the management in the process of decision-making. These cannot replace the judgement of the manager and should be used to analyse the current situation and evolving recommendations.

(c) *Process of Productivity Management*

The process of managing productivity essentially consists of creating an organisational climate where employees feel encouraged to identify with the organization and contribute to its goals. For a continuous growth in the productivity, the organisation must :

(i) Create an institutional mechanism such as Quality Circles, Production Action Teams, Task Forces, Employee Involvement Programmes for involving employees in the identification, analysis, formulation and implementation of the ideas for improving productivity.

(ii) Train employees at different levels of management with a view to equip them with necessary knowledge. The human resource development often has received low priority especially in service sector. This activity should be given its due recognition and money spent on this should be considered as an investment. In addition to technical training, the managers, supervisors and workers should be trained in problem-solving approaches, attitudinal aspects on continuous basis,

(iii) Develop result-oriented organisational structure with clearcut and defined responsibilities, modernise and simplify systems to avoid delays in decision making.

(iv) Encourage development of a positive relationship between the workers unions and management. A climate of confidence is pre-requisite for implementation of productivity improvements. The workers representative or union has also to play a very key and positive role in this regard. Any resistance to change, both by workers and management will only result in reducing the overall efficiency and effectiveness of the organisation. Changes have to be accepted to keep up with fast expanding technological and managerial knowledge. It will also be necessary that gains of productivity are shared properly with the workers through the design and implementation of Productivity Linked Reward Schemes.

(d) *Productivity Structure and Planning*

Most of our organisations in service sector have measurement systems in terms of money value without integrating in many cases, the physical targets. To develop a proper understanding about productivity in the context of organisational goals and objectives, it is essential to :

(i) Formulate organisational specific productivity definition so as to focus attention of all concerned on the significant outputs and inputs.

(ii) Isolate and identify heirarchy of outputs at departmental, sectional level to integrate this with extensive budgeting and planning process.

(iii) Fix specific targets to be achieved in respect of productivity measures to be achieved by different organisational units.

(iv) Evolve productivity monitoring system so as to compare productivity performance with targets/ standards, analyse deviation and isolate priority areas for actions.

(v) Fix responsibility for productivity improvement at different levels of management.

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EXECUTIVE READINGS

Essays in the Social History of Modern India
Ravinder Kumar

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The book under review is a collection of excellent research papers which individually and collectivelly contribute to our understanding of modern social history of India. Most of the essays in the book somewhat deal with colonial India. The studies hitherto on colonial India focus on political ideologies, nationalist sentiments and often missed the ideas, interests and motivations which prompted the disparate rank and file participants in the movement. Wholistic analysis of social movements has emerged recently. Ravinder Kumar opting for a middle track, studies both leadership and ideology and also the ordinary participants.

Several authors while acknowledging the crucial role of Gandhi in the Indian Liberation Movement ultimately disagree in their comments about the consequences of his mission. Ravinder Kumar says that Gandhi was at once a magnificant success and a colossal failure. That Gandhi was able to fuse the interests of different primordial collectivities as well as those of rural-urban, occupational and class groups into one whole, accounts for his success. But this coalitional strategy of mass mobilization was rather misty and ambigous and therefore, Gandhi had to anchor on the something more concrete and firm. "Gandhi deliberately picked upon religion as the basis for political action and national identity" (p. 42).

This Gandhian strategy to mass mobilization had the predictable consequences of differences between Hindus and Muslims. Gandhiji's theory of trusteeship and method of non-violent collective action did not force any threat to the rural rich and the urban bourgeoisie which led to the continued inequalities in the Indian society.

On reading the book, one cannot help noting the tension between the faith of the intellectual and the empirical reality that he investigates. The author believes that the role of productive activity provides excellent vantage point to begin the analysis. However, the empirical situation may not easily oblige him in this enterprise. There are apparently contradictory but actually reconcilable statements in the book. Ravinder Kumar like many other historians attempts to explain the present in terms of the past. He draws empirical evidence from colonial India and presses it into service to understand and explain social realities of independent India. At places, this becomes relevant and at others, suspect because the historicity of context between a colony and the nation state vary substantially. The apparent inconsistencies in the book may actually be the

indicators in the intellectual growth defining his value positions from time to time, as he wrote the essays over a period of 12 years.

The eleven essays in the book can be broadly grouped into three categories. There are essays of a general type such as 'Social theory and the Historical perception of Modern India', 'the Concept of Man in Indian History', 'Varieties of Secular experience'. The essays on 'Nationalism and Social Change', 'Class, Community or Nation?', 'The Transformation of Rural Protest'. 'From Swaraj to Puran Swaraj' etc., look at Indian society as a whole, although they discuss empirical date relating to specific regions or communities as illustrative materials. The third type of essays deal with particular events and locations (Rowlatt Satyagraha in Lahore, The Bombay Textile Strike, 1919 etc.) A thematic sectional grouping of these essays and a critique on them in the introduction would have been helpful to grasp the 'why' of the internal inconsistency in the central argument of the book.

Advanced Power System Analysis and Dynamics

L.P. Singh

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This book is a welcome additon to the small number of good books on advanced power systems written by Indian authors. The book is very interesting and informative.

Chapter 1 of the book is an intorductory chapter. Chapter 2 deals with power system network formulations. Nearly all the material in this chapter is available in existing book on the subject, especially the one by Stagg and Et Abiad. The only novelty introduced by Singh in Chapter 2 is the presentation of a flow chart for building Z bus. Chapter 3 deals with the representation of power system components. Detailed modelling synchronous machine is treated in a separate chapter. Modelling of three-winding transformers is omitted from chapter 3. New concepts of rotational and reflection symmetrics are introduced in this chapter. The last section in chapter 3 deals with six-phase transmission, and important finding of the recent work in this area are ably summarised. Chapter 4 contains the usual material on short circuit studies except for the inclusion of some flow-charts which will be found useful by program writers. Chapter 5 deals with numerical solutions of mathematical equations. I do not know why this material should be included in a Power System book. Its appropriate place is in mathematics text books, or at most as an Appendix in a Power System book.

The treatment of lead flows in chapter 6 is well done. Fast decoupled lead flow method which is widely used these days is discussed. Three phase load flow is also included. The ways of handling tap-changing transformers and phase-shifting transformers are presented. State estimation in power systems is not included, and one hopes that it will find its due place immediately after the lead flow chapter in future edition of the book.

Economic scheduling of hydro-thermal plants which is not dealt with in currently available text books finds it due place in chapter 7. Dynamic programming as an optimization technique is also discussed in this chapter.

The very important aspect of sparsity programming, which is again missing in many other text books on power systems is well-discussed in chapter 8. Application areas of sparsits are also included briefly. Oytimally ordered triangular factorization which forms the basis of many computer programs is discussed in an elegant manner. Chapter 9 on machine modelling is a very exhaustive chapter, and includes topics which are needed by all advanced students of power systems. Excitation and governor modelling as well as indiction machine modelling are included.

Chapter 10 deals with stability studies. More material on load voltage characteristics should have been included in this chapter. Similarly, voltage instability and voltage

collapse phenomena should have been considered.

On the whole, the book is very well written and well produced, with solved numerical problems included at appropriate places in nearly all the chapters. Pertinent literature is given as a list of references at the end of each chapter. These references will be found useful by those desiring to know more about a particular topic. Exercise problems are also given in each chapter, for the benefit of students. However, the answers to these problems are not given, which is drawback of the book. I hope that this deficiency will be made up in future editions of the book and also a complete solutions manual brought out,

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Quality Circles
A Practical Guide
Mike Robson

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The book consists of three parts. Part I deal with the quality Circle Concepts; Part II with introducing a Quality Circle Programme; and Part III tries to answer the question "Will it work for me"?

The Quality Circles Concept is discussed in four chapters (Chapters 1-4). The author starts by saying that a Quality Circle is a group of four to ten volunteers working for the same supervisor or foreman who meet once a week, for an hour, under the leadership of the supervisor, to identify, analyse and solve their own work-related problems. Beneath the apparent simlicity of this definition lies a concept and an approach to a range of organisational problems, of remarkable sophistication and power. The author strongly feels that Quality Circles will make a deep impact in organisations since it is 'owned by the members', as opposed to the many other management techniques which made their appearance during the last a few decades and failed to make to any appreciate impact. The core principles of Quality Circles are explained under the heads : Voluntariness, whose problem ?, Ownership, the adult contract, data-based problem solving, realistic time perspective and win/win. Some perceptions of the Quality Circles Concept and approach that can be seen in the Chapters are :

"The main reason for the success of Quality Circles is that they give non-managerial staff, with their first-lines supervisor the opportunity of contributing to the creation of a more successful organisation and more satisfactory working life".

"One of the 'Missing links' in many business to date, however, has been a system which enables a genuine two-way flow of information to take place, an increasingly important consideration as the organisation increases in size and the problems of communications become correspondingly greater . . . . . Now Quality Circles can fill this gap".

"As regards the benefits, changes in attitude, the advancement of a problem-solving ethic, and the development of supervisory performance are significant, but probably the most important of the range of non-quantifiable benefits is the power of Quality Circles as a method of pormoting, and achieving, the genuine participation of a much wider range of staff than has been achieved by other methods".

Chapter 2, Development of Quality Circles, has been presented reviewing briefly the impact of management thought since nineteenth century by referring to the contributions of F.W. Taylor and mentioning the role played by W.E. Deming and J.M. Juran in Japan prior to the introduction of Quality Circles and also expressing the view that the theoretical basis of Quality Circles can be found in the Y theory of Douglas McGregor. Had the author stopped at this itself there might not have been any major disagreement, but has concluded the chapter with these words : "There is a talk among some people of Quality Circles being culturally based, and only possible in the East. This given the discussion of McGregor's theory, is patently not true. Indeed, if there were to have been a cultural problem, it should have been the other way round, since Quality Circles are family based on modern Western behavioural knowledge".

The available evidence, particularly in terms of practice of management all over the world does not lead to such positive statements. While it may be true that the philosophy and ground rules of Quality Circles Approach and the six principles of theory Y go hand in hand (p. 32), it does not explain the phenomenal success of QC Circles and group working in Japan as compared to other parts of the world. This is only a theoretical argument and does not take away from a very good presentation of quality circles concept by the author.

Part II of the book deals with introducing a Quality Circles Programme in six chapters (Chapters 5 to 10). The basic requirements have been described as, commitment from the top, the problem-solving structures, the commitment of resources, namely, provision of coordinator, facilitator, and circle leader, cost arising from the solution proposed by the group as well as the outlays associated with setting up the programme. The roles of coordinator, facilitator, circle leader as discussed and on the issue of using outside resources, it is suggested that Consultancies with track record in management and supervisory development as well as Quality Circles are most suitable. A flexible model that can be adapted to suit any organisation is discussed. Training of facilitators and leaders is discussed in detail. There is a fair amount of detail regarding the introduction of the Quality Circles programme, but refers to some external material as well, for complete instruction. As mentioned in the preface the book outlines an implementation programme and indicates the training input needed for co-ordinators, circle helpers and circle leaders; to that extent the book stands on its own. Once a decision is made to proceed, however, "it becomes an integral part of the Gower Quality Circle Programme".

Part III of the book tries to answer the question, will it work for me ? in two chapters (Chapters 11 and 12). Quality Circles programmes in a wide range of industries have been discussed highlighting how different problems relating to the nature or history of the business in question have been overcome and then outlines a number of individual case instances. The final chapter mentions general problems and issues that can occur with a Quality Circle Programme in any industry. The author has done well to stress repeatedly in the book that applied simplistically Quality Circles will not fulfil its potential. What is worse is that progammes will be introduced under the title Quality Circles disappointing many managements and discrediting the programme itself. It is necessary to remember, as the author has said, that Quality Circles Concept is a complex and sensitive instrument; do it, but do it properly, because it is worth doing properly. The book has enough material to understand the nature and significance of Quality Circles properly. The emphasis on top management understanding, voluntariness, problem-solving structure, training and commitment of resources are all well placed. The jacket of the books points out that this book is the first full-length treatment of Quality Circles in the U.K. The author of the book has been involved in the Quality Circles moment since 1978 and this experience has been well referred in the book through lucid explanation with a thorough understanding of both theoretical aspects of Quality Circles. Those interested in the introduction of Quality Circles will find the book useful.

Alternative Designs of Human Organisations
Nitish R. De

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The history of the themes : Quality of life and quality of work life is in fact the history of the mankind. However, the impetus which these themes had received during the sixtees, because of a worldwide cultural shift marked by a reassertion of human dignity and the challenge to all traditional hierarchies had energised the social scientists all the world over, to have a 'close look' at the questions.

The present treatise is an attempt at 'looking close' at these questions.

De is profoundly erudite in his presentation of an overview of one of the most extensive programs in India of the alternative designs of human organisation and of his ideals for human future.

The first of the two sections in the book focusses on 'Alternative Design Pursuit', wherein the first chapter documents the details of many of the several experiments that have been carried out so far in India. While the treatment of several projects is fairly elaborate, that of NORAD ILO-NPC projects is curtly brief. One would expect a slightly more detailed treatment of the same for the review to be more balanced and exhaustive. His Format 'A Summary presentation of Indian Cases' is analytical, informative and at the same time, subjective and not exhaustive.

In his introduction, De discussing diffusion of alternative designs, mentions that there are some endogenous and exogenous forces which militate against the 'spread effect' but he does not dwell on how to cope with them enough adequately. He is disdainful of legislative reforms when he says "Most of us succumb to the bureaucratic model of legislative reforms". Emery in his insightful and incisive Foreword is more realistic when he says "It is my judgement based on some personal experience of each of these programs, that when all the many theories of diffusion are boiled down, the sanctions of a national interest in work democratisation, is critical for the speed, scale and depth of diffusion. In the absence of such sanctioning, diffusion will be laborious and fragmentary and frequently divisive".

Emery is sharply negative to progress through shortcuts such as pumping in patro dollars, which he rightly points has resulted in the emergence of dictatorial regimes and an explosive workforce, as has been evidenced in several newly industrial countries in South East Asia. Nearer home in India the centralised national planning with little industrial capitalism has not prevented the growth of divisions between workforce and mangement. Is there an alternative to this kind of social instability? Emery firmly believes the solution lies in integrating the workforce through conscious designing. Work democratisation is more relevant to the capital scarce Third World countries according to him, for it reduces the demand on the capital, increases the skills, commitment and thereby the performance of the people, making the organisations more stable because of reduction in status differentials, with increasing emphasis on human dignity.

The second chapter dwells on the organising and mobilising dynamics of human organisations and discusses *inter alia* the cases of Maliwada and the milk cooperative Kaira District. He adds emphasis to the point that consciousness raising effort is an important force which influnences and shapes the design of human organisations.

De, discussing the process by which a democratic change can be brought about to make the organisations socially more relevant and humanly more acceptable, presents the meta ideals, which should propel these organisations into a new world order.

De's solution lies in Samaj Siddhi- an assertion of a productive culture in establishing a new social order which cannot be brought in and conceptualised by expert planners and efficient minority implementors of plans. It requires a liberating sense of commitment which should encompass the deprived majority of population in the Third World and their counterparts living in comparative deprivation in the rich world. Liberation according to him is in collective thinking and collective action.

De is right when he says that there is less of emphasis on organisation ecology today. It is doubtful whether local community scenario, which he is pleading for, would ever take roots, taking into consideration the current trends in the world. He is righly negative on the devouring culture, consumerism, armament race and wastefulness of non renewable resources. But he is optimistic when he says : There has to be global planning, not be sectoral or reductionistic approach but by taking to the broader spectrum of a newer paradigm taking into account the complexity of issues involved. The paradigm which he presents lists the issues at four levels : at inter society leval, Nuclear society level, human groups level and at the level of persons as individuals and is by itself thought provoking. It's presentation in the form of an unfolding lotus is, however, quite ludicrous to say the least.

De quotes the other scholars to profusely that, what he has to say gets almost submerged in the quotes. Also a greater economy in words would have achieved better results. Works cited mentions, Madala's mimeo on Action Research porject at Srinagar Post Office, while in fact her work was at Swami Ram Tirath Nagar Post Office (p. 236). Publishers have done a good job, with an attractive get up of the book and with an error-free printing. But there was a faux pas in paging (p. 168) which one would not expect from Sage Publications.

Productivity
1985, XXVI, 2, 181-196

Select Bibliography
on
Productivity Management and Analysis

S.N. VIG

That the productivity is influenced by multiple factors and that all of them need to be analysed and managed effectively, for improving productivity, is a realisation that is gaining ground rapidly. The present bibliography on "Productivity Management and Analysis" is an endeavour, to help keep the managers of productivity abreast of and the developments in productivity management.

S.N. Vig is Librarian, Documentation and Information Officer, National Productivity Council, New Delhi.

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Letter From the Editor-in-Chief

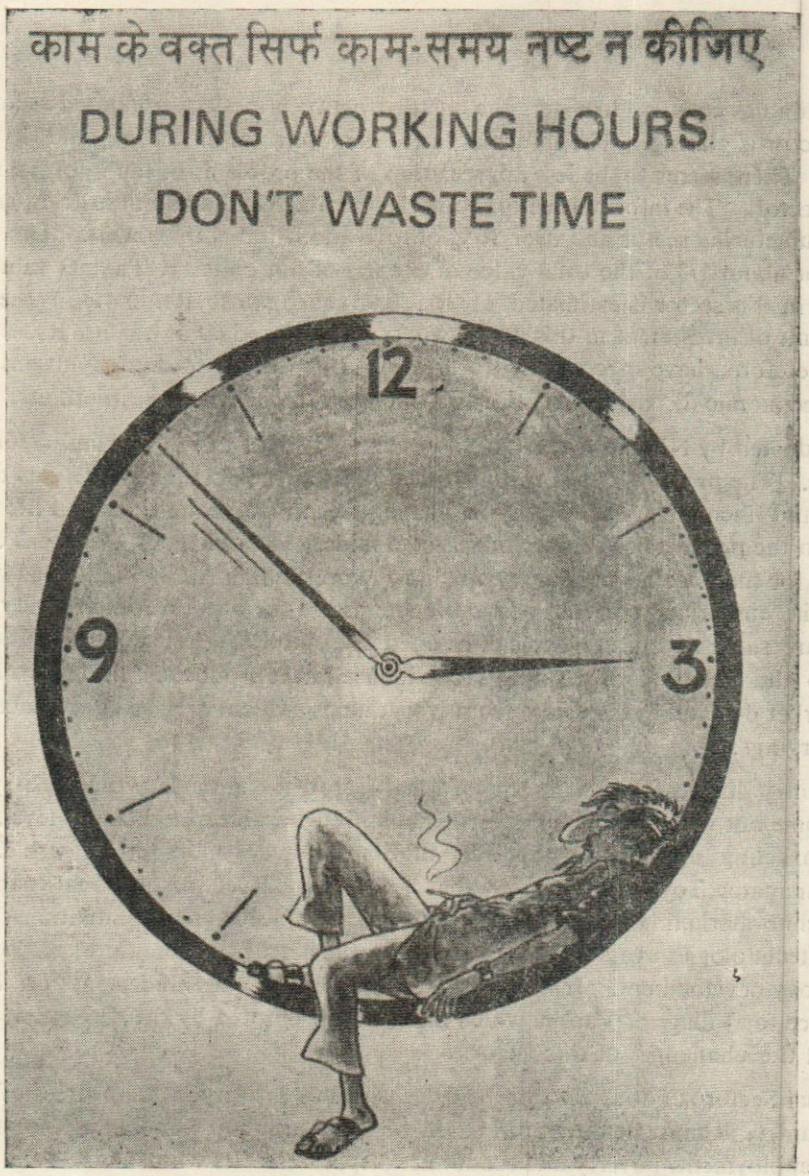
In a developing country like ours the contrast between modern organised sector and the informal unorganised sector is glaring. The informal sector is more rural in nature and its problems are complex and acute. There seems to be less appreciation of the problems of the informal sector as compared to the formal sector. The informal sector, comprising village and small industries, contributes 50% of GOP of the manufacturing sector and over 80% of total industrial employment. The exports from this sector account for about 1/3 of the total value of exports of our country. The net value added per unit of fixed investment in this sector is estimated at Rs. 0.96 as against Rs. 0.41 in the large scale sector. Production per unit of investment in this sector works out to Rs. 5.60 as against Rs. 1.80 in the organised sector. We, therefore, have necessarily to turn to this sector to find solutions to the problems of unemployment, economic disparities, rural urban differentials, scarcity of capital, etc.

Studies conducted by NPC in this sector have revealed that merely giving credit will not improve the performance. The productivity of the individual units at the grass root level has to be increased in term of sales and income levels. With the changing economic conditions and life style of people the expectation from the products of this sector has also undergone a change. Whereas once these products were in demand for their aesthetic value, people now expect a high utility value as well. An analysis of items sold in emporia shows that best selling items are the ones with high utility value. Handloom garments, silk sarees, cane furniture etc. can be cited as examples. Influx of imitations into market is also adding to the deflation of customers' confidence in the products. Imitations have also decreased the effective market demand as is evident from ivory items which are being replaced by cheap, less durable bone carvings.

If the country has to gain from the informal sector, it is necessary that we pay attention to these problems and come out with specific solutions which are workable at grass root level. NPC experience with techno-marketing upgradation projects of Blue Pottery of Jaipur, Aligarh Lock Manufacturing Units and Chennapatna Toys have revealed that grass root level institutional support system with emphasis on techno-marketing upgradation instead of credit needs greater attention. There are a number of intermediate technologies avaiable but not tested in the market. Absence of feedback system has also affected technology development. Institutions like Council for Advancement of Rural Technology, Centre of Science for Village at Vardha which have been promoted by the Government needs substantial funding to meet the challenges of this sector.

The Informal Sector is not a sector to be dealt with low priority in the process of economic development of this country. It must be developed based on its strength of finding solutions to the basic problems of unemployment, poverty and economic disparities. Its whole market lies in quality—quality not only in common sense usage, but also one of containing sense of beauty made up with human touch.

(R.S. GUPTA)


काम के वक्त सिर्फ काम-समय नष्ट न कीजिए
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