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# Attitude—the Key to Quality

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DR. J.J. IRANI

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*The author based on his experience at Tata Steel, points out that the human aspect has a lot to contribute towards the betterment of the quality.*

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## Introduction

India since independence has experienced a phenomenal growth in its industrial sector. The output of most industrial products has registered a quantum increase. There is also a discernible drift towards adaptation of higher technology of production. Products like automobiles, diesel and electric locomotives, photo film, computers, semi conductors, thermal and nuclear power plants, sophisticated defence equipment and many others are now being manufactured in our country. This revolution, in quantity and variety of Indian products, was not necessarily associated with an equal progress in quality. On the contrary the image of many Indian products in the international scenario leaves a lot to be desired. What is even more disheartening is the fact that by and large the Indian industrialists, entrepreneurs, engineers and even the consumers have, so to say, come to terms with the state of affairs and appear to have, more or less, settled for the less-than-top notch quality of indigenous products and services. A psychological resignation of this sort is detrimental to the industrial development of our country. While the count-down for the 21st century has begun it is time for us to break this syndrome and face the situation squarely. The objective would be to define what has gone wrong with quality of our products and to ascertain what needs to be done to correct the situation. This is the purpose of the present deliberation.

The author has derived the best part of his experience at Tata Steel, a company that had been and continues to apply its resources in reversing this trend. Fortunately the will to produce quality product has prevailed and the company has succeeded in consolidating its product image. Further actions are on the anvil to improve the quality and reliability of its products even further to meet the present and expected future demands posed by increasing sophistication of Indian industries. Although, the specific examples cited in this presentation are drawn predominantly from the experience at Tata Steel and the dealings with its suppliers and customers, the points made are relevant to the manufacturing industry, at large, and could be translated readily from one situation to another.

The excellent image that Tata Steel enjoys, is a direct reflection on the attitude of its management that has permeated down to one and all. The author firmly believes that the failure to achieve the desired quality can be primarily attributed to certain attitudinal barriers, summarised as :

- (a) quality being viewed as an obstacle,
- (b) quality being viewed as an abstract attribute,
- (c) inspection getting preference over prevention in the matter of quality assurance.

#### Quality—An Obstacle

It is not uncommon to view quality as an obstacle that has to be surmounted before a product can be supplied to a customer even if the quality level involves certain risk of rejection by the customer. This has culminated into the manufacturing philosophy which can be summarised as "a good enough product is the best"; the philosophy trickles down to the shop floor as the concept of "Chalega".

An immediate consequence of this feature is that the level of quality being aimed at a given point of time, is largely governed by the market forces of demand and supply rather than being an objective attribute related to the efficacy of the product. Considerable effort is misdirected to maintain the

market forces conducive to a low level of quality often with subdued ethics.

What is being overlooked is that, in the final analysis, it is often cheaper and not costlier to do things right in the first place. To quote, Philip B Crosby "Quality is free . . . . . What costs money are the unquality things—all the actions that involve not doing jobs right the first time."

It is true that when an honest attempt is made to change the system, the preliminary expenses run high. More importantly some of the initial revelations are nerve shattering for the weak minded. But at the end of the day, when the dust settles down, the benefits in terms of lower cost of production higher price commanded in the market and the hard earned goodwill, more than compensate the efforts.

The author is pleased to share the information that working along this line, Tata Steel have received a rich dividend. Even while catering to an increasingly knowledgeable and quality conscious market and the company's bid to make more and more of high valued special steel items, the company succeeded in registering the records for an all time high proportion of tested steel, and an all time low arising of defective steel in the last financial year (1985-86). The quality achievement in the last 10 years is summarised in Table I.

TABLE I

The Quality achievement of Tata Steel over the last 10 years in the perspective of increasing volume of production and productivity

	1975-76	1985-86
Total production of saleable steel (million tonnes)	1.486	1.772
Capacity Utilisation (percentage)	93.8	102.00
Percentage of Special Steel (Despatch basis)	18.75	35.25
Percentage of tested steel	75.71	86.54
Percentage of defective steels	6.14	4.62

To put it in proper perspective, it should be pointed out that all this happened when the company was breaking the records of total production every year for five consecutive years. There can be no better way to prove that quality and quantity are not conflicting concepts at all.

### Quality is Abstract

In the field of engineering industry both the purchaser and the manufacturer are supposed to possess enough technical competence. In spite of that, it is surprising to find that the matter of quality is frequently expressed in vague terms: open to subjective interpretation. It is not uncommon to find stipulations demanding suitability to a particular type of end use without any effort to elaborate what factors contribute to such suitability and how is the manufacturer supposed to test and stand guarantee for it. Freedom from harmful defects is a commonly used phrase in technical specifications. Little attempt is made to clarify what is harmful and what is not. When the products finally fail to perform, tremendous effort is spent to establish whether the product itself was inherently deficient or the fault was with the defective practice at the user's end. The ensuing friction generates a lot of heat but little light. There are other examples of all defined clauses like 'complete freedom from defects'—which, again, is not possible to attain. Ultrasonic testing is often required but the criterion for acceptance or rejection is left to imagination. The matter reaches a climax when an industry in the organised sector tests the soundness of one of its components by the sound emitted, when the component is dropped on the floor.

Both the user and the manufacturer are responsible for such a situation. An accurate specification requires precise knowledge of the conditions of use and service parameters which the user should attempt to acquire. There is also an unhealthy attempt to evade paying the price for the right quality by keeping the stipulations obscure. The other extreme is also not hard to find where there is a tangible attempt to play safe by over specification naturally at a cost. At the other end of the scene, the manufacturer has to know how to implant the attributes quantified by the

purchasers in his products. He needs to equip himself with the necessary production facilities, process control and testing equipment required and that is a tall order in the present situation.

The Indian Standards Institution can play a very effective role to clear some of the confusion. Today one finds so many aspects left to the mutual agreement between the purchaser and manufacturer leading to considerable chaos. A large number of specifications will also require revision to improve clarity and to spread the concept of quantification of quality. Experience gathered over the years in India and the changing trend in international standards could provide some guidance.

Contemporary research all over the world has brought about a much better understanding of certain hitherto abstract properties of metal, like machinability, formability, weldability, cleanliness, fracture toughness. The relationship between the properties of steel and its macro and micro structure is also known with better precision. Experience with Indian industries, however, indicates that the comprehension, of these subjects, continues to be rather nebulous. The author recollects an organisation engaged in constructing a plant in the Himalayan region. The work involved extensive welding, at subzero ambient temperature. The organisation tried out a wide variety of materials, testing their room temperature strength and ductility. The matter was referred to the experts of Tata Steel, suppliers of the steel. The grade of steel selected paid due weightage to the properties having over-riding importance, i.e. low impact transition temperature and weldability at subzero temperatures. Once the criterion was properly established it was possible to recommend and supply a suitable and cost effective material. The example underscores the importance of intensive interaction between the manufacturer and the user on a constructive note.

It is worth citing another example of what could be achieved through a constructive and deeply involved interaction between the manufacturing and consuming organisations. An automobile manufacturing company was encountering high rejections on crank shafts. The

company took pains to analyse the problem and was able to identify that their problem was related to the cleanliness of the steel. They realised, as a corollary, that the methods being followed for evaluation of cleanliness were not adequate. Taking the cue from the other automobile manufacturing companies around the world this company was able to quantify their requirements in terms of a new test and define its own criterion for acceptance. The metallurgists of Tata Steel accepted the challenge to meet the new standards. There were initial failures but the experts of the Steel Company used their electron microscope and micro-analysis facilities to extract valuable information from the new tests prescribed by the automobile company. With some effort the specific cause of the problem was identified and corrective actions could be taken by the Steel Company. Subsequent supplies were fully satisfactory to the customer. The Steel Company was also successful in replacing a slow and energy intensive process, the Electro Flux Refining, by another more productive process; Vacuum Arc Degassing & Refining. The transition was quick and reliable as the testing technique the standards of acceptance, and the understanding was complete.

### Quality by Inspection

A reaction, to demand for a higher level of quality by the market is intensifying of inspection. This move is as ineffective as it is dangerous. It is ineffective because quality cannot be 'sorted out'. It has to be 'built in'. It is dangerous because with a large contingent of inspectors waiting down the line quality ceases to be the business of the person who is actually producing the material. There is indeed some truth in the sarcastically stated modification of Parkinson's law which proclaims, "In a closed system, the number of mistakes made expands to fill the inspection capacity available".

The emphasis must lie not in weeding out the defectives but in the prevention of their occurrence. The following steps lead to the building of a system which is designed for prevention of defectives :

*Step 1* : Understanding the users' requirement completely and quantitatively.

*Step 2* : Laying down the complete specifications in unambiguous terms and getting it cross checked by the user.

*Step 3* : Writing down a well laid out process chart which is expected to meet successfully the relevant specification.

The process chart should indicate specific process control parameters, extraordinary precautions to be taken and action suggested in the event of accidental non-compliance with any of the requirements. Every concerned individual should be fully familiar with the process chart. For materials being produced over a considerable length of time it may be a good idea to review and update the process charts from time to time.

*Step 4* : Deciding on the quality of inputs and the source for guaranteed quality of supply. Compromise on account of quality of inputs acts as a serious handicap to quality and proves expensive in the long run.

*Step 5* : Evaluation of the capability of the involved processes and equipment to produce the desired quality. If a particular process or equipment turns out to be inherently deficient, decision might be taken to modify, improve, replace or discard the process. Particularly attention needs to be given to equipment capability and the peripherals like instrumentation, toolings, jigs and fixtures, power supply system etc. More often than not these peripherals can make or ruin the quality.

*Step 6* : Implementing a scheme to ensure that the process control parameters indicated in the process chart are duly adhered to.

*Step 7* : Instituting an audit checking system to prevent any slide back from the established quality standards.

The foregoing methodology of quality assurance has been tested with great success at Tata Steel. The major emphasis of the company had been to improve

the process capability and augment the testing facilities which have been discussed in the next section in greater detail. Every case of high rejection of customer complaint is investigated thoroughly and appropriate corrective actions are taken. The resulting improvement can be illustrated by way of one example. During middle of '84 the rejection due to steel defects in the Medium & Light Structural Mill used to hover between 10 and 15%. A series of corrective actions were taken to bring the rejections down to a level of 2 to 3% in a matter of two years even though the product mix changed in the meanwhile to include more difficult products. The course of this improvement over a span of two years is shown in Fig. 1.

**The concern for Quality at Tata Steel**

The process and equipment of Tata Steel have been

improved and augmented continuously over the years. To illustrate the dynamic approach the organisation has taken towards both building in and assuring quality, a resume of some of the major developments is enumerated below. The list is far from being complete and attempts only to highlight the span of activities undertaken by the organisation to enhance the quality of its products.

**Steel Making Area :**

- \* Use of splash cans to improve the surface of the ingots.
- \* Optimisation of the deoxidation practice.
- \* Introduction of mechanical capping of rimming steel.
- \* Optimisation of design of the ingot moulds.

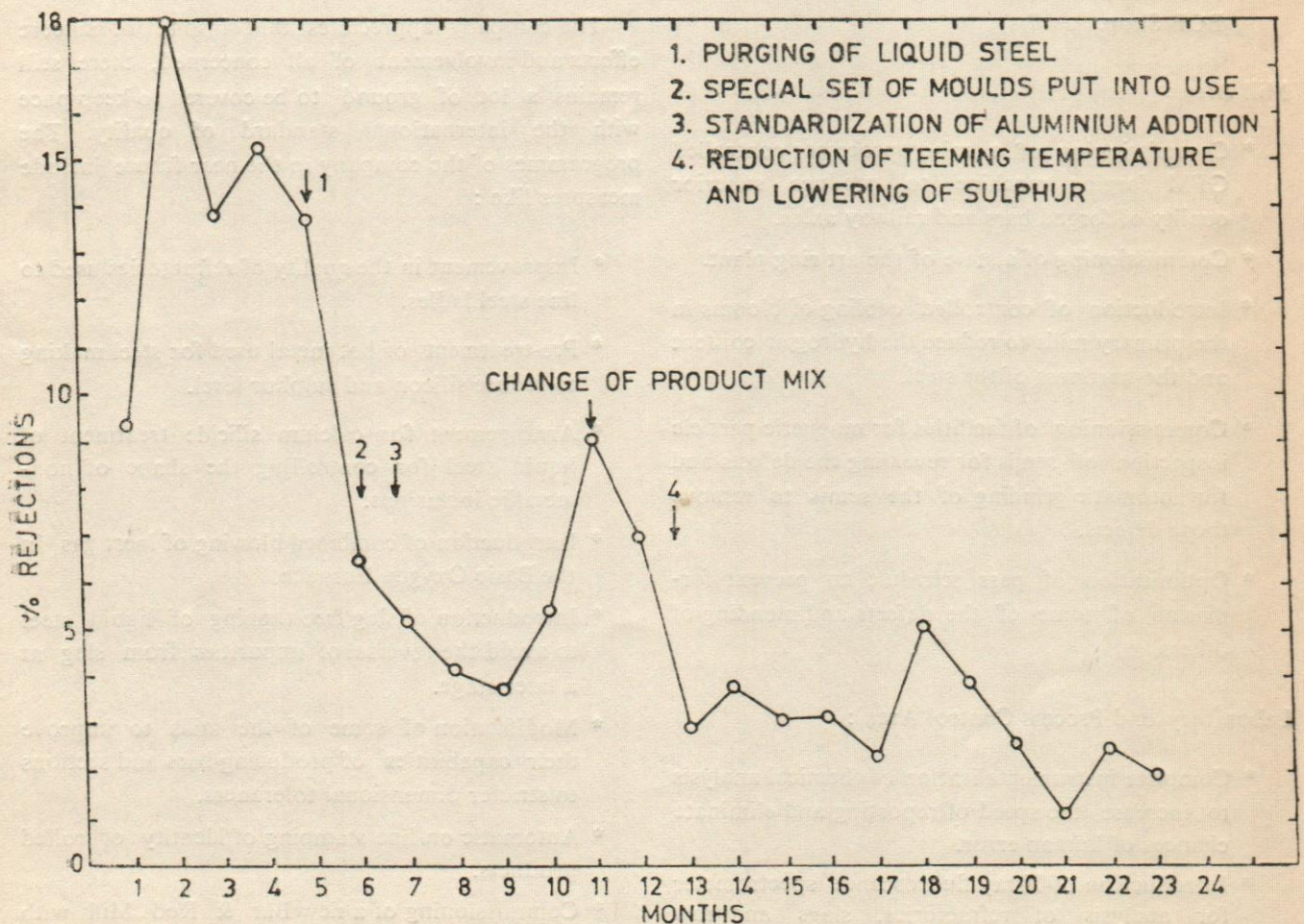


Fig. 1 : % Rejection of Steel at MLS Mill

- \* Adopting a restricted range of chemical composition than that specified, with the objective of ensuring more uniform properties and to avoid compositions prone to high rejection.
- \* Introduction of the practice of bottom pouring of ingots.
- \* Use of slide gate stopper system.
- \* Introduction of the wide end up ingot mould practice.
- \* Rinsing of the liquid steel by bubbling of inert gas.
- \* Commissioning of Vacuum Arc Degassing and Refining Unit.
- \* Introduction of inert gas or refractory shrouding of the stream the objective being prevention of atmospheric oxidation of the liquid steel.
- \* Completely computerised process control in the BOF Shop.

#### Mill Area :

- \* Commissioning of a microprocessor controlled GFM forging machine to produce superior quality of forged bars and railway axles.
- \* Commissioning of a state of the art ring plant.
- \* Introduction of controlled cooling of blooms in the primary mills to reduce the hydrogen content and the hardness of the steel.
- \* Commissioning of facilities for magnetic particle inspection of semis for revealing the defects and for automatic grinding of the semis to remove those defects.
- \* Optimisation of pass schedule to prevent formation of some of the defects and mending of others.

#### Laboratory and Process Control Area :

- \* Complete instrumentalisation of chemical analysis to increase the speed of reporting and eliminate chances of human error.
- \* Introduction of X-ray fluorescence spectrometer for analysis of refractories, slags and raw materials.

- \* Introduction of atomic absorption spectrometer to analyse alkalis in raw materials and slag.
- \* Addition of a gas analysis laboratory for analysis of nitrogen, hydrogen and oxygen in steel.
- \* Use of mobile spectrometers for checking the grade of steel on the shop floor.
- \* Extensive use of ultrasonic testing, magnetic particle inspection and other non-destructive testing techniques.
- \* Facility for optical and electron microscopy and EDX micro analysis system.
- \* Use of personal computers for the purpose of model studies and evolution of process control parameters.
- \* Facility for creep and fatigue testing in addition to all routine testing for mechanical properties.

The company appreciates that inspite of sincere efforts and involvement of all concerned, there still remains a lot of ground to be covered to keep pace with the international standard of quality. The programmes of the company in the near future include measures like :

- \* Improvement in the quality of refractories used to line steel ladles.
- \* Pre-treatment of hot metal used for steel making to reduce silicon and sulphur level.
- \* Arrangement for calcium silicide treatment of liquid steel for controlling the shape of non-metallic inclusions.
- \* Introduction of combined blowing of inert gas in the Basic Oxygen Furnace.
- \* Introduction of slag free tapping of liquid steel to avoid the reversal of impurities from slag at a later stage.
- \* Modification of some of the mills to improve their capabilities of producing bars and sections to stricter dimensional tolerances.
- \* Automatic on-line stamping of identity of rolled products.
- \* Commissioning of a new Bar & Rod Mill with provision of no-twist block and Tempcore and

Stelmor cooling lines to produce bars and wire rods with superior and uniform dimensions and mechanical properties.

- \* Proposal for installation of a wide strip mill incorporating modern process control facilities like automatic gauge control and accelerated cooling of products.
- \* Setting up facilities for testing machinability of steel.
- \* Computerisation of all activities connected with issuing of test certificates.

The company has also taken a decision to provide an extensive computer network with terminals in different departments so that vital process information can be stored, retrieved and transacted with ease and speed. This would certainly help in taking prompt corrective actions and prevent recurrence of mistakes

#### The Human Aspect

The quality of a product is the manifestation of the quality of the people who produce it. This in turn reflects the quality of the people who manage them. Selection of the right man for the right job and to impart the requisite training are management functions. The importance of such functions need not be emphasised in this paper.

The motivation factor is also a major consideration. It is widely appreciated that involvement and recognition is a more powerful motivator than money alone. Many organisations incorporate this element of recognition with the help of the quality circles, with excellent results. In Tata Steel the employees are encouraged to put forward their suggestions for improvement in their respective fields of work. Many of these suggestions, relate to the improvement of quality of products. Any suggestion that is implemented earns the employee a cash award along with recognition in public. This scheme is found to have generated a lot of enthusiasm among the employees.

The crux of the problem is to create a culture of quality consciousness among the employees. In Japan an operator inspects his own products and is accountable for the quality he turns out. The awareness of

the Indian operators has to be raised to a level when such a system can become a reality. The trade unions have a vital responsibility of promoting the awareness for quality among its members. It is desirable that the incentive schemes in our country are linked with the production of good quality material rather than the 'gross production.' The trade unions should assume the responsibility to extend their support in this matter. In some of the old production units and in the new production units of Tata Steel, it has been possible to introduce the element of quality in the incentive schemes. The responsive and responsible role taken by the Tata Workers Union in developing and implementing such schemes is worth appreciating.

#### Role of the Government

The policies adopted by the national Government influence strongly the attainment of quality by the industries in general. Experience with the steel industry indicates that certain policy formulation by the Government would be a great help to upgrade the equality attained by this industry :

- (i) The Government could consider endorsing certain mandatory provision for quality assurance in term of personnel and equipment, in the same way minimum norms for safety and industrial welfare are enforced.
- (ii) The Government can introduce suitable incentives in the form of subsidy, tax relief, reduced import duty, partial financing for purchase/import of vital process control equipment.
- (iii) The quality of products in the steel industry often suffers from inherent deficiencies in raw materials like coal, flux and refractories. This handicap restricts the country's capability to produce certain sophisticated products. As a result, higher foreign exchange outflow is necessary to import these products. It is logical to consider import of the requisite quality of inputs and encourage the industry to make the product indigenously.
- (iv) A large quantity of steel is sold in the country without any ISI certification although, ISI

standard for these products does exist. It is recommended that the Government should take a greater initiative to prohibit marketing of any such product without ISI certification.

#### Conclusion

1. Quality is essentially a matter of attitude; the attitude of those who manufacture the goods, those who manage the show and of those who buy them.
2. Quality is not an abstract attribute of any

product. It can be and has to be quantified and understood by the manufacturer and the purchaser.

3. Quality needs to be built in, i.e. produced. Selection of the right raw material and process and development of optimum process control measures should get precedence over inspection of finished product.
4. The success of Tata Steel in improving the quality of its product is a reflection of the efforts made by both the Union and the Management.

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# Quality Management in Power Sector

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M.L. SHISHOO

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*The author in this paper points out the need for better quality management in power sector for better performance. He emphasises importing right technology, creating quality, consciousness among the personnel, as important factors for achieving better performance.*

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## A. Development of Power System in India

Since independence there has been a phenomenal growth in industry and in agriculture in the country. This is not unusual but quite characteristic of a developing economy. It is as if the demand that lay dormant for decades suddenly found expression.

This growth has resulted in a spurt in the demand for power and hence also development of power sector, the power being the main input to the industry, as also to a large extent to the agriculture. In response to this increasing demand our National Five Year Plans have been making huge plan outlays for the development of this vital sector. In order to make up for lag in the development for decades, we have had to quicken our development pace through technical collaborations and borrowed designs.

## B. Ensuring Quality with Transfer of Technology

However, transfer of technology is not that simple and often donors are not that obliging. Broad specifications and blue-prints do not by themselves ensure a product of the same level of reliability as the original unless we are able to observe the same quality norms as those of the collaborators. Collaboration tie ups should specifically provide for transfer of this information regarding quality plan. User has lot of stake in ensuring that the equipment manufactured indi-

generously conforms to collaborator's quality standards. We have seen in the country that equipments manufactured to otherwise proven designs of the collaborators have often not come up to the same reliability and availability level.

As a result, in the power sector, the reliability and availability of the equipment has suffered which has got reflected in poor Plant Load Factor. It is, therefore, necessary that the user should assert himself and insist upon the manufacturers to acquire quality manuals, quality plans for manufacture, installation, testing and commissioning and in fact should set up its own quality inspection unit in the major equipment manufacturers' works to ensure the observance of the quality standards.

### C. Quality Control in NTPC

NTPC has been conscious of the tremendous responsibility placed on it and is working continuously in a coordinated manner towards the attainment of high reliability for its power plants to ensure optimum utilisation of the plant capacity. In a service sector like NTPC, we have to instal various generating equipments and accessories supplied by various suppliers and manufacturers and the quality of our operation is largely dependent on the quality of equipments supplied. The role of equipment supplier on one hand and the users on the other is highly complimentary in achieving the high reliability of equipments. The quality plan has to cover all the stages, that of design, procurement, manufacture, testing, commissioning as also operation and maintenance. Often, the attempt seems to be to have the quality audit at the final testing stage and other stages are not given due importance. This often leads to sub-standard products with internal defects/deficiencies surfacing during operation.

A small fuse or terminal connector may not by itself be of a high value item in terms of cost but its bad quality and subsequent failure in operation could in some cases lead to shut down of a complete installation or lead to the damage of the main equipment. A non-return valve may not seal properly or an auxiliary contact used for a vital interlock may not

close or open as expected and can lead to serious damages. Quality in all facets of operation has to be given due importance. NTPC is conscious of its requirement of total quality assurance through all the stages of design, manufacture, installation and testing, has developed a quality assurance system. It has set up its quality assurance units in the major manufacturers' works and field quality units at project sites. The entire quality assurance wing is independent of project execution authority. By following an integrated quality management system, the industry can achieve a project quality improvement in a progressive way. NTPC can derive satisfaction from the fact that through its meticulous adherence to quality control plans, it has made manufacturing industry quality conscious. The industry has come to realise the need for quality assurance. It has helped the industry to successfully compete for international bids subjected to stringent quality norms.

### D. Poor Utilisation of Power Plants

Despite very large outlays in power generation projects and growth of generation capacity, we are not able to keep pace with the demand. The entire power system is over-strained. There is no spinning reserve and you find heavy power cuts all over the country. To remedy the situation calls for addition of large generation capacity. Although we have plans for the same but we are not able to give effect to the same in view of the resource constraint. We had to prune down drastically our projections for the 7th Plan and contain ourselves within the resource availability limits. This, therefore, brings out the necessity for maximum utilisation of available capacity. We have to go a long way to improve the utilisation. As on date, the average Plant Load Factor (PLF) for the country is only 52%. Even during the recent World Energy Conference, there was so much of emphasis on better utilisation of energy options available.

One of the major reasons for poor utilisation is poor reliability of the generating equipment and hence also its poor availability. Design and manufacturing defects that remain undetected during the manufacture due to inadequate quality control ultimately surface during operation. It then becomes difficult at that late

stage to remedy those defects in a definite way as it could have been done at the manufacturing stage. People have a wrong notion that if a particular equipment passes the final acceptance test at the manufacturer's works, that is adequate to prove that the equipment has been manufactured to the quality standards. Unless a meticulous quality assurance plan is followed by the user right from the stage the contract is awarded till the equipment is commissioned, one cannot be assured of the quality. Right at the contract stage, there has to be an understanding between the supplier and the user regarding the quality plan, regarding the check points and hold points and if the manufacturer does not have enough of information/data regarding quality requirements, it is necessary to obtain the same from their collaborators and incorporate it in the manuals and the user should be at pains to ensure that the quality plan is implemented scrupulously. There have been a large number of cases where deviations in quality requirements during manufacture came to light only because the user had a quality unit stationed at the manufacturer's works and the user could intervene at the right time and necessary corrective action could be taken and even if a compromise became necessary, the implications of the compromise were very clear regarding how far the safety margins have been eroded and what sort of special monitoring would be required and the deviation was very well recorded for a future reference.

Each of the generator coils is tested before it is laid in the slots. But when the generator is tested it fails under high potential test. Why? Because the handling of the coils of their insertion into the slot was not subjected to strict quality check. Insulation suffered mechanical damage in the process.

The turbine rotor is supposed to be assembled within close tolerances but when it is subjected to high speed test, the blades were found getting loose. Why? Because machining tolerances at the root were not strictly adhered to.

The high voltage motors were successfully tested in the manufacturer's works but within a short time of operation, insulation failure took place and it was seen that the stator coils moved at each start and in

the process the insulation got cut at the slot exit. Why? Because quality norms to ensure that the movement of overhang position was arrested through adequate fastening arrangement were not adhered to.

A fastener within the generator stator ran loose and fell inside and got sucked into the air gap and damaged the whole generator rotor and the stator. Why? The bolt was not adequately locked and further was made of magnetic instead of non-magnetic material.

Many such examples can be cited to establish how non-existence of or non-adherence to the available quality plan has resulted in un-reliability of the equipment and failures that exacted high penalty by way of long outages which in turn brought down the availability of the generating plant.

Unfortunately, there is no guarantee that if quality control in respect of main equipment is taken care of, laxity in respect of the peripherals would not matter. Well sub-standard quality of peripherals have often brought forth disasters. A leaky non-return valve has resulted in water ingress into turbine and damaged the rotor. Even a faulty connector has resulted in non-operation of a trip circuit at the time of a major fault which could not be instantly cleared and resulted in severe damage. Ceiling segments of an inlet steam valve have ran loose and found way into the turbine causing serious damage.

### E. Creating Quality Consciousness

Very small items by themselves which, one would normally tend to ignore often exact heavy penalty due to insufficient attention to the quality of these peripherals. One has to go about the quality control systematically. Quality control measures are to be spelt out explicitly in a detailed manual and the requirements are to be enforced without any compromise.

Such quality controls become really effective provided one realises the full implications of these requirements and does not pay only lip service to the quality plan. It has often been seen that in the manufacturers' works, workers do not realise the

gravity of the consequences flowing from non-adherence to some of the quality norms and they take the same very lightly. Not their fault. It is part of the quality enforcement plan that the workers are educated regularly through audio-visuals, through periodic appreciation programmes to make them realise the significance of these quality requirements and the heavy price one has to pay for default in the same. Unless quality consciousness and awareness is achieved and becomes a culture, quality control will only remain a dream.

#### F. Standardisation of Codes & Practices and Evolving Special Test Procedures for Quality Assurance

I should like to bring out another aspect. Present standard specifications by and large specify the limiting conditions which at best ensure the safe functioning of the equipment. The standard codes or practices have not been sufficiently evolved to ensure that the quality of the equipment produced is of the desired standard. Conformity to such quality standards could be a certificate for reliability under difficult operating conditions and for availability of the equipment and would also be in a way a measure of equipment life. After all, various types of equipments conforming to the same standard specifications and brand names conforming to the same specifications connote different quality standards, different expectations of reliability and availability. In the absence of proper evolved codes in such matters, it is very difficult for a user to distinguish between two products at the bid stage conforming to the same standard

specifications and carrying widely varying price tags. Under the prevalent practice, one has of necessity to go by the lowest price tag because there is no quality tag attached to it.

The result is that often products conforming to the standard specification requirements are evaluated on the same basis irrespective of widely different quality levels. Capacitors, for instance, may conform to the same standard specifications but behaviour under varying temperature conditions may be widely different.

Take for instance, cases of electrical motors. The code of practice has to be evolved that these motors, apart from high potential test, satisfy partial discharge test, dielectric test. We should like to have reference characteristic of motor insulation of different ratings to be able to distinguish the quality of the soundness of insulation of one set of motors from for other. No proper codes have been established to bring out the requirements of motors used for difficult starting conditions. For instance, to incorporate the requirements of starting time, ratio of starting torque to running torque, thermal withstand, capability of withstanding stalling current, etc. Non-existence of codes in this respect has resulted in sub-standard motors being used which have proved well below the standard requirements, resulting in frequent insulation failures bringing down the availability. Reliable pressure switches, uninterrupted power supply system of the desired quality needed for sophisticated equipments are not available inspite of so many collaborations.

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Quality – A Way of Life

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# Quality Management in an Indian Engineering Enterprise

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B.S. SAMAT

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*The author in this paper focuses on the quality aspect in managing and engineering enterprises. To involve the people in quality management, the author emphasises the need for institutions like quality circles. Much of what the eminent author says in this paper is from his experience in BHEL, a heavy engineering enterprise.*

## 1. Introduction

Quality of Products and Services and Quality Management in large organisations are matters of great topical interest today all over the world. Indian Industrial and Service Organizations are equally concerned with the need for upgrading their programmes and match the Quality levels achieved by other international organisations. The experiences of such development effort for Quality in a large engineering enterprise in India provide the basis for this paper which will be of interest to several others in this country to appreciate the direction and management for Quality.

## 2. Concepts of Quality

Quality in Juran's words is

"FITNESS FOR USE."

Quality, as defined by ASQC, is the

"TOTALITY OF CHARACTERISTICS AND FEATURES OF A PRODUCT OR SERVICE THAT BEAR ON ITS ABILITY TO SATISFY A GIVEN NEED."

Quality of a Product is dependent on

"QUALITY OF DESIGN" and  
"QUALITY OF CONFORMANCE."

B. S. Samat is Chairman, Bharat Heavy Electricals Ltd., New Delhi.

Conformance to Design and Specifications demands elimination of non-conformances by Prevention of Defects. The main image of Quality Control is

“PREVENTION OF DEFECTS”.

A programme of Defect Prevention in large organisations and complex products calls for a system-based approach. This will lead to the formulation of a programme for

“QUALITY ASSURANCE”

which comprises of

“ALL THOSE PLANNED AND SYSTEMATIC ACTIONS NECESSARY TO PROVIDE ADEQUATE CONFIDENCE THAT A MATERIAL, STRUCTURE, COMPONENT OR SYSTEM WILL PERFORM SATISFACTORILY IN SERVICE”.

Such a Quality Assurance System must be founded on the basic premise that every “TASK PERFORMANCE” is responsible for achieving conformance in his operations. In large organisations the Quality Assurance System must be documented and spell out clearly the responsibilities of each functional group. The contents of a Quality Assurance System Manual adopted in BHEL are listed in Annexure 1. Thus, it becomes obvious that Quality programme has to be a plant wide activity unlike inspection which is essentially a localised activity confined mostly to the manufacturing shops.

The Quality Programme in Our Organisation develops prevention-oriented QC plans and procedures appropriate to each functional group in consultation with the respective groups; hands them over to each group for routine adoption by the group itself—on the principle of self-control; coordinates all the activities related to Quality.

In further support of the Quality Programme, an additional organizational arrangement was the formation of Quality Surveillance groups which would be particularly responsible for safeguarding the customer interests by providing additional Surveillance and

checks at specific stages of product manufacture. In specific situations, services of third-party Agencies like Lloyd were engaged to inspect and certify Products. BHEL's Customers were encouraged to place resident Surveillance or Inspection Teams to inspect at Customer Hold point stages and to clear the Product only when all tests were satisfactorily performed.

### 3. Training for Quality

In the past, the traditional approach to achieve Quality has depended on Inspection. If an organisation plans to base its Quality Management effort on the basis of a Quality Assurance Programme, the start must be made through a massive Quality-related Training Programme. A well defined objective for Quality-related training is development of company personnel—in all functions and at all levels—to acquire those attitudes that knowledge and those skills in Quality Management which may contribute to production at minimum cost consistent with full customer satisfaction. The significance of words “all functions, all levels, full customer satisfaction and minimum cost” in the above definition must be grasped clearly. Industrial problems and their solutions are continuously changing. Consequently, education in Quality Management methods and techniques can never be considered complete at any stage.

A profile of such a training programme for the year 1986-87 covering personnel from Top Management to Operators is presented in Annexure 2.

The development of the analytical skills of the personnel in the Quality Departments of BHEL as an integral part of BHEL's overall Quality Improvement Programme has been recognized as equally essential.

A special fifty-two week training programme for young engineers providing them with an exhaustive and comprehensive body of knowledge in the field of Quality, Reliability and Operations Research is a part of this planned effort, starting from 1978 and till-date about 150 engineers have been trained in these programmes. A novel feature of this programme

is its practical orientation achieved by sandwiching field project exercises with class room theoretical training.

The snowballing effect of deploying such trained engineers, supported by a suitable system has led to identification of topics for Quality Improvement Studies totalling several hundred, by personnel from Quality Departments and from other functions in the company. Such an effort by several personnel on a large scale can be sustained and developed further only if it is supported by similar effort from the Management to provide these personnel with the necessary professional inputs to take up study and solve the Quality problems in their respective work areas. Arising from the recognition of need for such an effort a common training programme for engineers in the Quality Departments was organised from the year 1980-81. Such an effort can ensure that all engineers in the Quality Departments can apply similar principles and concepts and have a common understanding of Quality Improvement Programmes.

#### 4. Quality Improvement Projects

Reference was made earlier to the practical study projects undertaken during the special One Year Training Programme to enable the participants to acquire the skills for application in work situations requiring Quality Improvement. Several studies so undertaken led to a regular and continuous system of identifying Quality-related problems and formulating an approach in each for solving the problems. Production and field data compiled from work centres, either on a routine basis or through special data-collection activities, can be analysed suitably and scientifically. During the past few years, several such Study Projects were undertaken in the organisation as classified in Annexure 3. These studies, besides identifying the causes for specific defect-prone situations, also brought out corresponding recommendations for control and improvement. Such recommendations together with appropriate SQC techniques can be the basis for QC Check-lists, QC procedures and QC Plans. During the past few years, suitably structured Annual Plans for Quality

Improvement are being framed for each Unit or Division.

#### 5. Quality Circles

Along with the Management leadership for Quality the recognition that "Quality is Everybody's business" led to the programmes for employee participation in the Quality Improvement effort. Japan has shown the way by developing the concept of Quality Circle through which the employee in an organization can voluntarily engage themselves in small groups for looking at Quality problems in their respective work areas and to offer solutions to these problems. The merit of these Quality Circles is that the members of the Quality Circles proceed to solve the problems in their work areas through their collective wisdom and effort. Suitable training sessions in simple Statistical technique enable the Quality Circle Members to approach their work on the basis of facts and data gathered in their work experiences. As a consequence of the organisational development for Quality within BHEL, it was possible to initiate in 1981 few Quality Circles in one of the BHEL Units. After gauging the success of this initial effort, a more vigorous campaign for formation of Quality Circles was launched during the subsequent years. In a meeting of the Joint Committee of Management and Employees Unions, it was formally decided that Management and Employees Unions would encourage and support formation and functioning of Quality Circles in the BHEL Units and Divisions. A healthy tradition of participation of employees at all levels has thus been developed. The total number of Quality Circles in BHEL number more than 1,600 with a membership exceeding 15,000.

The benefits of Quality Circle activity go beyond Quality Improvement. Other benefits are :

1. Increased Productivity.
2. Reduced Cost.
3. Better Communication.
4. Job Satisfaction.
5. Improved Motivation.
6. Team Spirit.

These aspects of Personnel behaviour are the objectives of Human Resource Development in an organisation and, in a larger framework, add to the congenial environment for all to contribute effectively for the organisational progress.

#### 6. Sub-supplier Quality Development

BHEL, like any other large Engineering Enterprise, depends on thousands of sub-suppliers, both from abroad and from India, for supply of raw materials, components, sub-assemblies and other products in order to complete the manufacture of its products. The Quality of supplies from these sub-suppliers is an important element in controlling the Quality of BHEL products. BHEL was recognized that the relationship with these Sub-supplier must be one of development and mutual assistance. The traditional constructural relationship between a Purchaser and a Supplier does not provide the framework for such a mutually co-operative endeavour. Instead, a programme of Development has to be framed, particularly for the Indian sub-suppliers. This development programme consists of activities at three levels.

1. Top Executive programmes through which Top Executive of the sub-suppliers are briefed on the Quality Policies and requirements of BHEL with a special appeal to these Top Executives to organize Quality Management in their organisation on modern scientific basis with emphasis on Defect Prevention.
2. Executive programmes for working level Engineers and Managers through three-day sessions giving more detailed information on Quality Control Technique and Quality Management Systems.
3. Continued in-plant association with selected sub-supplier organisations to look at production procedures and to establish Defect-free Production procedures with emphasis on "Task-Performer Self-Control" and "On-line Quality Control".

The progress made so far is adequately encouraging. This programme of sub-supplier development

is expected to gather momentum in the years to come, thereby nurturing the national effort for Quality Improvement.

#### 7. Customer Service

The products supplied by BHEL, have long service life. It is, therefore, necessary for BHEL to organize effective Customer Service to provide life-time support to BHEL Customers for reliable service of the equipment. BHEL has set up suitable organisational structure for providing such service to its Customers. In addition, arrangements have been made for quick supply of spares and to set up an insurance-pool of spares for meeting emergency requirements of the Customers. Annual plans for periodic and regular maintenance during planned shutdown period have been prepared. Unforeseen break-downs requiring services of BHEL teams are attended to on priority. Any generic problems encountered are tackled on a continuing basis so that further break-downs in other set can be minimized. These measures for Customer-service have paid appropriate dividends and, as an example, the steady increase in the Plant Load Factor of the Thermal generating stations can be seen as an indicator.

#### 8. Task Ahead

The successful developments so far in BHEL point out the correct direction to follow, Ishikawa has pointed out that it takes about 5-10 years for the initial round of Quality Education and training to be completed in a large organization and to influence the personnel. Juran has pointed out that, even for Western Industry, a revolutionary approach of massive Quality-related training programme accompanied by a vigorous Quality Improvement Programme with the focus on "DEFECT-PREVENTION" on a company-wide basis is very essential. BHEL, cannot, therefore avoid a more extensive and intense Quality Improvement Programme in years ahead, such a Programme to be continued on the foundation of the progress made during the last few years. The objectives of this Programme should be to establish Quality of Design and Development and Quality of Conference through process Control.



The broad framework for the future programme will be :

1. to further emphasize TOP MANAGEMENT commitment for "QUALITY FIRST" as the Management Policy recognizable by employees at all levels.
2. to establish Management Commitment for "QUALITY FIRST" at all levels through education and training and through proper managerial and administrative action.
3. to pursue massive Quality-related training programmes for all BHEL personnel at all levels.
4. to continue the Special One-year Training Programme on Quality, Reliability and Operations Research so that the steady annual induction of young Engineers trained in modern Quality Control methods is maintained.
5. to develop and improve the professional capabilities of the personnel in the Quality Departments so that they can accelerate introduction of Process Control techniques and documented Quality Control Procedures to strengthen the Quality Assurance Systems.
6. to establish several data-based Management Information System documents to bring out information on Quality Status at the levels of Operational, Unit and Corporate Managements.
7. to encourage further scientific development in Quality Assurance methods and Quality control techniques.
8. to set up a planned programme of Management Audit by Departmental Heads, Product Managers, General Managers and other Top Management Executives to observe the extent to which Quality systems are implemented in practice.
9. to review in-depth at frequent and periodic intervals both at Unit Top Management, Management Committee and Board levels specific progress of Quality Improvement Plans.
10. to encourage continually Quality Circles Movement within BHEL to establish firmy participation by working level-personnel.

#### 9. Conclusion

BHEL, as a large Indian Enterprise, has embarked on a basic mission of improving the Quality of its Products and Services following the concepts of Modern Quality Management. The progress so far made is indicative of the correctness of this policy and it can be predicted that this development will be a pace-setter in the Indian National effort for Quality Improvement in the years ahead.

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Standards—An Unshakeable Frontier  
For Quality

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## ANNEXURE-I

## Quality Systems Manual

## Contents

<i>S. No.</i>	<i>Subject</i>
1.	Quality Objective
2.	Quality Policy
3.	Plant Quality Committee
4.	Organisation for Quality
5.	Issue, Review and Revision of QA Manual
6.	System for Design and Technology Review and Documentation Control
7.	System for Incoming Materials
8.	System for Subcontract Operations
9.	System for Manufacturing Operations
10.	System for Handling Rework, Rejection & Deviation
11.	System for Measuring Instruments and Gauges
12.	System for Tools, Jigs and Fixtures
13.	System for Product Despatch
14.	System for Evaluation and Analysis of Quality Costs
15.	System for Handling and Analysis of Customer Complaints
16.	System for Evaluation of Quality Systems
17.	System for Quality Reporting and Review

(Note : The above list is illustrative)

## ANNEXURE-2

## Quality Related Training Effort During 1986-87

Type of Programme/ Level of Programme	Quality Orientation	Quality Manage- ment	Advanced Analytical Techniques	Product Orientation	Process Orienta- tion	Inspection and Test Methods	Quality Circles	Total
Top Executives	6	—	—	—	—	—	—	6
Senior Executives	6	1	—	—	—	—	—	7
Junior to Middle Executives	17	23	16	3	—	2	—	61
Quality Function Executives	3	4	5	—	—	—	—	12
Supervisors	20	22	2	26	23	18	40	151
Operators	3	6	—	15	25	15	50	114
<b>Vendors</b>								
1. Top Management	12	12	—	—	—	2	—	26
2. Middle Management and Supervisors	11	12	—	—	—	—	—	23
<b>TOTAL</b>	<b>78</b>	<b>80</b>	<b>23</b>	<b>44</b>	<b>48</b>	<b>37</b>	<b>90</b>	<b>400</b>

1. Figures as above indicate Number of Programmes planned.

2. The total Number of Personnel likely to attend these Programmes will be about 1000.

## ANNEXURE-3

## Summary of Studies as of February 1986

Product Oriented Studies		Process/Technology Oriented Studies		Function Oriented Studies	
Air preheater	3	Assembly	6	Behavioural Aspect	7
Boiler	92	Casting/Forging	107	Engineering	22
Bowl Mill	23	Ceramics	45	Erection/Commissioning	14
Control Equipment	27	Fabrication	23	Industrial Engineering	
Compressors	11	Heat Treatment	23	Long-Term Planning	3
Electrical Motor	51	Insulation	26	Maintenance	18
Electrostatic Precipitator	30	Machining/Drilling	92	Material Saving	10
Electronic Component	46	Materials	104	Miscellaneous	13
Fans	20	Mechanical	13	Performance	24
Heat Exchanger	44	Metallurgical	45	Production Planning and Control	12
Hydrogenerator/Turbine	42	Metrology	24	Quality Cost	6
Oil Rigs	3	Packing/Preservation	6	Spares Management	6
Pumps	19	Surface Treatment	11	System Development	43
Steam Turbine	60	Tube Drawing	35		
Switch Gear	55	Welding	87		
Solar Cell	3				
Traction Equipments	42				
Turbogenerator	78				
Transformer	60				
Valves	29				
<b>TOTAL</b>	<b>738</b>		<b>647</b>		<b>192</b>

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\* \* \*

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B.A. (Hons.), G.D.C. & A.

### Committee Members

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2. Shri S.L. Sondkar	Vice-Chairman
3. Shri J.M. Jare	Director
4. Shri K.T. Shevale	Director
5. Shri S.P. Kokate	Director
6. Shri N.K. Kale	Director
7. Shri G.R. Mhaske	Director
8. Shri S.S. Mahangare	Director
9. Shri V.A. Salunke	Director
10. Shri E.D. Jagdale	Manager

### Present Milk Transport Contracts

1. Miraj	Bombay
2. Baramati	Bombay
3. Phaltan	Bombay
4. Solapur	Bombay
5. Aurangabad	Bombay
6. Beed	Bombay
7. Bhoom	Bombay
8. Udgir	Bombay
9. Nanded	Bombay
10. Dhulia	Bombay
11. Dhulia	Indore (MP)
12. Udgir	Hyderabad (AP)

# Quality in Bus Service

M. KOTEESWARAN

*The author in this paper focuses on the quality in services—in this case transport. He brings out the importance of developing yard-sticks of quality and working out the various measures necessary to achieve the higher quality service.*

1. Synergy of quality and productivity is of immeasurable value to any progressive society: While in production and process industries, quality and productivity are amenable to assessment and measurement, in service industries this is not so easy—more often it is subjective. In banking sector, perhaps one would rate the quality with reference to one's own experience in respect of treatment given to him, facilities in operation, waiting time for encashment of cheques presented, etc. If it takes more time to get credit for the cheque deposited than what it used to be earlier, one may gain an impression that the quality is deteriorating.

## Expectations

2. The environment in Road Transport is complex. Quality of Service varies over a wide spectrum depending on the clientele, crew and management. The expectations of customers determine the quality of service. This varies from a poor villager expecting just one service to reach the nearest town or market place to elite of the urban demanding service the minute he steps out of his house to the door step of his destination as many times as he requires and to different destinations and at the cheapest price.

3. The expectation of bus users is a safe, comfortable, cheap and quick service. Unless these expectations are adequately fulfilled, the quality of transport service cannot be claimed to be satisfactory. The relationship between the bus company and every

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passenger is instantaneous, physical and one to one. A conductor in a bus has to transact with about 1000 individuals involving infants to persons one foot from grave. He has to keep his cool irrespective of how each of the one thousand behaves.

4. The driver has to keep his faculties alert for eight long hours day or night, ensure safe journey and should be capable of anticipating all the time what could happen. It is not enough if he is safely driving, he has to be defensive to hundreds of road rule violations by animals, uneducated and educated alike.

5. The technical staff are to ensure proper maintenance of vehicles to avoid breakdowns enroute and accidents. They have to take care of the wear and tear of nearly three thousand components going into the system.

6. Hence the objective of road transport service is to provide efficient, effective; economic and well co-ordinated network service to the public. If this is achieved, both quality and productivity of the service should be good.

#### Impressions

7. The general impression in the minds of public about bus service, particularly about public sector units is that the crew lack courtesy; large number of accidents and breakdowns occur, hence there is no reliability : punctuality is at discount; waiting time is more and operations erratic, hence there is no co-ordination; large number of State Transport Undertakings are incurring loss, hence they should be inherently inefficient; therefore quality of service by State Transport Undertakings is poor and State Transport Undertakings have become a dead weight to the society at large. Are these opinions subjective or objective if objective how are they tested and what could be done ?

#### Yardsticks

8. It is proposed to analyse this here, with reference to possible measuring yardsticks and with the

data relating to Tamil Nadu Transport Corporation for the past six to ten years.

9. In order to measure quality in Transport Service, one can set several of the following measurable factors :—

#### 1. Effectiveness

1. Breakdown rate/10,000 kms. of operation
2. Kms. run by each bus employed in a day
3. Fleet utilisation (% of buses used by the company out of its stock)
4. No. of accidents/1 lakh km. of operation
5. Passengers carried
6. Villages covered over a period
7. Public grievance and complaints

#### 2. Efficiency—Physical

1. Punctuality maintained
2. Percentage of Km. operated over schedule
3. Km. per litre of diesel
4. Tyre Km.
5. Manpower ratio per bus
6. Consumption of spares
7. Age of the vehicle

#### 3. Efficiency—Economical

1. Earnings and cost per Km.
2. Variable cost and fixed cost
3. Growth in assets
4. Return on investment
5. Profit
6. Tariff structure

#### 4. Social Obligations

1. No. of bus shelters provided
2. Maintenance of bus terminal
3. Comforts provided to passengers inside the

bus and at Motels and bus terminal, reservation, etc.

4. Employees' welfare.

Performance in Tamil Nadu

10. In 1977, 4918 buses operated by Tamil Nadu Transport Corporations, earned Rs. 72.82 crores resulting in a profit of Rs. 63 lakhs. In 1986, the vehicle strength had grown to 10,187, the Corporations have earned Rs. 436 crores with a profit of nearly Rs. 11 crores.

11. The Tamil Nadu Government's investment in Transport Corporations is Rs. 23 crores and the Corporations have already paid nearly Rs. 34 crores back to the Government. The following are data relating to some important parameters :

Year	Cash generation in crores Rs.	Gross value of fleet held	% fleet utilisation	Break-down per 10000 Kms
1977-78	11.81	55.59	—	1.02
1978-79	15.48	73.45	88.72	0.99
1979-80	18.80	98.29	89.78	0.80
1980-81	30.41	128.06	90.98	0.64
1981-82	15.89	164.22	90.25	0.61
1982-83	22.46	190.52	91.05	0.61
1983-84	19.90	191.14	91.15	0.53
1984-85	31.84	226.27	92.39	0.43
1985-86	48.56	250.00	92.60	0.32

As against a vehicle utilisation of about 300 Kms per day in 1977, it is 343 Kms/day to-day.

The cost of diesel, tyre and spares has increased 300% in the last ten years. Yet the variable cost per

km has been contained at Rs. 3.93/Km as against Rs. 2.12/Km in 1977.

In 1976-77 with 4954 vehicles, operating nearly 50 crore Kms. resulted in 500 accidents, that is one accident per lakh Km. operated.

In 1985-86 with 10185 vehicles operating 110 crore Kms. there were 876 accidents only, that is 0.59 accident per lakh Km. operated.

12. In Cheran Transport Corporation Limited

Year	Fleet utilisation	Km efficiency	KMPL	KM/Tyre	Buses built
1980-81	94	96	3.70	79426	233
1981-82	94	97	3.71	82873	301
1982-83	94	100	3.70	86805	346
1983-84	95	100	3.66	98961	253
1984-85	96	101	3.72	100811	450
1985-86	96	102	3.81	100581	615

Public Amenities

13. During the past six years 5645 villages have had the benefit of transport facilities for the first time.

More than thousand bus shelters have been erected by the Transport Corporations at a cost of about Rs. 1.5 crores.

Automatic traffic signals and reflective sign boards have been erected at a cost of 50 lakhs.

Motels are being established throughout the State at 60 Km. interval. In each district one Tourist spot is being developed at a cost of Rs. 3 lakhs each.

Students are provided with concessional travel

pass. The general fare itself is the cheapest in South India.

The above facts are indicators of relative quality standards in transport service. We consider the above factors to be appropriate yardsticks to measure the quality of service. Having said what is, let me briefly explain how this was achieved.

### **The Goal**

14. In 1972, the Government of Tamil Nadu decided to nationalise all big bus companies having more than 50 buses. At least two of them were known for their efficiency and effectiveness. Nationalisation of these units was a formidable task in that it was a challenge to maintain the image and confidence they had created in the public. At that time, area nationalised Madras City service run by Transport Department was at its lowest ebb in public image with old vehicles, large breakdowns and accidents.

### **Building a Work Culture**

15. Departure from the present was a must. Creation of confidence and evolving a work culture were need of the hour. Being a service industry with commercial operation. It was decided to do away with departmental bureaucratic management. It was felt that Company set up, confined to specific area would bridge the widening gap between decision making and decision application. Importance and effectiveness of one to one relationship in the industry was realistically conceived. This shook off the yoke of burden of departmental fiscal and physical management.

16. Providing effective, efficient, economic and well co-ordinated transport service with commercial prudence became the basic objective. Accountability became part of the management philosophy. Quality of service lies in those who render service. Hence building a culture was a must. Extensive selection procedure and training were started for drivers and conductors.

17. While there are many technical training insti-

tutes for various trades, even to this date, there is no organised training for heavy vehicle drivers. There are the drivers who take care of millions of lives travelling in buses throughout the country. They are generally drop outs from schools, perhaps socially neglected who get into apprenticeship under lorry drivers as cleaners or assistants and learn the art of driving including undesirable habits, if any, of their gurus.

18. If the service were to be qualitatively improved and reliability increased, the quality of drivers had to be improved. Two pronged action was taken.

### **Driver Training Reduces Accidents**

19. Since there are no organised Driver Training Institutes in the country, fourteen driver training institutes were established in Tamil Nadu by Transport Corporations where driving is taught systematically along with values of life and need for quality enrichment in profession. The existing drivers are sent to the training school where they are tested for their inherent personal qualities and acquired habits. Psycho analysis is performed. A full course on transactional analysis called 'Quality of Life' (VAZHUVU MALARA) is conducted for a week. They are detained before specific re-training in driving is started. A course called 'Defensive Driving' is given upto six months in varying degrees which includes rudimental technical issues. Now the driver is more alert towards social system, the little technical giant he drives and anticipates the action-reaction drama between him, his vehicle, road and animals and other road users. Result, drivers are more responsible, time conscious, maintain punctuality, stop at proper places, driving more safely and socially alert. Road accidents are just 50% of what they were six years ago. Service is reliable and safer.

### **Good Human Relations is the Essence of Service**

20. Conductors are the roving ambassadors of the bus service. Their relationships with customers is one to one. Courtesy, honesty, patience and social service should be the hall mark of their quality of service. These are subjective. Since conductors join service at



a very young age, it is absolutely necessary to make them realise that it is the quality of their service which builds the image of the company. Training course on transactional analysis and values of life is given to each new entrant. Course includes analysis of goals, objectives, self confidence, problems of inferiority complex, habits, discipline, large heartedness, perspective outlook, maturity, social welfare, values of sacrifices and service, budgeting, Gandhian thoughts, philosophy of socretes and sociologists, alcoholism, values of yoga, first aid practices, problems in life, lives and contributions of scientists. Result better human relations amongst crew and between crew and public.

#### **Technical Training Brings Better Reliability of Service**

21. It was realised even in 1972 that professional management was the only key to improve the quality and productivity of this service sector. The process was immediately initiated. It was soon realised that the ITI's training for Motor Vehicle Mechanics was inadequate and the product of these ITI's required atleast two years training to get absorbed in the work culture of the transport corporations. Hence, twelve dedicated technical training institutes were started, where required number of trainees are admitted for three year heavy vehicle maintenance course. Result—the trainees have in depth knowledge of latest technology and high level skill in handling these vehicles. The breakdowns have come down from 1.02 per 1 lakh Km operation to 0.32 now.

#### **Professional Management**

22. Continuous training for knowledge and skill improvement amongst supervisory and managerial cadre in inter-disciplinary matters and computerisation goes on throughout the year through a separate Institute of Road Transport established by Transport Corporations at Madras. The supervisory and managerial personnel are all professionally qualified. There are nearly 250 first class graduates in Engineering 500 first Class Diploma holders, 50 MBAs, 30 Chartered Accountants, 14 Company Secretaries, 30 Law Graduates and Post-Graduates in Social Work. Since transport service is manpower intensive, more emphasis is laid on human relations.

#### **Employee Welfare and Mutual Trust has Provided Uninterrupted Service**

23. All branches having more than 25 buses have canteens which serve highly subsidised wholesome and balanced food.

Medical care is extended to families of employees and periodical medical camps are conducted for the families.

Substantial assistance towards education of employee's children upto post-graduate level is provided.

The Corporations have started in Engineering College and a Medical College where 40% and 33% of the seats are respectively reserved for the children of Employees. In the last three years 160 children of conductors, drivers and other categories of employees have been admitted into our Engineering College, offering courses in Automobile, Transportation and Computer Science branches. 20 children have been admitted into our Medical College started this year.

In Cheran Transport Corporation, one out of eight employees has a house of his own out of his savings.

Grievance system works effectively and any employee can discuss his personal problem with the Chief Executive direct. The communication channel is both one to one and formal. All issues of employment are periodically discussed with the leaders of all union federation and amicably settled. The emphasis in the talks is sincerity and mutual trust. Result—during the last six years, there has not been a single work stoppage or strike as a result of a dispute. Harmony, confidence, commitment to service and productivity have increased and quality of service has improved.

#### **Commercial Prudence**

25. It has also been realised that unless decisions and operations stood the test of commercial prudence, quality of service could not be maintained for long.

In transport service, both input cost and output price lie outside its environment. Pricing service in road transport has become cumbersome and more often political than economic. Therefore maintaining economic efficiency of bus service becomes more difficult and the emphasis shifts to containing variable costs.

### Fuel Efficiency

26. Diesel, tyres, retread materials and high value fast moving stores account for more than 95% of the variable cost. Diesel prices are fixed by the Government and hence bus companies have no control over this. Alternative is to consume less diesel by better maintenance practices and technological innovations. Over the last decade, the vehicle manufacturers have not produced really fuel efficient engines. Nor have the monopoly companies, producing filters and fuel rejection pump, improved the productivity of their products. It is by sheer training of drivers and by incentives, improvement in fuel consumption has been achieved in Transport sector. Mechanical stoppers, speed control devices, etc., are being tried out. Smoke meters are used to check smoke emission by buses to detect defective engines and to prevent environmental pollution.

### Spares Control

27. The spares suppliers are classified into four groups :

**Toothpaste :** Everyone at one or other time finds air instead of paste, when he presses the tube. It was proved by laboratory test that more than 60% of UJ cross suppliers to ASRTU had not used EN 253 or 20 Mn Cr 5 steel specified. Many were found supplying ferretic castings as pearletic castings. Retread rubber and many rubber components had large percentage of fillers. Components made of assorted variety was passed off as RMA 3 or 4 quality. Since crores worth of retread rubber is purchased, a treat rubber manufacturing unit has been set up in Cheran Transport Corporation. Result—Not only it was possible to ensure quality inputs but also longer

kilometers at lesser cost.

### Exploiters

A few years ago in the absence of any provocation, synthetic nylon price was increased in sympathy with rayon. When tyres were being sold in market at a high premium, a District Manager said in Shakespearean style that he was ready to give a pound of his own flesh but not a tyre at controlled rate: A Company supplied an inferior quality paint at Superior quality prices by mistake! Since Tamil Nadu Corporations require nearly a crore worth of paint a year, a paint unit has been established to produce quality paint at a reasonable cost. Within a year 100 KL production was crossed.

### Take it Or Leave it

Crores worth of flat springs are purchased by bus companies. Spring breakage led to undesirable inconvenience to passengers and termination of service. Either the quality of spring was not of EN 45A steel or hardness properties differed. End users were sufferers. In two years of setting up a unit 400 MT production of required quality of spring has been achieved resulting in substantial saving. There are also such suppliers in this category who would assure quality but at their price and convenience resulting in high stock and severe starvation. Take or leave.

### Sincere Partner

There are companies who genuinely believe in selling quality products followed by sincere after sales service. They voluntarily offer benefits of technology and improvements made by them to the consumer. Though this group is microscopic minority, they spell fresh breeze. There were occasions when credits were passed on firm orders when they reduced their prices and supplied at ordered rates when they increased. They believe in long term relationship.

By judiciously choosing the supplier, not necessarily going by the lowest rate, the variable cost has been contained. The fact remains that inspite of inflationary increases, the input costs have not correspondingly gone up.

**Communication**

28. It is common in Tamil Nadu for a passenger to write directly to the Chief Executive about the inconvenience caused to him or worthy behaviour of the crew. A personal letter on the action taken about inconvenience is written by the Chief Executive in every case by his hand. For worthy behaviour crews are immediately rewarded. House Journal carries both bricks and bouquets received, to enable crews to correct or emulate.

**Special Services**

29. During fairs and festivals, special squads are set up by the transport corporations to attend to road side repairs to private scooters and cars so that road blocks are eliminated and passenger inconvenience is avoided. Free butter milk is provided to thousands who gather on such occasions. Large pandals are erected for sheltering the milling crowd. Avomin tablets and vomit bags are made available.

**Reservation**

30. Action is on hand to introduce on line reservation system by computers to help long distance passengers. Arrival-departure announcements are to be made through Closed Circuit TV system at Madras initially and latter on at Madurai, Tiruchy, Coimbatore, Salem and Tirunelveli.

**Wireless Monitoring to Rescue**

31. Two crore project has been started to link the entire bus routes in the state by a dedicated Wireless System to monitor arrival-departure of vehicles at different points, their movements and to rush rescue and ambulance vehicles in the event of any mishap. Madras, Chingleput Madurai, Anna, Coimbatore and The Nilgiris Districts have already been covered. Mobile units watch the movement of buses.

**Ambulance for Relief**

32. Apart from the fire and medical service departments' ambulance vehicles, the transport Corporations would maintain nearly 100 ambulance vehicles and

about dozen recovery vehicles for effective rescue and relief operations.

**Future**

33. Quality of bus service can and should improve. It is not enough if effective, efficient, economic and co-ordinated service is provided. Comfort and reliability should improve. This is possible to the degree to which automobile technology, road maintenance and communication systems improve.

**Bus-Bodies Construction and Cleanliness**

34. Today with bus bodies mounted on 'lorry' chassis, tiny tots, sick and old have to perform acrobatics before entry and exist. Modesty of young ladies is affected. There is modesty panel in our buses! The number of steps should be reduced and last step lowered to almost floor level so that handicapped could also use buses.

It should become mandatory that long distance buses on route length beyond 164 kms. or three hour duration should have two by two lay out with 105° inclination and sufficient leg room. Grab rails should be at lower level with sufficient holders. Sharp edges should be rounded off.

We spend Rs. 15,000 daily to clean the buses of the dirt and waste they pick up from air, mud and passengers. Every one can co-operate in keeping the buses clean.

**Technological Features to Improve Quality**

35. With power steering, pneumo cyclic gear box, air suspension, fail safe dual braking system, unitized bus bodies—the fatigue to the driver can reduce safety, reliability and comfort to the passenger can considerably improve.

**Communication can Help Passengers**

36. Unless roads are maintained, inspite of the above improvements, quality would still be at a discount. With improved communication system, the

traffic can be monitored and regulated so that passengers' waiting time, unproductive traffic jam resulting in waste of diesel and petrol and unnecessary extra dosage of pollution can be avoided.

#### Passengers can Improve Service Quality

37. If quality of public consciousness can only improve hundreds of buses can remain with otherwise unbroken costly, glasses, dozens of buses consigned to ashes will be available to carry more of them, thousands of seats would remain intact providing comfort over bumpy roads if only artistic skills with knife and blade are not displayed on the rexines and foam cushions.

38. If only quality of public consciousness improve to higher level, the checking staff can be put to better productive uses and perhaps conductors, if need be can play host.

39. Quality of service will considerably improve, if road users are taught and to obey, road rules. Many precious lives can be saved, buses held up on account of accidents will be available for productive use.

40. These are not utopian. It is possible to achieve these minimum tasks before the turn of the century.

---

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## Quality in Small Scale Sector

K.S. SRIRAM

In the present environment Quality goods are a must, at competitive prices. Small Scale Industry has to upgrade its technology. Modernisation has to take place in the production process to produce high precision equipment. Upgradation of technology ensures better quality.

The major factors that go into making a quality product from the Small Scale Industry point of view are the Material, the Manufacturing Process, the Finished Product and the Men.

1. *The Material*: The Quality of incoming material should conform to specifications, be bought from a reliable supplier and should be of tested quality. Records and documents should be maintained on the incoming material each week so that any defect can be discussed with the original raw material supplier. It would also be imperative that the raw material is available on time and a continuous supply is ensured.
2. *Manufacturing Process*: The production process contributes greatly towards the finished product. Good process quality can be achieved through regular updating of manufacturing facility. For this machines and tools of the right capability and the right type are to be used so that they do not become obsolete.

*The author in his paper dwells on problems of quality management in Small Scale Sector. A first hand account of his experience in CEI is presented here.*

K.S. Sriram is Chairman, Small Industry & Ancillary Development Committee, CEI.

3. *Finished Product* : To ensure the quality of the finished product audit checks can be undertaken. Small Scale Industry would have to aspire for a "Zero defect" situation. In the long run small units could also hope to have their own inspection set-ups and self certification programmes.
4. *Men* : A very major and important factor in making any quality product are the people involved. The quality of work of people at all levels and in all functions has to be good. We have to bring in an attitudinal change so as to achieve optimisation of individual capability.

Having outlined the major factors that go into making a top quality product, it is necessary to be more specific and elucidate on how we can achieve this.

In the present age, the industry is seized of the concept of the Total Quality Management and is implementing it. Quality Circles which have been popularised and successfully implemented in the developed World, particularly Japan, are ideally suited to small units. Quality Circles are essentially a small group activity. The problem solving techniques in Quality Circles which can be used are brainstorming session, use of cause and effect diagrams, checklists, histograms etc. These could be implemented by following a very simple procedure.

1. Problems can be listed out in order of simplicity.
2. Simple problems can be solved first and thereafter, the complex ones can be tackled.
3. Problems should be solved one-by-one.
4. Data can be collected and analysis which can give us the cause of defect and the degree of defects.

Once the defects have been identified a problem solving checklist would help us to come up with solutions and give us new methods of working.

We can achieve a great deal through quality—there would be a decreased percentage of defects, increased

yield, increased production at reduced costs.

It may be appropriate to present a case-study which will highlight some of the points made by me.

My organisation named Madras Gauge Room Equipment (P) Ltd; produces Inspection Metrology products. We produce these checking base plates in widest range both of Cast Iron and Granite. We also produce widest range of other inspection aids such as Angle and Box Plates, Bench Centers, Spirit Levels etc. We have recently introduced Layout Tables of largest size measuring to 10 × 6 mtrs and Floor Tables of High Accuracy size being 12 × 4.5 mtrs. We started our organisation in 1973 and employ nearly 100 in all. Ours is a unique effort as we are dependent for all our Castings and only one supplier in Bangalore, having failed in total to develop a second source. Many of our attempts only ended up in loss of time and money. But this single sourcing gave us a tremendous boost to think of interacting and upgrade Vendor's ability to cater us. We helped them with inputs, certain new Technology obtained through established consultancy houses, Finance by means of 100% advance and various other Foundry inputs.

Our end product is the one used by user industry to check, mark, layout inspect and acts as datum reference plate for ensuring their product, quality of machining, matching etc. To ensure high class of such a reference Plate we started looking into every aspect of finishing the Casting to a Surface Plate that would answer various standards such as DIN, BS & IS specifics. Most of the Plates we manufacture are hand finished for accuracy. When I say handscraped many of you would wonder as to why a Plate need be handscraped when you could achieve the same accuracy by Grinding.

Handscraping is done to introduce Airgaps for easier movement of other Flat objects on top of the Plate. This is done in a way to ensure Flatness and at the same time have High Points say 26 per 625 mm<sup>2</sup>. When we started production of our products finish inspection were done by Block and Frame levels to read 0.02 mm/mtr but world over our

contemporary organisation switched over to Finish Inspection by Autocollimator. In 1980/81 the final inspection switched to Lazer interferometer. We in our Works are in the process of switching over to Lazer checking for Flatness, Squareness etc.

By these and high quality of input raw material and handscraping we ensure a good product being delivered to the customer for value of money.

Coming to the point of service, as a manufacturer of Quality Control Equipment, we offer periodical inspection and award certificate of Flatness/Squareness having inspected Plates at Customer's Works. This is applicable to organisations who ask us to do this, irrespective of where he buys the Products. In Madras where we are located this is done free of cost. If it is other than Madras where we are located, we charge actual cost incurred by us. Once we find the product not to specification, we advice the Customer to get the product rescraped recalibrated to original specification as per relevant DIN, IS or BS. Since we started producing sensitive spirit levels, we have offered to Calibrate all varieties of Spirit Levels in our Works. Wherever needed we have rectified the Flatness, changed Bubbles and recalibrated the Spirit levels. Almost all organisations in Madras have taken our service at minimal cost.

Reliability is a word, if understood properly there could be no product manufactured by any organisation that does not have Quality in it.

Again here on our product the customer has to rely upon so much, that our product design has a very high margin of inbuilt safety factors. Let us take the example of a Surface Plate of size  $2000 \times 1000$  mm which as per DIN 876 (I am not referring to relevant IS specification at this time which is under revision) must have a said top thickness, rib thickness and go through a certain Heating Process for stress relieving, has to take a load factor of say 500 kgs. for Grade I Plate (Maximum load) can distort to an extent of only 0.005 mm. But then the Plate has to spring back to the original plane after the load is removed.

We ensure in building of all the Parameters of the specification to which the product is produced, so that, such expected performance is fully guaranteed. In fact we do a little over designing of some products such as Floor Plates that we make for Horizontal Boring, Machines, where the throat of 'T' Slots are to be ground to match the face of the Boring Machine and guaranteed for a minimum of 100 tons load spread over the plates. The plate is made of 9 pieces of size  $4000 \times 1500$  mm to achieve the overall size of  $12 \times 4.5$  mtrs. Their permissible load as per specification could be calculated only to reach say 60 to 70 tons. But to satisfy the customer and a possible overloading occasionally we had to over design the product and to effect suitable modification to ensure Reliability on the product we supply.

The motto we have thrust into the minds of our Sales Engineers and Service Personnel is a phrase "CUSTOMER IS ALWAYS RIGHT". But of late, we have been made to realise that wiseness on warranty and sticking to condition of sale "some times saves you money".

We do offer the customer a satisfaction by keeping our minds open to receive their suggestions on product design and application.

I would like to high-light some of the educational aspects our organisation went through in assisting one of our customers. One of our most esteemed and respected customers bought Surface Plates from another Organisation than us as they were the lowest. When the product arrived after Pre-inspection at suppliers works it came fully rusted and did not pass the test of even visual inspection. But the product had been pre-inspected; hence the customer called us to do a third party inspection of course unofficially on all aspects of the Plate. We found the following defects :

- (a) The Top thickness though looking to specification, was reduced from within the reduction equivalent to about 20% of Raw Material cost.
- (b) The plate had rusted in total on the top

reference Surface thereby it was not ready for use and had to be rescraped.

- (c) The plate had less capability to withstand load, to which it is guaranteed, thereby the whole purchase was found to be not upto the Customer's expectation.

The summary of this case study is that the lowest in Price need not necessarily deliver the Right Quality of product you expect.

We as an Organisation have done free maintenance of customers Angle Plates and Surface Plates when they had to unexpectedly close down the Factory due to lock-out or strike. Since prevention care could not be taken, the products Rusted.

Two such Organizations received special care from us as they were our first few customers.

Our Organization is nearing 15 years of age and looked up both modernization and avenue of the growth, to add value added product in the same field of "Metrology".

We have picked up Products such as Layout Measuring Machine, 3 Co-ordinate Measuring Machines and Machine Tools that are quite unique for India and which is not threatened by CNC Machining Revolution. Layout Measuring Machines and 3 Co-ordinate Measuring Machines are 100% Imported into our country and we have located French and Italian Technical Tie up and new Plant will be on stream latest by middle of 1987. Till such time we would use the existing infra-structure for producing these, out of Imported kits.

The base in both cases is already being made by us. The relative 3 Co-ordinate movements and Electronics thereof would only be imported. The initial value addition will be to the order of 35% to start with and reach 90% in 3 to 4 years.

The Machine Tool project of ours will deliver Horizontal Surface Grinders of table movement size 650X400mm and 750X600 mm with microprocessor

control for one or two axis. This is an optional accessory. It is for the first time we would produce in India this type of Machine which has more than 300mm capacity in the axial way. With production of 3 Co-ordinate Measuring Machines and Layout Measuring Machines. we need not look up for imports any more, and achieve and measure tolerance on large work pieces, components, moulds, dies, pressed and Machined parts and assemblies to match international quality of finish. Today's need is presentability and performance. Indian made products are suffering for want of Quality Input, machining and finally checking. We would tend to correct the last process in manufacturing "Checking" by making available high Quality Measuring' Machines.

If due to our small effort we deliver to Indian Engineering Industry the ultimate in checking, there is no reason why our products cannot compete in performance. We in industry look to Government for supporting any effort by which quality of end product could be raised.

Quality Control Equipment that are not produced in India should be allowed to be imported with NIL Duty. There should be no penalization imposed on Industry for importing Equipment that are not available in India. This year being termed Quality year, we earnestly request the Government to give a boost to industry buying Quality Control Equipment and give remission of Excise Duty and Import Duty and allow higher depreciation to enable industry to avail of the facility to upgrade Inspection and thereby Quality Control. At the same time, when a product starts to be manufactured in India with overseas technical collaboration, due support must be given to make the project viable. It is suggested the basic theme to be accepted and implemented for any imports, has to be Raw Material to be taxed the least, then finished component and then fully finished products. Here again if the product is not made in India there shall be minimal duty levied which will ultimately bring down the project cost and cost of manufacturing of products. Government should allow Technical Collaboration free of any taxes, specially, if any small Industry graduates to Medium or has the intention to upgrade Technology. Why Tax an Industry trying to



upgrade Technology? May I therefore, appeal to Government to bring in necessary amendments in the forthcoming Budget to give effect to the suggestion of abolishing Tax on Technology Import under TDF of Foreign Collaboration.

Another suggestion to Government would be to assist the Small Scale Industries to graduate to Medium Unit by giving substantial seed capital. Venture Capital or risk capital, rather than encouraging the new setting up of Medium Scale ventures.

This would need deliberation and policy evolution.

Small Industry investment limits are no more relevant considering the cost of inputs of present day CNC Machines and Quality Control Equipment. There is an urgent need for upward revision of these in specified categories such as Auto Components, Machine Tool Defence/Space oriented Industries etc.

There is also a need for simplification of all Tax Collection Machinery.

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# Quality of Service for Consumer Satisfaction

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M.P. SHUKLA

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*The author presents here a case study of improving quality and reliability in telecom service for consumer satisfaction. The case study spells out in great detail, the various steps that Mahanagar Telephone Nigam has undertaken for improvement of quality and reliability.*

M.P. Shukla is Managing Director, M.T.N.L.

In this paper, it is proposed to present quality, reliability and after sale service aspects of Telecommunication Services particularly as obtaining in Mahanagar Telephone Nigam (MTN) which comprises of local telecommunication systems in two largest Metropolitan Cities—Bombay and Delhi. Before the various details of the quality of Telephone Service are discussed, let us see what is meant by Quality as applied to Telecommunication Service. The intention is to give an overview of the various factors which contribute to the overall quality of service as perceived by an user.

Quality of Telecom Service can be judged from the following criteria

1. *Performance of Service*

- \* Accessibility—should be available when requested by the user.
- \* Retainability—should be continued for a requested period.

2. *Performance of Support Services*—such as Directory enquiry, number assistance etc.

3. *Operability Performance* i.e. the service should be easily and successfully operated by the user.

4. *Continuity Performance* i.e. degree of impairment.

5. *Transmission Performance*—the level of reproduction of the signal at the other end.

Taking above criteria, Telecom. Services are provided. We can achieve very high quality and reliability by spending too much or poor quality of service can be provided by spending too little.

JOHN RUSKIN has said.

“It is unwise to pay too much but it is worse to pay too little. When you pay too much all you lose is a little money, that is all. When you pay too little, sometimes you lose everything because the thing you bought was incapable of doing the thing it was bought to do. In common law, business talent prohibits paying a little and getting a lot which cannot be done. If you deal with the lowest bidder, it is well to add something further risk you run. If you do that, you will have enough to pay for something better.”

So the Telecom. Service Network has to build at reasonable cost involving not very high cost for very high quality because people will not be able to afford it and at the same time not at very low cost thereby giving a very poor grade of service.

Now after a Telecom. Service Network has been established and while establishing this Telecom. Network we have taken into consideration the above criteria for providing a reasonably good service.

Similarly noise limits have been specified for the public switched telephone circuits :

#### NOISE LIMITS

Distance in KMs.	7320	321	641	1601	2501	5001	10001
		to	to	to	to	to	to
		640	1600	2500	5000	10000	20000
Noise in dbm	-55	-53	-51	-49	-46	-43	-40

One need not go into the details as to how the noise is produced viz. Equipment noise, Line noise, Atmospheric noise, Induction noise etc.

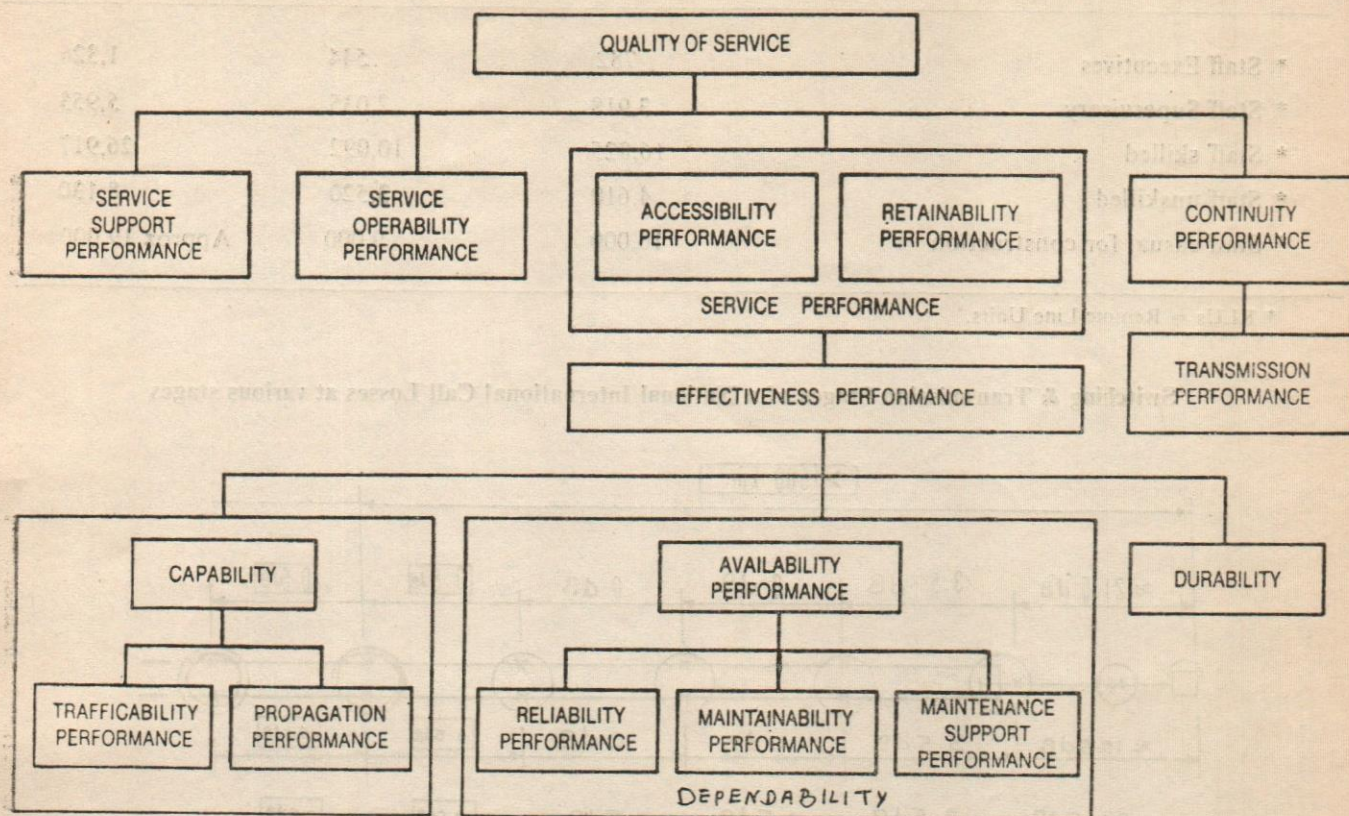
We come to a number of factors which affect the quality of service, such as :

1. Effectiveness—Ability of the network to meet the service demand.
2. Durability—Useful life, unsuitability for any economic or technological reason.
3. Dependability.
4. Capability.
5. Trafficability.
6. Availability (Performance).
7. Reliability (Performance).
8. Maintainability (Performance).
9. Maintenance Support.
10. Propagation (Performance).

How all these items are related with each other can be shown in the form of Performance Concept :

The reproduction of signal or speech at the other end depends upon the *level of the signal* and *signal to noise ratio*. When a call is established within the city, to a different city in the country or an international call, switching stages and transmission links are involved. In order to have satisfactory speech at the other end, losses in various links have been specified. The diagram given below gives the links and specified losses. If the losses are more than what have been specified, the quality of speech will go down.

PERFORMANCE CONCEPT



MAHANAGAR TELEPHONE NIGAM

At this stage, it will be appropriate to present the size and other Corporate details of MTN which has been formed about seven months back.

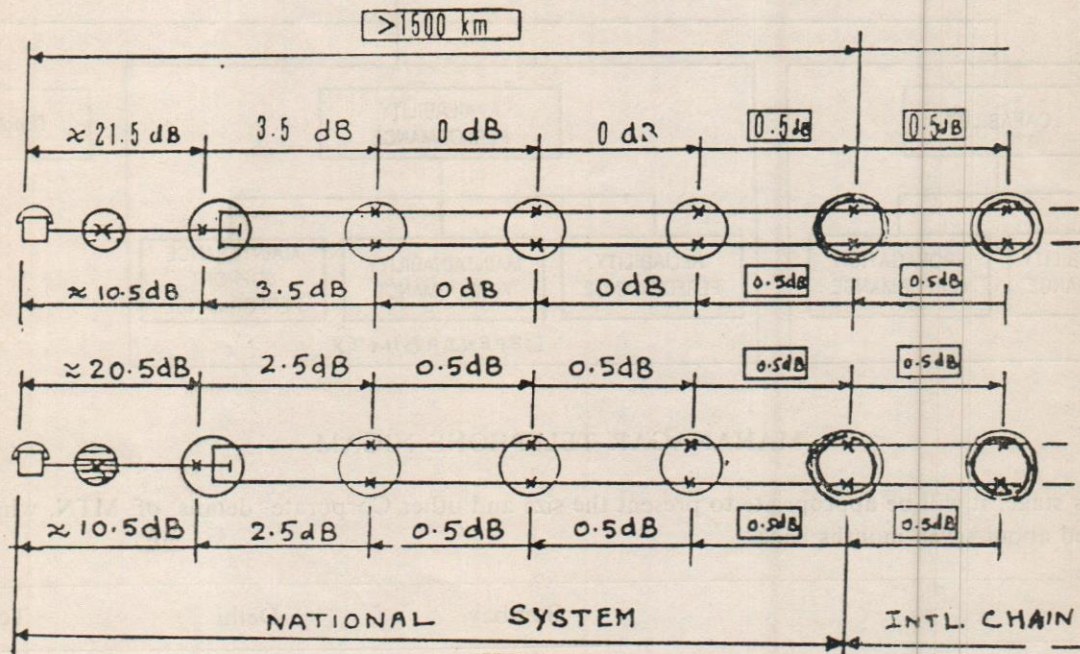
	Bombay	Delhi	Total
1	2	3	4
* No. of Telephone Exchanges	77+4 RLU*s	46	123+4 RLU*s
* No. of Direct Exchange Lines	4,70,841	3,09,171	7,80,012
* No. of Telephone Stations	6,75,939	4,36,647	11,12,286
* No. of Telex Lines	7,908	5,497	13,405
* Route Km of Cables U/g	12,970	13,064	26,034
* Conductor Kms of U/g cable	76,54,800	77,10,280	1,53,65,080
* Investments upto 31.3.86 (Rs. in crores)	513.25	405.00	918.25

(Contd.)

	1	2	3	4
* Staff Executives		782	544	1,326
* Staff Supervisory		3,918	2,035	5,953
* Staff skilled		16,825	10,092	26,917
* Staff unskilled		4,610	3,520	8,130
* Staff casual for construction		10,000	9,000	Approx 19,000






\* RLUs = Remote Line Units.

Switching & Transmission Stages of a National/International Call Losses at various stages



SENDING 25.5

RECEIVING 14.5dB

-  Subscriber Set
-  Local Exchange—two Wire Switching
-  Two Wire-Four Wire Pad which is Switchable
-  4 Wire Switching Exchange
-  Intl. Exch. with Vertical Switching P.S.

**Telephone Density**

	Bombay	Delhi
* Population	1,00,00,000 (Approx.)	80,00,000 (Approx.)
* Estimated Population which may require telephone	60%	50%
* No. of Telephones per 1000 population	67.6	54.3 Telephone stations
* No. of Telephones per 1000 people who may require telephone	112.6	108.6

No. of Telephones per 1000 people in important cities of the world

	Tele. Stations	D.E.Ls.
Bombay	67.6	47.08
New Delhi	54.3	38.64 As on 1.10.86
London	811	462
Paris	1,438	666
New York	821	453
Washington	1,727	569
Tokyo	812	—
Sydney	629	353 As on 1.1.1981
Seoul	164	125
Hongkong	470	303
Singapore	291	217

connections say 10,000 in one year about 20,000 people apply in the same year. Thus, there is a lot of unsatisfied demand for getting connections. People not having telephone connections try to use others' telephone. In that process, the traffic per line increases, the period during which a telephone remains busy also increases. So that people trying to reach the busy telephone go on dialling successively. Therefore, the traffic and the load on telephone exchanges as well as inter exchange junctions increases thereby creating a snow balling effect, resulting in over loading of exchanges, greater wear and tear, reducing the accessibility to a large extent and thus affecting the quality of service.

Let us see the calling rate per telephone per day in the cities of Bombay and Delhi vis a vis a few other cities :

	No. of metered pulses per Telephone/day
Bombay	14.3
Delhi	16.2
U.S.A.	3.4
France	3.7
U.K.	1.1
Singapore	4.4
Korea	0.6

From the above figures, it will be seen that the telephone density in Bombay and Delhi is very low. Since the present suppressed demand of getting telephone connection is as high as 3,75,000 in these two cities, it is quite obvious that as we start giving telephones more people apply. The past experience shows that in any exchange area when we release the

By seeing the above situation, we come to conclusion that in Bombay and Delhi, the telephone density is very low which has created a situation that the calling rate per telephone has increased too much and thereby the systems are over-loaded.

Now let us see what is the meaning of quality and reliability when applied to telecommunication service.

“Quality of Telecommunication Service is reflected on the quality of reproduction of the original signal when communicating from one point to another point. When a person speaks from one telephone to another, to what extent his speech is reproduced at the other end, how much noise has come up, how much the distortion has taken place i.e. the extent to which the original speech has been reproduced. Similar is the interpretation of the Quality of Service in respect of Telex, Telegraph, Data etc”.

“Reliability of Telecom. Service is reflected from the number of times and the duration the service remains out of order i.e. not available for use. Reliability can be judged from the number of faults occurring during a given time and the duration of faults”.

Talking about the Indian scene, the development of telephone in India upto 1947 i.e. upto Independence was almost negligible. Whatever telecom services we are having today have been significantly achieved during the successive plan. However, the growth rate has been very small. This has been because of the lack of resources both in the form of money resources and material resources. The achievements in the Research and Development field have been rather significant because we certainly cannot have our needs of today and tomorrow appropriately met from the indigenous sources. Since the system has grown in stages, no one technology had large scale penetration in our system.

Broadly speaking, the local Telephone system can be divided into five segments namely :

1. Exchange Equipment
2. Underground Cables

3. Terminating and Distribution Devices
4. Leading-in arrangement into the Buildings
5. Telephone systems.

### 1. Exchange Equipment

In early 50s, the Strowger system came which stayed alone over 16 years and is still continuing. The Crossbar system came in late 60s and is still continuing. Recently, digital electronic systems have been introduced. While introducing new technologies in the past, no large scale replacement was resorted to, primarily because of lack of resources. Even now, it can be seen that large number of old, worn out, life-expired exchanges are still working. We have not been able to replace them because the money available was required to be utilised for opening new exchanges to expand systems to meet the demands of the applicants waiting for many years.

The following chart gives you the various types of equipments installed during different years :

#### 1. Internal Exchange Equipment

	Bombay	Delhi
<i>Strowger—Electromechanical</i>		
(figures in thousands)		
* No. of lines which were installed in 1950s	20.2	26.9
* No. of lines which were installed in 1960s	81.875	48.4
* No. of lines which were installed in 1970s	41.525	26.8
* No. of lines which were installed in 1980s	13.7	14.3
* Total lines	150.0	73.8
(After scrapping and transferring 42.6K lines)		



*Crossbar Electromechanical*

* No. of lines installed in 1960s.	30.0	13.0
* No. of lines installed in 1970s	90.2	79.3
* No. of lines installed in 1980s	174.2	95.8
* No. of Total lines	294.4	1188.1
(Transfer + 7		6.0
Net.	301.4	182.1

*Electronic Exchanges*

* No. of line Analogue	62.0	90.0
* No. of line Digital	50.0	10.0
* No. of total lines	112.0	100.0

<b>SUM TOTAL</b>	<b>563.4</b>	<b>355.9</b>
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Because of the lower technology employed in Strowger and Crossbar electro-mechanical exchanges and also because of the old, worn out exchanges, still working, the quality of service and reliability is not upto the standard. In order to improve the situation, the policy decision has been taken that henceforth in Bombay and Delhi only Digital Electronic Exchanges will be installed which have very high reliability and quality of services and they can give a large number of modern and additional facilities.

**2. Underground Cables**

Similar is the case of Underground cables. The cables which were laid some time in 1950s are still operational. Most of these cables were laid directly into the ground. By repeated diggings either to lay new cables or to repair old occurrence of faults, the cables have been damaged. These have also been damaged by other agencies like Electricity, Water and Sewage etc. when they dig roads and pavements for their work. Over a period of time, it is seen that our cables have

been operated a number of times resulting into low reliability. They are now getting faulty more often than expected.

The following chart/table gives K.Ms of underground cables laid in different years :

*Underground Cables*

	Bombay	Delhi
* KMs of U/G cables installed in 1950s	745	993
* KMs of U/G cables installed in 1960s	4,258	2,245
* KMs of U/G cables installed in 1970s	3,884	3,901
* KMs of U/G cables installed in 1980s	4,083.4	5,925
* Total Kms of U/G cables laid till 1986	12,970.118	13,064
* KMs of Jelly filled	512.674	1,329 Km SKM

In order to improve the situation, the policy decision has been taken that in Bombay and Delhi underground cable ducts shall be provided throughout the cities. The cables will be drawn through them. By this arrangement, there will be no chance of their getting damaged. We have also taken policy decision of providing only jelly filled cables which are resistant to moisture penetration. The manufacturing technologies of the underground cables were not upgraded and therefore the Govt. had issued licences to a number of state sector, joint sector and private sector companies to produce jelly-filled cables. But even now, the production from these companies is still to come and meet out demand. This is the reason why imports are being resorted to from time to time. M/s HCL Asansol is still producing paper insulated lead sheath cables which are of low technology and therefore their reliability is low. Modern technologies of jointing by thermoshrink method and mechanical

closures have been adopted which are less prone to faults and more reliable.

### 3. Terminating and Distribution Devices

The old method of terminating and distribution was by way of terminating devices which were Screwing and Soldering type. This gives rise to low reliability because by dry joints and loose connections. Recently the technology has been upgraded by Telephone Workshops. They have entered into collaboration with a foreign company for manufacturing terminating and distribution devices of the State of Art. The technology is such that the terminating wires are pushed into the Terminating device which not only cuts the insulation but also makes firm contacts. Special tools are used for pushing the wires into the terminating device obviating human failure. These devices are, therefore, less prone to faults and are highly reliable. The production in Telephone Workshops has just started. The quantities available every year are small. The quantities needed for replacements and expansion programmes are still not available. So we have to continue with old technology. It may take a few years for complete breakthrough.

### 4. Leading in Arrangement into Buildings

The present leading-in arrangement into buildings is either through galvanised iron wires running on poles and insulators or through copper cadmium drop wires. Both these arrangements are not having good reliability. So we are going to change over to the use of Steel Wire Copper Coated PVC Insulated Drop Wire with proper accessories. This drop wire is very strong and with the use of well-designed accessories it has a very high reliability.

This drop wire at present is not being manufactured in India. As we start using this type of drop wire some manufacturing company will take it up and then the things will be easy to rehabilitate the old wornout leading-in arrangements with the new ones and also for our expansion programme.

### 5. Telephone Instruments

The telephone sets which we are using, at present,

are, by and large, having rotary type of dials. The design was, no doubt, upgraded from time to time but the reliability of this indigenous design has not been upto the mark. Recently, collaborations have been arranged with three foreign companies for manufacturing Push Button Electronic Decadic and DTMF (dual tone, multi frequency) instruments.

The following table gives the quantity of instruments that are existing in the network in various years :

	Bombay	Delhi	Total
* No. of Telephone instruments provided in 1950s.			
Still working.	29,300	38,200	67,500
* No. of Telephone instruments provided in 1960s	1,61,800	85,110	2,46,910
* No. of Telephone instruments provided in 1970s.	1,90,820	141,080	3,31,900
* No. of Telephone instruments provided in 1980s.	2,58,250	1,72,810	4,31,060
* Total No. of instruments provided.	6,40,170	4,37,200	10,73,370

M.T.N.L. has proposed for replacement of the old worn out telephone instruments and use only push button type electronic instruments which are highly reliable. Orders on the various licences to purchase 2,80,000 telephones has already been finalised. The supplies have to start from March, 1987 onwards. As we enhance the technology and materials for these 5 segments, it is certain that the quality of service and reliability will increase to that of international standards.

The other factors which affect the quality of service are manual labour management and supervision etc. Action have been initiated to enhance the capability to increase the quality and reliability of the services.

Now, let us see with the present situation of the telephone network what is the quality of service in these two cities of Bombay and Delhi. The following table gives you the average number of faults and average duration of faults per 100 per month.

**Faults – per 100 telephones per month :**

*Average Duration :*

	BOMBAY		DELHI	
	Average duration of fault	Faults/100 Telephones per month	Average duration of fault	Faults/100 per month
1985	16.7 hrs.	25.8	8.73 hrs	31.26
1984	18.7 hrs.	26.0	8.20 hrs	33.66
1983	18.6 hrs.	28.4	8.00 hrs.	34.77
1982	18.6 hrs.	24.5	11.05 hrs	38.37
1981	11.9 hrs.	14.7	7.7 hrs.	39.50
1980	11.7 hrs.	25.0	5.8 hrs.	40.70
1979	11.8 hrs.	25.4	5.35 hrs.	42.10

The situation of faults per 100 telephones per month in two countries of the world is as follows :—

JAPAN		FRANCE	
1970	1.8	1978	3.75
1973	1.0	1980	2.8
1976	0.7	1981	2.5
1979	0.59	1983	2.25
1982	0.48	1984	2.2
1985	0.36	1985	2.0

**Important Concepts of the Action Plan**

1. Balancing of waiting lists so that the subscribers in different exchange areas are treated more or less alike.

2. *Improvement in Services :—*

- (a) Use of only digital electronic exchanges;
- (b) Use of Jelly-filled cables of all sizes;
- (c) Large scale use of PCM & Optical Fibre systems on junction routes;
- (d) Replacement of worn out and life expired exchanges;
- (e) Replacement of worn out and life expired cables;
- (f) Re-wiring of large buildings on modern concept;
- (g) Ducting on large scale to avoid repeated diggings and reduce the construction periods of the network;
- (h) Use of latest wire termination devices and use of latest cable splicing techniques;
- (i) Use of Copper coated steel drop wires;
- (j) Push button telephones—large scale use of Decadic and DTMF instruments and replacing the old instruments, thereby providing modern facilities from electronic exchanges.

3. *Network Optimisation :*

- (a) Network Optimisation by increasing throughput Traffic;
- (b) Improving Call Completion Rate by augmentation of equipment (wherever required) and provision of Tandem exchanges.

4. *Automatic Message Accounting Equipment—Introduction of Detailed Billing :*

- (a) This will avoid manual meter reading;
- (b) Provide detailed billing for STD and ISD calls;

5. *Improving Trunk Manual Services*

Provision of Digital Trunk Manual Exchange to improve the capability of the operators and optimum utilisation of channels.

6. *Introduction of New Services*

- (a) Radio Paging
- (b) Cellular Radio Mobile Telephones in Cars
- (c) Videotex
- (d) Telefax
- (e) Electronic Mail

7. Improved telephone facilities to villages around Delhi and Bombay by using digital microwave and optical fibre system and provision of Remote Line Units.

**Human Resource—Upgradation**

In this connection, it is very necessary to upgrade the human resource available with MTN. As technology is improved, modern management concepts are introduced, we have to bring about the changes in attitude, culture and skills of the staff. In order to improve the efficiency large scale computerisation programme is being introduced and certain targets and dates have been set for this computerisation programme.

**Upgradation of Management—Training, Incentives, Computerisation**

1. *Training and re-training*

- (a) Emphasis on training and re-training of staff
  - (b) Upgrading the Training centres and opening new ones.
- } Already commenced

2. *Incentive/Motivation*

Improving the productivity, Improving mobility of staff, provision of modern tools and works aids. } Already commenced

*Computerisation of Administrative Services*

- (a) Directory Enquiry June 87
- (b) Subscriber's records and commercial working Dec. 87

**PRODUCTIVITY**

- (c) Cable records Dec. 87
- (d) Subscriber's line Management June 88
- (e) Subscriber Inventory June 88
- (f) Personnel records and its management Dec. 87
- (g) Staff Pay Billing June 87
- (h) Material Management June 88
- (i) Computerised library June 87
- (j) Computerised receipt and despatch of letters June 87

**Objects and Targets**

By taking steps explained so far, the following objects and targets are set to be achieved :

*Waiting Period*

Clearance of waiting lists upto 30.9.86 both in Bombay and Delhi by 1990. During this period imbalance of waiting list in different exchange areas will largely be removed.

*Faults*

Faults per hundred telephone per month will be reduced as follows.

	Bombay	Delhi
1987 (31st March)	20	30
1988 (31st March)	18	25
1989 (31st March)	15	20
1990 (31st March)	12	15

3. *Excess Metering Complaint*

Excess Metering Complaint will be insignificant after Detailed Billing equipment is installed and fully operational by 31st March 1989.

4. *Trunk Efficiency*

Trunk efficiency for effective calls will be over 80% by use of DTMX by March, 1989.

(b) Waiting List shall be current from 1988 onwards.

(c) Faults per 100 stations per month to reduce as follows :

5. *Call Completion Rate ?*

Call Completion Rate for local calls from free to free telephone will be 98% by 1990.

6. *Call Completion Rate for STD Calls*

Call Completion Rate on STD from free to free telephone will increase from 30% to 60% by 1990 between Delhi and Bombay.

7. *Telex*

(a) All strowger Telex exchanges shall be replaced by 1988.

(d) Telex machines will be all electronic by 1990.

	Bombay	Delhi
1987 (1.4.87)	45	45
1988 (1.4.88)	40	40
1989 (1.4.89)	30	30
1990 (1.4.90)	20	20



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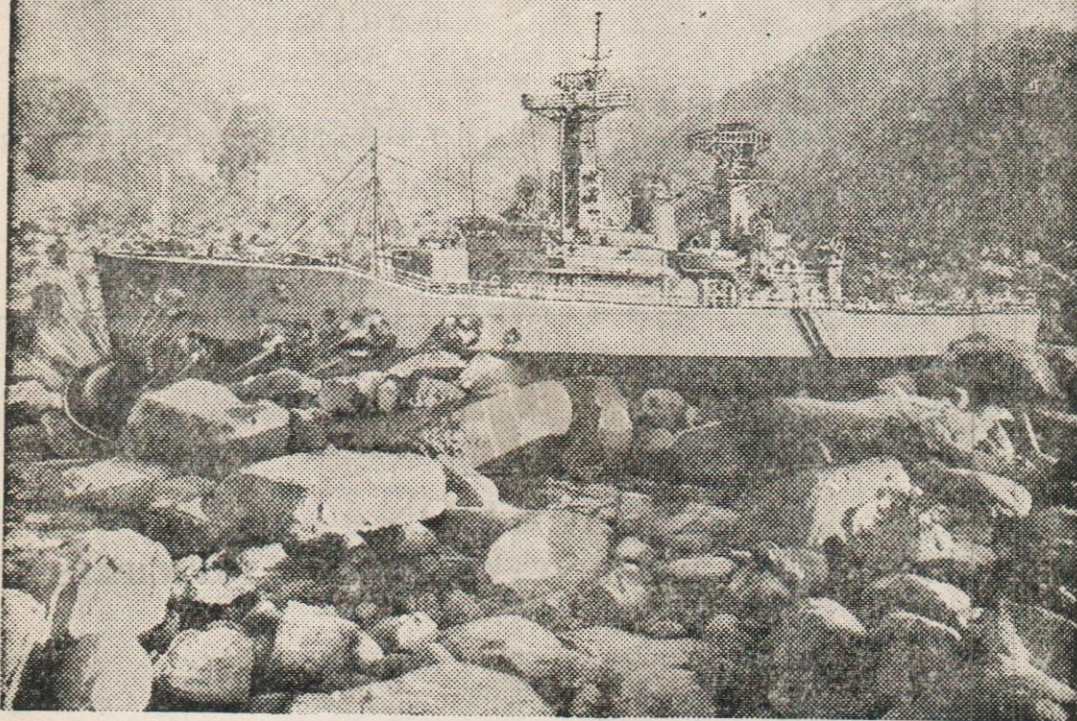
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# Managing Marine Products Quality

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DR. D.C. MAJUMDAR

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*Managing quality in Marine products, calls for special strategies. The author in this paper presents the same and gives a number of recommendations which if implemented would protect the consumer against adulteration in marine products.*

Dr. D.C. Majumdar is Director (Inspection and Quality Control), Export Inspection Council of India, New Delhi 110 008.

## Introduction

Every nation needs an effective food quality assurance programme and food control service to protect the consumers against foods :

- (i) which are contaminated, decomposed or adulterated
- (ii) which may be injurious to health, or
- (iii) which are deceptively packaged or labelled with false or misleading statements or otherwise fraudulent.

## Food Control Acts and Orders Operated by the Different Government Institutions/Departments in India

A summary of the Food Control Acts and Orders operated by the different Government Institutions/Departments in India are as under :

*Prevention of Food Adulteration Act (P.F.A Act), 1954*—This Act, which is operated by the Directorate General of Health Services, Ministry of Health is very comprehensive Act designed to formulate and monitor standards of quality and purity with emphasis on prevention of adulteration of foods. However, the Act, which is applicable to domestic trade only, lays down broad general principles of food control empowering the Government to frame rules which

can be modified to suit the frequent changes that may become essential as a result of the advancement in the food technology. In 1964, the Act was so amended as to enjoin the manufacturer, distributor or dealer to give a warranty of the food's quality to a retailer. Such warranty can safeguard the retailer in the event of the food being found to be adulterated. Besides other provisions, the Act also provides for penalties for various offences and empowers the judiciary to enforce such penalties.

*ISI Certification Marks Scheme*—For the purpose of providing a third party guarantee to the consumers, the Indian Standards Institution is operating a Certification Marks Scheme under the ISI (Certification Marks) Act, 1952 which is voluntary for internal trade and compulsory for export. Under this scheme, licences are issued to manufacturers who produce goods in accordance with the provisions laid down in the relevant Indian standards. Thus, for granting an 'ISI Certification Mark Licence', the availability of the relevant Indian standard is a pre-requisite. The scheme is voluntary, but when a request for obtaining a licence is made by any manufacturer, a scheme of testing and inspection is drawn up by mutual consultation between the applicant and the ISI Directorate General for exercising strict quality control and vigilance at all stages during production. Such control includes the details regarding the number of samples to be drawn at every stage and tests to be carried out in order to ensure conformity of the end product with the relevant Indian standard. Besides periodical and surprise inspections carried out by the ISI Inspectors, samples obtained from the open market are also tested in ISI and other independent laboratories. Any discrepancy in the quality is immediately reported to the licensee who, in the first instance, replaces the product of defective quality and subsequently checks his records with the help of the batch and code numbers on the product. As a follow-up action trouble spot in production line are identified in collaboration with ISI authorities and corrective measures taken forthwith. Thus, this ISI operated scheme could be regarded as a technical audit rather than a policing operation.

*Agricultural Produce (Grading and Marking) Act*

1937—This is one of the oldest Acts promulgated by the Government of India. The Act is operated by the Directorate of Marketing and Inspection (DMI) for the grant of symbol 'AGMARK' in respect of the grading of many of the common agricultural raw produce such as foodgrains, tobacco, ghee, butter, edible oils and spices. Close collaboration exists between ISI and DMI during the formulation of Indian standards, but the areas of operations, so far as certification is concerned, are clearly demarcated.

The Directorate establishes or adopts national standards for its inspection and certification. The certification system adopted by the Directorate also varies with the nature and characteristics of the material to be certified. AGMARK certification for internal consumption is voluntary for many products. However, it is compulsory for all export items.

*Fruit Products Order (FPO), 1956*—This order, which is operated by the Food and Nutrition Board (FNB) of the Ministry of Agricultural includes specifications for various fruits preparations. In accordance with this order, all fruit manufacturers in the country are required to be licensed for production, and the quality is controlled through F.P.O. mark by the operating authority. A special feature of the quality control scheme under the order is that FNB has an inspection system of continuous checking of raw materials at the production site especially in cases where differentiation of raw material from the end product is not possible. Close collaboration exists between ISI and FNB.

*Meat Food Products Order, 1973*—This order is operated by the Directorate of Marketing and Inspection of the Agricultural Marketing Adviser's office of the Government of India. Under the order, the Directorate of Marketing and Inspection controls production, quality and distribution of raw and processed meat food products. It is understood that suitable infrastructure is being developed for a rigorous ante-mortem and post-mortem meat inspection on the basis of the relevant Indian standard.

*Solvent-Extracted Oil, Deoiled Meal and Edible Flour (Control) Order, 1967 and Vanaspati Oil Products.*



*Order, 1967*—These orders, which are operated by the Directorate of Vanaspati in the Ministry of Commerce, regulates the production, distribution and quality of solvent-extracted vegetable oils and vegetable oil products. In accordance with these orders, the quality requirements of vegetable oils have to be complied with statutorily.

*Other Acts and Orders*—To control the quality of other common food items, regulations such as Coffee Act, 1942, Tea Act, 1953, Sugar (Control) Order, 1956 and Packaged Commodities Order, 1975 are also in operation.

*Export (Quality Control and Inspection) Act, 1963*—With exports gaining paramount importance in the economic progress of the country, the need for ensuring high quality of our export products to match up to the growing overseas demands and to improve the image of the Indian products in the international market was realised by the Government of India. As such, for the sound development of the export trade of India through quality control and inspection and for matters connected therewith, a comprehensive legislation entitled 'The Export (Quality Control and Inspection) Act, 1963, was enacted by the Government'. This Act came into force with effect from 1st January, 1964 and, on the same day, Export Inspection Council was set up. The main functions of the Council, which include experts from the fields of quality control, inspection and testing, are to advise the Central Government regarding measures for the enforcement of compulsory quality control and inspection of various commodities intended for export. The Act empowers the Government of India to notify the commodities which shall be subjected to compulsory quality control or inspection or both prior to export and to specify the type of quality control or inspection which shall be applied to a notified commodity. With a view to strengthening the scheme of quality control and pre-shipment inspection, the Act was amended in 1984. To deal with the unscrupulous manufacturers/exporters more effectively, the Act, as amended, has given authority to the officers of the Central Government and the Export Inspection Council/Agencies to search the premises of the manufacturers/exporters, to seize and confiscate the

commodities which have been substituted with inferior material after inspection and also to initiate adjudication proceedings against the delinquent manufacturers/exports apart from launching prosecution in the court of law.

*Agencies responsible for quality control, inspection and certification*—Besides, formulating specifications and standards for the export products, Section 7 of the Act also empowers the Government to recognise/establish Inspection Agencies to carry out the required work relating to quality control or inspection or both. Under the provisions of this Act, five export Inspection Agencies were established one each at Bombay, Calcutta, Cochin, Delhi and Madras with effect from 1st February, 1966, to cover the entire country. These Agencies function under the Administrative and Technical Control of the Export Inspection Council. Presently, there are 67 offices under the jurisdiction of these five Export Inspection Agencies and these are manned by a complement of staff numbering about 2,200. These Agencies have 24 well equipped microbiological laboratories for testing fishery products meant for export at all the important processing/exporting centres of fishery products. Export Inspection Agency's laboratory at Cochin is one of the most modern and well equipped quality control laboratories in the country.

In addition to the five Export Inspection Agencies mentioned above, the Government has also recognised under section 7 of the Act, 39 private inspections agencies and 10 Governmental agencies including DMI, Indian Standards Institution, Directorate of Fruit and Vegetable Preservation, Quality Marking Centre of the State Governments, etc., which are competent to conduct pre-shipment inspection of certain notified commodities.

*Items under the purview of compulsory quality and control pre-shipment inspection scheme*—As on today, a large number of export items of food and agriculture totalling over 77 in number are in operation under the Export (Quality Control and Inspection) Act, 1963 under broad headings like fish and fishery products, edible nuts, including cashew kernels, spices and condiments, unmanufactured tobacco, essential

oils, vegetable oils, fruit and vegetable products, pulses, animal products, animal food, gums and rosins, etc.

*Quality control and pre-shipment inspection of fishery products*—The fishery products which were first brought under the compulsory quality control and pre-shipment inspection scheme under the Export (Quality Control and Inspection) Act, 1963 with effect from 15th March, 1965, were frozen and canned shrimps. At that time, the scheme of pre-shipment inspection was operated by the Director, Central Institute of Fisheries Technology, Cochin, who was recognised as the Inspection Agency, under section 7 of the Act. Consequent on the decision of the Government of India, the scheme was taken over by the export Inspection Agencies with effect from 1st May, 1969. Gradually, other items of fishery products such as frozen froglegs, dried shark fins, dried fish maws, dried fish, dried prawns frozen lobster tails, dried Bombay duck; laminated Bombay duck, canned crab meat, frozen pomfrets, frozen cuttlefish and squids and beche-de-mer were also brought under the same system.

*Inspection Standards*—While publishing notification enforcing statutory pre-shipment inspection, the Government of India laid down detailed standards regarding various quality control factors relating to each product. These standards relate to physical Organoleptic, Analytical and Bacteriological factors.

*Quality control pre-shipment inspection systems*—The Consignment-wise pre-shipment inspection: In the initial years, the pre-shipment inspection of fishery products was carried out under consignment-wise pre-shipment inspection scheme which required inspection and testing of only the final product to ensure conformity of the product to the prescribed standards.

In Process Quality Control (IPQC): With a view to making the quality control and inspection scheme more meaningful and effective, the Government of India introduced the IPQC Scheme for frozen shrimps, lobsters, lobster tails and lobster meat, cuttlefish, and pomfrets with effect from 31st December, 1977. Under

this scheme, processing of fishery products for export is permitted only in the processing units which are approved by the Export Inspection Agency. To Qualify for such approval, a production unit must have the minimum sanitary and hygienic facilities stipulated in the 'Export of fish and fishery products. (Quality Control and Inspection) Rules, 1977'. These rules prescribe requirements in respect of the processing units, environmental, sanitary and hygienic aspects of the units, processing facilities available and the health and personal hygiene of the workers employed. The production units which do not have these prescribed facilities are not allowed to process fishery products for export. As per the IPQC System, the entire processing operations are carried out under the supervision of competent technical personnel employed by the processing unit. Standards have been laid down for the acceptance of raw material also and only approved raw material is allowed for processing. At all the stages of processing, the necessary inspection is conducted by the technologist of the production units and his observations counter-checked regularly by the officers of the Export Inspection Agency. The final product is further subjected to physical, organoleptic and bacteriological examinations and if, on such inspections and examinations, the product is found to be satisfactory, then only certificate of exportworthiness is issued by the Export Inspection Agency for the relevant consignment.

Subsequent to certification, the Agency conducts further checks on the certified export consignments in the cold storages and at warehouse also, prior to shipment. Thus, IPQC Scheme, now enforced, entails continuous surveillance and vigil by the Export Inspection Agency officers during the entire processing and packing operations, starting with the receipt of the raw material till the final product is exported.

Modified In-Process Quality Control (MIPQC): Taking into account the experience gained and the strides made by the industry, the Export Inspection Council felt that the system of In-Process Quality Control may be modified in the case of those of the processing units which have been accorded approval to process fishery products under the IPQC Scheme

and which have additional infrastructural facilities (like their own testing laboratory) to ensure production of bacteriologically and organoleptically sound products for export. This system entitled 'Modified In-Process Quality Control (MIPQC) Scheme' was introduced in 1980. The units approved under MIPQC Scheme are permitted to process and pack fishery products for export under their own supervision and control. Accordingly, exercising total surveillance of the entire processing operations to ensure quality of the product is the sole responsibility of the processors themselves and the main duties of the Export Inspection Agencies' officers in respect of these units are to assist and guide the processors in their attempts to produce wholesome and quality products. So far, out of about 300 processing units in the country, 52 are approved under this scheme. Export Inspection Agencies have provided detailed guidelines to the processors for this purpose and they maintain a continuous monitoring on the performance of these units. Although, the responsibility for ensuring the quality of the product and declaring the consignment exportworthy rests with the processors themselves, the inspection certificates are issued by the Agency for the purpose of export, with counter-checks wherever called for.

**Self-certification:** This scheme has recently been approved by the Government of India. Only the units presently approved under MIPQC system shall be considered for approval under Self-certification scheme. While doing so, their performance for the preceding three years shall be reviewed. The approval under this scheme shall not be accorded to a processor in case any complaints or claims are received from overseas buyers regarding the quality of the products and, on investigation, they are found to be genuine. As per the required norms, the units, approved under this scheme, shall have separate and competent technical personnel to handle pre-processing, processing inspection, testing and quality audit operations. Such processing units shall have their own testing facilities, quality audit cell, transportation facilities for raw materials and finished products, in addition to the other normal facilities of a processing unit. The approval accorded to such units shall normally be valid for a period of one year which may be extended, provided the units continue to fulfil the

required norms. So far, no processing unit has been accorded approval under this scheme.

### **Export Inspection Concils' Contributions to Fish Export Industry**

Export Inspection Council's vital role as an impartial third party guarantee to the overseas buyers has been to assure the quality of Indian fishery products to the ultimate consumers, thereby to improve the image of our products in the international market. Although the above task is extremely hard and challenging, the Export Inspection Agencies, with a network of 24 inspectorate and well equipped microbiological laboratories manned by well trained and experienced personnel have been able to accomplish the same with a reasonable degree of competence. This is reflected by the steady increase in the export earning from fishery products over the years : from a meagre export figure of Rs. 6.92 crores in 1965 to Rs. 397.99 crores in 1985-86. In fact, the Ministry of Commerce (Government of India) has envisaged an export target of Rs. 700 crores by the end of the Seventh Five Year Plan (1985-90) for marine products.

India is presently ranked the seventh among the fishing nations of the world as far as fish production is concerned. She is exporting fishery products to over 60 countries and has thus emerged as one of the leading exporters of seafood in the world. As our fishery products are exported mainly to sophisticated and fastidious markets such as the USA, Japan, Australia, the UK and the continent admittedly, the organoleptic and bacteriological standards of the Export Inspection Council and their timely upgradation have played an important role in achieving the present level of exports of these products. As the importing countries have started stipulating stringent quality standards for the different fishery products they import, the future of seafood export industry appears to depend largely on the capability of the industry and regulatory authority to meet such requirements. Thus, quality control will definitely play a leading role in the exciting saga of Indian fishery export trade in future too, and the challenging role of the Export Inspection Agencies to safeguard the country's image by controlling the quality of fishery products will

continue to remain significant till the time quality control measures will no longer be required to be adhered to under statutory obligations.

### Recommendations

For the proper implementation of Food Laws and Regulations, the following suggestions are made to protect the consumer against health hazards and fraud or adulteration .

(1) The present food quality control systems have not been able to meet the growing aspirations of the people, particularly in the rural areas: Presently, the food quality control activities which are being carried out by the different organisations lack coordination. It is desirable to bring about necessary coherence in the various existing food quality control activities of the different Governmental Agencies, so that their activities should complement each other and there should be no room for duplication of their efforts. To accomplish this, establishment of an apex body to coordinate and review the various food control systems and activities may be considered necessary.

(2) Regulatory control and extension and advisory services should be given priority and for this purpose, the guidelines may be as under :

(a) Full regulatory control in urban areas;

(b) Regulatory control with advisory and extension activities in such areas where certain amount of industrial development, increase in literacy and rise in the standard of basic food hygiene have taken place;

(c) Mainly extension and educational activities, with monitoring by food quality control agencies, in rural areas; and

(d) Provision of adequate number of properly trained field inspectors, well equipped laboratories and well trained analysts.

(3) Provision for non-governmental organisations such as Consumer Associations and Trade and Industry Associations to play positive role in protecting consumers' interest. Any amount of legislation cannot fully solve the problem of food contamination and adulteration unless the consumers become conscious of the hazards to health consequent on the consumption of adulterated or contaminated foods and unless they are able to discriminate between the product which is acceptable from that which is not acceptable for consumption. Consumers must be taught the provisions of the food laws and regulations and how the food control service protects them.

(4) Licensing regulations in respect of common food items may be made as stringent as in the case of fishery products processing units which are approved by the Export Inspection Agencies for processing the products for export.

(5) It is high time that we adopt at least some minimum standards statutorily for handling, transportation and distribution of fishery products inside the country, so that health hazards likely to be caused by contaminated fish and fishery products could be reduced to the minimum, simultaneously providing wholesome fresh fish to our people. The experience gained by the Export Inspection Council and Export Inspection Agencies through the implementation of various quality control systems applicable to export fishery products may be utilized by other agencies with a view to upgrading various quality control programmes for other food items meant for domestic consumption.

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# Creating Quality Consciousness

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CAPTAIN B.K. DATTAMAJUMDAR

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## India Decides on "Quality-March"

*The author in this article discusses the need for a campaign for quality and reliability improvement of our products. For our Nation to increase exports and emerge as a respected and very powerful industrialised Nation in the world, this is a must says the author.*

It is indeed very befitting that Union Industry Minister Shri. N.D. Tiwari has declared that India would be observing the month of November, 1986 as "Quality-Month" to emphasise "Quality" alongside "Productivity" in our industries. "Quality should become the nation's pride," he has said. Over the years we have improved our products and we also export these to many countries. To increase exports with an image of good quality, much more needs to be done today. Our survival as an industrialised nation and further progress is at stake. Whereas electronics exports from smaller and lesser known countries like South Korea, Singapore, Hongkong and Taiwan exceed Rs. 1,000 Crores, India's exports stand just at about 60 Crores, the export of consumer electronics from India is only about Rs. 10 Crores. A recent estimate puts the requirements of marine electronics in India at Rs. 200 Crores. Only a small percentage of about 20% of this is likely to be met indigenously as per present forecast. A critical analysis of this sad situation reveals that it is primarily because of lack of confidence in Indian Electronics by the users. Non-availability of sophisticated designs with proven reliability is another reason. This lack of confidence arises from poor reliability and performance of Indian Electronics. While there is no shortage of "super brains" in electronics in India, it is pertinent to ask why the Indian electronics cannot compete with those from abroad? The simple answer could be that the

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buyers do'nt "Value" (explained in details a little later) Indian products highly. We shall have to overcome this malady quickly, by leap frogging. To quote our Prime Minister, Rajiv Gandhi from his address to the National Conference on Engineering Exports on 22 March, 1985:—"Quality of our products really leaves very much to be desired. One of the problems is that we are selling to a captive market. We are selling to a market which is not responsive to quality. We are selling really in an absolutely seller's market. It will change. In our recent policy statements, in our budget, we have tried to change to some degree. But our market of 700 million is so vast that it is not going to change quickly. The industry will have to change faster and will have to make the market change because ultimately you will be called upon to compete not with each other but with other industries of the world. And we must prepare for that day "today". The present campaign thus is not even a day earlier in this context.

### Quality Campaign Abroad

Suffering from the economic recessions in the postwar years because of it's poor quality of manufactured goods and lack of market for them, the U.K. observed a "Quality and Reliability Year" for a whole year in 1966-67. About 8,000 Companies took part in this campaign. Very encouraging results were achieved from the "Q & R year" movement. Substantial savings were achieved in production costs and new markets were created mainly as a result of rise in prestige by reasons of reduction in failures of the products through better quality of designs and increased reputation for reliability of manufacture by British firms. In America also in about the same period, the "Zero Defect" campaign initiated by Robert McNamara, the then Secretary of Defence, made great impact on the industries. Japan had also observed such "Q & R year" campaign to great success.

### How Much Quality ?

The manufacturer and the customer both must be conscious about the importance of quality and reliability and consequent benefits thereof. Customers can

give the valuable feedback data for improvements in the design to reduce failures and resultant dissatisfaction thereof that make them to go for other makes where available. This awareness can be brought in by well planned, motivated and result-oriented campaigns such as "Q & R year". Workers and management of a company as well as the general public need to be prepared gradually to adopt measures conducive to achieving more and more reliability. Survey has shown that one dissatisfied customer may mean loss of about forty potential buyers for the item in a "Buyer's Market". This may mean that a company may go out of business in a market of abundance as is the trend in India now. Compared to this, reliable products reassure customer good-will and sell better. More sales reduce unit cost. Hence, it pays to make reliable products. But there are other practical considerations also. A very reliable item e.g. Rolls Royce Car could be beyond the means of many and may put the company out of business as happened with this company in the seventies. The buyers then look for the next best reliable item which he can afford. People also like change of models, designs and upgraded technology. External features like finish, paint, controls, looks, shape and size etc also influence a buyer's choice initially but in the long run it is "Q & R" of performance that governs his decision. This is why intelligent buyers look for products from reputed firms and are even prepared to wait for them in a market of short supply e.g. some known brand of TV set, Scooter, Cosmetics and so on. There are also naive customers who are influenced by looks and "Cheaper" initial price based on lowest quotations obtained without relating performance and "Life-Long" costs. A judicious combination of Q, R and price (P) makes a product "Attractive" or worth its value. "Value" of an item can be defined as :

$$\text{"Value" of a product} = \frac{\text{Product Quality (Q) \& Reliability (R)}}{\text{Product Price (P)}}$$

The designer has to optimise these, based on market research for survival of the company. It may, however, be borne in mind that "long life reliability" is not required for all products. The story of the "long life carpet" proposed for Government married accomo-

ation in Britain seemed an excellent idea until some one pointed out that the harassed housewife often demanded a change regardless of the condition of the carpet.

Reliability of a product is influenced by many factors like mission time, frequency and place of use, environmental conditions, design and maintenance philosophy, the user himself and his training etc. Quality is the basis for good reliability. Without quality control, reliability cannot be achieved. However, besides "Quality Control", there are many other factors that ensure reliability eg. Quality Control of an inadequate design will not give reliability. Above all, it is common sense which helps to achieve quality.

The optimum reliability of a product is a transfer function of many input variables Vide Fig. 1. The successful designer/manufacturer has to provide all the relevant inputs, even though some of them may conflict with one another, at the optimum level. Follow through by formalised engineering and positive management are essential. Dr. Condon, NASA's Director of Reliability who saw through many American successful space missions in the sixties attributed the success to these two factors alone. Recent space missions that failed lacked these essential needs.

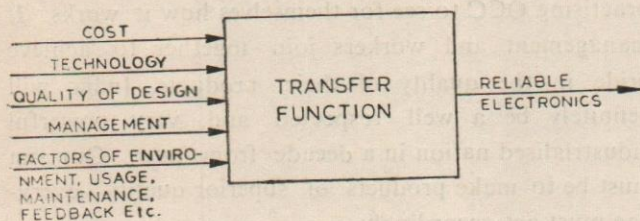


Fig. 1: Reliability is a Transfer Function of many input Variables

From the point of view of the user, the ideal equipment is the one which never fails. The state of art and science in "Reliability Engineering" is yet to develop to this extent at economical costs. It, therefore, follows that failures will take place and repairs/maintenance will have to be done. Our concern is to minimize the effects/duration of the failure (MTBF & MTTR) when it occurs. Various factors lead to a

failure e.g. bad usage, bad workmanship, bad design and so on.

If these factors can be identified and altogether eliminated, a state of "Zero Defect", One time famous "ZD" doctrine expounded by Robert McNamara can be achieved. This is the ideal state but over the years it has been found to be impractical to have hundred per cent reliability even in American Defence Industries.

### Constraints of Reliable Products

Reliability is inherent in the design—the designer has to provide for it in the selection of components, in the choice of inbuilt redundancy in case of failures, in the instructions for manufacture, stage inspections, usage, maintenance and repairs. It is also very important to train the users to handle the equipment as per design parameters. Many troubles arise because of insufficient knowledge or ignorance on the part of the user regarding the design limitations of the equipment. For example that the life of the TV tube is about 3,000 hours and that too high a setting of "Brilliance Control" further lessens it, is not known to many users. Neither the manufacturer nor the seller highlights similar information to the customers to exercise caution and care in usage.

### Areas of Darkness

Analysis has shown that in India darkness exists in the following areas :

- (a) Design does not take into account environment and other conditions of usage.
- (b) R & D coupled with testing to defect potential weak areas in the design.
- (c) No user education for proper usage of the equipment i.e. to prevent defects because of bad handling.
- (d) No botheration to get field feedback.

### Failure Analysis

The aim of the failure data analysis is to determine the reliability of equipment in service or of

equipment undergoing prototype testing prior to entering service. The results of the analysis may be used for a variety of purposes like :

- (a) To determine life and replacement policy.
- (b) To identify inferior equipments whose unreliability prejudices whole plant reliability.
- (c) To aid spares provisioning policy.
- (d) To indicate suitable values for use in reliability models.

The fallibility of an equipment may change during its time in service. Before the mathematically attractive assumption is made that failures of an equipment are randomly distributed in time, attempts should be made to obtain the "Hazard Function" by Weibull analysis.

Duane method (a plot) can present the vast amount of cumulative failures and defect information arising from various equipment/machinery in service to the management in a simple manner for effective resource planning. To produce a Duane plot the following data are required :

- (a) The total cumulative operating time over given periods.
- (b) The number of failures/defects in each period.

From these, an availability plot can be derived from the expression :

$$\text{Availability} = \frac{\text{MTBF}}{\text{MTBF} + \text{MTTR}}$$

The Plot of Lin-Log scales is as shown in Figure 2.

### Quality Circles (QCC)

Japan during fifties manufactured most shoddy goods and everyone talked "If it is Japanese, it will not last long". Japan also realised the odd situation and with a desire to overcome it, invited Dr. Edwards Deming and Dr. J.M. Juran, two wellknown experts in Quality Management in the U.S.A. for a series of lectures to the industries in 1950. Thus the seed for today's reputation of Japan for "Quality Goods" was

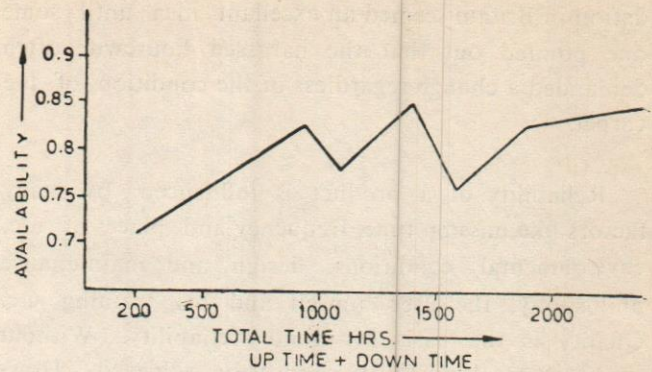


Fig. 2 : Duane Plot

sown. It took over a decade and in 1962 Dr. Ishikawa thoroughly indigenised all about quality and reliability and conceived the "Quality Circles" concept which swept through Japanese industries to make it number one industrial nation in the world today. It is indeed fascinating as to how the odd situation in Japan changed completely to one of the top quality good manufacturers in the world today—all these in a span of about 20-25 years only. QCC has found it's favour in many advanced western countries, America and India also. As a sequel to the "Quality Month" in November, 1986, organised planning should give a very big boost to the concept and implementation of "Quality Circles" in Indian industries. Short training courses should also be organised. Workers and Managers from industries should visit companies practising QCC to see for themselves how it works. If management and workers join together to achieve pride in the quality of their products, India will definitely be a well respected and very powerful industrialised nation in a decade from now. Our aim must be to make products of superior quality—everyone must act accordingly.

### Q & R Marketing and Guarantee of Performance

Q & R certification by an independent authority (eg ISI) for general customer products will ensure minimum quality. It may not have significant bearing to improve Q & R beyond the minimum acceptable. It could very well be an interim measure till we achieve Quality by QCC etc.

The decision of the Indian Government that all



the 55 electrical appliances listed in it must confirm to the specifications laid down by ISI shows the importance of customer safety and satisfaction. The typical example of poor quality plugs and sockets made to no specifications (!) and customers falling for them because of low costs and regretting later is an obvious example.

**Reliability Management**

Fig. 3 shows that at every stage of the reliability loop there is active participation and two-way feed back to and by the management at all levels. The importance of this needs no emphasis. Management must provide engineers and designers with a free hand "To apply their arts and mysteries so as to bring the end product to the necessary level of satisfaction." Unfortunately only a few management understand this.

Management must understand the benefits of Q & R and motivate everyone in the company to "Work Till It Hurts" and realise that his future as well as the company's lies in better customer satisfaction of the products as compared to those of his other competitors in the field. Unless this is done and whole objective is understood, employees may still feel that Q & R controls threaten their jobs. The voluntary participation by workers, supervisors and managers for excellence of the end products has been the basis of "Quality Circles."

The senior management must also ensure that the best talents are available for the design and development engineering and that adequate funds are allocated for developmental testing to have a proven design.

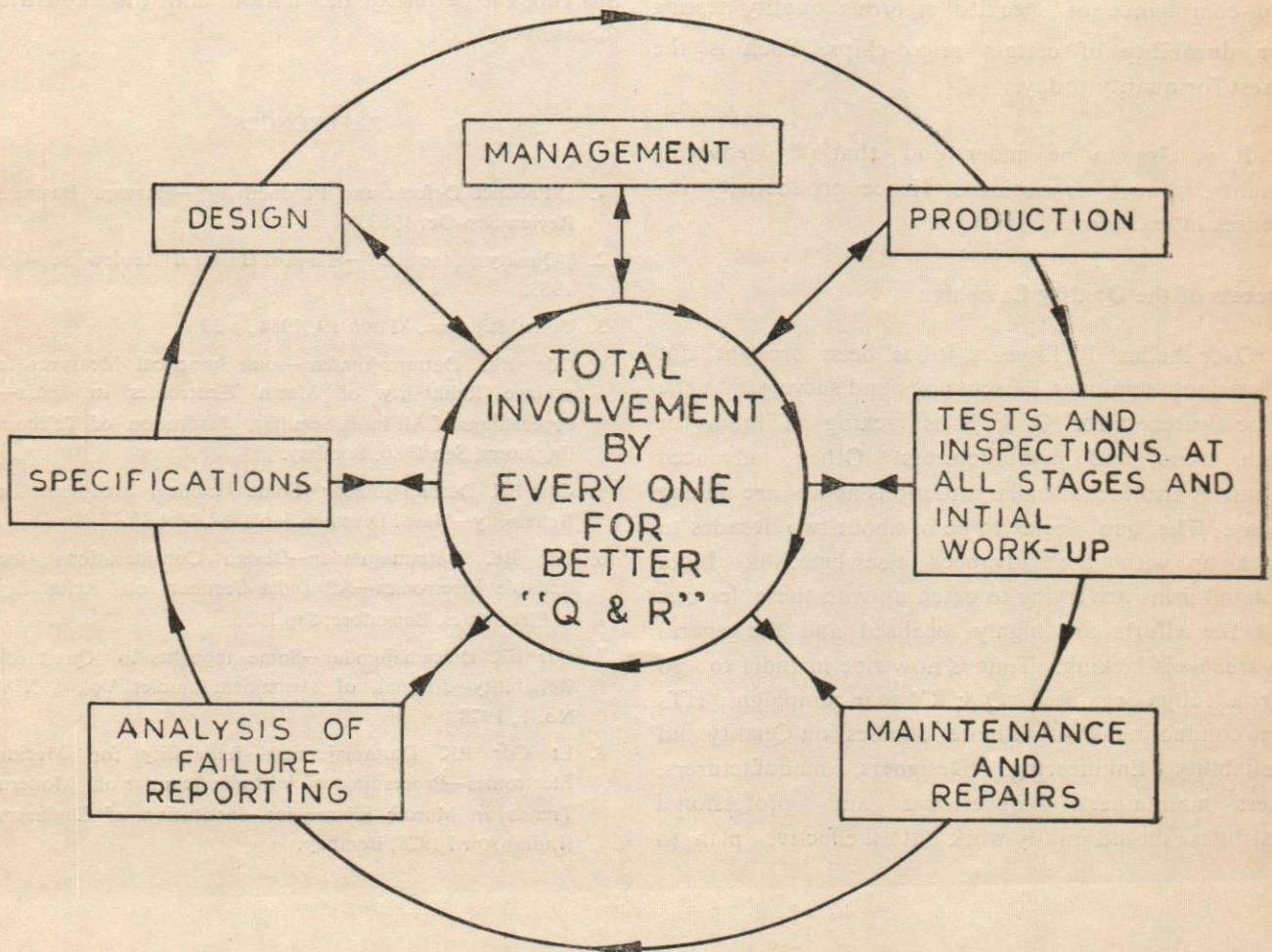


Fig. 3 : The Reliability Loop

It is not enough for a company for all the specialist technological functions involved in design, manufacture and servicing merely to exist, they must be co-ordinated to exist, they must be managed. Well co-ordinated market research through design, development, testing manufacture, Q & R control, purchasing for product support and personnel involvement are basic requirement for reliable products. The success of a company depends on all these which give customer satisfaction in a competitive market. In Japan, Vendor development to supply quality materials for manufacture is given high importance and 100% inspection of incoming materials is often a must to ensure quality of end products. Japan speaks of Integrated Quality Management, Concurrent Design and QCC. In the USA, a major electronics company, National Semiconductors of Santa Clara, Calif was sentenced in March '1984 to pay penalties of 1.8 million dollars for non-compliance of specified rigorous quality testing for durability of certain micro-chips. Such is the quest for quality today.

It is also to be understood that by ensuring Quality, rework is avoided. Hence productivity increases in real terms.

#### Success of the Quality Campaign

Over the last 10/15 years, it has been brought out in various seminars, discussions and surveys that the basic awareness for Q & R is lacking in India for both users and manufacturers. Other advanced countries also faced similar situations as we are facing today. The gap seems to be of about two decades to catch up with the advances elsewhere. In India isolated firms are trying to catch up with these lessons but the efforts are highly localised and the general awareness is lacking. Time is now ripe in India to go for a fully organised "Q & R" year campaign. IITs are conducting Postgraduate courses on Quality and Reliability Engineering. Designers, manufacturers, users maintainers, educational and professional institutes should jointly work out an effective plan to

achieve similar results like Japan, the U.S.A. or Britain. Sooner it is done, better will be the gain, more so, as India is now exporting her products to more than 80 countries. This campaign should be given a boost by the professional institutes in co-ordination with Ministry of Defence, Industry, Commerce, Department of science and technology, Electronics Commission, Indian Standards Institution and All India Manufacturers Association amongst others. Much of the success will depend on organised planning and execution of the campaign. This author had been quietly advocating a nation-wide Quality-Campaign for more than ten years now in various national Forums/Seminars and talks. Our industries will have to make most of our requirements of Defence equipment and machinery also in time to come where Quality and Reliability are of great importance for victory (or defeat) in a war. Sooner we gear up to this end, the better for the nation and the industries themselves.

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# Consumer and Quality

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MANUBHAI SHAH

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*Quality does not exist in vacuum Quality is demanded and achieved by the consumer. The author in this paper brings into focus the role of the consumer in quality improvement of the various goods used by him.*

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A consumer buys and uses products and services. In doing so he or she has the right to expect that the food he buys is fresh and wholesome, the drugs are pure and effective, the products are safe and work well, he is charged honest and fair price, the air he breathes and the water he drinks are pure and unpolluted, he can travel safely and in time from place, to place, the telephone functions, his letters reach the destination within the expected time, his electricity supply is uninterrupted.

But what is the reality. Our major cities are plagued with noxious fumes and smog, our rivers and lakes are polluted, our roads take a huge toll of deaths. Injuries are caused by substandard household appliances. The food sold in the market is very often unfit for human consumption. The medicines are unsafe and ineffective. Besides you come across deceptive packaging and labelling, injurious cosmetics, harmful detergents, tricky advertising, bogus warranties, unfair credit practices.

How can this state of affairs be changed. How can we bring quality and safety into our products and services. We have to make consumer protection everybody's business, the Government's the industry's, consumer organizations and of the consumers themselves. Just warning the consumer how to avoid some of the pitfalls is not the answer. He must be protected first and foremost by law from the air and water polluters, the shoddy manufacturers the food takers, the tricky advertisers and all who prey on the

consumer. This means that any realistic solution to the problem calls for organised action. All sections of the Society have to work together to achieve quality in our products, services and the very life we lead.

Let us for instance look at the quality of our food. Of course we have a right to expect clean wholesome food at a reasonable price. But how well is this right being protected? Most housewives will say that food prices have been steadily increasing. Perhaps what is even more shocking than this living-cost increase is the news that contaminated food and products containing harmful chemical additives are being sold.

Pesticides such as DDT are doing almost irreversible harm to our ecology. Animal and plant life are being destroyed by these chemicals, used recklessly to fight insect-pests and increase agricultural production, with little or no thought given to their harmful effects on our natural environment and our food supply. Some of these chemicals can cause cancer.

Pesticides are by no means the only way you can get poison in your food. Many food additives are toxic. Most of the packaged and canned food contain chemical additives in some form, and some of them are toxic and even cancer-causing. Many of these synthetic flavours colours, thickeners acidifiers, bleaches, antibiotics and preservatives can be positively harmful.

This brings us to the importance of proper labelling. Unfortunately, veils of secrecy, misinformation and half information now cloak our food labels.

The quality of other consumer products and the services is not any better. We may put forward any number of reasons like lack of care, red-tapism, poverty etc. as causing the poor quality of our products and services. But above all there seems to be an element of escaping responsibility. People are not held responsible for what they do, a lack of accountability. The services that the common man avails of most, road and rail transport, water supply electricity, post and telegraphs are all in the hands of the Government, or in the public sector. There the poor

consumer is treated like a beggar. He is expected to accept whatever is dished out to him as services. Here is the case of the servants of people becoming masters and lording it over them. The whole system has become so lax that acquiring a Government job has become synonymous to not doing any work or responsibility.

Failure in services telephone, electricity, post and telegraph has become a way of life. If we as a nation have to progress, this state of stagnation and rottenness have to give way to efficiency and accountability.

This situation can change only if accountability and responsible behaviour is ensured at the manufacturers, government levels. Manufacturers have the responsibility to ensure that goods produced are of standard quality and safe. It should become the responsibility of the distributor to make sure that unsafe and substandard goods are not brought to the market. Proper warnings should be given in the case of hazardous products pointing out the risks involved the conditions in which they should be used. It should become the responsibility of the producer.

These days when manufacturers attention is drawn to defective quality of their products, the immediate reaction is resentment. They are unwilling to replace defective products, or withdraw faulty products from the market. It is only after a lot of persuasion, sometimes lawsuits, that they see the light. At the same time one should admit that the industry has come up with organisations and consumer cells to instill the idea of fair business practices among their members and to redress consumer grievances. Adulteration and misleading Claims about quality of products are two areas these organizations should urgently look into.

The Government at least seems to have woken up to the plight of the consumer and his dire need for protection. The Centre as well as some State Governments are in the process of enacting consumer protection laws. Some State Governments have constituted consumer protection agencies. These are welcome steps. The good intentions of the government are very often defeated the way the Government goes

about framing the bills. The task is always left to a few bureaucrats and government officials. As a result instead of laws to protect consumer interests, laws to set up governmental agencies and their control over consumer bodies emerge. The real issues affecting consumers like : adulteration, overpricing, poor quality of products, improper labelling, misleading advertisement, cheating etc. are not tackled. Not only that these agencies become yet other hurdles and stumbling blocks for consumer organisations to grapple with. I hope the new consumer protection laws do really help the consumers. Another aspect the Government, when it creates new laws, seem to forget is the monopoly services, which happen to be in the public sector. If the consumer needs protection, and the government wants to protect the consumer, then it cannot say that the protection it offers can only be partial. It may happen that the consumer's real need for protection is from those who are left outside the ambit of the law. This exactly is what is happening today, under the MRTP Act. The public sector undertakings go scot-free. The Commission can do nothing in the case of consumer complaints against them.

The Consumer organisations, all over the country are at work basically to improve quality—quality of products, quality of services, quality of environment and ultimately quality of life in general. The work the consumer organisations do : educating consumers about choosing the right articles, the importance of ISI and AGMARK Certifications evaluating and publishing the quality of goods and services available, holding manufacturers liable for the illeffects and shortcomings of their products, making the consumers aware of misleading and tricky advertisements, and instilling in consumers the habit of protesting against substandard products and services—all this can be done more effectively if the organisations have the backing and support of the Government. After all, the organisations are doing a supportive work for the government which has the responsibility of protecting the citizen.

In a broader sense all the issues that have been taken up by the Consumer Education and Research Centre relate to improving the quality of products, services and environment.

### Quality of Products

#### Household Electrical Appliances Order, 1981 :

Quality of the products in market can be achieved by way of standardisation. After persistent efforts by consumer bodies throughout the country, the Government in 1981 amended ISI Act and issued Household Electrical Appliances Order of 1981. By this order Certification of Marks is made compulsory and no manufacture, dealer, distributor or seller etc. is allowed to deal with the common household electrical appliances without certification of marks. Even though the order was brought out by the Central Government, the implementation of the order as per the procedure of law was left to the State Governments and till this date only two State Governments and one Union Territory has implemented the Order. Ipso facto considering the overall national perspective this implementation does not solve any problem since substandard electrical appliances manufactured in other States always find their way in the restricted markets. Even in the States where the Order is implemented the manufacturers of the dealers are trying to create legal embargo. CERC has vigorously supported the Government. Through legal tools like educating members of the Parliaments and advocacy before the administrators, CERC has been successful in persuading the Government to implement the Order in Gujarat. In response to a writ petition filed by one of the dealers challenging the Order before the Gujarat High Court, CERC has intervened in support of the Government in the interest of the consumer.

### Quality of Services

CERC has been constantly battling for the betterment of services provided by Public Utility Monopolistic Corporations. Most of the laws governing the Public Utility in India, lay down that the Corporations should function efficiently, economically and on sound business principles. In reality the losses incurred by these Corporations due to their inefficient and uneconomic operations are transferred to the consumers by way of increase in fares and tariffs. CERC has filed a writ petition against State Road Transport Corporation, State Electricity Board etc.

The main contention of the CERC against these Corporations is that the fares should not be increased unless they performed efficiently, economically and on business principles thereby providing better quality of services to the consumers at a reasonable price.

CERC is also fighting for the safety of the passengers travelling by Indian Airlines.

CERC is also trying to improve the quality of insurance that is available to the general public.

Better quality of these services thus also mean better quality of life for the consumers.

### Safety

One of the basic attributes of quality of products or services is safety. The products or services which are unsafe cannot be said to be qualitative products or services. CERC has taken up various issues regarding the safety of the products and services.

#### Sheri Louise Slimming Centre

Consumer protection agencies the world over have taken up the cause of slimming centres which in one way or the other affect the quality of the life of the clientele visiting such centres.

CERC has taken up the cause of Sheri Louise Slimming Centre to the MRTP Commission. One of the issues involved is the safety of the clientele as the food supplement supplied by the Slimming Centre contains drug which is harmful to the body. Another important issue is that of quality of advertising. The Slimming Centre Advertisement—claims are unsubstantial and misleading.

#### Creamy Snuffs

Creamy Snuff is in fact a tooth-paste which contains nicotine which is harmful as well as habit forming. CERC had received a complaint where the complainant complained about his wife consuming a

tooth-paste a day. Based on the subsequent research conducted, CERC has filed a writ before the Gujarat High Court, requesting the Courts to direct the Food and Drug Commissioner to cancel the licenses of the manufacturers.

This is a case where an individual complaint has led to a litigation which raises the issue of quality of a toothpaste and hazards accrued to the consumers because of unsafe products.

### Quality of Environment

CERC has issued notices to the toxic and hazardous Companies, the Directors of the companies, the Government Authorities and the District magistrates to take adequate measures and to maintain the quality of environment in the interest of the employees and the people at large. CERC is also trying to find a solution on the relocation of these hazardous companies which endanger the life and liberty of the citizens at large.

CERC has also taken up the issue of occupational hazardous. In a writ filed before the Supreme Court against the asbestos manufacturers, the Union of India and the respective State Governments. CERC has contended that the workers working in asbestos manufacturing units are exposed to Asbestos fibres which cause Asbestosis, a fatal disease. CERC has contended that stricter norms regarding suspension of asbestos fibre in the air, based on international standards should be adopted in India.

These two issues raise the basic fundamental right of life and liberty and the right of citizens to unpolluted air.

### Quality of Advertisements

Using 1984 amendment of MRTP Act, CERC has filed various complaints before the MRTP Commission various advertisements and other sales promotional policies adopted by the Corporate sector.

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# Quality & Top Management

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S.M. SUNDARA RAJU

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*"Indian Industry is in for a quality revolution. The responsibility to make it a success to a large extent falls on the upper management in industry, scientific institutions and the Government.*

*In this article the kind of measures that management should implement is briefly presented by the author.*

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## In Prospect

Both by public policy and private enterprise, electronics and communication industry is poised for a significant growth. There has been an allround concern to attain new heights and results in the public sector. Significant increases to resources of the exchequer are anticipated from accelerated and expansive growth of industry. Common man is aroused to look forward for a happier and healthier future.

## 2. Managerial Challenges and Response

2.1 All these have no doubt imposed challenges of unprecedented nature on the upper management in all spheres of economic activity. The upper managements on their part have also been responding by a number of measures of varying depths and degrees.

2.2.1 Electronics industry, which continues sheltered to some extent has shown concern for product quality and its improvement. To capture a higher market share and profit, each manufacturer is exerting to build a 'brand' image by projecting quality and reliability of his product. Similar efforts are noticeable in the automotive, communication and precision product manufactures.

2.2.2 In the public, specially core sector plants, which have accounted for huge outlay, pressures have been mounting to make them yield higher returns by better quality, efficiency and productivity. The

challenge in this sector seems tough. The implications are far-reaching of losses arising from quality and productivity of their products and services.

2.2.3 Export, though apparently growing, yet in real terms, shows pictures of regression. Quality and productivity gaps are no less responsible for this. Take textiles, a traditional product. In a recent global survey, Indian textiles figured nowhere. Korea, Taiwan and Japan all stole the march to account for over 90% of the market choice on quality and price fronts.

### 2.3 Snap Survey

2.3.1 Unlimited market and un-organised consumers at home together with shelters from sympathetic public policies, were no doubt disincentives for real concern and improvements in quality and lowering costs. Anxiety on the part of upper management to register turnover and quick profit was also a factor that led to turn-key collaborations and product manufacture. Quality and productivity efforts became simplistic and mechanical. Structural changes in Q. organisations and activities were symbolic.

### 2.4 The Changing Scene

2.4.1 Efforts are now visible to upgrade quality; market forces as well as public policies are impacting a measure of change in this direction. The tasks are tough and expansive. Unlike in other fields, quality and productivity impacts and improvements take much longer time to mature and yield durable result. Attitudes have to be moulded; people have to be trained and motivated; problems and approaches have to be resolved; and specific goals and improvement programmes have to be implemented.

### 3.0 Global Situation

The scale of success is unprecedented in Japan. Electronics, automotive, ship-building, steel and a host of other products from Japan have nearly had no rivals in quality, cost and customer preference in the world. Japan has also triggered reviews and upgradation of quality and productivity efforts in many

parts of the world. In America, unprecedented efforts have been set in motion since early 80s to review and strengthen quality efforts. Upper management has first come to focus in all the programmes and thrusts. Annual result-oriented specific quality improvement plans and programmes are the features in such focus. Training is another aspect. The role of upper managements in industry and Government for cooperative ventures and national progress is also significant. Worker participation and responsibility in Quality Control and surveillance is also greatly enhanced.

### 4.0 India Programmes

4.1 The need in India is urgent and paramount for achieving high quality, high productivity, low cost and good life and living, for our people. What can our managers do to work towards these known goals and achieve quick durable results ?

4.2 Upper management must make a positive response. They must break with the past traditions. These breaks might be in the following new directions :

1. Launch a programme of annual improvement in quality/productivity.
2. Undertake a massive programme of training so that the entire management team, not just the quality department is trained in, how to attain, control and improve quality/productivity; and
3. Undertake a critical and expansive review—a personal review by the senior managers of the company's approach to quality so as to establish new policies, goals, plans, organisation, measures, controls.

4.3 Annual improvement has the shortest lead time and the most obvious return on investment. The return will be several hundred times more than the investment. The approach usually consists of project by project attack by the same concept and approach that any management project is handled by specific goals, trained manpower, scheduling, review, follow-up and evaluation—and not by pious exhortations.

4.4 A specific language is employed in project



resolutions; a language which is bilingual—cost to lower, and targets and physical results, to higher management. Specification of clear responsibilities is a part of such an approach. Annual plans and five-year improvement plans as extensions, are a part of the exercises necessary to sustain and continue improvements in companies.

4.5 Training

4.5.1 Training in the body of concepts, tools and skills through which we attain control and improve quality, is another important and necessary step. The span of such training covers product development and manufacture, engineering and technical services and supply development. The training needs and areas have to go far beyond the narrow spectrum of education and motivation to inspectors and quality personnel.

4.5.2 Japan took a little over a decade to train the entire management team in various quality disciplines. In a vast country like India, it would take longer, but then a planned and organised approach to training seems absolutely necessary.

4.5.3 In the sphere of upper management training in Quality the content of training is exemplified by the topics listed in the 1980 Japanese Union of Scientists and Engineers (JUSE) training course for top management :

5. Upper Management Participation

5.1 An aspect that has failed to receive attention is the personal participation by upper management in improvement projects. Mere committee or task group formation and appeals or directives would fall far short of the requirement.

5.2 Personal participation by upper management is really necessary. Provision of coordination and resources, prompt correction of system weaknesses and promotion of positive attitudinal change to trigger and sustain improvements are some of the aspects of participation by upper management.

5.3 Also, review and correction of conceptual,

TABLE

Topic	Hours
Role of top management	1.5
Product development	2.0
Statistical methods	3.5
QC management	3.5
QC in Manufacture	3.5
QC in Purchasing and Sales.	3.5
Quality Assurance	3.5
QC in Japan and in the world	3.5
Group discussions	3.0
Reports on group discussions	3.0
<b>Total (Hours)</b>	<b>30.5</b>

Notice the length of the course is *four days*. Notice also that 40% of the time is spent on quality oriented activities of departments which have major impacts on quality, product development, manufacture, purchase, sales and quality control.

operational and organisational deficiencies in the Q. area need urgent remedy. To promote and achieve quality at source requires massive planning efforts. Upgrading worker role in improvement is an important area which requires serious attention.

5.4 Audit of the Q. function is another major activities of the Upper management. The audit outcome should provide rich and objective material for action by upper management to strengthen weaker areas of Q. in the organisation.

6. Supporting Expertise

6.1 A revolution in industry is round the corner. This demands revolutionary responses to bring about major improvements in quality and productivity. The improvements have also to be rapid. We can meet each year's budget without necessarily improving quality and productivity, but at the end of each year, we would have fallen behind global counterparts.

6.2 Japanese Union of Scientists and Engineers (JUSE), Japanese Standards Association (JSA) and a

number of professional Institutions/Associations have been actively supporting and servicing the efforts of industry to reach newer heights of performance and strength. In America too comparable institutional and professional infrastructure support is available for upper management to strengthen the industry efforts in quality and productivity. In India, the SQC Units of the Indian Statistical Institute which were started with the funding of the Central Government in the early 50s have been providing quality services and training to industry. National and regional productivity councils, the Indian Standards Institution, NITIE, and also a few professional associations have been supplying supporting services in the field. However, compared to the needs of industry, the nature and scale of service has to be considerably augmented and vitalised. Also the Upper managements have to organise their own in-house expertise to sustain and

intensify the results.

### 7. Government Industry-Scientific Institutions Relationship

7.1 The revolution and response cannot succeed without Government-Industry-Scientific Institutions playing their due orchestrated role. Each is a part of the whole. The managers in Government are concerned with their role of spending public moneys. In their role, they have to create the needed revolution within the government; they have to assure that within industry the needed response is also created.

7.2 A great deal depends on how far the upper management in industry, responds to the situation. No doubt, major opportunity and exciting challenge lies ahead for improvement in quality, national productivity and prosperity.

## Form IV

### Statement about Ownership and other Particular about Newspapers Productivity (as per Rule 8)

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I, A.C. BHUTANI, hereby declare that the particulars given above are true to the best of my knowledge and belief.

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A.C. BHUTANI  
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## EXECUTIVE READINGS

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### **Human Response In Organisations : Towards The Indian Ethos**

S.K. Chakraborty

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Published by :  
Vivekananda Nidhi, Calcutta  
: 1985.  
Rs. 95  
Pp. 236

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Reviewed by :  
D.P. Upadhyay  
Director  
National Productivity Council  
New Delhi

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The title under review is not only a significant contribution of an Indian author in management field because of its original approach but also for provoking our thinking process for searching areas of action without too much dependence on foreign models. The author does not demolish the contribution of experts of other countries in the area of organisational behaviour but makes a plea to think of these

areas in the Indian context. India has such a rich experience in understanding the human behaviour and the work that they deserve interpretations in the modern context and a lot can be learnt from them.

The idea behind publishing the book is that, in contemporary India, with the given pace of economic development, managers may do good if they look into the Indian ethos in developing management style and ethics in the country. While emphasising the elements of Indian ethos the book also attempts to draw the attention of readers to some parallel approaches and techniques followed in other countries with different cultural contexts. It would be better to quote the author in this context.

“The majority of Indian scholars and intellectuals today seem to dismiss, at times contemptuously, Indian wisdom as irrelevant, non-empirical, prescriptive, feudalistic, fatalistic, abstract, other wordly, obscurantist and so on.....There is a distinctive Indian world-view and lifeview of eternal value which

transcends all the visible, social, political, religious and economic institutions and their manifestations—often repulsive, ugly and painful. Their re-discovery and articulation to face the challenges of modern times may be difficult but surely worthwhile as they have sustained the Indian civilisation for millenia”.

It is altogether a different matter if one agree to the propositions or analyses of the author or thinks that he has stretched some points too far, the strength of the book lies in the fact that it is perhaps the first comprehensive attempt to identify the elements of Indian ethos which the Indian managers must think about or atleast debate before coming to conclusions.

Establishing the supremacy of Indian ethos, the autor points out that while western thought or conceptual framework of understanding human behaviour is based on understanding the sub-conscious or self-awareness, the Indian approach stresses on bringing up this subconscious to conscious level.

and then establishing a link with 'super-conscious'. He pleads that by merely causing the sub-conscious to become conscious, the troubles and ills of mind and behaviour are not eliminated. It is only when we link this exercise with super-conscious that we achieve the desired goal and a better style of management. This super-consciousness does not mean faith in God or super power but visualisation of values of life which are based on spiritual and ethical considerations rather than materialistic considerations limited to fulfilment of certain human needs.

Quoting from the writings of Swami Ranganathan, the author says that insight to distinguish between three types of environment in and on which men work is very essential. These three types of environment relate to natural, social and spiritual areas. All available literature of Behavioural Science pertaining to modern industry and its management concerns itself only with the first two environments. The Indian approach encompasses the third one also. Swami Ranganathan says, "There is a constant interaction between this inner spiritual environment and the other social environment. The handling of this interaction by man, individually and collectively is the one determinant of all social health or ill health".

Thus there is a need to think of such practical philosophy for nourishment and inspiration. Only then should we embark on the task of structural as well as management style changes and improvements.

A significant aspect of this book is that unlike western Behavioural Scientists it does not deal with groups and teams as such. The individual is the focus right through the work. The author points out that even West has started recognising that it is the unit which comes first, the group only follows. If the unit is helped to set out on the right track for inner developments, then groups or organisations will be automatic beneficiaries.

The book which contains six chapters deals with deeper and fundamental issues related to Indian ethos, human response in Indian organisations with a model of organic resonance, business management and Indian mysticism, human response development and Patanjali's aphorisms, team building, leadership and integrated personality in the light of Guna dynamics and change agents and catalysts.

Although it is difficult to appreciate all the components and premises of the author and some of these appear to be very indirectly linked, the greatest strength of the book lies in its convincing appeal to the need of appreciation of Indian ethos and value orientation in this context. There cannot be two views that Indian managers too should look for Indian ethos as Japanese have done in past two decades.

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**Getting to Yes—Negotiating Agreement without Giving In**

Roger Fisher & William Ury

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Published by :  
Hutchinson Business, London  
1986  
Pp. 162 + xiv  
£ 5.95 (Rs. 117.20)

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Reviewed by  
M.M. Jacob  
Director, Supervisory Development, NPC,  
Madras

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This is one of the rare books with considerable practical value in the field of human relations. It provides a successful strategy for the negotiators. "Like it or not, you are the negotiator". All of us conduct negotiations every day and many times we end up in bruised relationship between the negotiators.

This book tries to promote new and effective principles for the people to deal with differences and problems and how to settle them to the satisfaction of both the parties involved.

It is based upon a long term research project 'Harvard Negotiation Project' carried out at Harvard University. It gives entirely a new perception and methodology for successful negotiation where both parties derive satisfaction of achieving their respective objectives. It explains the methods and tactics to avoid the personality clashes and conflicts which generally occur during negotiations, resulting in failure. It delineates the procedure for 'Principled Negotiation', keeping to objectives and criteria. It proposes various strategies which

can be adopted to face different situations. It provides tips and guidelines to keep the negotiators on the track of 'Principled Negotiation' by avoiding 'Positional Bargaining'. The common examples of routine negotiations and the examples of historic negotiations illustrated in the book try to validate the concepts involved in the 'Principled Negotiation'.

The book can help managers, trade union leaders, administrators, politicians and also common man in their day-to-day negotiations as well as negotiations concerned with organisational, national and international matters.

'Principled Negotiation' is based upon reasoning and the principles which guide the human behaviour. Of course it is much more rationale than the common 'Positional Negotiations' taking place everywhere. Adoption of the principles, strategies and tactics evolved by the Harvard Negotiation Project can certainly bring more success. The book also deals with situations like "What if they do not Play", "What if they use dirty tricks", etc.

The emotion charge situations and games people playing with pre-conceived notions require adept skilled negotiators. The negotiation situations managers face in our industries with multiple trade unions and volatile labour, are indeed difficult. More difficult are our national problems like Punjab situation, language problem, problems created by religious fundamentalists, etc. which are

being negotiated by the politicians. Of course, the strategies of the 'Principled Negotiation' cannot be applied in a capsule manner for these problems. The negotiators need much wider perceptions and deep understanding of the people and their cultures by the lessons of histories and literatures. They also need adept skill to channelise the emotions for creative purposes. 'Principled Negotiation' can bring in better success to such adept negotiators.

John Kenneth Galbraith summarises his appreciation "This is by far the best thing I have ever read about negotiation".

It is a small book of 162 pages in paper back edition and is priced to make it accessible to most literate people.

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#### **Designing for Minimal Maintenance Expense**

**Marvin A. Moss**

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Published by  
Marcel Dekker Inc  
New York and Basel  
270, Madison Avenue  
Edition 1985 (1st edition)  
Price \$ 47.50  
Pp 184 (Bound Edition).

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Reviewed by  
Y. Satyanarayana  
Regional Director NPC  
Guwahati

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There is a marked difference in the last 2 to 3 decades during which the operating expenses, consisting

of the labour and the fuel/energy cost and maintenance expenses in the form of material/spares cost and skilled technician's charges have been increasing. The rate of increase is so much both the user as well as manufacturer have been feeling the pinch of the cost. With the increasing demand for higher rate of production, the capacity of the system/unit has been increased in multiples, so that the operating cost would be made optimal. For example if a single Kiln in a Cement Plant was of the order of 600 TPD, 2-3 decades back, now a days the optimal capacity of the kiln is around 3,000 to 4,000 TPD. Along with this the cost of non-availability per unit time of the equipment tends to be so exorbitant that one has to be extra careful for making the unit/system working with high availability, greater reliability and good maintainability. Gone are the days wherein the manufacturer played supreme. All over the world the user of the equipment/system has started realising the importance of reliability and maintainability aspects. They have started comparing the equipment not merely on the basis of initial cost but use the parameters of RMA as well as life cycle cost for selections.

To this extent the responsibility of the manufacturer vis-a-vis the designer of the equipment/system is increased so much that building up of the reliability and making the equipment of good maintainability is to be achieved along with the minimal price so that the user can think of purchasing the equipment/system. Also the manufacturer/

designer is also expected to provide the suitable maintenance practices/schedules to be followed by the user. The time is changed where the generalities are taken for granted. Both over maintenance and name-sake maintenance have resulted in huge maintenance costs.

Under these circumstances it has become quite imperative that the equipment design should adhere to minimal maintenance expenses which can only be achieved by a proper pre-analysis of RMA concepts and linking them with the cost effectiveness. There have been some books on the subject on reliability and logistics engineering which try to make the user to think of reliability, maintainability and availability and to make an analysis before the equipment could be purchased, in addition to identifying the logistics support requirement even to the project stage itself to enable him to interact with the probable manufacturer of the equipment/system.

This book, 'Designing for Minimal Maintenance Expense', as the name highlights is intended to bring in brain-storming in the thinking and concept of designers. The book starts with fundamentals about reliability, maintainability and availability. The author has made it simple and interesting which develops interest in the reader to proceed ahead. The 2nd Chapter deals with the concepts of maintenance and its relevance to manufacture the equipment cost effective, even at the designing stage itself. In this direction the Reliability Centered Maintenance and the

extension of the concepts to different sub-systems and lower level units of the equipments to identify the probable failures, and the seriousness and type of maintenance like preventive servicing, condition monitoring or component replacement, CMA (Corrective Maintenance Analysis) etc. have been dealt with. The question tags the failure, effective classification categories etc. would help the designer not only to have the grasp of maintenance requirement but also to provide him the scope for thinking of alternate methods for achieving better component or sub-system performance. Taking up a simple case, radiator and complex, electrical system in case of automobiles for analysis have given some practical touch to the subject.

Under Maintenance Planning the author tries to highlight the importance of the logistic support to the system for optimal life cycle performance. Most probably as these things might have been discussed very elaborately in some other books, the author might have made just an attempt to indicate some of the salient features. In Chapter-III, the carrying out of RMA analysis has been dealt with. The point made by mentioning "the purpose of preventive and corrective maintenance is to counter this loss of reliability", should be an eye-opener for intending user about strengthening the maintenance discipline. This has more relevance to the developing and under-developed countries, where the Maintenance is looked down as evil and unwanted expenditure. Under this Chapter a complex system has

been taken up for the application of RMA concepts and analysis in order to ascertain the status, providing measures to eliminate the deficiencies and bringing improvements through design changes and assuring the clients/users about the achievement of parameters of Reliability, Maintainability and Availability as specified by the user. The mathematical calculations of one system to determine the RMA ratings were given under Appendix in Chapter-III.

In page 146 it has been mentioned that the most cost effective design is the one in which all circuits meet minimal requirements but none exceeds these requirements substantially. It is quite heartening to note about the cost effective design but methodology and detail discussions for ascertaining the cost effectiveness and evolving various alternatives to provide the most cost effective proposal is more or less not available in the book. The absence of such analysis has made the objective of the book ineffective. Highlighting with some of the examples, the influence of either a redundancy or new design of the component/unit or the modifications on the cost, both in case of availability and maintainability would have made the book more meaningful and bring home the concepts. May be the author may think of working out some examples in this direction in the next edition.

It is surprising to note some of printing mistakes crawling into publication. For example in page 77 in the last para it is mentioned

"the broader line between the Electrical Subsystem and Poropulsion system...". May be in, instead of 'border line' it has been wrongly printed as 'broader line'. Similarly in page 115 in the 1st line it is mentioned  $i=i$ . It could have been  $i=1$ . In the same page in the 2nd para under 7.4 it is mentioned as redundant *resostor* in stead of *resistor*. Similarly in page 120 in para 2 of 8.2 "most radar sites also relay messages between other other sites and the Control Center...". It seems one *other* is redundant. Such of these things may be taken care of during the 2nd edition.

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**"Evaluating Management Training & Development"**.

B.R. Virmani & Premila Seth.

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Vision Books, New Delhi.  
Ed/1985  
Rs. 190/-  
P p. 420.

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Reviewed by :  
Dr. Ram Prakash  
Indian Institute of Public Administration  
New Delhi.

Tightly-run organisations devote time and money for training with the hope that investment will be paying returns year in and year out. It is commonly believed that there is no accepted method of finding its cost-benefit ratio due to enormous matrix of variables affecting training outcome, but on the whole it does a reasonably good job of providing awareness, stimulation, concepts

and new ways of thinking. The case method, lectures, discussion and theories of various kinds have been around for some time. These are helpful exercises for mind stretching. But how much of that instruction ever finds its way back to the office to show up later in substantial bottom-line performance improvement, is an often debated question and raises issues of management and evaluation and of training. Great concern is often expressed by experts about lack of optimum utilisation of management training.

To enter this book is to join an eddy of wisdom for those who go beyond the assumption that the trainers provide a "menu" of courses and to the extent these are well done the purpose is served. The usefulness of the book will be better seen by those who believe that without assessment and follow-up, there is no assurance of the programme effectiveness.

This book is the outcome of funded research by Indian Council of Social Science Research. The investigation was aimed at studying various aspects of management training and development, and its evaluation from the point of view of training institutions and the concerned organisations. The book focuses on identification of training needs, its process, acquisition of knowledge and transfer of learning to the job situation. The chapters I and II explain the conceptual framework and evaluation model guidelines which are claimed to be evolved on the basis of the action research approach adopted by the

researchers. The description of the conceptual framework sometimes gives the impression that the authors have not distinguished between two different strategies of learning—"andragogy" and "pedagogy". The study data gathered from the executives of the public and private organisations who participated in management improvement programmes of Administrative Staff College of India (ASCI) and their seniors have been analysed in the chapter III to IX. The ASCI was established in 1957 and conducts 60-70 residential training programmes every year. The position revealed on the basis of ASCI experience does not seem to be different from the one which might be experienced by other training institutions. Among others, three aspects may be of particular interest. First is the age aspect of trainees in learning process. Contrary to the common belief, the documented data reveal that in some of the programmes the people of older age learnt more than their younger ones. The general conclusion is that "though the older trainee is capable of learning, their information processing capacity is considerably reduced with age. They also find it difficult to obliterate irrelevant features during learning and problem solving tasks. One of the features that ought to be mentioned is their preference for accuracy than speed. Attitudes of the older trainee are equally important because generally he is less inclined to take risks and introduce changes than the younger trainee" (pp. 33). The fallacy in the questionnaire method of research is the second interesting

feature. For instance, on asking both the boss and trainee whether they discussed the training objectives between themselves, different affirmative response rates were revealed (in one programme bosses—92% and trainees 58%) (pp. 55). Before suggesting a shift to interview method of research, the readers may note what authors have to say in this regard "...due to constraints of time, money and large number of organisations sending their executives for training the questionnaire method of seeking information had to be replied upon." (pp. 231). Third is the limitation of data processing techniques. In a study of this nature, number of considerations run parallel in selecting a candidate for training, measurement of learning, and transfer of knowledge to job. The multiple variables in the matrix of learning effectiveness interacting on each aspect repeatedly hinder the overall judgement. That is why the readers will find that the percentage results do not add up to 100. For instance, in table 5 on page 151 the percentages of participants who responded favourably to ten different aspects relating to organisational climate affecting transfer of learning have been mentioned. The results of one course show 38% of organisations

only favoured innovation, 69% give freedom to make changes, 54% lack autonomy to carry out projects, in 46% participants feel restricted by rules and procedures etc. The position differs from course to course. In such a situation one may find it difficult to understand what conclusion is being drawn. It is a challenge for researchers to devise methods which might facilitate overall judgement on various aspects affecting training efficiency. One may question the validity of the conclusion drawn by the authors "that very few training institutions have a systematic procedure of evaluating their training programmes" (pp. 274). In evaluation of training, considerations of practical convenience and constraints of resources play important roles, more so, when training budgets are cut to bone. The indepth analysis sometimes gives an impression of being over-intellectualised. One wonders if proposed sophistication in evaluation methodology may not involve efforts worth more than the expected benefits. The chapter X contains conclusions and suggestions. It is claimed that "studies in training in action are patchy and are done mostly by researchers who are not directly involved in implementing the findings."

(pp. 277). This chapter contains 12 areas where future research can be fruitful. The great merit of the book is the detailed questionnaires developed by the researchers which are reproduced in the appendices contained in one hundred printed pages. A rich bibliography is an added attraction.

On the whole, this book is well organised and well written on technology of evaluating management improvement programmes. It effectively conveys the need of replacing common procedure of evaluating the training course on the concluding day by more comprehensive assessment in pre, concurrent, and post training stages. Available evidence show that one shot-evaluation at the end usually results in exchange of pleasantaries. The book will certainly delight all those who are in search of better procedures for selecting trainees; setting clear goals of training; determining realistic biographical, psychological and organizational variables to be taken into account in programme development; and more effective post-training follow-up measures. Management improvement programmes require a lot of tailoring to our environment: It is expensive, but guarantees results.



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## on

# Quality Management

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S.N. VIG\*

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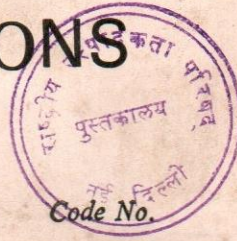
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