Economic Reforms & Organisational Performance in India — A Survey

NPC Research Division

The economic reforms in India seems to have brought in drastic macro level changes in the economy. But its impacts on the performance of organisations have yet to be assessed. The present survey by the National Productivity Council (NPC) attempts to bridge this gap by assessing the impact of economic reforms on the performance of Indian organisations at micro level.

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An Economic reform package is under implementation in India since the last three years, Macro economic indicators show that these measures succeeded, to a large extent, in achieving their declared objectives. A run away inflation has been brought under control. Exports increased at impressive rates and foreign direct investment in the crucial infrastructure sectors has been on the increase. Against a foreign exchange crisis three years ago, currently there is the problem of managing the foreign exchange reserves. There are indications that the industrial sector currently is poised for a growth of over eight percent per year.

There is very little organised information on the impact of these reform measures on the performance of the industrial and service sector organisations in India. It is important that the perceptions and experiences of organisations regarding the reform measures have been assessed and their strategies analysed carefully so that reinforcement policies could be initiated in order to consolidate the advantages due to economic reforms with a view to sustaining them in future years.

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NPC Survey

A survey was undertaken by the National Productivity Council during May-June 1994 with the objective of assessing the impact of economic reforms on the performance of Indian organisations. A simple and brief questionnaire was designed seeking information on

select variables during pre and post reform periods. The questionnaire was mailed to the chief executives of about 500 top organisations in the country, representing all important industrial segments from the private and public sectors. A total of 65 responses were received by the National Productivity Council. A list of responding companies are given in Appendix 1. Among them 60 (92%) were from the private sector and the remaining 5 (8%) were public sector enterprises. The lukewarm response of the public sector enterprises towards the issues posed to them in the survey could be interpreted to represent their lack of enthusiasm in the reform process. It may be noted that a major objective of the economic reforms has been to ensure efficiency in resource utilization and to achieve improved operating performance by the public sector units. That withdrawal of budgetary support has been relied on as the main mechanism to achieve this objective, might have rendered many of these organisations financially vulnerable and thus, affected their performance unfavourably.

The lukewarm response of the public sector enterprises towards the issues posed to them in the survey could be interpreted to represent their lack of enthusiasm in the reform process.

Exports

The survey results show that Indian enterprises have responded positively to seize the opportunities arising out of the liberalised trade policy. Compared to 58 per cent in 1990, the percentage of exporting companies from among the respondent group went up to 65 in 1993. Besides this, 74 per cent of the responding companies could increase their export shares in 1993 from the levels existed in 1990. Only in the case of 14 per cent of the respondents, the export shares fell in 1993 compared to that in 1990. In 12 per cent of the cases there was neither increase nor decrease in export shares between 1990 and 1993.

Indian enterprises have responded positively to seize the opportunities arising out of the liberalised trade policy.

Labour Productivity

Labour productivity is a crucial factor for survival and growth of industries, especially in a country like India where most of the industries are still labour intensive. Our survey reveals that reforms have brought in significant improvement in enterprise-level labour productivity. As high as 85 per cent of the organisations responded that their labour productivities improved in the post-reform period (table 1). As high as 48 per cent of the responding companies recorded impressive improvements in productivity during the period under consideration, while another 28 per cent reported moderate increases in productivity.

Reforms have brought in significant improvement in enterprise-level labour productivity.

Table 1: Labour Productivity of Enterprises Between 1990 and 1993 (% of Respondent Companies)

Improved Impressively (above 3% per annum)	48
Improved Moderately (between 0.5% and 3% per annum)	28
Improved Marginally (up to 0.5% per annum)	9
Remained Constant	9
Declined	6

Costs of Operations

Like labour productivity, the costs of operations have also shown a rising trend. In 91 per cent of the cases, the costs of operations have gone up in the range of 5 per cent to 10 per cent or more (table 2). Only in 6 per cent cases it declined and in the rest 3 per cent, it actually remained constant. This implies that the benefits of improved labour productivity are neutralised, to a large extent, by the rising operational costs. Taking general inflation into account, an increase in cost of operations up to 10 per cent can be considered as 'normal'. Therefore, in 33 per cent cases, the increase in costs of operations was above normal which is a matter of concern.

Costs of operations have also shown a rising trend.

Table 2: Costs of Operations Between 1990 and 1993 (% of Respondent Companies)

Increased Significantly (above 10% per annum)	33
Increased Moderately (between 5% and 10% per annum)	43
Increased Marginally (up to 5% per annum)	15
Remained Constant	3
Declined	6

Managerial Autonomy

The economic reforms aimed at, besides others, imparting, autonomy to the enterprise managements through debureaucratising and delicensing. A comparison of pre- and post-reform scenarios shows that there has been unambiguous improvement in the managerial autonomy in all the functional areas (table 3). The improved managerial autonomy is particularly evident in the case of investment decisions, technology related matters and, to a less extent, in the case of prices and markets.

There has been unambiguous improvements in the managerial autonomy in all the functional areas.

Table 3: Managerial Autonomy in Key Functional Areas Between 1990 and 1993 (% of Respondent Companies)

Functional Area	Degree of Autonomy			
	Full	Adequate	Inadequate	Extremely Inadequate
Personnel/ organisation	23.8 **(29.0)**	28.6 **(32.3)**	28.6 **(24.2)**	19.0 **(14.5)**
Investment decisions	6.5 **(25.8)**	25.8 **(56.5)**	38.7 **(14.5)**	29.0 **(3.2)**
Technology related decisions	16.3 **(34.4)**	31.2 **(59.0)**	31.2 **(6.6)**	21.3 **(Nil)**
Prices/markets	13.1 **(24.2)**	39.3 **(48.4)**	24.6 **(16.1)**	23.0 **(11.3)**

Note: The figures in brackets belong to post-reform period.

Attitude of Workers & Unions

Contrary to the popular belief, the Survey reveals that 54 per cent of the respondents felt that workers/trade unions have become more co-operative after 1990. Only a few (5%) respondents found workers less co-operative than they were earlier. About 41% of the respondents observed no noticeable change in the attitude of work force between pre and post reform periods.

Workers/trade unions have become more co-operative after 1990.

Manpower Reduction

The Survey shows that only 24 organisations out of 65, have undertaken any scheme for reducing excess manpower in their organisations. Of this, 17 opted for Voluntary Retirement Scheme (VRS) of one kind or the other, the rest resorting to other schemes like capacity expansion unaccompanied by additional recruitments, rationalisation/redeployment of existing manpower etc. As a result of these schemes, about 8,000 (9%) persons have been released from these organisations.

Quality of Manpower

A majority of the organisations (55%) felt that quality of workforce improved as a result of restructuring. While none of the organisations felt that reforms have any adverse impact on quality of workforce, 45 per cent of them opined that the reforms have not affected the quality of workforce in any visible manner.

Quality of workforce improved as a result of restructuring.

Withdrawal of Budgetary Support

One of the important factors which provoked economic reforms in India in the middle of 1991 was the then prevailing fiscal crisis. It is, therefore, not surprising that a major thrust of the reform has been to correct the fiscal imbalance. The government in order to put a curb on the inordinately growing fiscal deficit had decided either to withdraw fully or to reduce substantially its budgetary support to the public sector enterprises. Our survey attempted to examine the impact of this policy on individual enterprises. It was found that half of the respondents were not at all affected by this policy. For the remaining 50 per cent the effect varied from marginal to severe (table 4).

Table 4: Effect of Withdrawal of Budgetary Support (% of Respondent companies)

Severely affected	8
Moderately affected	19
Marginally affected	23
Not affected	50

Disinvestment in Public Sector Undertakings (PSUs)

Though there was sporadic talk of privatisation in India, what has been attempted so far has been disinvestment i.e. the transfer of a part of the ownership of state-owned enterprises to the public through the flotation of shares. During last three years shares of a number of PSUs have been divested. A few more disinvestments involving 21 PSUs are on anvil. There is a strong belief prevailing in the country that disinvestments in public enterprises would improve their performances. It is argued that disinvestment liberates the public enterprises from the superfluous controls of the government. Moreover, it forces the enterprises to come closer to the consumer and accept market signals. As a result, both the public enterprises and the government gain. The present survey overwhelmingly supports this view. 90 per cent of the responding organisations considered that disinvestment would lead to performance improvement. Only 10 per cent thought other way.

Performance Improvement Efforts

The sample organisations were asked to rank various measures which they undertook for performance improvement during the period. The measures listed in the questionnaire were:

(i) Modernisation/Diversification;

(ii) Market Promotion;

(iii) Internal Systems Improvement;

(iv) Financial Restructuring; and

(v) Other Measures.

The responses of the organisations are summarised in table 5.

Table 5: Efforts Undertaken to Improve Performance

Rank	% of Respondent Companies				
Efforts	I	II	III	IV	V
Modernisation/Diversification	57.6	18.6	13.6	8.5	1.7
Market Promotion	18.0	31.1	36.1	11.5	3.3
Internal System Improvement	17.7	33.9	29.0	17.8	1.6
Financial Restructuring	6.8	13.6	18.6	52.5	8.5
Others	38.4	15.4	23.1	7.7	15.4

Among the measures undertaken for performance improvement, modernisation/diversification emerged as the most important followed by internal systems improvement and market promotion. It seems that so far economic reforms in India could not make significant impact on the financial structure of organisations because this measure received relatively less priority among the alternatives available. Some of the respondent companies accorded high priority to 'other' measures. These are found to range from simple cost reduction techniques to change of product-mix.

Among the measures undertaken for performance improvement, modernisation/ diversification emerged as the most important.

Conclusion

The Survey, in spite of its limitations, reveals some important facets of the ongoing economic reforms in India. While a few findings of this survey conform to the expected outcomes, a few others contradict the existing beliefs. As expected, the reform encouraged exports from the country. The enterprise managers were found to enjoy more functional autonomy now compared to that in 1991. However, the most encouraging revelation of the survey is perhaps in labour aspects. The labour productivity of a large number of organisations have increased during the period of reform. More importantly, the industrial workforce and their unions were found to respond positively to the reform process. Majority of the respondents felt that labourers/trade unions have become more co-operative than they were earlier. The reduction of excess manpower through measures like Voluntary Retirement Scheme have started in many organisations. Though number of persons released from these organisations so far was not impressive, the achievement can be considered as 'satisfactory' in the face of the uncertain environment that prevailed in the country during the last three years or so. However, the economic reforms in India could not tackle the inflationary situation adequately. This is evident from the fact that more than 90 per cent of the respondents reported increase in costs of operations, the case of a large number of them being more than 10 per cent. The policy of withdrawal of budgetary support to the public sector enterprises seemed to have little impact on other organisations. But almost every manager from the responding organisations felt that disinvestment of shares would lead to better performance in public enterprises.

Appendix 1 List of Respondents

Alfa Laval (India) Ltd.
Andrew Yule & Co. Ltd.
Asian Cables & Industries Ltd.
Asian Cables & Industries Ltd. (Wiltech Division)
Atul Products Ltd.
Bajaj Auto Ltd.
Bajaj Plastics Ltd.
Ballarpur Industries Ltd. (Paper Unit)
Bharat Berg Ltd.
Bharat Electronics Ltd.
Burroughs Welcome (India) Ltd.
Caprihans India Ltd.
Century Enka Ltd.
Cosmo Films Ltd.
Crompton Greaves Ltd.
FAL Industries Ltd.
Garware Wall Ropes Ltd.
GEC Alsthom India Ltd.
Glaxo India Ltd.
Greaves Ltd.
Gujarat Ambuja Cements Ltd.
Hilton Rubbers Ltd.
Hindustan Petroleum & Chemicals Ltd.
Hindustan Organic Chemicals Ltd.
Housing Development Finance Corpn. Ltd.
Indian Aluminium Co. Ltd.
Indo Gulf Fertilisers & Chemicals Corporation Ltd.
Industrial Credit & Investment Corpn. of India (ICICI) Ltd.
Jay Bharat Maruti Ltd.
KBS Pumps Ltd.
Kesoram Industries Ltd. (Textile Unit)
Kinetic Engg. Ltd.
Majestic Auto Ltd.
Mardia Chemicals Ltd.
MERCK (India) Ltd.
Modi Olivetti Ltd.
Munjal Showa Ltd.
Orient Papers & Industries Ltd.
Padmatex Engineering Ltd.
Pfizer Ltd.
Philips India Ltd.
Premier Auto Electric Ltd.
Procter & Gamble India Ltd.
Raychem RPG. Ltd.
RPG Telecom Ltd.
Sarda Plywood Industries Ltd.
SCICI Ltd.
Seshasayee Paper & Boards Ltd.
Shivaji Works Ltd.
Soma Papers & Industries Ltd.
Sundarshan Chemical Industries Ltd.
Tamilnadu Petroproducts Ltd.
Tata Honeywell ltd.
Tata Engg. & Locomotive Co. Ltd.
Textool Co. Ltd.
The Associated Cement Cos. Ltd.
The Indian Seamless Metal Tubes Ltd.
The Mysore Kirlosker Ltd.
The Ruby Mills Ltd.
The Tata Oil Mills Co. Ltd.
Tractors India Ltd.
Twentieth Century Finance Corpn. Ltd.
Usha Beltron Ltd.
Vippy Solvex Products Ltd.
WARTSILA Diesel India Ltd. □

Local Level Environmental Monitoring in Punjab

Jürgen Oestereich

The paper describes the environmental problems of Punjab, a rather homogeneous region of India. Environmental monitoring, which is urgently needed, is governed by the national laws. These have an inclination towards centrality. However, local monitoring based on local observations and risk assessment would be more effective. The study gives some guidelines toward this end. It also analyses the reasons why local monitoring meets with many difficulties at present.

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In order to describe "development", the Report "State of the World 1990" of the World Watch Institute (1991), for example, discusses concepts like the Gross National Product (GNP), which measures the (monetarized) transactions in formal economics. "Human Development Index" of the United Nations, composed of many indicators — life expectancy, literacy rate, and an adjusted GNP, as well as the per capita cereal consumption, as used by the World Bank. Yet, none of these measurements is without shortcomings. They all relate to static situations and describe some rather vague, predominantly economic state of well-being of the average individual at a given moment. They all disregard completely the welfare of past and future generations. The notion of "development", however, is meaningful only if the passage from the past to the future is taken into consideration. This passage is determined less by the state of economics than by the state of the environment and its mechanisms and trends, The state of the environment is also important if mankind accepts responsibility for its fellow-creatures on earth, hence the importance of environmental monitoring and the instruments of environmental control.

The notion of "development" is meaningful only if the passage from the past to the future is taken into consideration.

In India, at present environmental monitoring is organized in a rather centralized manner. The competence to detect, to measure, to interpret and to draw conclusions form the findings is usually vested in administrative and academic bodies at national level. As in all central structures, this is justified on the grounds of shortage of qualified personnel and the expensive and

sophisticated equipment needed, with "economies of scale". The price to pay for these economies is remoteness from direct concern and personal responsibility and, hence, from voluntary endeavour and freedom of choice to adapt one's life style to conditions which keep the population in correspondence to a given ecological carrying capacity, i.e. sustainability in human habitat. The perspective of achieving sustainability in a given environment seems to be bleak if the present system, including that of decision-making is not modified. This may be illustrated and a possible but difficult way out may be indicated by the example of the Punjab, a state in the Northwestern part of India.

Environmental Problems of a Fertile Region

Punjab is one of the most productive regions of the world today. Due to its fertile soil and the rich waters from the Himalayas, its farms yield between two and three harvests per year. Unlike other areas of India, the region is able to feed its population and export wheat, rice, maize, sugar, cotton etc. However, in order to keep this high level of productivity, tractors and pumps are everywhere. Fertilizers and pesticides are being spread and stocked in large quantities. As a consequence, air and water are becoming increasingly polluted and are beginning to deteriorate. Deficiencies in the otherwise admirable irrigation system cause water-logging and salination, or the lowering of the groundwater table and desertification.

Forty years of the rule of hereditary subdivision led to more and more uneconomically small production units. Unused patches of land disappeared long ago, now even the remaining trees are being felled. New specimen of plants in the fields and the fight against any type of weed have altered the flora. As a consequence, most indigenous fauna has also disappeared: Each new spring is more silent than its predecessor.

The demographic growth is still unchanged causing not only overexploition in rural areas; but also growth of urban centres like Ludhiana, Amritsar, etc. These towns have now reached a population of just under one to over two million inhabitants. These and many other, smaller Punjab towns with population densities of 500 pop./ha or more and with many polluting production units are devoid of any planning, not the least environmental planning. There is no canalization, no treatment of effluents, no separation of hazardous waste.

The temperature in the built-up areas is constantly several degrees centrigrade higher than elsewhere and a purgatory in summer. The atmospheric immissions of sulphurdioxide, particulate matter and hydrocarbon are excessive. The emissions, which carry all kinds of organic and inorganic micropollutants — most of them noxious to toxic — go uncontrolled. Leather and metal industries release heavy metals and trace elements into all media of the environment. Much of the soil in these towns is contaminated. Over the years, the effluents which have remained untreated in basins, pools and slow-flowing canals, have contaminated the groundwater. Although being regarded already for some time as unfit for consumption, it is still used for irrigation, thus increasing the toxicity of hydro-limno-and biosphere in a vicious circle.

Environmental Monitoring in India

This state of affairs continues despite the fact that the Indian federal laws, regulations and agencies instrumental for pollution control are in keeping with international standards, Moreover, Punjab State Pollution Control Board is among the more efficient State Boards and the Punjab State Council of Science and Technology (1986) is one of the most dedicated found in India today. The Board handles the routine and non-routine detection of the standard pollutants in air and water, especially those with critical limits. Its most delicate task is the granting of the No Objection Certificate (NOC) required by the law for licensing industrial production. The Council of Science and Technology is more concerned with environmental planning, more specifically with introducing the Environmental Impact Assessment, and publishes in close cooperation with the Board, — ahead of most other Indian States — the "State of the Environment of Punjab" — Reports. To this end both the institutions are assisted to a small degree (and a much lesser degree than many other comparable institutions) by international co-operation. Communication with the world-wide scientific community through this channel — concerning the fundamentals of scientific procedure — proves extremely helpful.

A closer look at the results of environmental monitoring in India and in Punjab, however, reveals a number of deficiencies which point to general problems and thus calls for some radical modifications in the set-up. In India at present the basic activity of these agencies, the observation of nature (environmental monitoring in the narrow sense), is limited to the recording of a few standard indicators in the two media circuits of atmosphere and hydrosphere at an extremely limited number of stations. This data base is too small for accomplishing successfully

the two other main tasks of environmental monitoring and the additional two complementary ones, namely

- providing data to warn of health risks and of damage to natural regeneration,
- allocating ecological resources to potential users by the NOC-granting procedure,

and further:

- devising curative measures to remedy damages already occurred, and
- conceiving preventing measures like eco-farming, recycling-orientated production etc.

In India at present (environmental monitoring), is limited to the recording of a few standard indicators in the two media circuits of atmosphere and hydrosphere at an extremely limited number of stations. This data base is too small.

In hydrosphere, for example, many chemical reactions are still ill-understood. For example, DDT is still being used excessively because it is a very cheap pesticide — being produced in the country on licence. However, although being present upstream, it somehow seems to vanish downstream. Only recently has it been established that the substance changes into the possibly still more vicious DDE and other dangerous trace elements. Investigations into problems of this kind would trigger an alarm about possible contamination by other elements and substantiate the advice on pesticide production and application. With some luck, remedial measures for reducing the existing DDT-load may be found and a public discussion might be encouraged to avoid pesticides in agriculture completely. A function closely related to this one is the risk assessment with respect to pollution. This is a recently developed approach which is not yet well established even in Northern countries. Its introduction in a hierarchical system like the Indian one would be hampered by the remoteness of the assessing agencies from the actually concerned.

Apart from this, the problem of emissions from indiscriminate sources, the "Non-point-source emission", is completely neglected, being excluded in the legislation. "Non-point-sources" comprise agricultural emissions, domestic emissions as well as the emissions of the small-scale industry. By implication, only the pollution of bigger industries is controlled. In rural areas, therefore, there are no legal instruments to reduce pollution, to enforce the installation of sewage works, of controlled waste deposits etc. In those Indian towns where small-scale industries proliferate, as they do in most Punjab centres, the "non-point-sources" make up for an estimated 80 per cent of pollution.

At present, the general public is not yet aware of the dangers of environmental pollution to health, to life, to the regenerative capacity of the environment. Under these circumstances the political system is not yet prepared to consider curative or preventive measures at large. The affair of stipulating high limit values for the new refinery in the vicinity of the Taj Mahal is revealing: These have been enforced, but it has not been possible to cut down the still more dangerous pollution originating from some traditional furnaces at Agra itself.

The big difference to the Northern set-up of environmental control seems to be lack of knowledge with respect to technical implementation. Hence the reluctance to act on proposals for curative and remedial measures. The tackling of salination, deforestation, desertification etc. requires the co-operation of sympathetic departments of Agriculture, Irrigation, Forestry, Town and Country Planning etc. from the first to the last step. Traditionally, each of these authorities feels ultimately responsible for its field of action in its area of jurisdiction only, and is not easily persuaded to co-operate and, if so, only on an individual case basis at the central level. Any integrated approach — and environmental monitoring is integrated due to the involvement of the various disciplines — therefore, is top-loaded. This is particularly the case with environmental auditing, which would under these circumstances become completely inert.

Local Environment Auditing

Nevertheless, in view of the impact of modern civilization, environmental auditing is indispensible for the survival of nature and mankind. Therefore the deficiencies described can best be avoided, the necessary integration and comprehensibility best be achieved, if the responsibility for environmental affairs is vested in local government and agencies. These are best placed to acquire the necessary data base at acceptable costs, to evolve a comprehensive understanding of the specific ecological system and to motivate the people concerned and the authorities to change their daily routine towards retaining or gaining a sustainable habitat.

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Concern for the environment and the surrounding eco-system, has some tradition in India. In various parts of the subcomtinent, groups can be found like the Bishnoi people — a portion of which live in the South-western corner of Punjab. The founder of this particular sect propogated in the 17th century living with and not against nature. Having well understood the given particular ecology, he was able to convince his followers to keep and not cut the Acacia trees and to love antilopes and wild animals and not hunt them. These people, having earlier suffered from princes and poachers, are today harrassed by the military and the police, from which the ostentative support by the Department of Environment, Wild-life etc. cannot protect them.

A recent phenomenon is the emergence of environmentalists as individuals or as groups, for example the well-known Chipko movement, which defends trees from being felled, In spite of press coverage such people are quite often in conflict with the authorities.[1] In Punjab at present there are no prominent figures, but more than 50 local initiatives expressing concern over environmental issues, mainly or exclusively. The emphasis of these groups is usually more on actions towards understanding of the surrounding eco-system.

Yet the interest is there and it can be assumed that the members of these groups would engage in improving the data base. The most appropriate way of doing this is a technique which needs no sophisticated instruments. This technique consists of carefully registering the ecological processes, their state and flow equilibrium. This "biological monitoring" can be trained and learnt. It would relate to the whole territory if whatever unit is chosen and consider all types of pollution, including or even concentrating on "non-sources". In addition, local observers who fear pollution for themselves and their children can be expected to be more reliable than ambulant staff, who puts a detecting device in its place and passes from time to time to keep a record. They tend to be more action-orientated, too.

1. Environmental NGOs are springing up in many parts of the continent. Particularly famous is the "Centre for Science and Environment" in Delhi which has published among others: India's Environment 1984-1985, New Delhi 1986.

The first and foremost use to be made of the measurements taken is as an alarm. Those local inhabitants who are involved in environmental monitoring will be informed about limit values and what they mean. They can be expected to inform and influence public opinion on the danger of pollution. This will ultimately result in rising pressure on the decision-makers to draw the necessary measures. Only on the basis of this concern can it be hoped that in India also an alarm system will be installed that, as in other countries, triggers off some predetermined action. Once this is accepted in principle, the alarm system could be devised more flexibly in respect of the thresholds to be chosen. These might alternatively be conceived of in stages, which allow for establishing a succession of signals pointing initially to preventive, subsequently to curative and, finally, to emergency measures.

According to the results of the risk assessment, action must be taken (and in cases of emergency even before the final conclusions are known). Negotiations with the originator of the pollution could be held

- to prevent him from causing any damage.
- to bargain on compensating or remedial measures, or
- to stop him immediately, demanding compensation and possibly fining him.

The vary notion of bargain in this issue shows that there are various interests involved. In fact, most limit values and their corresponding indicators work like cease-fire lines between the producers and the representatives of the population, of future generations and nature in general. In this case the State Boards could act as mediators, as in a rudimentary form they already do, even without having the mandate for it. For example, in order to relieve the heavily congested and polluted Punjab centres, the idea of "Free Enterprises Zones" was put forward by the Department of Town and Country Planning. However, as they are planned now, these zones themselves constitute hazards of their own. This is where the Pollution Control Board could come into play to organise the solicitors of each interest group to put forward his arguments and interpreting them, while the final decision would lie with the local authorities.

Environmental planning visualises that human habitat is not necessarily a zero-sum-game. The ecology can be destroyed without gaining any economic benefit whatsoever and economic benefits could occur with little or no bearing on the environment. Whether or not the ecological carrying capacity can be raised without nega-

tive economic repercussions is a matter of discussion. In any case, the model of nature, according to which the waste of one process constitutes the resource for another, should be followed as closely as possible. This means that the NOC should be used not just to compare facts and norms but to assist in making any waste be recycled or, if this is not possible, to advise on appropriate treatment and filters so that the product, by-product and waste become harmless. The NOC-procedure should be modified and conducted in such a way as to make the production units ecologically compatible through advice on filter technology, on recycling etc.

Model of nature, according to which the waste of one process constitutes the resource for another, should be followed as closely as possible.

If this spirit turns towards the problem of the emissions from non-point-sources also public concern and result in higher priority for investments in this respect. Here again advice on the implementation and control of the management is necessary. Finally, of expertise of this kind were locally available, a closer, more regular and less easily bribable check would be possible on the observance of the regulations, limit values etc.

The very foundation of all this is stocktaking of the environmental resources, assessing its potential and projecting the trends of population, employment, pollution load and regenerative capacity of the eco-system. If regularly repeated, this exercise would become "environmental auditing", based on the beneficial circle: Raised awareness — raised competence — comparison with parallel units — more informed awareness — more informed competence.

The plans and programmes for the Punjab speculate on a more effective role of PCB/CST scientists and international experts, the much needed mediators between the international scientific community and the local population, on more effective detecting methods, on more meaningful interpretations of findings and on better feedbacks with action programmes. It is hoped that growing awareness would pressurize the political class towards devolution and subsidiarity.

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Only a mouse finds its hands full with a couple of food grains. Small desires do not behove you. Commit yourself to a lofty target worthy of you. Be convinced that you will succeed.

Mahabharata, Udhyoga Parva
Mother Kunti's exhortation to the
Pandava Princes and Krishna

Work Culture: A Cognitive Perspective

Amitava Chatterjee

Work culture is dependent on normative beliefs and expectations and is moderated by life goals representing the underlying human motives. When confronted with the alien emerging trends of scientific and technological advancements people undergo 'acculturation shock'. An integrated approach is required to harmonise the new and existing values, suggests the author.

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Culture is, indeed, an elusive term used extensively by social scientists in a variety of applications as a variable in human behaviour. But what exactly does the "cultural perspective" of an individual or social situation imply? Following the Indian philosophy, culture may be described as the expression of consciousness in life which aims at perfection — not only as great and noble, governing and inspiring ideas, but as a harmony of forms and rhythms, a mould of beauty into which the ideas and life can run and settle. It gives the vital forces a guiding law, subjects them to some moral and rational government and leads them beyond their natural formulations, until it can find for life the clue to a spiritual freedom, perfection and greatness.

Culture may be described as the expression of consciousness in life which aims at perfection.

Among the two major camps, one group views culture as behaviour — the total way of life of people. it reflects the regularly occurring organized modes of behaviour in organizational, economic, religious, political, familial and all institutional domains within a population, community or ethnic group. The other group holds that culture is a system of meanings, a symbol system. The distinct boundary between these two schools is often blurred.

To social scientists, culture as one of major utilitarian variable to be considered, encompasses the totality of life of distinct groups of people (Berger, 1986). It includes the activities of knowledge and reason and wide intellectual curiosity, the activities of the cultivated aesthetic being, the activities of enlightened will which make for high ethical ideals and a large body of human action, not to be governed by our lower or our average mentality but

by truth and beauty and self-governing will. It is the group's values, beliefs, norms and cognitive styles. Culture, thus, is a system of shared cognitions or a system of knowledge and beliefs (Goodenough, 1971). Since human cognition develops, lives by and transmits different images of the world and of itself rather than adapting to a given existential reality in an 'objective' sense, distinct cultural traditions become the differential attributes of discrete human societies. Indeed, each culture has a distinct identity at its base out of which it secures its continuance or the development of its civilization.

Work Culture

'Culture's consequences' have been reflected in the multiple approaches to the meaning of work and work-related constructs. The term work value has, more often, been used in this context. The most commonly used constructs associated with studies on work culture are work values (Lortie-Lussier et al, 1986; Orpen, 1978), work beliefs (Hofstede, 1980), and work centrality (England & Misumi, 1986; MOW, 1987). It is better to use an inclusive term, work cognition, in which all work-related constructs seem to collapse (Holt & Keati, 1992).

Work culture acquisition, in the same vein as any other value orientation, occurs through the three generalized stages of socialization process: early socialization anticipatory socialization and socialization practice in the society (Katz & Kahn, 1978). The early training emphasizes on the general values of a culture more than specific goals related to different aspects of life. This early socialization forms the bedrock for the development of specific value systems. At the next stage the individual is provided with concrete information and training about various adult roles so that a person aspiring toward a given role is aware of some of its requisite norms and values. It is not until the third stage of development that cognitive norms and beliefs are internalized and given expression in behavioural exercises. Work related cognition, thus, once formed is linked to a total belief system that gives meaning and consistency to the events experienced by the individual across the integrated domains of life (Atieth et al., 1987).

The Western impression is that Indian culture has been an entirely metaphysical and other-wordly system. And so is bereft of any discussion on earth-related work values. But here we should get the right view away from all misinterpretations. The doctrine of work tells us that human being embodied in the natural world cannot cease from action, not for a moment; the very human existence here is an action. It is true that the Protestant ethic in Western culture has played a significant role in generating a positive and dynamic work culture. In comparison Indian work culture seems to be little passive but permissive characterized by its rational adaptability (Singer, 1972).

The basic difference between Indian and other cultures springs from the spiritual aim of Indian civilization. Spiritual aspiration, an inner force thursting the human self to go beyond its own in all aspects of life, was the governing force of this culture, its core of thought. Religious practices were used as stepping stones to reach the highest inner elevation. To the Indian mind the least important part of religion is its dogma; the religious spirit matters, not the theological credo. Through work the Indian mind has aspired for knowledge and perfection and so joy in work is the essence of work culture. In the tussle between humans and the machine the true spirit of work is diminuted and ultimately the machine gains supremacy. Indian work culture emphasises the purpose not just the means of work. Every work is considered to be devotion and the sacrificial symbolism enhances the dignity of labour. The implied spirit of work is to exact the identity of the performer and instill a high self-esteem within the individual.

When a culture meets with some novel, creative innovation, it is impelled by the very instinct of life to take over these ideas and forms and in one way or in another take advantage of these new forces and opportunities. And in this process the culture is enriched and develops

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to a greater height. But if there is only mechanical imitation, if there is a subordination and servitude, a culture — conflict ensues which is finally reflected through unwanted hazards of the society.

A culture to be permanently stable, notwithstanding its catholicity, and serviceable to human society must provide something that inspires the progressive life-power. It provides meaning to the material existence of life on earth and adds values to its expressive acts. Indian culture does not advocate asceticism in the form of a crude repression of nature, a tired flight from existence nor does it formulate only for the material satisfaction of the individual self. Its roots penetrate into all the vital necessities of life; its ideal, nonetheless is a noble effort of the human spirit to rise beyond the life of earthly desire and vital satisfaction and arrive at the acme of human perfection and ethical harmony. And herein lies the undaunted life power of Indian culture.

Work culture emphasizes that work is not an ephimeral phenomenon of life. "It is not our physical movement and activities along which are meant by work, by *karma*,; our mental existence also is a great complex action, it is even the greater and more important part of work, of the unresting energy, — subjective cause and determinant of the physical action" (Sri Aurobindo, 1993). And here lies the imperative of motivational dynamics to work.

Motivational Basis

The study of motivation has to do with the analysis of the various factors that arouse, direct and maintain actions and behaviours. It is the tendency for the direction or selectivity of behaviour to be governed in some way by its relation to objectively or subjectively definable consequences, and the tendency of behaviour to persist until the goal or end is attained (Atkinson, 1964). Motivation, thus, refers to a relatively general personality disposition at a specific time and acts as one of the determinants of behaviour. It may, on a different note, be said that motivation alone may not explain behaviours, but all behaviour is motivated. In this connection some other terms like need, drive, and motive are used to indicate the internal driving force behind motivation and these words are often used synonymously. The motives are innumerable in number and expanding constantly with environmental interactions. The motivational dynamics suggest that all actions of living organism and of human beings are sub-ordinated to a coherent system of relative by small number of goals aroused from within and striving without towards outcomes for satisfaction. These goals overwhelm the whole repertoire of motives existing within the individual and are described as natural 'Life goals'.

Work motivation has been studied using many theoretical conceptualizations. Neglecting the subtle differences in their approaches, all the different concepts can be grouped under three major perspectives — need theory, equity theory and expectancy theory.

Probably the best known theory on need activities in organizations has been proposed by Maslow (1970). He theorized that people have five types of needs that are activated in a hierarchical manner. This means that the needs are aroused in a specific order such that a lower-order need must be satisfied before the next higher order need is activated. Once a need is satisfied the next highest in the hierarchy is triggered and so on. In some respects, however, Maslow doesn't appear to be as monolithic in his thinking. More than one need may simultaneously motivate the individual and with higher-order needs Maslow departs from the rigid hierarchy and admits that different people may place higher-level needs in a different hierarchy. In Maslow's hierarchy, physiological needs occupy the lowest rung, followed in ascending order by safety needs; social needs to belong, to be accepted, to like and be liked; esteem needs to obtain respect and status; and finally at the top, the need for self-actualization which Maslow defines as "the desire to become everything that one is capable of becoming".

In contrast with the focus on individual needs the equity theory views motivation from the perspective of the social comparison workers make among themselves. It proposes that people make social comparisons among themselves and others with respect to two variables — outcomes and inputs. outcomes, Adams (1965) says, are anything the person receives (e.g. money, recognition etc.) and inputs are those that she/he invests in the situation (e.g. effort, education, time etc.). The people compare their outcomes and inputs in the form of ratios. The theory proposes that unequal ratios lead to negative motivational states like tension and frustration which the person tries to reduce. The manner chosen to reduce "dissonance" may vary from person to person and for a particular person over time and may include any or a combination of the following: distorting one's own or the other's inputs and/or outcomes, withdrawing from the situation and changing the comparable person against whom the comparison is made with respect to outcome — input ratio. The individual; will adopt the method that appears easiest in the situation (Festinger, 1957).

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Expectancy theory (Vroom, 1964) is the broadest in scope. It characterizes people as rational beings who thinks about what they have to do to be rewarded and how much the reward means to them before they perform in some specific way. According to expectancy theory, motivation is a multiplicative function of three components. In other words, it is the product of three types of beliefs (EIV) expectancy (effort will result in performance) × instrumentality (performance will result in rewards) × valence of rewards (the perceived value of the rewards).

Among the principal theories of motivation discussed, it may be noted that equity theory and expectancy theory are associated with the cognitive experiences of the individual. They centre around the beliefs about the self, others and the nature of the world. The Indian mind always kept in sight the fact that human existence is complex and so is human life on earth. With philosophic intuition it concluded that people's' life-goals' were the outward expressions of different psychological motives. There is a close link between thought and action — between cognition and motivation. Indian culture viz-a-viz work, therefore, founded itself very expressly upon four life goals inclusive of respective motives; *kama*, *artha*, *dharma*, *moksa* (Aurobindo, 1985). The highest aim of Indian culture is to universalise, spiritualise and divinise life by work and self-knowledge but in its practical execution there is comparable consistency between cultural goals and life goals though the supreme ethical note sounds at every stage. Except in very rare cases the satisfaction of the three mundane goals must run before the last; fullness of life must precede the surpassing of life.

Physical life of human kind, its maintenance, its continuance is a journey, a pilgrimage of the body and that cannot be effected without action. The primary motives are vital desires and enjoyment. People are born with some physiological urges or motives and some of them may be psychological in nature. Satisfaction of these inborn psycho-physiological motives s fundamental to the existence and growth of life. These serve as Basal (B) life goals of the organism. Indian culture gave a large recognition to this primary turn of our nature, *kama*. These powers have to be accepted and put in order, for the natural ego-life must be lived and the forces it evolves in the human being must be brought to fullness.

Mere existence and vegetative growth cannot be the sole goal of human life. The individual being has to learn and be trained for the development of habits, inner abilities and habituated to the sense of honour and duty necessary for the discharge of allotted functions of life. Self interest, hedonistic desire and other original human motives can further be satisfied by a force to acquire abilities for the satisfaction of economic, political, sacredotal, literary, scholastic or of other related motives, in short, by Acquiring (A) different abilities. The life goals are natural to ego-life and the forces they evolve in human nature must be brought to fullness as interest, *artha*. These goals, in that sense are instrumental for existence and continuation of basal life goals.

The two categories of life goals described so far, especially the basal ones, are essentially inborn; the varying existence of these goals is determined by physiological inheritance, though environmental interactions may, to some extent influence the course of initiated behaviour. Desire for the full satisfaction of these motives is the natural law of life. But this element must be checked from making uninhabited claims or heading furiously towards its satisfaction; only then optimum outcome can be obtained without disaster and only so it can be inspired eventually to go beyond itself to the blossoming of the full potential of the individual. An internal or external anarchy cannot be the rule. Another cultural goal keeps a check and balance and overtops desire and self-interest, the goal of *dharma*.

Human beings are social beings and they live by and in society. Every society, for its existence, continuation and development, has its own general customs and rules and the individual life must be filled into this wider law of movement. There are some direct and immediate ways in which the social group comes to shape and control the behaviour of the individual. As the individual acts in interpersonal, behaviour events, in face-to-face contact with other group members, he is often placed under group pressure to conform, to judge, act and believe in agreement with the judgement, belief and action of the group. Conversely the individual also learns that much of the elements for satisfaction of even the natural motives are products of social institutions.

Because of individual differences, social determination has to wed itself to the self-determination of each and find the way to enact a real union through this mutuality.

Persons do not like to be treated as unknown faces in the crowd. In the social perspective, individual life goals centre round self-identify, status, esteem and the like; in other words a person's own identity as the individual. The recognition and fulfilment of the individual being in own self and in the society is the basis on which one must come to the possession of oneself as a free self-determining being and of humankind too in mutually possessing self-expansion.

The cultural goals of dharma was meant to serve two purposes: It aimed at creating a perfect social order of harmonious relations so that the human urge for love and belonging, for affiliation and friendship could be satisfied. The satisfaction of co-existential and interpersonal motives pertains to the realization of life goals as Social (S) beings. The recongnition of individual identity was the other aspect of the cultural goal of dharma. The life goal for self-identity that includes the individual aspiration for esteem, recognition and freedom has to be accomplished. To strive for satisfaction of Individualistic (I) motives is not selfish but a necessity for the healthy growth of collectivism.

The universal goal of Indian culture is aimed at the ideal perfection of developing the human mind and self; through its ethical system encompassing all actions and behaviours, it compels the individual to grow in the power and force of certain high and universal qualities which in their harmony tend to build the highest type of humanhood. The ideal in this world is relative and yet there must be some absolute somewhere at least for comparative purposes. Strictly speaking what the philosopher means by absolute appears to be other-wordly but in practice, according to Indian religious culture, it is attainable by human on this earth. Thus the highest goal set is one of striving which exalts human life beyond itself into something spiritual and divine, *moksa*. It is poised interestingly between the twin extremes of self-liberation on the one hand and completive (C) perfection of life on the other. The ideal is not only moral or ethical conception; it is also the flowering of the total ideal human, the perfection of total human nature. It is to the pragmatic human, the motive to utilise one's personal capacities for the development of inner potentiality and to engage with individual freedom, in activities to which one is well suited.

The life goals are not rigidly compartmentalised from each other but more than one of them may be focussed simultaneously at a particular period though immediate activity results from the intensity of motivation generated by a specific motive. The entire system of cultural goals was designed to meet the demands of individual life goals and the whole ordering of society was cast into a scale of graduated ascension towards the supreme objective. The cultural goals of *kama*, *artha*, *dharma*, *moksa*, are founded upon the human motives system BASIC; Basal, Acquisitive, Social, Individualistic and Completive. A matrix of cultural goals in relation to the different life goals and the inclusive motives of each are presented in table 1.

Work Value

The implicit aspect of culture consists of modal congnitions, wants, interpersonal response traits, and attitudes in a society. In the traditional society of India the implicit culture is based upon premises about the motivational imperatives of human behaviour. The cultural goals of life including that of work include these premises. Being a historical product of the interaction of generations in millennia, the implicit culture in India shows comparative stability. The explicit culture, on the other hand, as depicted by the typical and distinctive pattern of behaviour events of a people or by a part of the group, may or may not always strictly follow the cultural goals. The explicit culture though based on the implicit one has a tendency to change due to the impact of ecological or social changes within a society (Georgas, 1991).

Values ascribed to cultural goals are beliefs shared by members of a society concerning what is desirable or "good" or what ought to be (Krech et al, 1962). Because of their relative and materialistic characteristics, values are concerned with phenomenal behavioural events or the explicit culture of a people. What the person recognizes as desirable values — may not necessarily be his desires. People coming across emerging desirables in an innovative situation become "culture — broken". The desirable tend to become desired — values change and the changed values occupy the position of personal goals. Throughout history, this has happened with one of the most profound value systems, work values.

In a developing country, multi-faceted innovations bring the native people in contact with alien culture and influence the life goals. Contemporary techniques of planning and programming of societal development are mostly technocratic with a purely economic approach. These approaches evolve a new style of life, a new culture which throws a challenge of acculturation. The homogeneous value system of the traditional society in which they have been socialized still lingers underneath the apparently satisfying allurement of the host culture. The conflict in acculturation to disparate values, which

Table 1: Cultural Goals and Life Goals with Corresponding Motives

	Life			Goals	
Cultural goals	Basal (B)	Acquisitive (A)	Social (S)	Individualistic (I)	Completive (C)
	Motives	Motives	Motives	Motives	Motives
(a) Moksa					Other Wordly Divinisation Immortality Liberation Universalisation
(b)					On Earth Self realisation Self improvement Sense of life Creativity Perfection
Dharma ideal of noble man	I			Self regard Freedom Esteem Recongnition Aestheticism	
Dharma Ethical Code in Social Life	II		Coexistential Interpersonal Participation Altruism Emotionalities		
Artha		Family Upbringing Education Economic Abilities			
Kama	Personal Survival Ecology Safety Health Amusement				

are yet to be internalized, results in atrophying the learned work values. The changes have a stronger influence on migrant industrial employees.

The conflict in acculturation to disparate values, results in atrophying the learned work values.

In modern society different occupational groups in different environmental settings (e.g. rural/urban) show variations in overt cultural contents. Some of these groups are large enough — organised industrial group, for example, in comparison to groups of small artisans and craftsmen. The smaller groups are generally "cultural-bearing units" (Barth, 1969). The role of the socializing forces of these groups has generally been ignored by social science researchers. Traditional culture is generally transmitted through the family lives of such people and to a large extent they act as the cultural heritage — bearing units of the society. It can be shown that the variation in individual work values, the principal component in work culture is correlated with socioeconomic status and/or occupational group affiliation.

Work Culture: A Research Study

Are the employees motivated by the same goal all over the varying occupational groups? It is an intriguing possibility that two groups of employees though socialized to the same traditional culture, but presently at different types of jobs can be equally motivated by uncomparable aspects of jobs. The influence of job characteristics (Hackman & Oldhman, 1976) and that of ecological and social factors on work motivation cannot be overlooked. Employees engaged in assembly line jobs in urbanized work settings and those working manually with unsophisticated skills of their own and with some simple tools and equipment in distant rural surroundings from almost two distinct ethnic groups (Royce, 1982). Do the content and context of job and style of living lead to a change in work values? To address this issue a research study was conducted comparing cultural goals, life goals and work values of people in two occupational groups — urban industrial employees and rural artisans engaged in handicrafts.

The two groups were more or less homogeneous in demographic characteristics like age, education, years of working etc. except that the latter was comparatively poor in economic conditions. The artisan group comprised rural people and the industrial one, included first/second generation migrants to developing industrial towns. A

diverse sample from each of the two groups was asked to rank 17 goals, comprising non-work and work-related items, in order of importance. This instrument was meant to gather the rank order measure of Cultural and Personal Goals which they "considered as important to strive for". They were also interviewed with an adapted version of work value questionnaire prepared by Wallack et al (1971). As summarised in table 2 some interesting findings emerged.

There was very little difference between the two groups in their respective beliefs about cultural goals and the difference was not significant. But the motivating life goals of the industrial group working in a technologically advanced organization differ widely from that of native artisan workers ($t = 2.82$, $p < .05$). Consequently the work values, as well, differed significantly between the two groups ($t = 4.86$, $p < .05$).

Table 2: Rank Order of Cultural Goals, Life Goals, and Work Values of Two Groups

INSTRUCTION: CULTURAL: Rank the following work-related items, in order of importance, according to cultural norm of your society.

LIFE: According to you what is the order of importance in ranks, of the following work-related items, in your life.

	Artisan		Industrial	
Goal	Cultural	Life	Cultural	Life
Spiritual development	1	4	1	—
Self realization	2	5	4.5	5.5
Sacrifice	3	6	6	—
Following tradition	4	3	2.5	15
Meeting life needs	5	1	4.5	2
Maintaining family needs	6	2	2.5	8.5
Happiness in life	7	9	10	3
Self regard	8	8	7	10
Community recognition	9	15	13	11
Helping others	10	10	11	—
Peace everywhere	11	14	9	5.5
Harmony with others	12	7	16	12.5
Love for the nature	13	11	15	8.5
Loyalty to superiors	14	13	17	12.5
Acquiring knowledge	15	16	12	7
Financial independence	16	17	8	8
Autonomy	17	12	14	1
r_p	.521		.358	
p	< .05		Not significant	
Work Value (Max = 54, Min = 18)	49.00		33.71	
$t = 4.68$, $p < 0.5$				

Indian civilisation had built up a work culture which was modelled to infuse through it the traditional aim of spiritual perfection. People in the artisan group working in their own environment with traditional technology had accepted the cultural norms and tended to seek them as goals in their lives. The high congruity between cultural and life goals resulted in work values which were significantly higher than that of the industrial workers. Finally, as mentioned earlier the new work force in urbanised industrial cities were mostly migrants from the rural environs. For them the quick transition produced an "acculturation shock causing them to drift away from the traditional goals which was reflected in their acquired values to work.

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These findings are of interest for several reasons. First, of course, they demonstrate our point that we need not be shocked, as unfortunately some are advocating, about the total loss of "work culture" in the present generation though, work value responses appear to be negative. Second, they clearly demonstrate how a society's religious and social ideologies may be responsible for its people's personal goals in work. Technological *quid pro quo* material advancements notwithstanding, if there has been a noticeable decrease in people's work values, to what extent is the present-day growth approach responsible for that.

Work Culture & Alienation

Because of the interconnectedness between different components of a cognitive system (Krech et al, 1962) another phenomenon, involvement has been studied widely n the context of work (Kanungo 1982; Rabinowitz & Hall, 1977). Work involvement signifies the 'internalization of values about the goodness of work or the importance of work in the worth of a person' (Lodahl & Kejner, 1965). involvement has, further, been conceptualized to be an attitude variable coming out of past socialization processes. Like many other attitude variables, it is comparatively stable and is carried by the individual from job to job (Kanungo et al. 1975). The motivational formulation defines work involvement as a unidimensional cognitive belief state of psychological identification with work.

In the last few decades alienation the converse phenomenon of involvement has come to the fore for research and discussion. Further fillip to empirical research in this area derives from the Marxian concept of alienation as the negative aspect of internalization of conventional goals in that it suggests an active rejection of them. It would be more correct to say that "it is a belated recognition of Derkheim's thesis that modern society lacks the common collective conscience provided by the internalized values of a traditional culture" (Katz-Kahn, 1979). From the literature on alienation, it is evident that it encompasses subjective feelings and objective realities. Its range of interpretations span from historico-philosophical interpretations (Schacht, 1970) to empirico — analysical theories (Blauner, 1964; Fromm, 1966; Kanungo, 1982; Seeman, 1971).

Belief state of psychological separation from work, in so far as work is perceived to lack the potentiality for satisfying one's salient needs and expectations.

In terms of motivational approach, "alienation is a generalized cognition or belief state of psychological separation from work, in so far as work is perceived to lack the potentiality for satisfying one's salient needs and expectations" (Kanungo, 1982). Workers have vital, mental and spiritual motives and they are motivated by the related goals of life. When people fail to meet any or most of the goals satisfactorily, the frustrated outcome is alienation The extent of alienation is determined by the cognitive dissonance between two sets of events: historical and contemporaneous. The former refers to the cultural conditioning effects of early socialization on the role of work in one's life. The latter refers to the work cognition of the person structured by socialization practices, as observed, in the current environment. Since it is easier to rationalize newly acquired beliefs, the individual at first tries to resolve the inconsistency in cognitive structure by paying attention only to material goals which are more apparently enjoyable and moving away from the higher goals of life. But this single channel move leaves the higher motives ungratified. The life goals are disanchored ultimately resulting in gradual diminishing returns of satisfaction.

The researcher in search for the cause of the prevalent alienation among factory workers finds some support in the Marxian hypothesis on modern production system. Despite the political implications of Marx's work, his arguments present a theory of human behaviour concerning the proposed effects of certain independent variables (i.e. the hierarchical decision — making, and specialization and standardization of work) on the dependent variables (i.e. alienation from condition of work and alienation from, self). The Marxian hypothesis, obviously, tends to oversimplify the problem. Estrangement and self isolation are not limited only to the assembly line workers, but are widespread with the managerial population as well (Bartlome, 1972) though the latter is far less stifled by hierarchization and standardization. (For some contrasting thoughts on this issue please see the Organizational atudy which follows.

Work Culture: An Organizational Study

The research study established the variations in work values between two groups, though there may not be much variations in their work cultures. What leads to this variation in work values? Alienation from conditions of work, we argue, may be at the root of this cognitive inconsistency. The existence of critically different types of work environments in modern industry results in large variations in the form and intensity of self imposed isolation. In modern industrial organizations, for example, a vast process of "Structural differentiation" has taken place. Although they have some features in common, the most striking are the differences and in these different 'socio-technical systems' the objective conditions and the inner life of employees are strikingly variant. As a result the industrial system distributes alienation unevenly among its employees, just as many other benefits, like income and/or decision power, are distributed unevenly. Further empirical findings suggest that alienation is a characteristic feature of lower level workers in a highly industrialized situation.

The ecological conditions, again, are such that the individual worker and the workers as a group experience certain stresses and strains that contribute to the loss of identity and escalated alienation. The explosive growth of industrial towns, pollution, noise, congestion, inadequate living place, fragmentation of relationships and unconcerned modernisation are environmental realities which accelerate the process of isolation. The tragedy of the migrant worker is that he has to choose between a job without physical comfort and mental peace in thea city or happiness and peace albeirt accompanied by poverty, in villages.

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In order to gather evidence on the impact of alienation on work values a study was conducted in an engineering industry. The organization was fairly advanced in the technological aspect but was rather old fashioned on human management practices. The sample for interview included both managerial personnel and blue-collar workers at the shop floor level. The two groups differed on some demographic characteristics like education and socio-economic status, but those data were assumed as given in the situation for the present study. The sample population however, was on the whole evenly distributed over age and family support, the two variables considered to be of prime importance with the problem of alienation. The interview schedules included two modified versions of questionnaires on work value (Wallack et al, 1976) and alienation (Dean, 1961).

When these data were examined several intriguing findings emerged. First, as expected, there was a strong relationship between alienation and work value measures ($r = -.46$, $p < .05$), Second, the higher level employees reported lesser amount of alienation (the contributing factors, though, not specifically investigated) and higher degrees of work values. In addition, higher work value was fostered by strong involvement in work by managerial personnel (Fig. 1). In sum, for the managerial group, organizational returns tended to be commensurate with their life goals. This was reflected in the higher work value scores and a very low level of isolation from work and work context.

In conclusion, people join the organization with certain built-in work culture. But later they come across some cultural norms that appear alien to them. Conflicting values need to be accommodated within the established work cognition structure. Some changes are made, certain decisions are taken by others concerning their work and life patterns in which they do not have any role. This cognitive dissonance leads to frustration. People's identity is lost and self-regard diminished. To reduce the dissonance the individual finds some solace in self isolation which has noticeable effects on all domains

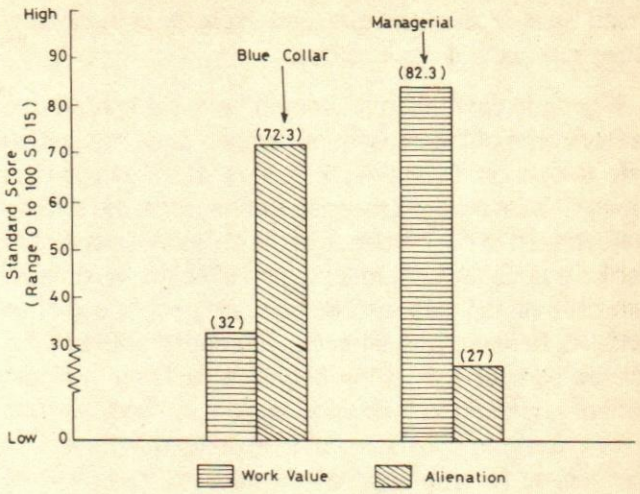

Fig. 1 Comparison of two levels of industrial employees across work value and alienation

of life including work. Work values decline and absence of a congenial work culture becomes manifest in the organization.

Conflicting values need to be accommodated within the established work cognition structure.

Conclusion

The implicit meaning of work is dependent on culture-based normative beliefs and expectations about the distinctiveness of different life roles. In a traditional society, like India, the cultural ethics of work are moderated by life goals representing the underlying human motives. The commonality between work-related normative beliefs and life goals results in the genesis of explicit cognitive orientation to work, the work values.

Berry et al (1989) assert that between the initial contact and the resultant change, relationships are likely to be characterised by conflict. During acculturations persons of a traditional society are subjected to the influence of the ecological and social factors of the host culture. If not supported by a homogeneous value system the people who have to accomodate the emerging culture face the challenge of disparate cognitions that ultimately result in cognitive dissonance. Acculturation or indigenous people's adaptation to the host culture in such a situation is characterised by margnality (Berry et al 1989) Deculturation from the archetype is followed by

feelings of alienation and loss of one's own cultural identity, The implicit striving for reducing dissonance, characterised by alienation is expressed explicitly in the loss of values to work and work context.

From the contention presented here it is implied that the workforce of the present generation does not necessarily subscribe to the work values of its indigenous groups. Adaptation to emerging trends within the society cannot be left to the prudence of the individual alone or to specific groups. Acculturation, to be effective must be an attempt towards bringing total change in people' cognitive world. Because of the interconnectedness between the different components of the cognitive systems, a single channel approach to innovation results in "acculturation shock" and immunizes people against new beliefs in other areas. New values may develop but they may not always be conducive to the desired goals of the society. Acculturation by multi-channel approach is an integrative process where maintaining existing cultural integrity is an integral part. A total integration of classical Indian ethic — the creation of dedicated, motivated, perfection-seeking and self-enlightend individuals and the enhanced commitment of present-day generation to scientific and technological advancements and responsiveness to novel and challenging demands of work — has the potentiality to further higher involvement and positive work values system.

The world does move; culture does change but only if it does so through the process of internalized accommodation if leads to better values. And there is no other alternative.

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Assessing Progress in Total Quality Management

Greg Bounds

Total Quality Management (TQM) is a means of improving organizational competitiveness, but only if managers implement it appropriately. This study focuses on: developing a valid survey measure for assessing progress in Total Quality Management, and testing the sensitivity of the survey measure against observed behavioural changes.

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International competition and requirements for continuous improvement became an issue of major the importance in the 1980s and even more important in the 1990s. Competing requires an organization to provide superior value to the customers (Ohmae, 1988). Total Quality Management refers to a comprehensive approach to management which involves implementing strategies and organizational systems that continuously improve quality, reduce cost and ensure the consistent, on-time delivery of products and services in order to provide superior value to customers (Bounds & Dewhirst, 1991; Bounds, et al, 1994).

This new approach is often referred to as a new paradigm (Bounds & Fausz, 1993). This means that managers should not regard TQM as a special program to be implemented aside from regular management activities; rather, TQM should become interwoven within the cultural fabric of the organization. Then the organization will have shifted to a new paradigm for "management" and the special term Total Quality Management will not be needed. Indeed, TQM will be the norm for that organization, and not some special or lofty ideal toward which managers aspire. In the meantime, the label Total Quality Management (TQM) provides a convenient way to refer to the new paradigm. However, it has meaning only if it can be defined and measured, which is the purpose of this study.

Prescriptive works as exemplified by Deming (1986), provide helpful advice and have greatly increased our understanding of what is required to create customer value. Narrative success stories at Hewlett-Packard (Peters & Waterman, 1982), Xerox (Pace, 1989), Corning Glass (Magnet, 1982), and Milliken (Peters, 1987) also make significant contributions as do industry studies such as Garvin's (1988) comparative study of air conditioning manufacturers in America and Japan. Case

studies, (Bounds, et al 1994; Bounds, 1995) also offer insights into TQM. However, TQM has received scant attention by academics except for the longitudinal study on the implementation of a quality program based on Statistical Process Control at a manufacturing plant (Bushe, 1988).

With the view to stimulate greater interest in TQM and contribute to research in this important area, we developed, refined, and tested measures of organizational and managerial attributes which, taken together, are proposed as a valid metrics of an organization's progress in TQM. This research consists of three main phases: (i) Using existing theory and the prescriptive work of several authorities as a basis for conceptual development, critical variables are hypothesized as being related to success in TQM; (ii) items to measure these variables are included in a questionnaire which is successively revised to improve its psychometric properties, and (iii) the final measure is tested for its sensitivity to differentiate between organizations. Questionnaire scores are correlated with behavioural observations made at each organization.

Although anecdotal evidence abounds to support the efficacy of TQM, empirical research is needed to demonstrate that these practices are related to organizational competitiveness. Longitudinal research which relates TQM to various organizational criteria seems the most apt way to support this linkage. There is currently a dearth of measurement tools available for researchers interested in this topic. The survey instrument of this study is intended to fill the lacuna.

Conceptual Development of the Measurement Tool

Bounds & Dewhirst (1991), offer a theoretical framework for the measurement tool developed in this study (Figure 1). The framework was initially developed by content analysis of such practical works as Deming(1986), Juran (1964, 1988), Ishikawa (1985), and Imai (1986), as well as the traditional academic literature. It was refined through many conversations with practising managers to verify the relevance of the factors identified by the researchers. It includes **individual variables, organizational culture variables**, as well as **organization structure** and **control variables.**

Individual Variables

The essence of organizations are people and their behaviour. Since managerial behavior is the primary determinant of organizational reality, forces which shape managerial behavior are critically important to TQM. Accordingly, there are four potentially powerful leverage points in managerial performance—managerial competence and three aspects of managerial role perceptions.

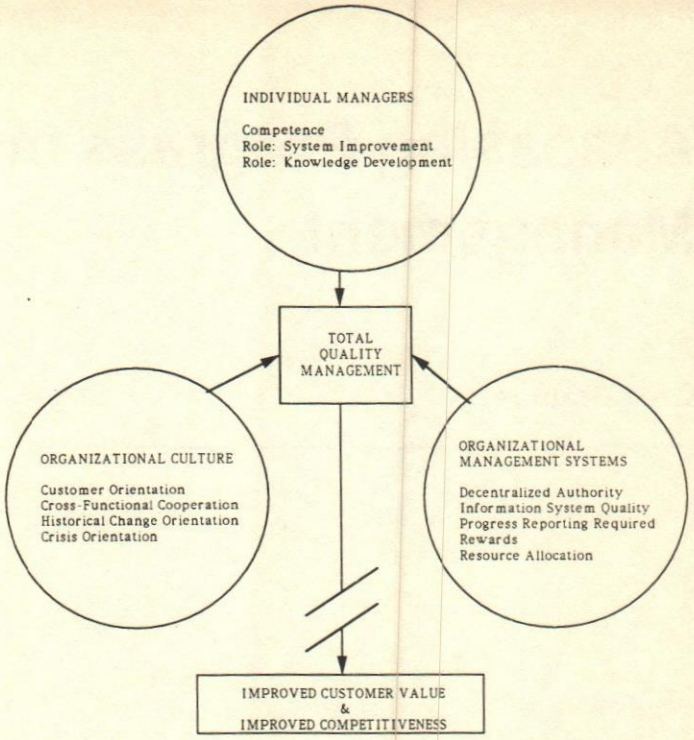

Fig. 1. Factors Important in Total Quality Management (TQM) (Adapted from Bounds & Dewhirst (1991)

Managerial Competence ("Can Do"): Individual aptitudes, attributes, and behavioral skills combine to influence potential managerial performance. If the individual is motivated to "perform", individual competence inherently limits or enhances performance. One key to motivation is role perception.

Role Perception ("What to do"): Roles are a set of activities or behaviors expected to be performed by any person who occupies a particular position. Two particular role perceptions important to TQM are system improvement and knowledge development.

Role Perception — System Improvement: Customer value is not improved simply by stating goals but through incremental improvement and breakthrough innovation. Managers must take action on the system of causes and constantly revise and improve performance standards. System improvement should be a major part of a manager's job — not a sideline activity.

Role Perception — Knowledge Development: In order to improve systems, managers need a thorough knowledge of the system which includes an under-

standing of the variations in system outcomes and the causal relationships among the inputs, processes, and outcomes of the system. It is important for managers to be personally involved in the knowledge development process and not totally rely on staff assistants as data gatherers.

Organizational Culture Variables

Although managerial competence and role perceptions are important determiners of managerial behaviors, organizational factors intervene between the intention to behave and the actual manifestation of this intention as successful role performance (Peters *et al*, 1985). Organizational culture variables must be considered as direct inhibitors or facilitators of role performance, as well as shapers of role perceptions. The following culture variables are the key to success in TQM:

Customer Orientation: Managers must understand what customers value in order to guide system improvement. Value can be added in products and services, by observing the way the customer uses the product, and then anticipating and responding to their needs. Since the systems that provide customer value cut across the organization, customer orientation is important in all functions and departments.

Cross-Functional Cooperation: The ability of different functional areas to share information and work together is central to TQM. Sectionalism is the energy. Unfortunately, high levels of cross-functional cooperation are difficult to achieve due to functional hierarchies. The natural tendency of functional managers is to talk mostly among themselves and to concentrate on their own functional objectives. Conventional control and reward systems often reinforce this tendency toward functionalism.

Historic Change Orientation: Organizations are most often constructed to be "in control". Authority structure, and procedures encourage people to behave in prescribed and predictable ways. While control is needed, overemphasis on it precludes the experimentation, risk-taking, the change that are required for continuous improvement. Historic change orientation refers to how much the culture has supported change efforts in the past and thus developed positive attitudes and skills for change.

Crisis Orientation: Organizations tend to become complacent and cling to established methods and practices. Even in the face of changing competition, many organizations find it difficult to realize that what was satisfactory or even superior in the past is no longer good enough. However, people are more likely to support and participate in a TQM change process if they perceive that a crisis exists.

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Organizational Management Systems

The final elements important to TQM are Organizational Management Systems which direct, guide, and control the behaviour of individual organization members. These design variables make an economic difference in organizational performance and are powerful tools for implementing change (Galbraith & Nathanson, 1978; Galbraith, 1986; Kilmann, 1984; Kanter, 1983). Variables addressed are as follows:

Decentralized Authority Structure: TQM requires an authority structure in which managers are free to experiment, to try new methods, and to make changes. They cannot do this if every decision must be approved by several layers of management. Appropriate levels of responsibilities should be determined for all employees.

Information System Quality: The minimum requirements for information system quality are that accurate information be obtained and that information be widely and freely shared. To support continuous improvement, there must be more emphasis on process measures as compared to outcome measures. Outcome data only tell you that you have a problem without pointing out what is wrong. By contrast, process data can be analyzed on a real time basis and lead to understanding of causes.

Progress Reporting Requirements: Managers attend to the measures that their superiors show interest in and respond to. Therefore, corporate controls and reporting systems should require progress reports on systems improvement and customer value.

Reward Systems: Even more powerful than control systems in influencing managerial behavior, are reward systems. The criteria on which rewards are based must be consistent with TQM objectives.

Resource Allocation System: The resource allocation system must provide support for TQM. It requires investments in training, equipment, tools, and supplies. It also may require capital investment or the sustained aid of

staff groups or consultants. Most importantly, managers must invest time and hard work.

Methodology

The goals of this research were twofold. Phase I derived internally consistent measures for distinct variables which provide a means of assessing progress in TQM. Phase II established the sensitivity of the measure to detect organizational differences. Based on the variables identified in Bounds & Dewhirst (1991) framework, a skeleton of the questionnaire was developed. Items for each variable were then, compiled to create a survey instrument. Three hundred forty-nine participants were used to "pilot-test" three versions of the questionnaire. In each version, the psychometric properties of the items were incrementally improved. By analyzing the data, some items were deleted and new items were added.

Procedures for this phase are described but results are not reported. To complete Phase I, data were collected from a new sample of 286 participants. From these data, the psychometric properties of the fourth version of the survey instrument were examined. Using an additional 231 participants, Phase II was then conducted to determine whether or not the measurement instrument had the potential to detect organizational differences in terms of the survey variables.

To enhance reliability, the measurement instrument was constructed with multiple items measuring each variable in accordance with established approaches (Likert, 1932; Nunnally, 1978; Thorndike, 1982). Once developed, the measures were examined to: (i) confirm the groupings (internal homogeneity) of the items representing each variable, (ii) demonstrate that the items representing each variable were more highly related to their own grouping than to other item groupings to justify summing them into a composite score, (iii) demonstrate that individual composite scores were sufficiently similar within an organization to justify aggregating the scores across individuals within an organization to produce reliable mean scores for each variable, which allows cross-organizational comparison.

Procedures

The data were gathered from managers who volunteered during their participation in either "on site" training courses or training courses at The University of Tennessee's Management Development Center. Each participant was instructed to respond to the questionnaire in regard to the business unit or plant in which he or she worked. The overall response rate was approximately 95 percent. The average age was 43 years with 15 years of experience as a supervisor/manager. Respondents typically had been with their company for 12 years and in their present position for 3 years. Demographic data are further described in table 1.

Table 1: Demographic Description of Participant Samples

Demographic Variables	Classifications	Phase I Sample	Phases II & III Sample
Gender	female	9%	4%
	male	91%	96%
Level of Employment	corporate	30%	13%
	business unit or plant	70%	87%
Involvement in Manufacture/ Delivery	direct	65%	73%
	indirect	35%	27%
Positional Description	line	45%	53%
	staff	55%	47%
Management Level	top manager	15%	6%
	policy making group	12%	5%
	middle management	58%	44%
	supervisory	8%	36%
	professional/senior technical	7%	9%
Function	general manager	17%	8%
	production	16%	31%
	marketing	6%	7%
	finance/accounting	2%	2%
	purchasing	2%	4%
	distribution	10%	2%
	engineering/design	14%	13%
	maintenance	1%	8%
	personnel	4%	2%
	quality	11%	8%
	other	17%	15%
Education Level	some high school	1%	5%
	high school degree	1%	22%
	some college courses	11%	23%
	undergraduate degree	53%	34%
	masters degree	33%	15%
	doctorate degree	1%	1%
Development /Training Pertinent to Value Creating Management	none	6%	17%
	1 to 10 hours	10%	13%
	11 to 20 hours	9%	9%
	21 to 30 hours	5%	5%
	31 to 40 hours	11%	11%
	41 to 80 hours	17%	13%
	81 to 120 hours	15%	10%
	More than 120 hours	27%	22%

Phase I

Iterative Item Analysis: Analytical methods used to develop each version of the questionnaire included: factor analysis: principle components analysis with Harris-Kaiser rotation, oblique centroid component cluster analysis, simple inter-item correlations, differential item-composite correlations, and visual examination of

bivariate plots to rule out the existence of gross non-linearities. Based on the convergence (consistency) and divergence (inconsistency) of the results among these multiple methods, the wording of some items were altered, the item content of some of the item grouping were changed, other item groupings were consolidated/ eliminated and new item grouping created.

Item groupings were confirmed empirically and rationally. Three experts, in addition to the researchers, participated in interpretating the content of the item groupings, labeling the item groupings, and ensuring that the conceptualization of the variable matched the items. Survey participants also gave the researchers feedback on their interpretations of items, content relevance, and use of the survey. Figure 2 represents the final version of the survey.

Internal Consistency and Distinctiveness Analysis: The internal consistency of each of the resulting item groupings was determined by examining item intercorrelations and computing coefficient alphas (Edwards, 1970; Lord & Novick, 1968; Cronbach, 1951). This was done to ensure internal consistency so that unrelated items would not be combined into composites. Otherwise, reliability and/or validity of the composite may have decreased (McIver & Carmines, 1981; Murphy & Likert, 1938). Factor analysis was also employed. Principal components analysis with Harris-Kaiser rotation was the chosen method since intercorrelations among the eleven factors were expected. Lastly, a maximum likelihood confirmatory factor analysis using LISREL was conducted to assess the fit of the theoretical factor structure matrix (Joreskog & Sorbom, 1988).

Phase II

Organizational and Individual Differences: To evaluate organizations with the survey, individual composite scores on each variable have to be aggregated. Unfortunately, work environment perceptions may differ across roles and organizational positions (Adams, Laker & Hulin, 1977; Payne & Mansfield, 1973; Jones & James, 1979). So, it was sought to determine whether organizational differences or individual differences better explain perceptual differences. If organizational differences do, then one is justified in aggregating individual perceptions to represent their common experiences within the organization (Guion, 1973; James, 1982; Roberts, Hulin, & Rousseau, 1978). To answer this question, data were collected from 231 participants at 9 organization sites for an empirical determination.

Analysis of variance was used to determine if mean differences between organizations were a more powerful determinate of perceptual differences than other individual demographic differences. The demographic classifications used included: gender, level of employment (business unit/plant vs. corporate), directly involved vs. indirectly involved in manufacture/delivery of product/ service, line vs. staff, management level, function of participant department, highest education level achieved, and amount of management development/training.

Each of the eight demographic variables served as classification variables with each of the 13 composite variables as the dependent variables to produce (8×13) 104 separate two factor ANOVAs. The second classification variable in each of the 10H ANOVAs was the organization site or plant. The following rationale was employed: If interaction effects were not prevalent, and organizational differences (main effects) account for perceptual differences more than individual demographics, then 13 one-way ANOVAs, one for each composite variable, should be conducted, with organization site as the classification variable. Using the procedure described in Shrout & Fleiss (1979), the mean squares were derived through one-day ANOVAs and then converted into a form of intraclass correlation coefficients (ICC-1). Next, the reliability of each composite variable mean score was estimated by applying the Spearman-Brown prophecy formula (Bartko, 1976; James, 1982). This gave another form of intraclass coefficient (ICC-2) for organizations.

Results

Phase I

Factor Analysis: The rotated factor patern of a principle components analysis, with Harris-Kaiser rotation, is presented in table 2. The items are grouped and labelled for each variable and the loadings for grouped items are enclosed in boxes. The factor analysis demonstrates the distinctiveness of each item grouping, except for the three items representing Progress Reporting Requirements (PRR) and the three items representing Reward System (RS). These six items loaded on the same factor, and the two hypothesized composite variables were highly intercorrelated, $r = .58$ (table 3). Thus, the item groupings were combined and labelled Organization Controls and Rewards (OCR). This consolidation seems justified, since it seems reasonable that organizations which require reports on system improvement are likely to reward individuals on the same basis. Analyses of the psychometric properties of the questionnaire are included

Managerial Competence

15. Managers at my level do not understand what is needed to make competitive strategic change.
28. Managers at my level do not have the skills that are required to manage continuous improvement.
32. Managers at my level are confident in their ability to manage competitive strategic change.

Role Perception — System Improvement

10. System improvement is *the* job of managers at my level.
24. Managers at my level believe that making continuous improvements in organizational systems is a part of their job.
38. In this unit, making changes in systems to improve our long term competitive position is part of every managers job.

Role of Perception — Knowledge Development

4. Managers at my level invest effort in learning the details of how systems actually work.
17. Managers at my level believe it important to learn about system functioning.
31. The development of knowledge about systems is important to managers at my level.

Intrinsic Motivation

35. System improvement has been welcomed as a challenge by managers at my level.
22. Managers at my level enjoy working to improve systems.
2. System improvement has been a satisfying activity for managers.

Cross-Functional Cooperation

6. Managers in this unit share information readily.
12. This unit is too compartmentalized to expect any significant changes in cross-functional systems.
18. Managers in other functional areas of this unit willingly provide information needed to institute systems changes.
25. Cooperation between functional areas is good.

Historical Change Orientation

8. This unit has a history of changing in anticipation of the future it desires.
19. This unit tends to react slowly to changes in external environmental situations.
21. Historically, this unit has proactively altered systems to improve our competitive position.

Customer Orientation

7. We are close to our customers.
26. We keep close watch on how satisfied our customers are with our products or services.
33. Managers are kept informed as to how our products are performing in the hands of the customers.

Competitive Crisis

11. The need to improve quality/cost/delivery is a crisis in this unit.
39. Managers perceive a crisis regarding our position relative to the competition.
27. The pressures of increased competition and environmental change are intense for this unit.

Decentralized Authority Structure

1. The authority structure here makes it difficult to get needed changes accomplished.
16. There are a high number of approvals required to implement significant systems changes.
34. This unit is decentralized to allow managers to implement systems changes.

Information System Quality

20. Information needed to diagnose system problems can be obtained easily.
29. The quality of information available to managers instituting change is good.
36. The information system of this organization provides managers with reliable data.

Progress Reporting Requirements

5. My formal unit objectives require me to demonstrate that I have made changes to improve our quality/cost competitive position.
9. I am required to report my progress in making continuous improvements.
14. My manager expects me to formally provide information on systems performance improvements.

Reward System

3. At performance appraisal time managers are evaluated according to the extent of improvement in their systems and processes.
13. The way to be a hero in this unit is to successfully manage competitive strategic change.
30. A major criterion considered in promoting managers is their demonstrated ability to improve the competitive strategic posture of the unit.

Resource Availability

40. It is usually possible to find time to work on system improvements.
37. Resources needed to implement changes are available to managers at my level.
23. Resources are available for activities which will yield long term benefits.

Additional items that might be substituted for the Intrinsic Motivation variable are those for a new variable called Role Perception: Customer Value Determination. These items have not yet been tested.

Role Perception: Customer Value Determination (New and Untested Items)

35. Managers at my level invest effort in learning specifically what customers value.
22. Managers at my level believe it important to learn about the specific uses of our products and services by customers.
2. Learning the details of what our customers value is an important part of my job.

Fig. 2. Survey Items for Each of the Variables Tested in this Study

Table 2. Factor Analysis of Survey Items

Variable Definitions	Number of Items	Factors[a]										
		1	2	3	4	5	6	7	8	9	10	11
Managerial Competence: Managers have the skills, understanding, and confidence to manage competitive change.	3	−.05 .14 .16	.02 .08 −.07	−.11 −.09 .46	−.02 −.15 .07	.91 .69 .43	.01 .10 −.07	.01 −.14 −.03	−.02 −.06 .00	−.10 .12 .16	−.02 .01 −.07	.01 .04 .12
Role—System Improvement: Managers believe that making contiuous improvements in systems is part of their job.	3	.04 .05 .01	−.01 .05 .04	.03 −.26 .30	−.00 −.08 .03	−.09 .21 −.04	−.13 −.05 .01	.18 −.18 −.09	−.05 .23 −.08	.00 35 .14	.82 .42 .45	−.08 .15 .07
Role—Knowledge Development: Managers believe it important to learn about system functioning.	3	.06 −.01 −.07	−.18 −.01 .05	−.16 .02 .22	.04 −.00 .07	−.05 .07 .25	.17 .04 −.30	.20 −.13 −.16	.10 −.05 −.09	.79 .75 −.02	−.04 .03 .46	−.13 −.09 .02
Experimental Items[b]	3	.04 −.07 .12	.00 .06 .18	.23 .11 .18	.08 .08 −.20	.33 .30 −.23	.04 −.02 .02	−.06 .04 .05	−.05 .03 −.01	.17 .17 .48	.20 .35 .05	−.06 −.05 .06
Cross-Functional Cooperation: Managers from different areas cooperate and share information readily.	4	.06 .06 .00 −.10	.85 .45 .73 .75	.08 −.03 .07 −.19	.06 −.04 .00 −.03	−.04 .12 .08 .04	−.04 .13 .03 .08	−.09 .34 −.02 .09	.03 −.05 −.08 .13	−.06 −.03 −.07 .02	−.03 −.09 .02 .03	−.06 −.05 .10 −.05
Historical Change Orientation: This organization reacts quickly to environmental changes and proactively changes systems in preparation for the future.	3	.03 .20 −.17	.05 −.07 −.18	.92 .44 .58	−.03 −.07 −.04	−.17 .17 .03	−.05 .25 .30	−.09 .32 .04	.03 .15 .10	−.08 −.41 −.10	−.01 −.07 .25	.02 −.27 −.02
Customer Orientation: This organization closely watches how our p[roducts perform for and satisfy our customers.	3	−.09 .07 .10	.06 .04 −.08	.14 −.08 −.01	−.01 .03 .10	−.25 .18 .25	.05 −.11 −.09	−.06 −.01 .06	.83 .81 .67	.09 .01 −.14	.08 −.03 −.15	−.06 .03 .06
Competitive Crisis: This organization feels pressure for improving its relative competitive position.	3	.15 −.15 .03	−.04 .12 −.05	−.22 −.02 .05	.52 .72 .77	−.11 −.21 .14	.13 .06 −.01	−.38 −.21 .22	.02 −.03 .09	−.17 .01 .05	.16 .16 −.20	−.02 .02 −.08
Decentralized Authority Structure: Managers have the authority freedom from structure to implement systems changes.	3	.01 −.04 −.26	.10 −.09 −.01	.11 −.22 .03	−.05 .01 .27	−.22 .10 −.28	−.10 .05 .06	.72 .79 .39	.11 −.14 .12	.29 −.15 −.02	−.13 .30 .25	.05 −.01 .36
Information System Quality: The information system readily provides data which is reliable and of good quality.	3	−.01 −.05 .02	.08 .02 −.01	−.07 .04 .28	.12 .02 −.03	.01 .08 −.01	.81 .71 .66	.08 −.11 −.08	−.20 .00 .06	.10 .16 .03	−.11 .02 −.16	.05 .10 .01
Progress Reporting Requirements: Managers are expected and required to report on progress in systems improvements.	3	.81 .80 .75	−.05 .03 .05	−.10 .06 −.00	.12 −.11 −.20	−.03 −.18 −.10	−.02 .03 .02	.07 −.07 −.18	.04 .08 −.02	.07 .04 −.10	−.03 .02 .22	01 .06 .04
Reward System: Managers are rewarded for making continuous improvements in systems to enhance competitiveness.	3	.56 .46 .43	−.09 .09 .01	−.07 .33 .10	−.05 .24 .24	.29 .04 .38	.09 −.20 −.13	.10 .05 .20	−.03 −.22 −.09	.02 .19 −.00	−.02 −.12 −.07	.02 −.03 .10
Resource Availability: Managers are able to find the time and resources to engage in systems changes.	3	.20 −.03 .10	−.06 −.08 .04	−.30 −.00 .01	−.08 .06 −.00	−.02 .06 −.01	.51 .02 .03	.05 .04 −.03	.14 .06 −.06	−.31 −.01 −.07	.49 −.05 −.01	−.10 .85 .88
Eigenvalues		9.1	2.8	2.1	1.8	1.5	1.5	1.3	1.3	1.2	1.1	1.0
Proportion of Variance Explained		.23	.07	.05	.04	.04	.04	.03	.03	.03	.03	.03

a The factor loadings enclosed in each box represent the items which were supposed to factor together for each respective variable.
b The intrinsic motivation items were experimental items introduced in the most recent round of questionnaire development.

Table 3. Means, Standard Deviations, Coefficient Alphas and Intercorrelations for Composite Variables[a]

Variables	Mean	s.d.	Alpha[b]	1	2	3	4	5	6	7	8	9	10	11	12
Managerial Competence	3.01	.79	.68												
Role — System Improvement	3.48	.78	.63	.42***											
Role — Knowledge Development[c]	3.24	.86	.57	.39***	.48***										
Cross-Functional Cooperation	3.48	.76	.75	.40***	.32***	.24***									
Historical Change Orientation	3.02	.84	.68	.36***	.36***	.24***	.38***								
Customer Orientation	3.45	.78	.71	.33***	.23***	.20***	.37***	.39***							
Competitive Crisis	3.65	.72	.58	−.16**	.06	.01	−.10	−.13*	−0.5						
Decentralized Authority Structure	2.78	.81	.59	.23***	.31***	.16**	.40***	.30***	.26***	−18**					
Information System Quality	2.80	.80	.77	.43***	.29***	.31***	.39***	.45***	.30***	−.12*	28***				
Organization Controls & Rewards	3.02	.96	.80	.34***	.54***	.44***	.26***	.40***	.34***	.07	.26***	.28***			
Progress Reporting Requirements	2.87	.84	.77	.23***	.48***	.36***	.17***	.33***	.33***	.03	.20***	.24***	.91***		
Reward System	2.94	.81	.67	.41***	.48***	.42***	.29***	.38***	.27***	.06	.27***	.31***	.87***	.58***	
Resource Availability[d]	3.01	.98	.63	.27***	.26***	.10	.32***	.32***	.31***	−1.4*	.42***	.40***	.32***	.28***	.30***

a N = 286
b Mean and Median Coefficient Alpha = 6.8
c Simple correlation for two item composite = .42
d Simple correlation for two item composite = .66
*p < .05, *p < 0.01, ***p < .001

for both the six-item composite and for the two three-item composites within Organization Controls and Rewards.

Two items failed to load as expected — one from Resource Availability and one from Role Perception-Knowledge Development. These items were not included in computing the composite scores used for subsequent analyses. With the third item eliminated, the remaining two items were summed into composites for these variables. The simple correlation between the 2 items summed for these composite scores is reported in table 3. Coefficient alphas are also reported in table 3 for the item groupings with all items included.

The three items on the Experimental grouping failed to load as expected. Although these items were internally consistent, with coefficient alpha = .67, they were not distinctly different from other item groupings. Since these items were considered redundant, they will not be used in subsequent administrations of the questionnaire and are not discussed any further here.

Confirmatory Factor Analysis: To assess the fit of the theoretical factor structure matrix, a maximum likelihood confirmatory factor analysis was conducted using LISREL (Jöreskog & Sörbom, 1988). The five items which failed to load as predicted were eliminated prior to the confirmatory factor analysis. The initial analysis was conducted with each of the 35 items loading only on their hypothesized factor. Since the scales were not hypothesized to be orthogonal, intercorrelations among the 11 factors were allowed. The "fit" statistics for the initial analysis indicated a good fit to the data [X^2 (505) = 855.61, goodness of fit index = .824, and root mean square residual = .066]. All of the hypothesized factor loadings were .37 or higher (t-values ≥ 5.18) with the exception of one weaker loading (.24, t = 3.40). Parameters with t-values greater than 2.0 are generally considered to be significantly different from zero (Jöreskog & Sörbom, 1988). Overall, these results provide good support for the theoretical factor structure of the item groupings.

Internal Consistency: Estimates of reliability were computed for each of the 13 groupings of items. Coefficient alphas for item groupings ranged from .57 to .80 (table 3). The Mean and median coefficient alpha was .68. These results are generally better than results reported elsewhere in the literature for exploratory instru-

ments (Jones & James, 1979). In general, the composite variables are positively correlated. The only exception was the Crisis Orientation (CC) variable, which is significantly negatively correlated with five other composite variables.

Phase II

Analysis of Variance:: The Phase II sample consisted of 231 managers at 9 organizational sites. A total of 104 two-factor ANOVAs were conducted for each pairing of the 8 individual demographics as a classification variable and the 13 composite variables as dependent variables. The other classification variable in each ANOVA was organization site. Two-factor ANOVAs were conducted to ensure that interactions were not present prior to examining one-way ANOVAs (Neter, Wasserman, & Kutner, 1985). The interaction term was significant in only 5 of the 104 ANOVAs, which is no better than chance occurrence. The demographic classification variable was significant in only 9 of the 104 ANOVAs. Further, there were only three cases in which the demographic classification variable was of greater significance than the organization site variable. This contrasts with 77 of the 104 ANOVAs where the organization site classification variable was significant.

These results suggest that the organization site explains perceptual response differences better than any other demographic classification. The small within-organization variance relative to the between-organization variance suggests that there is more agreement in perceptions among demographically diverse individuals from one organization than agreement in perceptions among demographically similar individuals from different organizations.

Interaction effects were not prevalent and organizational differences (main effects) accounted for perceptual differences more than individual demographics. Therefore, one-way ANOVAs with organization site as the classification variable were conducted. All F statistics were statistically significant except for the Decentralized Authority Structure (DAS) composite variable (Table 4).

Table 4. Managerial Responses to Each Composite Variable in Nine Organization Sites[a]

Variables	Means for Organization Sites									Statistical Analyses[b]		
										ANOVA Results	Intraclass Coefficients	
	1	2	3	4	5	6	7	8	9	F	ICC-I	ICC-2[c]
Managerial Competence	3.9	3.0	3.4	3.4	3.2	2.9	2.9	3.4	3.4	5.31**	.14	.81
Role — System Improvement	4.0	3.4	3.8	4.0	3.7	3.5	2.9	3.3	3.7	5.52**	.15	.82
Role — Knowledge Development	4.0	3.1	3.7	3.9	3.5	3.3	2.7	3.7	3.6	5.12***	.14	.80
Cross-Functional Cooperation	3.7	3.6	3.3	3.4	3.2	3.4	3.9	3.2	3.2	2.28*	.05	.56
Historical Change Orientation	3.4	3.0	3.3	3.3	3.4	2.8	3.1	3.3	3.3	2.61**	.06	.62
Customer Orientation	3.6	3.3	3.8	3.9	3.5	3.0	3.4	3.3	3.9	4.77***	.13	.79
Competitive Crisis	3.7	4.0	3.6	4.2	3.7	3.8	3.8	3.3	3.2	6.67***	.18	.85
Decentralized Authority Structure	3.0	2.7	2.7	2.7	2.8	2.7	2.6	2.7	2.8	.52	N.A.	N.A.
Information System Quality	3.6	2.8	3.3	3.2	2.8	2.8	2.8	3.1	2.9	3.35**	.08	.70
Organization Controls & Rewards	3.7	2.7	3.6	3.8	3.2	2.5	2.1	2.9	3.0	13.28***	.32	.92
Progress Reporting Requirements	3.4	2.7	3.2	3.3	2.8	2.8	2.2	2.8	3.0	5.14***	.14	.81
Reward System	3.5	2.7	3.4	3.5	3.0	2.6	2.1	2.9	3.0	11.54***	.29	.91
Resource Availability	3.6	2.5	3.3	3.4	3.3	2.7	2.2	3.0	3.4	6.54***	.18	.85
										Mean	.16	.79
										Median	.14	.81

[a] N = 231
[b] Intraclass coefficients were computed only where the F is statistically significant ($p < .05$).
[c] ICC-2 coefficients were computed based upon average sample size, N = 26.
* $p < .05$, ** $p < .01$, *** $p < .001$

Due to this nonsignificant ANOVA result, intraclass coefficients were not calculated for this variable.

Intraclass Correlation Coefficients: Table 4 provides F statistics, the intraclass coefficients (ICC-1) (Shrout & Fleiss, 1979), and the Spearman-Brown estimates of reliability for aggregated mean scores(ICC-2) (Bartko, 1976; James, 1982).

The ICC-1 estimates ranged from .05 to .32, with a mean of .16 and median .14. Although these appear low, we believe they are adequate for two reasons. First, the literature reveals that estimates of this kind typically range from .00 to .50, with a median of .12 (James, 1982). Second, the ICC-1 provides a point estimate of interrater reliability, which might be technically interpreted as the reliability of a single rating or measurement (James, 1982). As an estimate of agreement, these ICC-1 reliability estimates indicate that if ratings from only one individual in the organization were used to assess the organization on each of the variables, the results might differ significantly than if ratings were taken from another randomly selected individual.

However, since we advocate aggregating the individual scores to obtain a mean score to assess the organization, the ICC-1 reliability estimates do not indicate the reliability of the instrument as it will be used. As mentioned, the one-way ANOVAs demonstrated that organizations may be differentiated in terms of means. So, despite the low ICC-1 estimates, the agreement seems sufficient to yield small within-organization variance relative to between-organization variance (table 4); thus, differentiating organizations.

In use, the individual scores will be aggregated to provide mean estimates on each variable for an organization. Since the nine organization sites averaged 26 participants, n = 26 was used to estimate the reliability of the means (ICC-2) with an application of the Spearman-Brown prophecy formula (James, 1992). The logic behind the computation of ICC-2 is that "mean perception per organization contains less error variance (i.e., is more reliable) than the perception of a single rater" (James, 1982). The values of ICC-2 (see table 4), which estimate mean stability, reflect that the mean scores across individuals are more reliable than individual point estimates. The estimates range from .56 to .92, with a mean of .79 and median and .81. A larger sample would have produced higher ICC-2 estimates and even more stable mean scores.

In summary, the results suggest that the item groupings are internally consistent and conceptually distinct. The only exceptions were two three-item groupings which were reasonably combined into one six-item grouping. The resulting composite variables, obtained through unit summing of item responses, are useful in differentiating organizations on mean responses. These mean responses, averaged across individuals within an organization, are also fairly reliable.

Discussion

The purpose of this research was to develop and test a set of measures to assess progress in Total Quality Management. Based on the analysis of literature on the topic, a set of thirteen variables was derived and eleven survived the tests of psychometric quality. This set of variables was consistent with a systems view of organizations which suggests that individual, organizational culture, and organization structure and control variables are interdependent. It is not simply quality circles, training in statistical process control, or any single program or intervention which brings about improvement in customer value. Rather, many interrelated aspects of an organization must change in concert.

Total Quality Management requires that managers emphasize their role in systems improvement. Changes in organizational structure and controls are also necessary to motivate managers to perform these demanding new roles. Thus, progress reporting and reward systems are required. In addition, managers need to have organizational constraints lifted, which requires decentralized authority systems, resource availability, and effective information systems. Lastly, the organization culture must encourage cross-functional communication, readiness to change, and close customer relations. The only doubtful variable is whether some sense of threat or crisis is a valid measure of progress (further discussion will follow). With that one exception, this instrument will be a highly useful measure of progress in value creating management.

It is not simply quality circles, training in statistical process control, or any single program or intervention which brings about improvement in customer value. Rather, many interrelated aspects of an organization must change in concert.

Reliability of the Measures

Increased reliability of measurement does not automatically result from multiple measures. Thus, it was important to confirm that the grouping of items did increase reliability. The factor analysis indicated which items were related. Only two items, other than the three experimental items measuring intrinsic motivation, failed to load with their respective item groupings: one item in the Resource Availability grouping. While the factor analysis indicated that the items within each of the groupings were interrelated, the extent to which these items were interrelated was indicated by the estimates of internal consistency. The coefficient alphas for the item groupings were generally higher than alphas reported elsewhere in survey instrument development literature (Jones & James, 1979), which justifies summing of scores on the individual items into one composite score to represent each variable.

Distinctiveness of the Measures

In order to assess each aspect of an organization with a survey instrument, the various items must uniquely measure the variable intended. Although there will be some intercorrelation among the variables, and among items from different groupings, in general, scores on the items which measure the same variable should be more highly related than scores on items which measure different variables. The results of the factor analysis confirmed that, in general, the items representing each variable are more highly related to the items within their grouping than to other item groupings. There were exceptions to this general result. The exceptions include the aforementioned one item in the Role Perception — Knowledge Development grouping and one item in the Resource Availability grouping. Additionally, two item groupings loaded on the same factor, i.e., the three-item groupings for the Progress Reporting Requirements variable and the Reward System variable.

Although the Progress Reporting Requirements and the Reward System groupings are conceptually distinct and each internally consistent, empirically they appear to measure a single variable. One explanation is that these six items measure the same concept. Perhaps, though, Progress Reporting and Rewards go hand-in-hand in organizations. Then, an explanation for this common loading might be that those organizations who are seen as requiring progress reporting correspondingly reward managers based upon reported progress. In using the survey, the six items may be summed into one composite variable, labeled Organization Controls and Rewards, or summed into separate three-item composites. Due to the high internal consistency among the six items and their common factor loading, one would expect the separate three-item composite scores to be quite similar. Other than the similarly of the Progress Reporting Requirements variable and the Reward System variable, the other variables appear to provide relatively distinct assessment.

Differentiating Organizations

For a survey instrument to be useful, the data gathered from diverse individuals must be meaningfully aggregated and interpretable. Since perception of work environment often differs across roles and organizational positions (Adams, Laker, & Hulin, 1977; Payne & Mansfield, 1973), aggregation of survey data must be justified by demonstrating that the survey instrument yields responses sufficiently similar within an organization, across diverse participants. The participants involved in the development of this instrument were diverse in many ways (see table 1). Ideally the survey instrument should produce responses which are more similar for diverse individuals within the same organization than for the same type of individual in a different organization.

The results of the ANOVAs demonstrate that the survey produced individual composite scores which were sufficiently similar within an organization to justify aggregating the scores across individuals within an organization. This aggregation produces reliable mean scores for each composite variable within an organization, which is reflected in the intraclass coefficients for the mean scores. These results indicate that the instrument should produce sufficiently reliable point estimates to represent the common experience of the participants and to differentiate organizations in terms of the composite variables.

The ANOVA results are impressive given that the organization sites represented in the ANOVAs are likely to exhibit restriction of range on the mean scores. Examination of the profile of scores (see table 4) for each of the 9 organization sites reflects that only 1 out of 117 rounded above 4.0 on the 1 to 5 scale. None of the mean scores rounded below 2.0 on the 1 to 5 scale. These organizations have only recently initiated education and intervention programs. Although significant mean differences were anticipated these differences were not as pronounced as they would have been if other organizations which had been involved in education and intervention for a longer period of time had been included in the sample. The comparative difference between " more

mature" organizations and "neophytes" would have increased the mean squares between organizations, thus further increasing the F statistics and both the intraclass estimates. In light of this restriction of range, these results are quite satisfactory. Aggregation of data in organizational assessment seems justified.

Use in Further Research

The survey instrument has been shown to provide reliable measures which can be used to differentiate organizations in terms of variables related to progress in Total Quality Management. Additional research is needed to determine if this set of variables is related to improvement in competitive capability in organizations. As many authorities on organizational change suggest, this will require longitudinal research designs of several years duration (e.g., Kilmann, 1984). The survey instrument should be used in a variety of organizational settings on a longitudinal basis with concurrent measurement of outcome variables. Practical applications include diagnostic and baselining activities which may accompany organizational interventions or change efforts. The survey instrument set forth in this paper was developed by collecting data from demographically diverse participants. The questionnaire seems to be usable throughout various levels and areas of management in diverse industries. Additionally, the survey instrument differentiates organizations on mean responses summed across individual composite scores, and should prove useful in reliable baselining TQM progress over time.

In assessing change over time, one must be sensitive to certain measurement issues. The most pertinent, in the case of perceptual measures, is the likelihood of a cognitive change or frame of reference change which might contaminate the interpretation of survey results. There exists the possibility of a mean difference because of time of data collection. Over time individuals may adjust their evaluation of their organization simply because of a change in their own understanding or frame of reference, i.e., a cognitive shift. One might consider comparing pre-measures to post- and then-measures to check for cognitive shift (Armenakis & Zmud, 1979, for further discussion).

It is expected that an organization (as a system of interrelated parts) that is progressing in one aspect of TQM would be progressing on other aspects, as indicated by scores on the composite variables. This expectation seems to be supported by the preponderance of significant correlations among the composite variables. However, one of the results presented in table 3 calls into question this expectation: the composite variable labelled Competitive Crisis uniquely fails to positively relate to the other composite variables. This result means the interpretation of scores on Competitive Crisis must be done in light of specific circumstances, e.g., where the organization is in the life cycle of managing for customer value. High scores on this variable are related to the perceived need to engage in TQM, while low crisis perception might reveal denial and complacency in the early stages. Low crisis perception in later stages might reveal success in increasing competitive advantage, which was brought about by TQM. Crisis perception may spike initially, with consciousness about increasing organizational competitiveness, and plateau or decline over time. Alternatively, it may be that those organizations which maintain a sense of crisis are better at sustaining a focus on customer value. Thus, scores on this Crisis variable must be interpreted with caution.

The survey instrument must be considered as being under continued development. In the future, additional items may be developed for each composite to ensure reliable measurement for smaller sample sizes, e.g., less than twenty. In the interest of parsimony, only three or four items were used to measure each aspect, meaning a tradeoff in the reduced reliability of the corresponding composite scores. Since the results of the survey are aggregated across individuals to provide a mean score which is more reliable than a point estimate from one individual, the use of three or four internally consistent items of each composite provides reliable measurement with larger sample sizes. Increasing the number of participants in a survey will correspondingly increase the reliability of the organizational assessment with mean scores.

Conclusion

Total Quality Management (TQM) will require managers to change organizational systems, procedures, policies, practices, personnel, equipment, facilities, technologies, etc., to improve the long term competitiveness of the business. This change in managerial behavior must be both demanded and supported by organizational structures and cultures. Given the systemic nature of organizations, such managerial behavior is more likely to meet with success to the extent that the various parts are harmonious and oriented toward this objective. Thus, it is important that leaders are aware of the state of the various structural and cultural variables, as well as individual competencies and role perceptions. To this end, the survey developed in our research should provide both

academicians and managers with an instrument for both initial examination and continuing assessment of their organization's progress in TQM.

Change in managerial behavior must be both demanded and supported by organizational structures and cultures.

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Building Corporate Culture for Transformation

Madhukar Shukla

This paper argues that competitive success in today's global market is determined not solely by a company's tangible assets such as plants and equipment, the strength of product-portfolio, etc. Rather, the competition revolves largely round the accumulation, nurturing and utilisation of the knowledge-based intangible resources. The paper also aims to establish that the organising principles of a competitively successful organisation in the present business environment are predominantly cultural, and are not solely determined by formal structural arrangements. Specifically, this paper attempts to answer the following three questions: Why is knowledge important to competitive success? How can one build a knowledge-based organisation? What are the implications of viewing organisations as systems for knowledge and learning?

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Support given by European Foundation for Management Development in preparation of this paper is gratefully acknowledged.

The changes in the economic policies in the recent past, and the corresponding liberalisation of economy have placed new competitive challenges before Indian firms. While opening up new opportunities for corporate expansion and growth for many firms, these changes have also created potent threats for survival for others. Faced with competition from financially and technologically strong multinational companies, Indian business is engaging in a diversity of strategic responses. These initiatives range from unrelated diversification to portfolio restructuring, from increasing the equity base to entering into strategic alliances, from downsizing/rightsizing to acquisitions and expansion of operations, from TQM to reengineering, and so on. Underlying these hectic activities is also a search for the correct recipe for competitive success in the face of global competition.

Knowledge as a Competitive Weapon

Experience of an increasing number of companies shows that long-term survival and competitive success are determined not so much by their financial muscle and size, but by the manner in which they consciously attempt to learn, create, codify, and utilise knowledge. According to Andersen Consulting Inc., the knowledge of how manufacturing goods are built and how they work accounts for 70 per cent of their development costs. In service businesses, the knowledge component of development cost may be as high as 90 per cent (Schwartz, 1992). It is not surprising that firms are increasingly becoming more aware of their "interllectual capital". Intellectual property rights (i.e., patents, copyrights, registered designs, trademarks, etc.) around the world run into businesses worth billions of dollars, ranging from the billions dollar claim by Apple Computers against Microsoft's application of Windows, to the Swiss chocolate company, Toblerone's legal battle to protect its

triangular chocolate design. It is estimated that "intellectual piracy" accounts for losses worth $10-12 billions for the software companies, and about $5-7 billions to the pharmaceuticals (Rice, 1991). The competitive value of knowledge can be appreciated through the following examples:

- World leaders like Nike and Reebok have prospered by concentrating solely on knowledge-based activities: designing and marketing high-tech, fashionable footwear for sports and fitness. Nike own one small factory that makes some sneaker parts. Reebock owns no plants. The two rivals out source virtually all footwear production to suppliers in Taiwan, South Korea, and other Asian countries, while focusing their efforts totally on activities such as market research, designing, marker planning, etc.. Both Nike and Reebock earned a return on assets of over 16 per cent in 1992, fifth and sixth best in the Fortune Service 500 (Tully, 1993).
- Invariably, the market leaders spend considerable portion of their revenues on research activities. to quote just a few examples, ABB spends $1.3 billions, which is about 7 per cent of its revenue, the chip-maker Intel plows back 15.4 per cent of its revenue in R&D; Hitachi's research budget is $4 billions; Motorola's R&D expenditure is $1.8 billion, or 19 per cent of its revenue; Siemens spends 10 per cent of its sales on research; Sony's research budget is $1.5 billions, which is 5.7 per cent of its revenue, and so on.
- When Toyota introduced its new version of an existing commercial van, its engineers spent more than six months riding through the streets of Tokyo with the present users of its vans. These engineers later were made the project managers for the new van, and their knowledge of the customer's needs helped them to develop a model which completely met the market requirements (Shaw & Perkin, 1992).
- Starting from 1987, AT&T sent out teams to do benchmarking studies to compare the rates of product introductions, length of product realisation cycles; value-price relationship, etc. This knowledge industry practices helped AT&T to reduce its product development process from 2 years to 12 months (Hanley, 1990).
- Competitive companies invest considerably in building and up-dating the knowledge-base of their employees. Training at Motorola, for instance, averages 36 hours per employee per year (the company calculates that it gains $30 for every dollar spent in training); at Federal Express, each of the 40,000 couriers spends an average of 27 hours every year on an interactive PC-based program which tests his or her job knowledge, and offers remedial actions and advice; at Corning, USA, employees log in about 92 hours per year on training, and so on (Henkoff, 1993).
- At American Airlines, three "knowledge engineers" spent one year studying how scheduling of routine aircraft maintenance is done. The combined knowledge of all aircraft-routing experts was translated into 5,000 rules of their expert-system program Moca, which now decides the best schedule for maintenance of the 600 odd aircrafts without disrupting the airlines schedule. The estimated annual saving is about $500,000 (Schwartz, 1992).

Long-term survive and competitive success are determined not so much by financial muscle and size, but by the manner in which they consciously learn, create, codify, and utilise knowledge.

These examples are a cross-section of the current business reality, and highlight a trend which is in the process of becoming more the rule than an exception. They also present new insight about the nature of the present competitive environment: that while the tangible assets (plant, machinery, capital) may be necessary for the enterprise to function, it is its knowledge based resources — its "invisible assets" (technological know how, customer information and trust, MIS, corporate culture, etc.) — which provide it with competitive edge (Itami, 1987). Such a concept of organisation also radically alters the basis of competition from how the firm manages its product-markets to how it utilises and develops its collective learning or core competencies (Prahalad & Hamel, 1990). Hamel (1991) noted: "Conceiving of the firm as a portfolio of core competencies and disciplines suggests that interfirm competition as opposed to inter-product competition, is essentially concerned with acquisition of skills. In this view global competitiveness is largely a function of a firm's pace, efficiency, and extent of knowledge accumulation."

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Building a Knowledge-Based Organisation

Thus, the distinctive processes characterising knowledge-based organisations would be those which facilitate learning and creation of new knowledge, and help the organisations to cope with environmental change and turbulence.

Conscious Cultivation of Instabilities

To do commerce with knowledge-based resources on a continuous basis calls for openness to the idea of continuous change and transformation. The firm must develop processes and mechanisms which do not let it settle down into an inertia, but instead, keep it in a perpetual state of "infreezing" (Lewin, 1947). Such a state of disequilibrium is essential for creating the degrees of freedom which the system requires for adapting itself to the turbulent environmental conditions (Gemmel & Smith, 1985). Instabilities and crises shake up people, force them to question the status quo, and to focus on the essential. One study of 40 companies (quoted in Dumaine, 1993) found that in each case, a major strategic and organisational change was preceded by some form of crisis. Nonaka (1988), in his study of self-renewing companies, also noted that crises create opportunities for growth and innovation:

> "In order that an organisation renew itself, it must keep itself in a non-equilibrium state at all times.... A crisis, of course, can mark the start of a company's demise. But, in general, some form of crisis is needed to generate an entirely new, innovative product concept or to abolish a company's existing patterns and replace them with a new order."

Thus, even though contradicting the traditional organisational wisdom, a knowledge based organisation must value "rocking the boat" as a more viable operating norm than maintaining stability.

Essentially, such cultivation of instability involves conscious simulation of organisational crisis. One of the most common ways in which companies, and their leaders, create such a sense of impending crisis is by implementing swift structural/strategic changes. For instance, during the 1980s, in ABB, British Airways, and General Electrics, major transformational processes started with massive shake-ups which involved downsizing, divestments and acquisitions, changes at the apex level, restructuring, etc. What made these actions a potent force for transforming the organisation was the speed which they were implemented. In British Airways, for instance, within a period of just one year, the board was reconstituted, 20,000 employees were retrenched, old aircrafts were sold off, services were withdrawn from unprofitable routes, new managerial talents were brought in at top levels, and so on (Business Week, 1989). The swiftness and magnitude of such actions serve to communicate the signals of change across the organisation, and prepare the people to align their expectations and actions with the change. Nadler (1988) termed this the "management of pain principle":

> "Successful long-term changes seem to be characterised by creation of a sense of urgency right to the limit of tolerance — just at the point where responses may start to become defensive."

Bureaucracy-busting however, is not the only way of shocking the organisation into awakening. The same purpose is often served by articulating a broad, equivocal and challenging vision for the organisation. Such visions promote knowledge-creation in the organisation in two ways: firstly, they amplify the discrepency between the present and desired levels of performance, and provide a direction to the problem-solving efforts in the organisation (Sheldon, 1980); and, secondly, they allow multiple interpretations, leading to divergence and dialogue in the organisation (Nonaka, 1988). For instance, General Electrics' vision to become a "boundaryless organisation", or Xerox's aim to become a "document company", provided these organisations the impetus to redefine their own ways of functioning. Similarly, for many firms corporate goals such as TQM, becoming a learning organisation, leveraging on core competencies, etc., become the vehicles for self-reflection, self-reassessment, and self-renewal.

A knowledge based organisation must value "rocking the boat" as a more viable operating norm than maintaining stability.

Lastly, many knowledge-based organisations create instabilities by consciously cultivating diversities and redundancies in their functioning. This can be achieved in many ways. Some firms, for example, recruit people with diverse experience, often unrelated to the firm's basic business. Such a practice helps injecting new perspectives in to the organisation, create polarities of views, and facilitate a process of questioning. For instance, recruitment ar Sony favours people with open-mind and wide range of interests, over specialists-experts (Schlender, 1992). Similarly, companies like Citicorp and Xerox have had a tradition of recruiting people at senior positions from as diverse a background as automobile, chemical, and processed-food industry.

Knowledge-based companies also create redundancies by adopting practices such as multiskilling, interfunctional job-rotation, double-reporting , cross-functional teams, use of multiple teams around the same project, etc. Such practices stimulate knowledge-creation activities within the organisation, because, as Nonaka (1991) observed:

> "... (they) encourage frequent dialogue and communication. This helps create a "common cognitive ground" among employees and thus facilitates the transfer of tacit knowledge... Redundancy also spreads new explicit knowledge through the organisation so that it can be internalised... when responsibilities are shared, information proliferates, and the organisation's ability to create and implement concepts is accelerated."

Self-reflection and Introspection

A knowledge-based organisation needs to not only learn integrate new knowledge; it must also have mechanisms to unlearn old and obsolete knowledge. As organisations grow and become stable, they also become more vulnerable to getting trapped in their past success patterns (Miller, 1992; Shukla, 1994). Organisations tend to programme their past successes by developing systems, routines and culture around them. These patterns often become so much embedded in the company's policies and practices that they go unnoticed, even when they have become obsolete. Detecting is made further difficult by the fact that they serve to protect individuals and groups from embarrassments, pain and conflicts which arise when confornting the errors in one's own reasoning (Shaw & Perkin, 1992).

Ability to self-reflect and introspect is a necessary precondition for breaking out from such success traps. Argyris and Schon (1978) described this process as "double loop learning" which occurs when members of an organisation:

> "...reflect on and enquire into previous episodes of organisational learning, or failure to learn. They discover what they did that facilitated or inhibited learning, they invent new strategies for learning, they produce these strategies, and they evaluate and generalise what they produced."

Garvin (1993) in his study found that learning organisations create appropriate forums and mechanisms to tap and share their learning from past experience. For instance, they set up task forces to prepare reports on "lessons learned" from previous successful and unsuccessful experiences, do post-project appraisals, document case studies, share and disseminate these findings across the company, and so on.

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One of the popular methods used by companies to stimulate such processes of reflection and self-critiquing is the use of feedback. In fact, most OD (Organisational development) techniques rely exclusively on the use of internal survey feedback methodology (French & Bell, 1991). One example of the use of this method is the changes implemented in British Petroleum (BP) in the last few years. In 1989-90, BP initiated "Project 1990", survey to evaluate the company's employees, review current operations, and generate recommendations for enhancing the effectiveness of the firm (Butler, 1990). Headed by a team of high-flier middle managers, it painted a candid portrait of BP as an overcontrolled organisation, with a lack of clarity of goals and vision not being shared even at senior levels. This self-feedback led to radical transformations, including a focus on culture change, a massive communication program to make people aware of the company's core values, and a restructuring of BP's operations.

Another valuable function served by company-wide self-reflection and idea sharing is the enhancement of the organisation's ability to self-monitor itself. Corporate introspection creates the capacity within the organisation to

question its operations, to assess their appropriateness in the given context, and to adjust its actions accordingly (Morgan & Remirez, 1983). Asea Brown Boveri (ABB), for instance, has institutionalised such a process in its systems (Jaylor, 1991). The performance of all its business units, on different indices (e.g., failure rates, throughput time, financial), etc.) are computed, ranked and made public every month. This system not only boosts internal competition, but also encourages individual units to interact with others to discover new ways of working. To further this process of mutual learning, each of the 70 odd business areas organise meetings of functional managers from local companies around the world. The aim of these meetings is to bring managers together to exchange information, ideas and solutions with each other, and to learn from each others' experience.

Openness to External Information Sources

One distinctive feature of knowledge-based organisations is the permeability of their boundaries which allows then to accept and leverage on information sources existing outside the company. Such firms operate on the assumption that the innovative attitude of the firm reflects both in its capacity to conceive new ideas, as well as in its ability to leverage on ideas existing in the external environment. These firms actively scan their environments, pick up ideas, and take risk and initiative to implement them. Utterback (1974) in his study of 157 successful innovations in US firms, found that 98 of these were based on ideas picked up from outside the company. After all, in offering Pan Pizza which accounts for a $500 million business), Pepsico's pizza Hut merely exploited an idea which it had borrowed from the local competing pizzarias in Chicago (Pearson, 1989). Similarly, Xerox was able to achieve a turnaround by benchmarking good management practices from even those companies which were outside the photocopier industry, e.g., American Express for billing and collection, American Hospital Supply for automated inventory control, LL Bean for distribution, warehousing, and order-taking (Walker, 1992).

Innovative firms also systematically use their customers and suppliers to gain useful information about their own offerings, functioning and service, and use it as a stimulus for creative efforts. British Airways, for instance, conducts some 150,000 interviews with its customers every year (Horovitz & Panak, 1992). In addition, it also uses focus group discussions, conducts ongoing dialogues with its regular passengers, and systematically analyses complaints and suggestions to identify trends and ideas. This information is disseminated and shared across the organisation, often resulting in ideas for new services. Similarly, General Electric worked with their customer BMW to innovate the first car-body panel made of thermoplastics for their Z1 two-seater.

Such interaction with external stakeholders also helps the firm in gaining useful information about competitors' strengths and weaknesses. For instance, every year Whirpool, the domestic appliance company, surveys 180,000 households to get the customers' assessment of their own as well as their competitors' products. If a competitor's product gets a better ranking, Whirpool engineers rip it apart and do reverse-engineering to find out why, and to build these features in their future design (Solo, 1991). Likewise, Compaq Computer acquired knowledge about its largest competitor, IBM, by collaborating with common suppliers and bringing out a new IBM-compatible PC in the market even before IBM was able to do so (Wissema & Euser, 1991).

Another source for learning and innovation exploited by knowledge-based firms is through strategic alliances and "competitive collaboration."

Another source for learning and innovation exploited by knowledge-based firms is through strategic alliances and collaborations. Systematic management of these "competitive collaboration" (Pucik, 1988; Hamel, 1991) help these firms in gaining access to critical competitive information, and in building new competencies. Hamel, Doz, and Prahalad (1989), in their study of 15 strategic alliances between Japanese and American firms noted that the Japanese companies gained far more from these collaborations than their American counterparts. This was so because they carefully planned and executed a strategy to acquire their partner's knowledge assets. For instance, in many Japanese companies the collaboration managers would regularly contact all the employees involved in the alliances, collect information and pass it on to the appropriate departments. In some others, regular meetings were held where employees shared new knowledge and decided who was positioned to acquire additional information. The researchers concluded:

> "Successful companies view each alliance as a window on their partners' broad capabilities. They use the alliance to build skills in areas outside the formal

agreement and systematically diffuse new knowledge throughout the organisation.

Empowerment & Experimentation

In any organisation, relevant knowledge is neither uniformly distributed, nor is it always readily accessible to decision makers. This is so, not only because information gets distorted and suppressed while traversing hierarchial and functional boundaries, but also because the increasing environmental complexity and change create information-overload for firms to cope up with. As Senge (1990) noted:

> "It is no longer sufficient to have one person learning for the organisation... It's just not possible any longer to "figure it out" from the top."

It is only natural, for instance, that the firstline salesperson may have a more intimate knowledge of the customers' requirement or the shopfloor worker may have a better insight onto the reasons for high rejection-rates than the superiors. To exploit this knowledge, it is necessary to build up a participative-democratic setting in which people lower in the hierarchy are empowered to share information, learn from each other, and to take and implement necessary decisions (Emery & Emery, 1978; William, 1982).

To exploit knowledge, it is necessary to build up a participative-democratic setting in which people lower in the hierarchy are empowered to implement necessary decisions.

One way in which organisations practise this empowerment of lower levels is through the formation of self-managing teams. Such teams share three features (Simmon & Blitzman, 1986; Nonaka, 1988):

- They are autonomous in that they decide on many operational decisions, such as goal-setting, planning, monitoring performance, hiring, peer appraisal, etc;
- They are responsible for achieving their performance goals regarding costs and profits; and,
- They are multi-disciplinary so as to achieve synergy through cross-fertilisation of ideas among members.

A recent survey (Khanna, 1994) found that many Indian organisations (e.g., Modi Xerox, Telco, Ranbaxy, Voltas, etc.) have started organising their work around multi-functional and cross-hierarchical teams. Often, these teams, which consist of 6-12 persons, are completely responsible for a well-defined segment of finished work, and have the authority of taking decisions which in traditional structures would have been the prerogative of the managers.

The empowerment strategy also influences and moulds the formal structures of the organisation. It reduces the number of hierarchical levels, create more autonomous business units, and decreases centralised controls. Once having delegated responsibilities down the line, organisations do not require a multi-lavered centralised system to regulate and monitor performance. The 1,300 companies of ABB worldwide, for instance, are organised as 5,000 profit centres — some having as few as just 10 people — each an autonomous business unit with responsibility for its own profits and losses, and having control over decisions about issues such as launching products, design changes, altering production methods, etc.; there are no more than 5 levels between the top management executive committee and the shopfloor (Business Week, 1993). Similarly, Microsoft limits each of its business units to 200 persons to create flexibility, a greater sense of ownership, and synergy among the employees (Rebello & Schwartz, 1992).

Empowerment, however, is more than a mere creation of profit centres with operational freedom. Competitively successful organisations use many practices to innovate their members. One survey (Fortune, 1993), for instance, found that many successful organisations use "360-degree feedback", i.e., they have systems which allow upward evaluation of superiors by the subordinates. In fact, in 18 out of 32 organisations surveyed, the feedback was also used as an input for superiors' promotion and increments. Similarly, in General Electric, the system of "Work-Outs" (Pascale, 1990; Stewart, 1991) allow employees to carry out functions (e.g., identify and analyze unproductive work-related practices, develop new solutions, redefine the nature and flow of work, decide on the modes of implementation, etc.) which were managerial propogatives earlier. Such processes and mechanisms not only make empowerment an experienced reality for the employees, but also qualitatively redefine the nature of traditional hierarchical and functional relationships in the organisation.

Real empowerment also enables and encourages people to carry out knowledge functions on behalf of the

organisation. This may involve a variety of activities ranging from learning through customer-contacts to problem solving and product innovations. Xerox, for instance, trains and encourages its employees in using problem-solving techniques focusing on idea-generation, analysis, reaching consensus, and planning action, in their day-to-day activities (Garvin, 1993); many companies (e.g, 3M and Hwelett-Packard) encourage their employee to use 10-15% of their time on their own pet projects, and taking risk, experimenting and failing is a built-in cultural prerogative. Similarly, ABB practices the "7-3 formula", which means it is better to make swift decisions and be right seven out of ten times than to waste time unnecessarily in achieving perfection. This tolerance of failure encourages people to take legitimate risks and to learn from their mistakes without feeling defensive about it (Taylor, 1991).

Sometimes, in fact, innovative firms encourage its members and units to deliberately commit "mistakes" in order to learn from them. Citicorp's Credit Card division, for instance, periodically approves a few thousand applications at random without performing any detailed credit evaluation. Many of these, naturally, are bad risks, and default on payment. The bank lets these defaulters continue so that it can get a better statistical picture of how defaulters behave. This information is used by Citicorp in improving its credit scoring system considered to be one of the most sophisticated in the world to monitor its existing and future cardholders (Norton, 1987).

Innovative firms encourage its members to deliberately commit "mistakes" in order to learn from them.

Fostering "Knowledge-Connectivity"

While empowering and encouraging people to experiment helps organisations to increase the competence and expertise of its employees, it is equally important to diffuse this learning throughout the organisation so that it becomes a shared cognitive base for individual action (Garvin, 1993). "Knowledge connectivity" refers to this capability of the firm to connect the localised learnings to the rest of the organisation. Such processes, however, are not only limited to dissemination of ideas; rather, they bind the organisation in an interactive network of communication, allowing people to have access to each others' knowledge, to exchange views and ideas, and to interact with each other to develop new concepts (solutions, services, products, etc.), on a regular, and, as far as possible, on a real-time basis.

It is important to diffuse learning throughout the organisation so that it becomes a shared cognitive base for individual action.

There are three reasons for organisations to foster knowledge-connectivity. Firstly, in an organisation, knowledge and expertise is power, and power differentials can block freedom and synergy. As Nonaka (1991) observed:

> "When information differentials exist, member of an organisation can no longer interact on equal terms, which hinders the search for different interpretations of new knowledge."

Secondly, systems of sharing information and expertise are normally not built into organisations. The flow of knowledge and information within organisations is often inhibited and distorted by departmental, hierarchical and group boundaries. Brown (1991) noted that innovative knowledge-based activity,

> "... goes on at all levels of a company — whenever employees confront problems, deal with unforeseen contingencies, or work their way around breakdowns in normal procedures. The problem is, few companies know how to learn from this local innovation and how to use it to improve their overall effectiveness."

For instance, the normally segmented functional structure inhibits the product designers from learning about a design-fault which the service engineers may be encountering almost everyday, or one unit of the organisation may be unaware of the innovative solutions developed and used by another unit. The learning often remains confined to specific group of people because there are no channels through which it can be shared with others.

Lastly, much of the knowledge which makes an individual, team or department effective is tacit, personalised and deeply embedded in the specific contexts of action (Badaracco, 1991; Nonaka, 1991), i.e., they know more than what they can articulate. Making this knowledge explicit requires more than just picking it off-the-shelf and publicising it. Studies (e.g, Brown &

Duguid, 1991) have shown that such tacit knowledge is more effectively communicated and up-dated through informal interpersonal processes (in the canteen, while working, through exchanging stories, etc.) than through formal meetings, training programmes, house journal, etc.. Tapping this hidden knowledge, and converting it into collective learning depends much on close, personalised interactions (Spender, 1992).

There are various ways in which organisations go about establishing this connectivity among its members. One of the most common methods employed by organisations is by creating forums where its members can exchange their learning on a regular basis. The Corporate Research group at Sony organises an annual 3-day exposition — open only to its employees — in which its hundreds of product teams (and lone entrepreneurs), scattered across its 23 business groups display what they are working on. The occasion, which is quite important in Sony (all members of top management visit each display), also helps the company to establish a rapport among its innovators, and to encourage cross-fertilisation of ideas (Schlender, 1992). Similarly, Citicorp (like ABB) organises internal conferences on specific subjects (e.g., credit cards, mortgage loans, corporate services, etc.) in which participants come from its various worldwide offices and share their experiences (Tichy & Charan, 1989)

A more sophisticated method to ensure exchange of ideas and their implementation, which is being increasingly used by organisations, is by redesigning the work itself. The essence of this approach is to completely "reengineer" (Hammer, 1990; Hammer & Champy, 1994) the work-processes, so that all relevant expertise is available at the point of work, where it is required (e.g., representatives of research, engineering, manufacturing and marketing sit together, and not sequentially, to create and launch a new product). Work is accomplished through autonomous multifunctional teams, which are organised around specific business processes and outcomes, and not around functional tasks (Hammer, 1990; Ross, 1990). This arrangement makes it possible to tackle work-related interfunctional problems in parallel and interactively, rather than sequentially. For instance, in 1989, Kodak reengineered its business processes, and organised its employees into multi-functional "Zebra teams" to manage the "flow". Each team is responsible for making items for a particular customer (internal or external), and being multifunctional, sorts out diverse functional, but overlapping, problems (related to design, production, marketing, etc.) at the very point where they arise (Stewart, 1992). Similarly, in GE's Puerto Rican arresters factory, the 172 hourly workers are organised in self-managed teams of about ten persons each. Each item "owns" part of the work (assembly, shipping, receiving, etc). Members of each team come from different parts of the plant, so that each group has representatives from both upstream and downstream operations. Moreover, since these workers have rotated through the plant's man work areas, they are aware of the interdependencies and interfaces between different phases of the total work process (Stewart, 1992).

Some of the recent advances in information-communication technology have made it even easier for organisations to establish knowledge-connectivity. Networking among terminals, group softwares, expert systems, neural networks, e-mail, etc., not only facilitate exchange of ideas among people both within and outside the organisation, but also help organisations to make more efficient use of its knowledge and expertise. The implications of an informationally wired-up organisations are diverse (Savage, 1992). These information systems affect the organisations in three ways. Firstly, the free-flow of information empowers people and so, changes the culture. For instance, Microsoft encourage its members to log in and share ideas and information across departmental and hierarchical boundaries. Besides keeping people aware about what is happening in other parts of the organisation, it also helps creating an equalitarian work-atmosphere in which an employee can directly communicate with the CEO, Bill Gates, without going through his/her superior (Rebello & Schwartz, 1992).

Secondly, the on-line communication and frequent exchange of ideas among employees builds up group synergies and reduces the decision making time through better use of information. Boeing, for instance, uses an interactive group software for conducting meetings. The company found that it helped in drastically reducing the decision-making time (in some cases, from seven weeks to two and a half days), and an average saving of $6,700 per meeting in terms of employee time (Kirkpatrick, 1992). Similarly, at HCL-HP (India), service engineers log in case histories of customer-problems solved by them in a group software. This database is available to any service engineer in any part of India, leading to reduction in solution time from three days to four hours (Lahiri, 1993).

Lastly, these systems help in creating a common reservoir of organisational knowledge and expertise,

On-line communication and frequent exchange of ideas builds up group synergies and reduces decision making time through better use of information.

Increasingly the corporations are changing from being mere centres of production to becoming places for thinking, learning and knowledge generation.

which is readily and commonly available for solving organisational problems. Advances in systems such as neural networks, expert systems, genetic algorithms, etc., make it possible for organisations to create intelligent problem-solving systems by pooling the best of all the relevant knowledge available in the organisation. American Express, for instance, uses an expert system which has helped it to speed up and sharpen its credit authorization process. Earlier the authorizer would consult 16 screens of data for each customer to approve a credit. The new system distils the knowledge of its best authorizers into a simple programme, with a better rate of safe credits (Light, 1992). Similarly, Shearman Lehman Brothers Inc. uses a neural network based system for forecasting market patterns. The system is based on a decade's historical data, and manages its own portfolio. Since the software can "learn" from its mistakes, it has been gradually improving its performance, and even started making profits after an initial learning period of two years (Schwartz, 1982).

Implications

The growing trend of using knowledge as a business asset (and not just as a resource) has significant implications for how one interprets the nature and function of the business firms. The fact that in 1986, the total R&D spendings of 50 top Japanese firms exceeded their capital expenditure (Kodama, 1992), or that in 1991, US companies spent more on computing and communication than on industrial, mining and construction machines (Stewart, 1994) necessitates rethinking the familiar notions about the nature of the firm, the role of management, the menaing of business success, etc. Evidence appears to suggest that increasingly the corporations are changing from being mere centres of production to becoming places for thinking, learning and knowledge generation. According to Badaracco (1991):

> "... Firms appear not as separate administrative, social and economic spheres, but as open, porous forms of organisations that learn, create, transmit, deploy, and control knowledge. They are, in essence, vast, complex repositories of embedded knowledge."

That is, the knowledge-based view of the organisation involves looking at organisations, not as mechanical or merely adaptive entitles, but as intelligent systems, which are capable of learning and incorporating new knowledge by scanning and interacting with their environment, and by reflecting on, analyzing, and reconceptualizing their own ways of working. This emerging alternative view of organisation as an embodiment of knowledge has three critical implications.

Firstly, the knowledge-based organisation calls for a redefinition of what constitute the managerial/organisational principles and practices. The traditional organisational principles were based on an assumption of environmental stability, in which control and predictability were crucial requirements for organisational effectiveness. Within such a paradigm, the definition of managerial activities in terms of planning, directing, unity of command, division of labour, span of control, etc., was relevant, and probably useful. The knowledge-based view of organisations, in contrast, emerges form a realisation that in the current discontinuously changing environment, it is no longer possible for organisations to succeed merely through applying old business methods, concepts and solutions; rather, to grow and service, organisations must continuously learn, evolve and innovate new knowledge and alternatives, Within this new perspective, the critical managerial/organisational activities must also revolve around and focus on building knowledge-resources of the organisation. The four such essential activities which would determine the effectiveness of firms as knowledge-based systems are described in table 1.

The second implication for firm flows from the nature of knowledge itself. Unlike the tangible assets, knowledge is not a static commodity. Its value and utility keeps on changing with time. In a fast-changing environment, it can also rapidly become obsolete. As Hedberg (1981) noted:

> "Knowledge grows, and simultaneously it becomes obsolete as reality changes. Understanding involves both learning new knowledge and discarding obsolete and misleading knowledge. The discarding

activity — unlearning — is as important a part of understanding as is adding new knowledge."

Table 1: Essential managerial & organisational activities in knowledge-based firms

1.	**Knowledge-Acquisition** This refers to those organisational and managerial activities which focus on acquiring new knowledge through scanning its strategic, market and technological environments. The knowledge-acquisition activities can be quite diverse in nature, ranging from customer surveys, technological collaborations to benchmarking of industry practices.
2.	**Knowledge-Generation** Unlike knowledge-acquisition activities, which focus outward, these activities would focus on exploiting organisation's internal talents and resources. These activities may involve structured formal mechanisms (e.g., research, product development) as well as somewhat informal unstructured processes (e.g., organisational surveys, suggestion schemes, brainstorming, etc.).
3.	**Knowledge-Codification** While many organisations acquire and generate new knowledge in the normal course of their activities (e.g., while solving customer's complaint or repairing a machine breakdown), this knowledge mostly remains with the concerned individual(s) and is lost over time. To become available to the whole organisation, and to be used across time, it must be codified. The form of codification may vary depending on the nature of new knowledge; it may be a new organisational system, a design change, changes in process features, definition of new market segment, or even a new patent or copyright.
4.	**Institutionalisation** Lastly, while the above activities are essential to knowledge-based organisation, it is equally, if not more, important that the firm also learns how to carry out these activities consciously on a continuous basis. Institutionalisation of knowledge-based activities would involve mechanisms and processes which help the organisation to regularly scrutinise and reformulate the manner in which it acquires, generates and codifies new knowledge.

Continuous adaptation and generation of new knowledge also implies a continuous process of change and flux. Creating and exploiting new knowledge about new markets, products and technologies also makes it necessary for the firms to continuously make corresponding internal changes — in the manner in which they structure their activities, in their control and coordinating mechanisms, in the way their members relate, report to and interact with each other, and so on. Thus, in sharp contrast to the traditional corporate prescription of achieving stability and predictability of operation, the knowledge-based perspective looks at organisations as inherently changing, self-transforming and self-renewing systems.

Lastly, if a critical task for the organisations is to continuously learn and update their knowledge-resources, they must be designed for such a task. This necessitates changing one's mental-model of the organisation as a task-based system to that of process-based system.

A critical task for the organisations is to continuously learn and update their knowledge-resources.

This is so because, as we noted earlier, a large proportion of relevant knowledge in a firm is tacit and intangible (Starbuck, Greve & Hedberg, 1978; Nonaka, 1991). This kind of knowledge resides in the experience-based skills and expertise of specific individuals, in the informal working norms of the group or team, or in the community-specific network of relationships, and can be articulated, influenced and transplanted only through informal means. Thus, the informal cultural processes, endemic to the firm, become the major carriers of knowledge. Correspondingly, organisational proficiency in institutionalising these processes becomes the critical determinant of its learning potential.

Moreover, the formal task-based systems focus primarily in *what* is to be learned, and create knowledge (in the form of systems, products, operating norms, etc.) which is static and resistant to renewing itself. A knowledge-based organisation, on the other hand, needs to focus less on what knowledge should be accumulated, and more on *how* learning can occur regularly, and at all levels in the organisation. This requires developing and facilitating processes which ensure uninhibited flow of ideas, new knowledge and learning in the organisation.

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Critical Choices in Restructuring of Firms — A European Approach

Andreas M. Hinterhuber

Restructuring of firms is a three pronged approach — coming from above, taken up by the lower eschelons and spreading throughout the organization. The author advocates creating a receptive window of the world i.e. cultivating the right perceptions to achieve success in this venture.

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Business studies is the desperate and hopeless attempt to define commonsense scientifically.

E.E. and A.M.H.

Any conference worth the name and any scientific paper purporting to discuss current and relevant problems must, these days, emphasize the fact that we live in a world which is constantly changing. It is difficult to estimate the extent of these changes. The only thing we know for certain is that a new era (Alvin Tofler talks of a New Wave) has dawned upon us with a violence which has destroyed and is destroying all the beliefs which, we have held dear.

Since change is a linear function of time, we cannot criticize the change mongers as the elapse of time is linear and in one direction. However, statements about change do nothing to extend our understanding. Rather, it seems more sensible to indicate those conditions in the environment which may be relevant for a firm and which move the firm in the direction of change — change which represents a process of adaptation of the firm to its environment. These environmental conditions also indicate the direction in which restructuring of the firm can take place.

Restructuring the Firm

"When we began to organize ourselves into groups, we wanted to reorganize ourselves. It was only later in my life that I was to learn that we counter every new situation with reorganization. And what a wonderful method reorganization can be for giving the illusion of progress, whilst in reality nothing but disorder, inefficiency and demoralization is achieved ".

Petronius Arbitor (210 B.C.)

Keen photographers know how much good equipment costs. Keen photographers also know, or should have learnt from experience, that excellent equipment does not automatically mean good pictures. Pictures taken with a good camera are of a good quality, but even the best camera cannot give pictures especially poetic, or evocative of nostalgia. A good camera cannot tell the user which pictures inspire action and which tend to induce a contemplative mood. For, an essential precondition for good pictures is human understanding and intellect.

Likewise, the discipline of Business Studies pursues the everyday concept of human common sense but will never be able to capture this concept in words. If we wish to observe changes in the organization, we are seeking to photograph the restructuring process in the firm. But only the hard facts are accessible to observation. One can, for example, easily determine how the incentive and motivation system changes, what organizational structures emerge, what planning and control systems are used, how scarce resources are allocated to different departments of the firm and what products and services the firm currently has to offer. An analysis of these factors can easily be had, *albeit*, at considerable expense, since this is an area where consultancy firms are especially active.

However, the factors which decide the success or otherwise of the restructuring of a firm are like the photographer's feeling and understanding — completely intangible.

In the final analysis, it can be summed up as the decision maker's view of the world. View of the world means how the decision makers perceive people, themselves and the value of life, time and work.

These windows of perception can be brought into line with reality. The choice of the window, through which we perceive our world is, therefore, the first (and most important) decision which we make (and should make) to ensure the success of the restructuring of a firm.

The Case of Case Studies

We cannot get into the same river twice.

Heraklit (500 B.C.)

Anyone who writes about the restructuring of firms is repeatedly asked to offer genuine examples to substantiate her claims. These requests are senseless; because absolutely nothing can be proved by means of a case study. The fact that one firm employed a certain set of measures to facilitate its restructuring can hardly mean that other enterprises will achieve similar results by employing similar methods. In the first place, the influencing factors differ from firm to firm. Secondly, it is precisely those factors which are, unfortunately, the least accessible to description which are among the most significant. These factors are: the level of commitment among the employees, the individual's 'window on the world' which determines which problems she will be capable of perceiving, a second set of problems which she will consciously ignore, as well as the window through which managers perceive their employees and motivate them. Only people who actually work in a firm can have even the remotest idea of the importance which these factors have in real life, as opposed to the importance attributed to them in the plethora of case studies.

Advocates of case study based teaching methods might well reply that case studies do not seek to prove anything, case studies serve only to illustrate theoretical concepts; in so doing, case studies, even without wishing to, testify to nothing else but the lack of clarity which characterize the style of their authors. Heraklit maintained around 2500 years ago, that one cannot get into the same river twice because, in the first place the river would have changed, and, in the second place, we ourselves would have changed. Managers will never have a problem to solve, which somebody else has already solved before them. People in leadership positions must constantly attempt to shape the future — the future for the firm, for employees and customers with all their wishes and dreams. Nobody can take on this task of shaping the future from the manager. In attempting to shape the future, leaders are thrown back on their own resources. Even a case study cannot be of much use.

People in leadership positions must constantly attempt to shape the future.

Case studies have also been termed *business fiction*. Basically, case studies are little more than fairy stories. In the discipline of Business Studies, there are very few golden rules or indisputable causal relationships. Instead, we find a considerable amount of chaos as far as the determination and application of theoretical principles is concerned. Entrepreneurial success is easy to explain. It is, however, more difficult to establish the underlying principles which lead to success and virtually impossible to imitate them.

The Case of Rolls Royce

This is the central principle of science. First one thinks of something which could be true, and then one checks to see whether it is really the case that it is true. And, generally speaking one finds that it is not the case that it is true.

Betrand Russel

Like some other firms, Rolls Royce had experienced golden times and lean years, Rolls Royce had also, and this is typical for many other firms, been through several periods of change, both in the firm's internal structure and its external environment. The oil crisis of 1973 seriously affected potential Rolls Royce customers and caused the firm's rising sales graph to plummet. However better times came for Rolls Royce with the economic recovery and with new models bearing the trade mark Rolls Royce and Bentley — such as the speedy Camargue. Dark clouds began to gather again in the year 1990. In 1980, 3333 cars could be sold world-wide. This was the highest turnover since the firm was founded in 1904 and represents a sales figures which remains unsurpassed even to the present day. However, in 1991, a mere 1768 cars were sold. This pitiable result was attributable to the fact that two of the most important markets, the United Kingdom and the United states, simultaneously collapsed.

The situation in Rolls Royce finished goods inventory store did not appear too positive because, although there was no shortage of good ideas for new models with which to stimulate demand, the company lacked the financial resources with which to put these new ideas into practice. The firm was in a crisis.

In such situations, the demand for restructuring usually becomes vociferous. Periods of crisis in an organization, or in the absence of genuine crisis, periods of artificially induced crisis are apt to promote change. This is true despite the fact that restructuring often merely cures the symptoms. The roots of most problems and the key to success generally lie much deeper in the organization. Now, a crisis generally helps to reveal and call into question all those procedures which have been done in a certain way in the past so that the argument, 'but that's the way we've always done things around here', fundamentally loses all force.

In the case of Rolls Royce, it is legitimate to talk of a resuscitation of the firm, since employees, managers and machines were all so selected as if the firm was facing the opportunity to begin again right from the word go.

The customer always occupies, the central place in the thinking of the firm. Rolls Royce sought after methods with which the company could gain-reliable information about the wishes of the customer. During the restructuring program, the 'Owner Satisfaction Program' was embarked upon. Two waves of questionnaires went round the world picking up data about the changing tastes of the well-heeled customers. The consistent use of 'greenfield' analyses revealed areas where the activities of the firm were unreasonably expensive and where 'Outsourcing' offered a cheaper solution. Such overly expensive activities included the production of certain parts or involved activities of the firm which were attracting overly high overhead costs.

All the employees, were introduced to the concept of 'Key Performance Indicators', by the end of 1991. From then on, 'Quality, Delivery and Cost', were to be everybody's business. Furthermore, departments which in the past had enjoyed a large degree of autonomy, were brought closer together. As 'the construction and production departments were, previously, not only physically separated, they also went in for a great deal of petty secrecy with the result a negative and paralysing atmosphere of empire building often prevailed.

Rolls Royce abandoned the functional structure for its activities and substituted this function system piece by piece by the so called, 'Zone Management'; all activities from the receipt of the order to customer complaint are now organised into 16 Zones. 10 Team leaders report to each Zone Manager. The team leaders are responsible for six to twelve workers. These team leaders also assist in the carrying out of tasks allocated to the workers who are subordinate to them. In this way the distance between worker and supervisor is reduced.

In the place of the 'universally detested inspectors' who did little else than find fault with other people's work with the benefit of hindsight, there are 'Auditors' from the teams themselves who evaluate the work of their colleagues as this work progresses. In this way the obstacles created by the tendency to empire building can be overcome, and problems can be recognised earlier. Zone-management also gives assemblers and engineers the opportunity for an open, prompt and honest exchange of opinions about problems which crop up.

The reduction of the layers of management in the Production department from 5 to 3 helped to speed up the internal communication and also helped to loosen up what had previously been a somewhat formal reporting procedure. There remains only the ZCAR. (Zone Con-

cern Action Report) which has, for example, enabled the Zone Crew to ensure that not a sound can be heard when one is sitting inside the vehicle.

Table 1: Faster, better, cheaper — Restructuring at Rolls Royce

1990	Elimination of three layers of management including foreman.
1991	'The factory within a factory', concept. Zone Managers are solely accountable for their actions.
1991	Appointment of 16 Zone Managers and 150 team leaders.
1991	Training for all, Decentralization into mini-factories for all Subsidiary Activities.
1992	Introduction of just-in-Time delivery system and Kanban.
1992	Selection of yardsticks of performance for all activities carried out within the firm.
1993	Establishment of internal customer-supplier relationships for the whole production process.

The vision of a Customer Driven Company (table 1) had taken hold even at Rolls Royce a company which for decades had been dominated by the rock-steady conviction that the customers should listen to Rolls Royce and not vice versa.

The 'Owner Focus Day', for example, was instrumental in the top speed of the almost three tonne heavy monster being increased. The day also demonstrated that not only conservative colours but also iridescent enamel can enhance the body of a Rolls Royce. These developments were attributable to the work of market analysts, who, incidentally also owe their jobs to Rolls Royce's recent shift to customer orientation. The market analysts determined that the average age of Rolls Royce drivers is less in some areas than in others. They also determined that different customers want different things.

The unions finally got wind of the new developments at Rolls Royce when the number of people in employment was reduced from 5200 to 2243. The sackings took place under the last in, first out principle, which is not always fair. Costs could be reduced by 55%, which reduced the break even point from 2600 cars to 1300 cars. This testifies to the success of the restructuring.

Thus at Rolls Royce the restructuring took place in the way in which those with the power to decide thought: a way of thinking which put the maximization of profit in the forefront was replaced by a different way of thinking — which paid the same amount of attention to customer service as to learning within the organization. The observer also notices that the direction of the restructuring was three pronged: The momentum of restructuring came from above, was taken up by the lower echelons and finally spread throughout the whole organisation.

A way of thinking which put the maximization of profit in the forefront was replaced by attention to customer service.

A new Restructuring Paradigm

'I can't believe that, 'said Alice, 'No'?, said the Queen sympathetically. 'Try again! Breathe indeeply, close your eyes' .... Alice laughed. 'I don't even need to try', she said, 'you can't believe something that is impossible.' 'You simply haven't practised in the right way, 'said the Queen.

Lewis Carrol, Alice in Wonderland.

The first and most important critical decision which a person makes, not just in connection with the restructuring of firms, is the choice of that person's view of the world. the way in which she seeks to see, experience and interpret the world.

We use this view of the world to formulate the criteria for decision making. In view of the importance of this view of the world, we should make an effort to express the framework which we use for making decisions as explicitly as possible. We should also be prepared to change our decision making framework. That is all well and good, but in which direction should we make the change?

The management should be constantly occupied with the task shaping the future both for themselves and for their organization to increase the value of the firm and the services it offers for the benefit of the relevant stakeholders.

This means:

- Increasing the value of the firm for its owners
- Increasing the value of the product for the customers
- Ensuring that the employees' worth in the organization increases.

Adopting this frame of reference as a hallmark in evaluating the restructuring of firms has certain implications: the classical uni-dimensional criteria for rationalizations must be extended. This old frame of reference influences managers to make decisions on the basis of

resulting profit or loss after interest. This frame of reference presupposes that the monetary payback resulting from certain activities is, basically, foreseeable. In a time when it is becoming ever more difficult even to estimate the extent of material resources, the yardstick which seeks to maximize those resources should receive less emphasis. Instead, the yardstick should be one which takes into account the generation of non-material resources and which evaluates decisions accordingly to how far they contribute to organizational learning.

The yardstick should reflect the generation of intangible assets. The same weight should be attached to this as is given to increasing the value of the enterprise for employees, customers and owners. Restructuring measures should be evaluated according to this multi-dimensional criteria.

It seems to be impossible to find a yardstick which would enable us to measure the following factors: organizational learning and the increased value of the firm for employees, customers and owners. It seems to be similarly impossible to rate these factors one against the other and to separate them one from another. In other words, it seems to be impossible to find a parameter which indicates the extent to which one can sacrifice higher order goals in order to attain several other lower order goal.

In all probability, it is not even necessary ever to find an answer to this question. Isn't it better not to give answers to certain questions?

The dead end into which modern science (including Business Studies) has driven seems, to no small extent to be attributable to the influence of Greek Rationalism. Greek Rationalism attempted to find an answer to every question, and avoided alternatives which were seemingly mutually exclusive. Furthermore, the mystic dimension of a problem had no value for Greek Rationalism.

The Question is the Answer! In the near and far East cultures which have not been influenced by Greek thought the possibility that a question may have several even mutually exclusive solutions is not ruled out.

If, therefore, no answer can be found to a question then, the procedure must be as follows. The insolubility of the question must be the starting point. From this starting point new questions must repeatedly be asked. Through a process of constantly going back to the initial question the different dimensions of the problem can be straightened out. In this way, we come a little nearer to a solution which will be one of infinitely many.

Through a process of constantly going back to the initial question the different dimensions of the problem can be straightened out.

In other words, there is no value in simplifying a problem. Such a simplification may exclude certain solutions ab initio. It seems to be more advantageous, on the other hand, to work through the complexity of a problem and to leave the finding of a solution to those most affected by it. This approach is advantageous for problems in general and for questions pertaining to the restructuring of firms in particular.

Restructuring Guidelines for Managers

> *But people ask discoverers to offer proof. If the explorer, for example, discovers a large mountain, then people ask her to bring back large stones from the mountain.*
>
> Antoine de Saint-Exupéry.

Restructuring means fundamental changes in the life of an organization. Not all those affected perceive the aim of a restructuring as clearly as the decision makers might expect. Not all those people affected by a restructuring agree with the necessary changes.

Decision makers need ideas, ideas which characterize a successful restructuring. They need these ideas to mobilize energy throughout the firm, to overcome obstacles and to transform those goals which are an essential part of the restructuring into challenging aims for as many as possible of those will be affected by them. Those affected can then attempt to achieve the goals with motivation and creativity. Some of the ideas which decision makers may need are as follows:

- Overcoming Organizational 'Hybris'
- Creating receptivity to change
- Overcoming Obstacles.

Decision makers need ideas to mobilize energy throughout the firm, to overcome obstacles and to transform goals into challenging aims.

Successful restructuring of the firm occurs when:

- There is an increase in the value of the firm
- The value of the firm's products increases
- The value of being employed in the organisation increases.

Even if the model reminds us of E. Schrein's 'Unfreezing, Changing, Refreezing', it is not to be taken lightly.

All enterprises develop certain expectations about 'how the world functions'. These expectations are then consolidated when the first successes occur. The firm believes that it has learnt how to sell products, how to satisfy employees. And how to achieve high levels of profitability. The moments in time when the firm establishes a fixed approach to certain issues are, apart from crises in the firm, the most dangerous in its life: Not infrequently does it occur that products and services which enjoy pioneering success in the market are the harbingers of ultimate failure.

Icarus thought that he had learnt to fly too until he was forced to accept a harsh lesson from the merciless rays of the sun.

Successful moments are dangerous because at these times a point is suddenly reached during which everybody seems to be satisfied and when nothing is called into question any more. It is at these times that people believe that they are just a little bit cleverer that the rest.

And Icarus burnt his wings in the rays of the sun and died a horrible death.

Managers must have good reasons if they are to transmit a spirit of dynamism to a lethargic and over confident organization. Without these good reasons it will hardly be possible to implement the process of restructuring in the firm.

In many cases, for example, even a medium-sized crisis in the firm is able to transmit a more audible and effective message than many managers. Experience seems to show, however, that in many of these cases, neither time, money or experience were available in sufficient quantities to avert a downturn in the firm's fortunes. Apart from everything else restructuring is not always the solution to the problem.

Creating receptivity to change

The greater the state of disatisfaction with the present state of affairs, the greater the ease with which this familiar status quo will be given up. The greater also will be the enthusiasm for the unfamiliar as opposed to the familiar status quo. Creating receptivity to change means, therefore, spreading dissatisfaction with the present status quo with the aim of moving the thinking of thise persons who will be most affected by change, in the direction of change.

It is not easy to create a feeling of dissatisfaction with the status quo and instil a desire for something new simultaneously. All too often, dissatisfaction with the status quo inspires people to nothing more than mere resignation. Anyone who has ever tried to give up an everyday habit such as smoking will know how difficult it can be. One should try the following:

Facilitate the process of change through pressure

If there is a widespread vague feeling that, 'We can't go on like this', then, it should prove easier to justify and implement the restructuring of the enterprise. Pressure can come in the first instance from the outside environment. Competition may be hotting up, or other market conditions may indicate that, 'the times are changing.' Pressure can equally well come from within the firm if the quality, cost or delivery times of the product are just not right. In practice, pressure from within the organization and pressure from the outside environment are usually mutually reinforcing, as was the case in the case study which we considered.

Indicate the gap between where the organisation is and where it should be

People will be more prepared to give up the present status quo if they have before them a picture of where the organization is going to. This will contribute an increased awareness. This presupposes, basically, that all the decision makers in an organization know what is the current state of their enterprise. Furthermore, a constant stream of feedback to managers is necessary.

Instil positive expectations about the restructuring

Expectations have the mysterious quality that they usually fulfil themselves. There appears, therefore, to be no surer recipe for the success of the restructuring of a firm than to inject postive expectations about the restructuring into the firm from all sides and then to simply wait. In reality, this fact may most probably be explained if we remember that (not only in the case of restructuring of firms) positive expectations occur when success seems guaranteed.

For the success of restructuring inject postive expectations from all sides and then simply wait.

Overcoming Obstacles

The restructuring of firms usually mean a series of insecurity for the members of the organization concerned. These insecurities usually comprise — a feeling of insecurity about one's future place in the social nexus; feelings of anxiety about the new professional role since changes in a person's professional role are most likely to accompany restructuring of the firm and people often worry about whether they are qualified for the new position or not. People also worry about whether what they have to contribute will be of value to the newly restructured organization.

The fact that for many people the change represents a risk rather than an opportunity is something which we can really do very little about. The following possibilities are available to make explicit the fear associated with restructuring and to at least make a start at reducing this fear.

Managers can learn to feel themselves into the position of those affected by restructuring.

Those parts of the enterprise which perceive the change as being particularly threatening can be identified through a process of ceonversation and active listening. In addition these conversations offer the opportunity for managers to change the direction of things, should certain specific problems not have been thought through or insufficienly worked through. A further process of active listening seems to be the best means of revealing possble weak spots in the restructuring and of marshalling support in the entire organization so that these weaknesses may be overcome.

Open communication helps to lay to rest irrational worry or anxiety generated merely by speculation.

Direct participation of those concerned is the best-tried and oldest method of converting opposition into active support for change. Direct participation, on the one hand helps to reveal genuine problems which may affect the progress of restructuring. On the other hand, it facilitates, quite fundamentally, the implementation of proposed measures.

Those people who are directly concerned can best express their personal fears and indicate possible weak points in the restructuring plan; the firm will be that much nearer to its aim of restructuring when people at the grass roots level are given the opportunity to share in the organization of certain processes, and products and even the organization of work. The firm will be nearer to its aim of restructuring when the enthusiasm of the employees has been won.

Creating a Vision

Vision determines the direction of restructuring. In general, it is the task of management to develop a vision and propagate it. The company vision should ensure that the necessity for change is understood and serve to harness the support of the most important decision makers in the firm.

The company's vision should engender an idea or dream in the decision makers. This idea should motivate them to adopt a certain orientation as soon as possible, At the same time, the vision should be so motivating that those people who are affected by it, seek out paths which are consistent with this orientation.

Motivation and creativity can be released in every individual. A feeling of loyalty develops between the employee and the firm, and, more importantly, a feeling of mutual trust is built up. This feeling of mutual trust determines that each individual contributes to the process of change and will be confident that the path selected is the best one for everybody.

Increasing the value of the product for the customer means offering the customer a product which is clearly superior to any other. The needs of the customer serve as the yardstick with which to evaluate the superiority of a product. It is in this area that Porter's model of Cost Leadership and Differentiation most easily lends itself to refinement. Every product and service possesses an almost infinite number of characteristics. These are: price, design/appearance, delivery time/how soon the goods can be shipped, how the customer experiences the product, degree of novelty, effect on the environment, the extent to which the product satisfies the need for status, the extent to which the product leads to personal fulfilment and the extent to which the product protects the customer's health and safety etc. According to the supplier and the product supplied, differing emphasis is placed on the product characteristics. The firm which offers its customers the greatest value for a certain sum of money and achieves the best match between product

characteristics and customer needs will have the greatest competitive advantage in the market.

(Too) much has already been said about increasing the value of the firm for the owner(s): What is required is to increase in the long term the amount available for distribution as dividend after interest which can then be paid to the owners of the firm. These payments, on the one hand, serve to reward the owners of the firm for the risk they bear as owners of capital. On the other hand, payments of dividend help guard against the threat of hostile takeovers from the outset. A vision which orientes itself towards an increase in the value of the firm in the long term for employees, customers and owners, and which succeeds in inspiring the most important decision makers represents an important step towards a successful restructuring of the firm.

Holistic Approach

A holistic approach to the restructuring of the firm will simultaneously consist of three guidelines for organisational change.

Change from above.
Change from 'below'.

New skills must be learnt traditional ways of-behaviour must be discarded in order to increase the value of the firm for customers, employees and owners on one's own initiative. This can mean an increase in the use of team work, a reorganization of specific functions in the firm, the consistent implementation of benchmarking and the setting of new goals within the firm. It seems to be important that the lower echelons of the firm understand that there is a strong connection between the employees' standard of living and the success or otherwise of the firm. It should also be realised that restructuring strengthens this connection.

Change throughout the organisation

A lot of firms, today, compensate according to performance. Results achieved, are measured against preset goals; we cannot expect this system to change in the near future. Edwards Deming was the first and the most well-known authority to suggest compensating people according to the efforts they put in.

Furthermore, the organization must learn to come to terms with increasing insecurity. If the decision criterium suddenly becomes indeterminate, if not tangible achivements but effort is rewarded. Then insecurity and uncertainty are introduced in the life of a firm. This insecurity will certainly not become less in an environment of rapid change such as the contemporary environment, which according to many is characterized by a rapid shift in the factors which affect the firm. The firm must live with the fact that in the future, in all probability fewer activities will be plannable. People will adopt a method of procedure which we may call incrementalism. Using incrementalism, people will approach the solution to a problem step by step and sift out the optimal solution from one of many solutions.

Employees should be able to and be allowed to carry out those tasks for which the relevant managers are insufficiently qualified.

However, in an organizational environment in which mistakes are allowed and in which learning is promoted, we shall probably see a new type of insecurity — an insecurity which releases human talents and abilities.

Colleagues and employees should be able to and be allowed to carry out those tasks for which the relevant managers are insufficiently qualified. Just as in an ideal partnership the two partners complement each other (and in a mystical way become one), so managers within an enterprise can complement each other perfectly. This will occur when everyone carries out the task or is allowed to carry out the task which she/he is best able to carry out.

Learning to see the world through other's eyes seems to be important in all situations, in which people are affected by events which they could not have influenced (and unfortunately did not always want). Successful managers are, above all, also 'good people' who understand other people and want to listen to them. Successful managers will have acquired a finely developed sense which will enable them to appreciate the fears and wishes of other people.

Creating the Future

Then a master spoke: Tell us about that which is taught. And he said: Nobody can teach you anything unless it is like sleeping seeds which germinate in the gleam of your discovery.

The master who walks in the shadow of the temple with his disciples, does not disseminate his wisdom. Rather, he projects his love and his belief.

If he is truly wise, then he will not invite you to enter the house of wisdom. He will accompany you up to the threshold of your thoughts. The astronomer can tell you how he understands the universe. However, he cannot impart his understanding to you. The musician can sing to you in the rhythms of the whole world. However, he cannot give you the ear that captures the rhythm nor the voice which is the echo of that rhythm.

And the person who occupies himself in science with numbers, she/he can show you the land of weights and units of measurement. However, he cannot lead you to this land.

For a man's understanding cannot lend its wings to another man.

Khalil Gibran, The Prophet

A prerequisite for the restructuring of firms is a change in the nature of the window through which managers see the world — a 'mental restructuring'. Everything else is of secondary importance at best. □

The Professor of Philosophy came to Nan-in.
Nan-in said:
I will prepare tea for you.
You look tired.
Wait a little, rest a little and have a cup of tea.
And Nan-in boiled the water and started preparing the tea.
But, he must have been watching the Professor.
Not only was the water boiling, the Professor was also boiling within.
And Nan-in poured tea into the cup.
The Professor came to be uneasy because he was continuously pouring tea, it was over-flowing.
Soon it would be going out on the floor. Then the Professor said: Stop !
What are you doing?
Are you mad?
And Nan-in said:
The same is the case with you.
You are so alert to observe and become aware that this cup is full and cannot hold anymore.
Why are you not so aware about yourself?
You are overflowing with opinions, philosophies, doctrines, scriptures.
Before coming to me you should have emptied your cup then I could pour something into it.
But I tell you, you have come to a more dangerous man.

Work Culture & Quality: An Initiative to Corporate Transformation

Ajit Singh

Promoting a conducive work culture in an organization entails a complete transformation in the existing framework. Such corporate changes can be initiated through total quality management, states the author. He elaborates on the role of ISO 9000 in shaping the work culture and concludes that strategic thinking, teamwork and commitment are the essentials for developing a positive work culture.

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Organizations are driven by value systems reflected in the managerial behaviour consistently. The work culture prevalent in an organization surfaces in the activities at different levels of organizational reality. The elements of culture influence the strategic planning process, and the behavioural outcomes such as productivity, quality and innovation. Broadly, it can be found that the presence of a given set of cultural attributes within an organization directly influences the overall performance. The validity of this statement becomes clear when the underlying mechanism regulating the relationship between specific cultural attributes and organizational performance is understood. Neither the senior management nor the people down the line can be held solely responsible for the performance of the organization. Something unknown drives the organization — and that is the concept variously described as work culture, organizational culture or corporate culture. A planned corporate change is needed when the members of the organization feel dissatisfied with the overall performance. That change can be initiated by an intervention or a set of interventions called quality intervention or in other words total quality management.

Cultural Change

The work culture has a tremendous influence on individual and collective commitment and entrepreneurship. Organizations can show ad-hoc improvements due to several influencing factors but the optimum remains unachievable because quite often, problems are left untraced to the root causes. If a transformation has to be initiated, it is imperative to promote a culture where people feel free to contribute their ideas.

Culture, therefore, represents the sum total of values, behaviours and norms of management which actually makes an organization tick. It may exist deep in the files,

rules and regulations set down by the founders of the organization. The scope and purpose may no longer demand them but unless change is initiated there is no progress. A style of management committed to performance improvement on a continuous basis encourages rethinking about the culture and value system. However, changing the work culture is a difficult task, as it may have been around for a long time.

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Quality Focussed Culture

Total quality management is a strategic approach to producing the best products and services possible through continuous improvement. Total quality process recognizes that concentrating upon products alone will not yield the desired results; the service side of the business is equally important.

TQM is a continuous and integrated quality strategy designed to give organizations the winning edge by changing the way people approach their work. It focuses on building a quality culture as the foundation for the subsequent introduction of quality and productivity schemes. It is a process of complete corporate transformation oriented to quality and customer. To promote quality we have to promote a work culture where people feel free to contribute ideas and are involved in problem solving. The vigorous use of tools and techniques by the teams ensure complete analysis and development of solutions for implementation. Over 3000 companies and about 40 government departments in the United States now practise some form of TQM, encouraging teamwork and active employee participation, using problem solving techniques such as brain storming, quality-story-boards or Pareto analysis and employing statistical process control methods [Michael, 1991].

Commitment & Leadership

Quality is too important to be left to the so called quality specialists, it cannot be achieved on a company wide basis if it is left to experts alone. Equally dangerous, however, are the uninformed who try to follow their natural instincts because they "know what quality is when they see it". This type of intuitive approach will lead to serious attitude problems, which do no more than reflect the understanding and knowledge of quality that are present in an organization (Oakland, 1993). The same old ways of doing things will give the same old results. Tightening up inspection, employing more repair teams etc. do not contribute to promoting quality TQM culture cannot be promoted by managers, it needs leaders, The managers must become leaders for TQM and develop ownership. Cultural change can only be brought about by commitment and leadership.

Today's market environment is undergoing tremendous changes. Price is being replaced by quality as the prime determinant factor reflecting customer choice. Hence, for corporate transformation, it is necessary to ensure that the management adopts a strategic overview of quality. The entire gamut of the organization needs to undergo a complete change of mindset — attitudes and approaches. The approach must focus on developing a problem — prevention mentality" (Oakland, 1993).

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ISO 9000 & Work Culture

The quality revolution has almost become a cliche. A number of companies are initiating customer care programmes, quality week etc. Such customer care programmes for example in an Airline are less than useful if a broad smile at check-in or by crew members is followed by delays in flights or delays in packing up baggage or carelessness resulting in damaged luggage due to indifferent attitude and slow handling. Customer care in the front office must be supported by improvement in the activities of the back office.

Similarly, a quality system registered to ISO 9000 may be nothing but a superfluous overhead if it is not lived by the people to whom it applies. A quality system by itself does not guarantee customer satisfaction. It is possible to produce rubbish which nobody wants and still satisfy ISO 9000. The standard will simply ensure that the rubbish is produced consistently. The purpose is not to criticise ISO 9000 standards. In fact ISO 9000 is a blessing to Indian companies as quality systems were practically non-existent in India. To elicit the maximum advantage out of ISO 9000, besides getting certification and deriving marketing advantages, the ISO 9000 can be used to initiate a cultural change in the company. One of the biggest advantages of ISO 9000 is that it improves

communication in the organization as the quality policy is required to be communicated to everybody at all levels. This provides a unique opportunity to the management to come face to face with employees. This situation should be utilized to build trust, respect and openness resulting in a new set of values and culture. The company mission and policy communication will have a unifying effect in the organization leading to the sharing of common vision and concerns.

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ISO, 9000 implementation should be used as a platform to create team work in the company. In a bid to obtain certificate some companies assign the entire work to one or two managers to champion the course of ISO 9000 in the company only to learn that it has delayed the certification. The effective way is to involve all concerned working in a team with similar goals.

Training of employees for improving quality has been along neglected area. ISO 9000 requires that a company should address the assessment of training needs affecting quality. This opportunity can be utilized for embarking upon creating a work culture driven by quality, impacting attitudes and mindsets. This can be rated as one of the most important elements of ISO 9000 which should be taken seriously by Indian companies if they want to become world class and face the challenge of multinationals. ISO 9000 should be used as a stepping stone for embarking on total quality management.

ISO 9000 helps in maintaining a continuous focus on the customer his requirements and satisfaction. The process of implementation may be utilized to drive home the fact that it is the customer who is holding the pay-cheques. ISO 9000 standard therefore, is much more than what meets the eye. It should be used for creating a new work culture towards complete transformation of the company, deriving maximum benefits in terms of effectiveness of operations, customer satisfaction and competitive edge.

The standard provides a simple system of ensuring that what is done is written down, justified in terms of the standard, recorded and reviewed and if necessary revised through the corrective action loop built into the system itself. It is a fundamental requirement of TQM to have a good quality system, whether that system is designed and developed in-house or certificated to an international standard subject to third-party audit. It is the basic control mechanism for delivering products and services consistently from business process. (Boreley, 1994)

Strategic Thinking

World class organizations have to make major changes in their business performance and customer orientation as a result of the ever-changing global market conditions. In the present era, quality has moved from a shop floor control technique to a strategy, where it is driving force of the whole business encircling the entire gamut of an organization's activities (Singh, 1994) The emphasis has shifted rightly from mechanisms and methods to strategic thinking. Quality and creating a work culture are therefore, strategic issues and they should be addressed accordingly.

Most organizations do display one or more of the various components of strategic action such as diversification, mission-statements, corporate planning, HRD activities etc. Many of these are introduced in the hope that they might yield substantial returns. However, more often than not, these get rendered to mere techniques and are perpetuated by ritualistic actions. They lack collective sense of ownership, meaning, purpose and commitment. (Singh & Bhandarker, 1992). This can be traced to the fact that the so-called strategic actions are borrowed by companies without sufficient strategic thinking. In fact, it is strategic thinking which energises people and generates commitment. It is the understanding of the philosophy, values and work culture behind strategic action that promotes strategic thinking. The salient features of strategic thinking are:

- Continuous reflection and evaluation
- Focus on vision, mission and goals
- Identification of key result areas and thrust areas
- Long term orientation
- Innovation in approach
- Total perspective
- Collective ownership and action
- All round improvement

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The focus and purpose of strategic thinking is to continuously learn and improve. When product development languished for a while, Nissan was given the slogan "Be thyself" (Ohmae, 1990) to make people look afresh at what products are required, rather than merely being reactive to the competitor's strategy. It essentially indicates a questioning spirit, which typically a strategic thinking company demonstrates. It is important in strategic thinking that a lot of unlearning takes place since learning capability is dependent on the process of unlearning, giving up old ideas and old ways of doing things.

A culture shift is required to promote total quality through strategic intervention. This culture shift should include moving from short term to long term, inward looking to outward looking, product to customer, survival to continuous improvement, control to support, position power to idea power and treating human beings as assets and not liabilities.

Teamworking

Team work is the cornerstone of quality improvement and the long term process of maintaining a desirable work culture. Teams having people from different functions and departments (cross functional teams) reinforce the understanding that people together can achieve wonders. This also improves communication by analysing problems, developing solutions and implementing them. The use of team approach to problem solving has many advantages over individuals working separately on problems.'

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- A greater variety of problems can be tackled which are beyond the capability of any one individual.
- A better quality of solutions is expected as two heads are better than one.
- The approach is motivating to team members and therefore satisfying to them.
- Problems don't recognise departments or functions and therefore can be dealt with more easily.
- The implementation is easier than individual suggestions.

The team working processes rely on the premise that people are more willing to support any effort in which they are involved. The basic purpose is to ensure collaboration and consensus and not confrontation. Iaccoca initiated quarterly reviews at FORD. According to him these meetings force dialogues, increase self accountability, improve teamwork, raise superiors awareness, motivate and foster creativity (Iaccoca, 1985).

Business Flexibility

The unrelenting increase in the intensity of commercial competition worldwide demands that organizations must continuously strive to improve the efficiency of their operations. Total quality is an approach to improve the effectiveness and flexibility of an organization as a whole. This is possible only when each function and each person develops an attitude to prevent and eliminate errors, waste, rework etc.

Quality is the result of processes and people. One of the key aspects for successful performance depends upon how well and effectively we are able to re-engineer our processes. The key parameter is process adaptability which reflects the measure of process flexibility to respond to changing customer expectations. To maintain flexibility, putting people first is desirable. Process re-engineering shall be possible only when people are dynamic and resilient. Business flexibility is achieved by fundamental rethinking and radical redesign of business processes in key contemporary measures of performance such as cost, quality service and speed. But re-engineering cannot be resorted to without first improving the processes and organizational culture. (Mani, Prabhakar & Venkatesh, 1993). For example, in a re-engineering effort if we want to eliminate incoming inspection without a prior continuous improvement on vendor development to ensure vendor quality and delivery, re-engineering would be counter productive.

Process flexibility should not be confined to the technical sense alone. It is equally applicable to all the processes such as management processes, systems and procedures. Business flexibility can be utilised to foster growth and capacity to proact with the outside environment. This readiness to adapt to changing economic and market conditions is indispensable to the continued growth of the enterprise. Business flexibility is a great strength in the organization and promotes new sets of organizational values and work culture.

One of the most effective ways of building flexibility in the organization is to implement just-in-time (JIT)

management. Basically JIT is a programme directed towards ensuring right quantity, right quality at right time to avoid waste and remain flexible. The aim of JIT is to produce, deliver or operate to meet the requirements of the customer exactly, without any waste or inefficiency. However companies considering JIT purely as a material control system, are found to fail. JIT shall not be able to work without total quality management. Process flexibility is an absolute necessity for flexible operations and value-added efforts.

Measuring the Effort

While implementing any programme, mid-course evaluation and measurement play an important role. A company embarking upon a programme for complete corporate transformation using TQM to create a cultural change needs to define the starting point (where we are) and the final desirable destination through a journey called continuous improvement. The destination is defined as 'desirable' because the actual destination will keep changing in a dynamic and flexible situation for continuous improvement. Measurement of effort gives the necessary reinforcement in terms of what has been achieved and the correctness of the route. The future strategies can be modified based on the progress and results achieved.

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The three basic roles of measurement (Oakland, 1993) are:

- Identifying opportunities for improvement (quality costing).
- Comparing performance against internal standards (process control and improvement).
- Comparing performance against external standards (bench marking)

The measurement should include:

- Quality parameters
- Delivery schedules
- Flexibility strategy
- Technological improvements
- Safety
- People related factors

Conclusion

The work culture in an organization is the result of beliefs, behaviours, management values, norms, conventions and rules. Instilling appropriate work culture requires the formulation of a strategy encompassing the organization's vision, mission and philosophy. TQM is an integrated approach to improving competitiveness, developing flexibility and impacting work culture. TQM can be implemented in all types of organizations. TQM starts at the top and the top management must accept the responsibility for developing a new set of values and work culture by providing effective leadership.

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TQM & Work Culture: An Empirical Analysis

Subba Rao & T.S. Raghunathan

In the increasingly changing and competitive world, companies have to focus their resources to achieve high quality standards in their products and services to become quality organizations. Work culture has been discussed as one of the important contributors for the success of quality management practices. This research analyses the existence of relationship between work culture and customer satisfaction, the basic premise being that organizations practising TQM and having higher customer satisfaction have better work culture.

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Quality is emerging as the single most critical factor for business to survive in the ever expanding and competitive global market place. World class manufacturing companies gain competitive advantage and greater market shares through extraordinary levels of performance and commitment in providing the kind of quality products and services demanded by customers cutting across national borders. Companies are being required to conform to international standards such as ISO 9000 and have to focus their resources to achieve high quality standards in their products and services. Gaining competitive advantage through quality has become the pass word in Indian organizations too given the fact, that the market has been opened to foreign companies and the country is competing on the international scene.

The philosophy of Total Quality Management (TQM) is being embraced as the vehicle for achieving higher levels of quality through the process of continuous improvement. TQM is an organization wide approach which encompasses the entire spectrum of activities from product concept to design, production to the final customer. It envisages the involvement of the entire workforce and active participation of the suppliers. It calls for top management vision and commitment. The driving force for TQM is the customer and in any TQM implementation the most important aspect is customer satisfaction.

Figure 1 depicts a model built on research on quality management practices. This model focuses on the continuous improvement process imbedded in a set of factors that form the central part of the quality management framework. The model contends that quality management practices depicted by strategic quality planning, work culture, quality assurance and supplier relationship will have an effect on the outcome variable, namely, customer satisfaction.

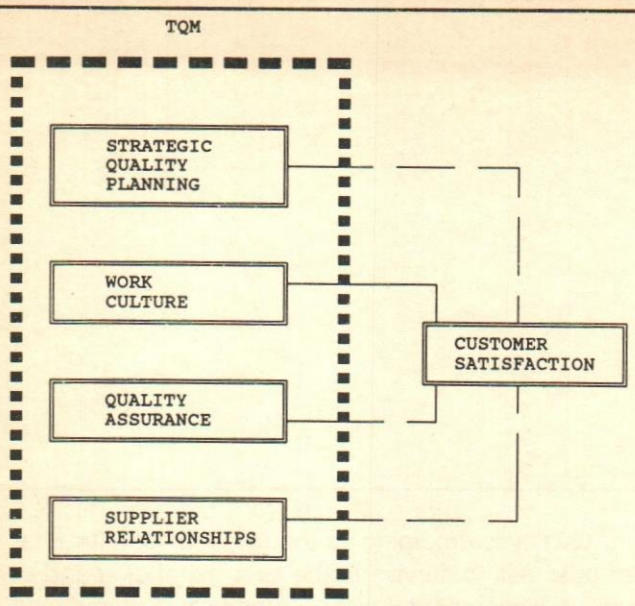

Fig. 1.: Quality Management Practice Model

Work Culture

In the achievement of total quality in the organization the human resource dimension as exemplified by Deming's fourteen principles (Deming, 1982; 1986) is very important. Continuous quality improvement depends on the best use of the talents and abilities of a company's work-force. To achieve world class quality, it is imperative that a company empowers its workers. Companies must develop and realize the full potential of their work-force and maintain an environment conducive to full participation for personal and organizational growth. This can be achieved through creating the appropriate work culture through training, employee participation and involvement.

An environment conducive to full participation can be achieved through creating the appropriate work culture through training, employee participation and involvement.

Customer Satisfaction

Ultimately, the customers define quality and therefore are the final arbiters of quality. Companies must be knowledgeable in customer requirements, be responsive to customer needs by maintaining high levels of service and measure customer satisfaction through a variety of indicators.

The quintessence of TQM is customer satisfaction which is achieved through the provision of the desired quality products and services which in turn requires that the inputs into the production process and the resources of the organization are appropriately managed. The work culture in an organization, which is a part of the human resource dimension is an important contributor to proper and meaningful quality management. The quality philosophy and practice has to be part and parcel of the whole work force and not a concern of only a few. With this in view, a research was conducted to examine the existence of relationships between work culture and customer satisfaction, the basic premise being that organizations having higher customer satisfaction have better work culture.

The work culture in an organization, which is a part of the human resource dimension is an important contributor to proper and meaningful quality management.

Research Methodology

The purpose of this research was to identify the differences in the level of human resource management factors which impact on the work culture among organizations which enjoy high customer satisfaction versus those which have low customer satisfaction. Data for the study consisted of responses to a questionnaire instrument (Rao et al, 1993) developed to obtain information on work culture in organizations and the extent of customer satisfaction. A set of 10 questions relating to employee training, employee involvement, employee participation, and employee responsibility with respect to work culture issues to improve quality were formulated. Responses were measured on a five-point Likert scale.

The sample was divided into two groups based on the level of customer satisfaction. This construct was measured using a set of 16 questions relating to various aspects of customer satisfaction (Rao et al, 1994). Organizations whose scores for customer satisfaction were more than the overall mean value of this construct were considered as the group having high customer satisfaction and the others as having low satisfaction.

This research is a part of an ongoing project to compare and contrast international quality practices (Rao, 1993). The constructs discussed here are a part of a

larger questionnaire. The questionnaire was developed and pilot tested by contacting many practitioners involved in quality management. Based on their comments on the clarity, readability, understandability, and specificity of the items measuring the various constructs the questionnaire went through three revisions before the final draft was developed. Since this research is conducted in different countries care has been taken to make it generic and understandable. Data for this paper was mainly collected in India. Respondents were contacted directly or through an intermediary. All the respondents were involved in quality management in their organization.

Table 1 provides the sample characteristics. Part A indicates that 93 per cent of the respondents are from the manufacturing industry. The service industry is not well represented in this sample. This should be considered while generalizing the results of this research. Part B indicates that large and small companies are well represented in the sample. The sample consists of organizations whose customer-base is both domestic and international (Part C). Part D indicates most of the companies (99%) have instituted quality programs thereby witnessing the pervasive awareness of the importance of quality in organizations. Part E portrays the causes which triggered the quality program in the sample organizations. Customer demand and competitive forces stand out as the primary causes.

T-tests on the mean values of all the ten items, measuring various aspects on work culture, between the two groups representing high and low customer satisfaction were performed and the results are presented in table 2. It is seen that all the ten items measuring work culture exhibit higher mean values for the high customer satisfaction group. Differences in the mean values for all the items were statistically significant except for one item "Extent to which quality circle/employee involvement programs are implemented in the company."

Discussion of Results

All the organizations in this study reported having TQM practices in place for at least a year; 90 per cent reporting more than 5 years. This means that for the reasons given in table 1, all the organizations were practising the precepts of quality management. In the total sample of 87 organizations, 42 were classified as having high customer satisfaction and 45 as having low customer satisfaction based on the mean value of customer satisfaction. In table 2, items 1, 2, and 3 relate to the training of employees. It can be seen that organizations with higher customer satisfaction have higher mean scores on training. Item 4 indicates that the first group whose customer satisfaction is high spends more resources on training. This implies that organizations using

Table 1: Sample Characteristics

A. Business Type

Business Type	No. of Respondents in %
Manufacturing	93
Service	5
Processing	2

B. Size of the Company by Number of Employees

No. of Employees	Frequency in %
Less than 50	2
50 to less than 150	13
150 to less than 500	15
500 to less than 1000	8
1000 to less than 5000	25
5000 and above	32
Others (not marked)	5

C. Customer Base

Customer Base	No. of Respondents*
Local	31
Regional	35
Domestic	72
International	69

* Total respondents will add up to more than the sample size of 87 because some organizations could have more than one type of customer.

D. Length of Quality Program in the Organization

Length of Program	Frequency in %
Less than 1 year	1
1 year to less than 3 years	3
3 years to less than 5 years	6
5 years and above	90

E. Causes Triggering Quality Program

Causes	No. of Respondents*
Customer demand	26
Increased competition	17
Need to reduce cost	14
Survival	13
Joint venture	3
Others	7

* Total respondents will add up to more than the sample size of 87 because some organizations could have more than one type of customer.

TQM and realizing higher customer satisfaction devote greater attention and resources to employee training. Items 5 and 6 in the table relate to the involvement of the employees in quality programs. Again the mean scores of the two groups show that in organizations with higher customer satisfaction, the implementation of quality programs as well as the involvement of the employees are much higher. But it shall be noted that though the first group mean is greater than the second group for item 5, the difference between them is not statistically different. The conclusion one can draw is that though the extent of implementation of employee involvement programs is about the same in the two groups, the effectiveness of employee involvement is much higher in organizations with higher customer satisfaction. Items 8 and 9 in the table deal with the responsibility aspects of the work culture and again the results of the mean scores between the two groups are significant. In particular, in organizations with higher customer satisfaction the employees are held responsible for error free work to a greater extent than in the other group. Again the organizations with higher customer satisfaction have a greater tendency towards building continuous quality awareness among their employees. Item 10 reconfirms that the extent of employee involvement and participation is much higher in organizations with higher customer satisfaction.

Table 2: Results of T-Test

Variable	Group	Mean	T-value
1. Extent to which quality related training is given to hourly employee throughout the company	1 2	3.756 2.756	4.61***
2. Extent to which training in the basic statistical techniques is provided in the company as a whole	1 2	3.585 2.773	3.53***
3. Extent of training in advanced statistical techniques provided in the company	1 2	3.205 2.182	4.00***
4. Availability of resources for employee training in the company	1 2	4.025 3.455	3.03***
5. Extent to which quality circle/employee involvement programs are implemented in the company	1 2	3.625 3.227	1.59
6. Effectiveness of quality circle/employee involvement programs in the company	1 2	3.500 2.909	2.53**
7. Extent to which hourly/non-supervisory employees participate in quality decisions	1 2	3.325 2.524	3.91***
8. Extent to which employees are held responsible for error free output	1 2	3.381 2.477	3.72***
9. Extent to which quality awareness building among employees is ongoing	1 2	4.000 2.956	5.31***
10. Extent to which the company measures employee morale	1 2	3.524 2.456	4.80***

***Significance at 0.01
**Significance at 0.05
Group 1 — High customer satisfaction (42)
Group 2 — Low customer satisfaction (45)

Organizations using TQM and realizing higher customer satisfaction devote greater attention and resources to employee training.

Overall the ten items in the table which relate to different aspects of work culture show differences between the two groups. In conclusion one may surmise that organizations which practice TQM and achieve higher customer satisfaction tend to stress more on the positive side of the improvement of work culture in their organizations.

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Culture & Performance Improvement

Rabindra N. Kanungo & Manuel Mendonca

The sociocultural environment has a significant impact on the internal work culture of organizations which in turn is reflected in the performance. This article identifies the critical features of the performance management process which contribute to performance improvement. It also deals with how the work culture in Indian organizations operates to facilitate or hinder the efficacy of this technique. The authors also propose strategies to promote a work culture conducive to performance improvement.

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The productivity of an organization largely depends on its technical and social systems. The technical system, broadly defined, includes the appropriate technology, and monetary and material resources. The social system consists primarily of human resources. Since the efficient and effective use of the technical system depends on the people who manage and operate it, their work performance plays a crucial role in the organization's productivity and in the fulfillment of its mission. Hence the importance of effective human resource management practices — particularly in the area of performance management. The on-going research in behavioral science has contributed much to the development of human resource management techniques which have proven beneficial to organizations in North America and Europe. Can these state-of-the-art techniques be equally beneficial to public and private sector organizations in India?

Culture & Work Behavior

The term "culture" has a variety of meanings. In the "popular", meaning, it is synonymous with terms such as "cultivated", "educated", or "sophisticated". In this sense, we refer to a "cultured person" as one who is perceived to have acquired knowledge and cultivated an interest in art and literature, and as one who possesses certain social graces. In the "scientific" meaning, culture refers to the total pattern of beliefs and values of a society, and the norms and behaviors that are derived from such beliefs and values. It is generally recognized that culture is transmitted from one generation to another, not through any hereditary mechanism, but through social learning and imitation processes. Stated differently, culture is the product of human interaction of a group of people which results in certain common and predictable ways of behaving. These common ways are also referred to as "social norms" which define the expected and acceptable behavior in a given society.

Through the socialization process, the societal norms affect the work behavior and job performance of individuals and groups in organizations. Individuals enter an organization with certain beliefs, expectations, attitudes and values regarding work which influence their work behavior in either a positive or negative direction. For instance, when individuals are socialized in a family or school environment that encouraged independence of thought and action, personal achievement, and self-restraint, these individuals are more likely to seek greater autonomy and opportunity for personal success at work. The attainment of job objectives will be an important consideration to them, and they will more likely develop initiatives in problem solving and appropriate action plans to accomplish their job tasks.

Societal norms affect the work behavior and job performance of individuals and groups in organizations.

On the other hand, individuals socialized in an environment that values strong family ties and extended family relationships, are more likely to develop stronger affiliative tendencies or greater dependence on others. In the work context, interpersonal relations will likely be more salient to them and, as a result, their job-related decisions might be influenced more by interpersonal considerations than by task demands. Clearly, cultural influences shape the employees' needs and expectations, their hopes and aspirations, and their perceptions of what constitutes desirable forms of conduct. Cultural influences also contribute to the formation of managers' beliefs, values and assumptions about their employees' work attitudes and behaviors. These assumptions of management influence organizational policies and practices relating to job design, control of employee behavior, communication patterns, decision making styles, leadership and supervision, and reward systems. In the organizational context, there are thus two major sources of cultural influences: first, the characteristics of the socio cultural environment which affect work attitudes and behaviors of all employees, second, the management's assumptions about their employees' work attitude and behavior which directly contribute to the development of the organization's internal work culture.

Performance Management Process

The management of performance is an on-going, cyclical process. In the first step the manager identifies all the important aspects and tasks of the job and clarifies how these are related to the goals of the work unit and of the organization. In the second step, the expectations and standards of job performance are established. Thus the first step spells out *what* needs to be done, and the second step specifies *how well* the tasks must be done. The third step involves monitoring employee performance in the light of the performance standards. During this phase, the manager provides informal on-going feedback not with a view to find fault, but rather to coach or make available the needed resources which can help the employee to achieve or exceed the job performance standards. In the fourth step, which is the formal appraisal review, managers record their assessment of the subordinate's performance. In so doing, they assume two roles: as a judge, they do a summative evaluation of the performance for the period; as a coach they identify the obstacles to good performance and formulate plans to overcome them. The formal appraisal review can affect the job definition of the subsequent period. If the review reveals that certain tasks or objectives of the job cannot be accomplished for reasons beyond the employee's control, then remedial action in the form of training or removing the organizational obstacles is taken; if this is not feasible, then the job is redefined.

Two conditions are necessary for the effectiveness of this process: First, managers need to see their employees as a vital resource and to understand how varied talents, aspirations, and behaviors affect productivity. The second condition is closely linked to the first. Since employees are a vital resource, the expenditure relating to employees such as — selection, compensation, training and development — is an "investment" much like the investment in capital assets. When managers regard their employees as an "investment", they recognize the implicit obligation to obtain an adequate return form this investment. Such recognition inevitably induces managers to set in motion the "performance management process" — to establish job objectives and performance standards, to coach and develop employees towards the attainment of these objectives. The success of the organization's efforts both in creating the necessary conditions and in implementing the performance management process will, in the final analysis, hinge on its internal work culture.

It is useful, at this stage, to recognize that there are two aspects to human resource management techniques such as the performance management process: One is the "content" of the technique; the other is the "process" by which the technique is implemented. For example, providing job performance feedback to subordinates is

undoubtedly an essential and critical managerial activity which contributes to improved performance and organizational effectiveness. For this reason, feedback must be practised in every organization. However, the modality of implementing feedback will depend upon the organization's socio-cultural environment. In highly individualistic cultures, it is quite common to give feedback in a confrontational mode. Such a mode is acceptable because in these cultures, individualism and self-reliance are valued, and employees expect to be held responsible for their actions. Furthermore, in a contractual relationship, regard for the person is not a major consideration in individualistic cultures.

On the other hand, in collectivistic cultures, regard for the person and relationships in all interpersonal contexts is a very high value, and "face-saving" is an important consideration. Consequently, the confrontational feedback mode is unacceptable and, therefore, inappropriate. Thus, the "content" of the technique — that is, its constituent elements, has non-cultural applicability. But, the "process" or modality of implementing the technique tends to be culture-specific. Therefore, the "content" of the performance management process — that is the procedural steps, the elements of each step, and the dynamic interaction between them — although developed in another cultural context, is an absolute necessity for organizations in any cultural environment in order to improve performance and organizational effectiveness. However, the "process" of implementing performance management should be suitably modified to ensure it is consistent with the internal work culture of organizations in India.

The "content" of the technique — that is, its constituent elements, has non-cultural applicability. But, the "process" or modality of implementing the technique tends to be culture-specific.

Indian Cultural Context

In order to modify the modalities of implementing the performance management process, it is necessary to identify the cultural differences between India and the western countries? In an organizational context, these differences can best be identified and understood in terms of the characteristics of: the socio-cultural environment; and the organization's internal work culture. To identify the socio-cultural differences and their impact on work attitudes and behavior, Hofstede's (1980) dimensions — power distance, uncertainty avoidance, individualism, masculinity; and Glenn and Glenn's (1981) dimension of abstractive versus associative thinking have been used. To identify the differences in the internal work culture and their impact on work attitudes and behaviors, the culture-determined assumptions proposed by Kanungo & Jaeger are used.(1990)

Sociocultural Environment

According to Hofstede (1981; 45-46):

- Power Distance is "the extent to which a society accepts the fact that power is distributed unequally";
- Uncertainty Avoidance is "the extent to which a society feels threatened by uncertain and ambiguous situations by providing career stability, establishing more formal rules, not tolerating deviant ideas and behaviors, and believing in absolute truths";
- Individualism "implies a loosely knit social framework in which people are supposed to take care of themselves and their immediate families only, while collectivism is characterized by a tight social framework in which people distinguish between in-groups and out-groups; they expect their in-groups (relatives, clan, organizations) to look after them, and in exchange for that they feel they owe absolute loyalty to it";
- Masculinity denotes "the extent to which the dominant values in society are "masculine" that is, assertiveness, the acquisition of money and things, and not caring for others, the quality of life, or people".

The dimension of abstractive versus associative thinking has been described by Kedia and Bhagat (1988; 566) as follows: "In associative cultures, people utilize association among events that may not have much logical basis, whereas in abstractive cultures, cause-effect relationships or rational Judaeo-Christian types of thinking are dominant". Using these dimensions, the sociocultural environment in countries like India, compared to the western countries, can be characterized as: relatively high on uncertainty avoidance and power distance; relatively low on individualism and masculinity; and relatively high on associative thinking. What is the likely impact of these sociocultural characteristics on work attitudes and behavior?

The relatively high uncertainty avoidance implies an unwillingness to take risks and accept organizational change. Consequently, employees will be reluctant to exercise initiative in problem solving and decision making in work-related matters, to accept responsibility for job tasks, and be indifferent to job feedback. The relatively low individualism implies that family and group attainments take precedence over work outcomes, that the primary purpose of work is not to express or fulfill one's self, but a means to fulfill one's family and social obligations. Thus, even when employees perform their job tasks well, their satisfaction is derived from work "work well recognized" rather than from "work well done". Low individualism operates both as constraining as well as a facilitating characteristic. To the extent that fulfillment of job tasks, per se, is not a priority, objective performance standards and individual performance-based rewards are not likely to be effective. On the other hand, group concerns, implicit in low individualism, facilitate the use of groups for job design and to base rewards on group performance. Furthermore, personalized relationships facilitate the use of non-economic rewards that recognize the individual's contribute to significant others in the job context.

The relatively high power distance implies that mangers and subordinates accept their relative positions in the organization's hierarchy and operate from these fixed positions. In high power distance cultures, obedience is due to the holder of the position not on a rational basis, but simply by virtue of the authority inherent in that status. The constraining effects of high power distance are: it discourages employees from exercising discretion and freedom in the execution of job tasks; it encourages supervisors to function in an authoritarian manner rather than as a coach and mentor. The unquestioning acceptance of the supervisor's decisions can result in negative consequences. For example, in the area of reward allocation, employee involvement in the design of performance appraisal and reward systems is crucial to foster employee perception of the fairness of reward decisions. Without such involvement, employees might seem to accept the supervisor's decisions on rewards even when they believe these to be inequitable. Although not vocalized, the perception of unfairness does, in fact, have an adverse effect on employee motivation.

The relatively low masculinity implies that employees' orientation is towards personalized relationships rather than towards performance. Consequently, the satisfaction of affiliative needs takes precedence over satisfaction derived from achieving job objectives. This characteristic can have both constraining and facilitating effects on work attitude and behavior. For example, the greater concern with the job context rather than the job content leads to a lower priority for job tasks and objectives; performance evaluation and feedback, in particular, are misconstrued as attacks on the person; and personal loyalty to the supervisor is seen to be more important and is expected to be rewarded rather than the fulfillment of the contractual obligations of the job. On the other hand, low masculinity also has some facilitating features. For example, the job objectives can be expressed in terms of serving the needs of significant others. Formulating job objectives in this manner provides a powerful motivation for improved job performance because it leads to the satisfaction of the employee's affiliative needs.

The high associative or context-sensitive thinking denotes that the employees' job behaviors are not guided by a normative work ethic, but by the needs o the context that is salient to them. Such a context-dependent approach does not place a high priority on planning for the accomplishment of job tasks. Neither is it conducive to the efficient use of the goal setting process which requires the setting of specific goals with specific time targets and the development of action plans to meet these goals, and adhere to the established deadlines.

Internal Work Culture

According to Schein (1985), the organization's internal work culture consists of three levels. The first level includes artifacts such as: technology, visible organizational structures and processes. The second level constitutes the values as expressed in strategies, goals and philosophy, and which serve to explain and justify the behaviour and artifacts of the first level. The third level is the set of basic assumptions and premises which alone can explain the organization's activities, creations, and behaviors of the first and second levels. These assumptions are so critical to understanding the organisation's culture that Sathe (1985; 10) regards them as the sole content of his definition of culture — "Culture is the set of assumptions (often unstated) that members of a community share in common".

The sociocultural environment, forms part of the cultural baggage that employees carry with them when they join an organization and, to this extent, it affects the development of the organisation's internal wok culture. However, the underlying assumptions of the organisation's internal work culture are largely the product of the conscious or unconscious efforts of the founder of the organization or its top management. For

this reason the internal work culture is necessarily idiosyncratic to the organization. Nevertheless, since the founder or top management comes from the prevailing sociocultural environment, it is not unreasonable to conclude that their beliefs and values about employee work attitudes and behavior will also be influenced by the characteristics of that environment.

What are the likely culture determined assumptions of the founder or top management of Indian organizations? Kanungo and Jaeger (1990) have categorized the culture determined values and climate of beliefs and assumptions in terms of: the descriptive assumptions about human nature; and the prescriptive assumptions about the guiding principles of human conduct. The descriptive assumptions relate to: control of outcomes, creative potential, time perspective, and time units of action. India differs significantly from the western countries on these dimensions. In India; the locus of control beliefs is more external; human resources are viewed as relatively fixed with limited potential; the time perspective is past and present oriented; and the time units for action is short-term. The perspective or normative assumptions relate to whether the management should adopt a proactive or reactive stance in task performance, judge success on a pragmatic or moral basis, promote a collegial/participative or an authoritarian/paternalistic orientation, and base one's behavior on the exigencies of the situation or on predetermined principles. In this category too, India differs significantly from the western countries. In India: organizations are encouraged to take a passive/reactive stance to task performance; success is judged on moralism derived from tradition and religion: people orientation is paternalistic; and consideration of the context overrides principles and rules (Kanungo & Jaeger, 1990).

What are the effects of such underlying assumptions of the management on work attitude and behavior? The managerial assumption that their subordinates' locus of control is external will lead managers to conclude that the subordinates are reluctant to take personal initiative and risks in working towards job objectives. Consequently, managers will not set challenging and difficult goals nor delegate responsibility for tasks, both of which are essential for effective performance management. When managers assume that subordinates have limited potential and are not capable of being developed, their focus will not be on investing time and resources on training and development. Instead the major motivational emphasis will be on a reward system that is dominated by the "carrot and stick" approach. of course, rewards are essential for improved job performance, but so is the need for managers to develop their subordinates to grow and find fulfillment in the job.

The time perspective which accentuates a past and present orientation, and the action focus with a short-term perspective reflect the high uncertainty avoidance that is inevitable in an unpredictable and largely uncontrollable environment in terms of economic and political events, and resource availability. With such a time orientation and perspective, managers and subordinates will not be inclined to adopt a future orientation and to develop action plans needed for: goal setting, training and development, and the removal of organizational obstacles to effective performance. Moreover, the short-term orientation will lead to a reward system that reinforces short-term objectives and, as a consequence, further perpetuates the dysfunctional effects of such a time perspective.

The perspective management assumption of passive or reactive stance to task performance, which reflects low masculinity and low individualism, is not conducive to effective performance management. Managing the subordinates performance requires that managers anticipate what needs to be done and initiate action to modify the environment or work procedures to facilitate the accomplishment of job objectives. Low masculinity and low individualism also influence the prescriptive norm of moralism which dictates that success is measured not by material prosperity but by service to others. The emphasis on interpersonal relationships implied in moralism might not permit an objective and rational assessment of subordinates performance, and also does not facilitate the system of performance-contingent rewards.

The authoritarian and paternalistic norm reflects the high power distance characteristic of the sociocultural environment. It is incompatible with several activities of effective performance management — for example: manager-subordinate partnership in goal setting; problem solving; and the creation of a climate which generates trust and free flow of communication that is so critical to accurate and supportive job performance feedback. Finally, the norm that behavior should be context-dependent reflects the associative thinking characteristic of the sociocultural environment. Mangers who subscribe to this norm are more likely to be tolerant of and accept the fact that the subordinates' job behaviors are determined by the immediate context that is salient to them, rather than being determined by job objectives. Such tolerance might even extend to excusing subordinates from job duties in order that they might then be able to meet social obligations that are totally unrelated to the job.

Managerial Strategies

What are some of the strategies which managers can adopt to promote a work culture that is conducive to effective job performance? To begin with, the strategies should retain the basic contents of the state-of-the-art human resource management techniques, but change the modalities of the implementation processes. This can be achieved by a systematic approach to remove the cultural constraints and build on the cultural beliefs which have the potential to enhance the effectiveness of the performance management process. Some useful actions by managers in this area would be:

- To address the inhibiting effects of high uncertainty avoidance and high power distance:
  - Set specific and difficult, but attainable, goals that are appropriate to attaining the objectives of the work unit.
  - Enhance the subordinates' self-efficacy beliefs through training and development and through actions designed to remove the organizational obstacles to job performance.
  - Function as mentor and coach to provide a personalized and supportive relationship. Provide feedback through a joint problem-solving mode.

Enhance the subordinates' self-efficacy beliefs through training and development.

- To address the inhibiting effects and build on the facilitating characteristic of low masculinity and high associative thinking:
  - Express job objectives in terms of: serving needs of others; and personal rather than contractual obligations. Make the employee aware of the job's potential to contribute to departmental and organizational goals, which ultimately serve some community or national good. Incorporate these criteria in the established goals and, during feedback, highlight the impact of performance on others, and the fulfillment of personal duty.

    Set goals in terms of observable behaviors to be performed within specific timeframes. During feedback, focus on actual behaviors and time taken vis-a-vis the agreed schedule.
- To address the inhibiting effects and build on the facilitating characteristics of low individualism;
  - Set goals consistent with the self-efficacy beliefs of subordinates. During and after performance, focus the feedback on performance aspects which were within the employee's control and examine how the employee can be helped to improve performance. Follow up with appropriate rewards.
  - Initiate actions such as training and verbal persuasion which enhance the subordinates' self-efficacy beliefs, orient them towards personal task accomplishment which, in turn, will contribute to developing their internal locus of control beliefs.

Fundamental to the success of these proposals is the need for managers to function as charismatic or transformational leaders. Such a leader is essentially an agent of change who formulates and articulates an idealized vision that is discrepant form the status quo but contains a purpose that is uplifting and contributes to the organization's growth as well as meets the needs and aspirations of the subordinates. The leader demonstrates commitment to the vision by special efforts and initiatives to achieve the vision. These initiatives might include personal sacrifice and building trust among subordinate through expertise (Conger & Kanungo, 1987).

In the context of the Indian work culture, charismatic or transformational leadership is successful when it is exercised in a style which creatively blends the necessary focus on job tasks, responsibilities, and results, with the equally necessary attention to the employee's need for a personalized and supportive relationship. Sinha (1980) has termed this style as the "nurturant-task leadership style" which draws upon familial and cultural values like affection, dependence, and need for personalized relationships, to temper the firm and structured task direction expected in the situation of high power distance. Equally important, this style contributes to increasing the employees' self-efficacy beliefs.

According to Sinha (1990), the nurturant-task leader provides clear, specific directions and performance standards as well as the guidance and direction which subordinates expect. As subordinates accomplish the job tasks, they experience two critical sets of outcomes: nurturant support from the manager; and enhanced self-confidence in meeting job goals and increased job knowledge and skills. With continued success in meeting job goals, the subordinates gradually seek less direction

and feel more capable of assuming responsibility. At this stage, the leader provides subordinates with increasingly less direction and more autonomy, but continues with the nurturant approach and expectations of task accomplishment at the agreed performance standards. The repeated cycle of subordinates accomplishing the job tasks and assuming autonomy is reciprocated by the leader with continued nurturance but reduced direction. This approach eventually results in the subordinates' growth and work involvement.

The brief description of the nurturant-task leadership underscores the transformational nature of this style. It operates to change the cognitive belief state of the employees to one of increased self-determination or personal self-efficacy in respect of performing the job tasks and accomplishing its objectives. The activities underlying nurturant-task leadership essentially serve to empower the employees. Therefore, in order to be successful nurturant-task leaders, managers need to develop competency in the effective use of empowerment strategies some of which are as follows:

First, a manager should function as mentor and coach in order to create a supporting and trusting climate. Second, managers should facilitate the subordinates' "enacting attainment", that is, provide them with opportunities to experience task accomplishment, because such experiences are a potent source of personal efficacy information (Bandura, 1986). Third, managers should set high performance expectations for their subordinates and, at the same time, express confidence in the ability of their subordinates to meet these expectations (Eden, 1990). This approach takes advantage of the self-fulfilling prophecy effect. Of course, subordinates might not always meet these expectations. But, even in such situations, managers should provide feedback in a supportive atmosphere. The focus of the feedback is designed to determine the causes of the failure with a view to developing appropriate remedial action plans for the future.

A manager should function as mentor and coach to create a supporting and trusting climate.

Conclusion

The performance management process is indeed a powerful human resource management technique which enables managers to fully utilize the tremendous potential of the organization's human resources for the benefit of both the organization and the employees. Success in the effective use of this technique requires that the modalities of its implementation are modified consistent with the organization's internal work culture in the context of the prevailing sociocultural environment. There are several managerial strategies for this purpose. But it is necessary to emphasize that the manager's leadership in the nurturant-task mode is the key to the effectiveness of these strategies.

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Learning & The Working Organization: Towards Synthesis?

F.J.C.M. van Koolwijik

The concept of the learning organization has come to stay in the present day world of increasing complexity and heightened individualism. The author analyses the problems encountered in initiating the learning process and recommends that the management should be actively involved with the project specific procedures to reap the full benefits.

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The process of initiating learning in organizations and the problems encountered in actual practice have been ignored for too long. "The efforts trainers put in to encourage employees to start learning are not concommitant with the improvements observed" is a complaint raised by many managers. In these demanding times organizations increasingly need managers who initiate and guide learning in practical situations and employees who are innovative in their approach. The concept of the learning organization suggests that it may be possible to bridge the gap between training efforts and the learning/working result. However, the practical integration of this concept in daily management appears to be difficult.

Learning Organization: The Concept

The futurologist Alwin Toffler (1992) noted a number of developments he had observed in society. Among them, those recognisable in daily organizational practice are:

- Increasing complexity
- Increasing pace
- Increasing individualism

In the past 20 years working in an organization has become increasingly complex due to improved technology, automation of management processes, and administration based on complex legal directives. Managers of chain stores complain bitterly about the piles of computer forms they receive every week. Policy statements such as "deregulation" and "a simplified tax system" prove that the government is aware of the complexity of the issue.

Despite shorter working hours and the high number of ATV days (shorter hours of work), complaints about the amount of work and stress are increasing. People are in a hurry; the fax, for instance, contributes to the fact that

less time passes between writing a note and it being received. In the last two years product turn-around time has decreased from 6 weeks to only 10 days on a large organization.

Individualization can be observed in the plaint heard from many executives that they do not know how to get their personnel to do what is required of them. It has become virtually impossible to force people; there is a great deal of negative power; people often have legitimate reasons to validate why something went wrong or why it was not completed on time. "Employees cannot be made to do something which they think is senseless or which they do not support. Against this backdrop the central management issue is "how to get the staff involved — not reactively or defensively, but participating, taking the initiative, making active contributions to thought proceses, how to get the employees to take a critical look at their own approach, improve, experiment and reassess their own approach? If the manager applies force, it generates fear and resistance in the employees, their will to undertake something and their creativity dry up. They use all their energy in being defensive and in avoidance behaviour. And yet the organization has to continue to develop, work processes have to be continuously renewed. But this is impossible without changing the employees' attitudes and skills, because otherwise it does not become a renewal but simply an occasional alteration. Without human development there can be no organizational development — without personal growth there can be no qualitative growth.

There is a growing awareness that there are no simple solutions to a number if issues, but by placing managers and employees in a learning and experimenting process, an opportunity for solving these issues is created. This applies less to day-to-day problems and more to structural problems such as quality management, internal entrepreneurship, and team formation. After all, these problems require a completely different approach and a different attitude of those involved.

The executive management therefore has a considerable need for a concept such as the learning organization. Learning is an important tool with which to achieve effective innovations and with which employees can be encouraged to experiment. However, executives do require a different approach to learning than the traditional training course concept can offer. The trainer's substantive knowledge is no longer the most important aspect, however; what is important is his expertise in being able to get people to start learning and experimenting according to specific practical issues. But does a trainer want to do this and is he able to do it? Is he prepared to depart from his relatively safe classroom and subject matter, is he able to become sufficiently interested in specific processes of the organisation in question and is he prepared to use practical situations as his syllabus, which can lead to measurable results? The issue here is to integrate the responsibility for learning in the function of the manager.

Learning is an important tool with which to achieve effective innovations and with which employees can be encouraged to experiment.

Application

Based on experience, the following elements are important when applying the concept:

- A learning organization is bounded by place, time and themes. It is a situational concept. The concept cannot be implemented for the entire organization. It is a customized process, with one specific problem and a clear end result.

A learning organization is bounded by place, time and themes. It is a situational concept.

- The manager and not an executive, owns the learning process. The learning project is the manager's own project. He has to do it himself and may be assisted by a supporting coach. After all, not every manager has the necessary didactic skills or understanding of human nature. The role of supporting coach need not necessarily be fulfilled by only a trainer. A member of the personnel department or an organization consultant may also fulfil this role as long as he has the necessary skills.
- There are three reasons why a manager would want to start a learning process:
  - When employees have learning requirements that have to be addressed.
  - There are nagging, recurring problems that require the renewal of knowledge, skills and attitudes.

- The manager has a new vision of the way in which work processes could develop.
- The subject matter and syllabus are adapted to the problems and challenges of the daily work. The focus is on the practical aspects. The theoretical aspect is fully aligned with this and is neither too much nor too general. Learning from one another is encouraged.
- The result of the learning meetings and projects is to experiment in daily practice through a renewed approach so that the learners are able to improve their own approach and become focussed. Breakdown of habitual actions is encouraged where these have proved to be non-profitable.
- The learning manager and his staff accept mistakes to a limited extent, insofar as these mistakes are related to the renewing process. They regard these mistakes as an investment in the future.

Designing the Learning Process

There are three types of projects in the framework of a learning organization:

- for an individual employee
- for a department
- for an echelon in an organization.

Although these learning projects may contain elements of a course, they are not courses as such.

The individual employee should be coached individually by the manager. This means retraining this employee in one aspect of his functioning that is regarded by himself and the manager as being important. For instance, let us take the case of a brilliant head of a laboratory who is unable to delegate. There is no training course that can help this man, but a series of coaching meetings may be the answer. He is coached by his own manager who also formulates the objectives and requirements.

The process is structured in the following way:

The entire course lasts 7 months, with monthly meetings of half a day. The employee undertakes interim experiments and studies specific aspects of delegating.

The agenda of every meeting is as follows:

- learning derived from experience gained in the previous month
- discussing hampering factors in himself and/or the environment
- designing new experiments and practising several vital elements of these.

An interim manager was given the task of merging a semi-government body. There were many problems; the previous manager remained absent for an unspecified time, some of the employees had become frustrated and there were conflicts. The management was weak. During the coaching process the interim manager discovered that she got into difficulties because she was not addressing the Board on the strength of her responsibilities. She avoided doing this because she assumed that it would not yield any results. During the coaching meetings she tried to find a way of doing this successfully without undermining her own position, which steps had to be taken and which skills were important. The result was that the management started cooperating and assumed their responsibility for several management issues.

When it comes to a department, several learning and working meetings have to be given shape. This means that the manager and the employees involved make an in-depth study of a major part of the work process that has to be changed structurally.

As was the case for example, of the Sales Department which had to deal with the problem that the search for new clients was structurally unsound. It appeared that the problem was the lack of acquisition skills. Four learning/working meetings were opted for, during which acquisition skills were trained on the basis of specific experience. Learning discussions were conducted and practising exercises drawn up. Specific new insights were presented and experiments designed. In this way the learners gained experience in everyday practice; they tested the new approach in the next acquisition interview; saw how it worked and adjusted the approach as they go along. At the following meeting they learned from these experiences by detecting the underlying patterns.

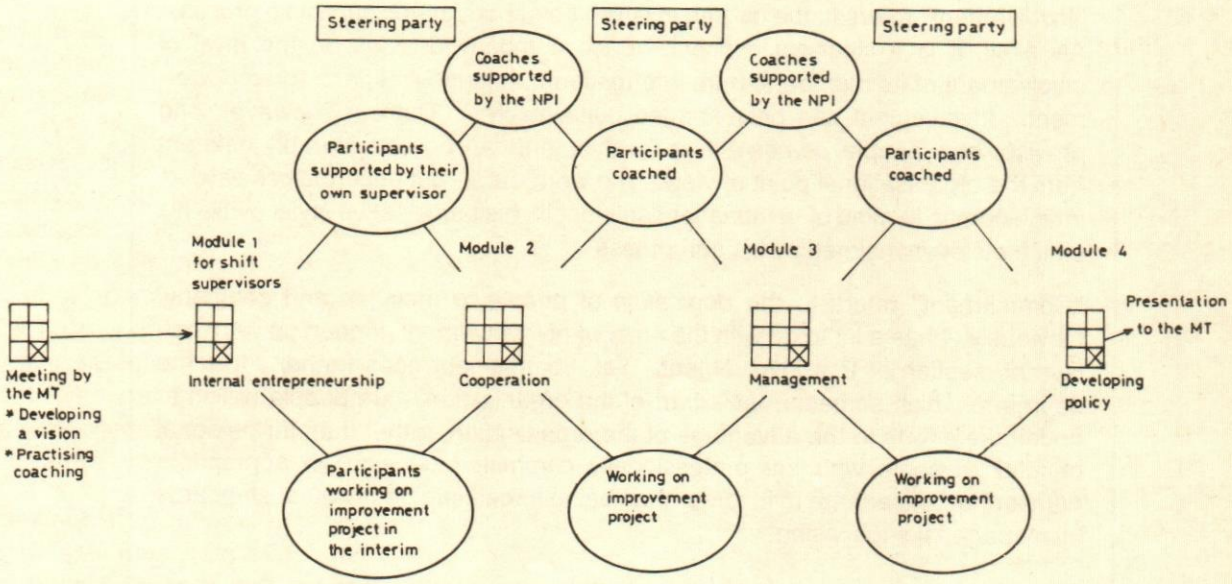
What is involved here was learning from one another, creating a learning and experimental climate with the input of an external consultant focusing on the components. The manager himself initiated these meetings; during the preparation he was supported by this coach. During the process the manager was a participant with the coach taking the lead, but the manager retaining responsibility.

What is involved here was learning from one another, creating a learning and experimental climate with the input of an external consultant.

When there are problems that are not related to a department, but to a horizontal layer in the organization (a management team, heads of departments) a learning process can be designed that covers several departments. For instance, there was the case of 25 shift supervisors of a dairy company each with a staff of 5 to 25 employees who felt the need to improve their managerial skills. Steering long-term improvement projects in particular appeared to be an important learning objective. They opted for a set-up in which the members of the management team, including the managing director, coached the shift supervisors. Four learning/working meetings were convened. In the mean time each worked on his own improvement project, coached by his supervisor. The supervisors were taught how to approach the coaching in the best possible way. Prior to working with the shift supervisors the management team held a meeting during which they drew up a vision of the shift supervisor's function. The shift supervisors also developed a vision of their role in the future. The interaction of these visions took place during the first learning/working meeting. In the final meeting the shift supervisors and the management team discussed the initiative proposal for an organizational improvement of the work process.

The following is one of the specific results achieved. An executive employee had selected the problem of lumpy butter-milk. In this learning process he and his "learning-mates" developed a new approach and put it to test. The result was a 75 per cent reduction in the lumps. At the request of the supervisor, he put the approach down in writing so that it could be used in the future in similar cases.

The architecture of this learning/working process was as depicted in Fig. 1.



Note:
1. Some members of the MT told the shift supervisors of their vision during the first meeting.
2. The shift supervisors presented a policy proposal to the members of the MT during the last meeting

Fig. 1. The Learning Process

Towards synthesis

The concept of the learning organization is not a new form of salvation that should be implemented as soon as possible; it is signal. This signal is that learning is a basic element in organization renewal as long as it is related to practical issues and the daily activities. The bridge be-

tween working and learning should be built on good foundations. The three pillars of the bridge are practical situations used as subject matter, the management doing the training itself and a didactic architecture used for the learning processes. Human and entrepreneurial understanding serve as the basis for a learning climate.

If the manager steers the learning process under his own responsibility and if the coach can link his know-how of teaching people to specific working situations a synthesis can be produced, for a particular situation, for a specific set of people at a specific point of time. It is imperative to reproduce this synthesis every time it becomes necessary.

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Involvement versus Commitment

"Involvement" refers to the degree in which somebody *participates* in a process. All in all, it is a clear-cut concept. Each company decides on the level of involvement of its members: from information ... to consultation ... to empowerment. Involvement can be managed quite easily. There is, however, one proviso: how people *perceive* their involvement can be considerably different from the organisational point of view. The worn-out — but nevertheless valid — image comes to mind of a manager confident in his participative style, while his staff feels overwhelmed by his abruptness.

"Commitment" refers to the *dedication* of people to their job and company. Obviously, it has a lot to do with the amount of involvement, topped up with their own perception of that involvement. Yet, commitment goes further. It is the degree to which someone feels part of the organisation. Are people willing to undertake efforts to the advantage of the organisation, rather than for personal benefit? People who are professionally committed develop an appropriate demeanour and adhere to it, rather than being forced into behavioural standards by managerial supervision.

Source: European centre for work and Society News, Oct. 1994.

TQM in Culture Transformation: The Case of Health-care Provision

Mohammed Zairi & A.R. Feeny

Culture transformation is a prerequisite for the successful implementation of Total Quality Management. The article elucidates the various steps involved in identifying customer requirements, introducing a quality culture and specifying standards in health-care provision and concludes that the issue can be tackled with an appropriate TQM strategy.

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Culture has been defined in so many different ways, such as 'shared values and behaviour patterns amongst people/workers', 'the sum total of intellectual and creative values of people/workers', and 'a set of norms and values', amongst others. Its relationship with leadership, another important subject in the context of TQM, is not easily understood; just like the chicken and egg situation — which comes first? However, it is widely recognised that both leadership and culture are very closely related, just like management and structure or management and systems. To achieve total culture transformation, there is a need for strong leadership. Similarly, strong leadership is often found in specific cultures characterised by a total positive climate.

The prevailing view is that attention given to the **visible** features of organisations, such as management skills, strategy, structure, and reward mechanisms, cannot lead to successful competitiveness. It is argued that there is a need to focus on the **invisible** features, such as quality, style, character and 'the way of doing things', which give meaning, direction and motivation for people to perform. Culture is the **social energy** that drives organisations towards their desired goals.

Culture change therefore becomes the responsibility of top management. The degree of success in achieving culture change depends on tackling the soft or invisible aspects and ensuring that the hard aspects such as systems, tools and techniques, structures, reward mechanisms, and communication systems are all effective and compatible with modern business requirements. Thus culture change is a **soft outcome** of having different elements in place, such as:

— Strong leadership with total commitment to the cultural transformation

— People's involvement, training and development

— Existence of systems compatible with TQM principles

— Use of tools and techniques and reliance on hard facts

— Team-work

— Focus on the customer's voice and the process's voice (i.e. the customer-supplier chain) during the running of business operations

— And most importantly, the instigation of improvements on a never-ending basis.

The degree of success in achieving culture change depends on tackling the soft or invisible aspects.

Quality in NHS

Prior to 1983, quality in the NHS (National Health Scheme) meant very little, and efforts made by the various health authorities were not really subjected to rigorous assessment for systematic quality assurance standards. In fact, for a long time, quality control predominated only in departments such as pathology and radiology and was more in terms of a technical compliance (scientific).

As the Griffiths Report (1983) concluded:

> "... there is little measurement of health output; clinical evaluation of particular practices is by no means common, and economic evaluation of these practices extremely rare. ... Whether the NHS is meeting the needs of the patient and the community, and can prove it is doing so, is open to question."

However, since then there has been increased awareness of the importance of providing quality in healthcare and more attention is being given to the management of quality issues, particularly because of pressures from consumer groups, increased patient expectations and successful medical negligence litigations; and because of the fact that the UK committed itself in 1984 to a World Health Organisation declaration intended for developing **'effective mechanisms for ensuring quality of patient care within the health system'** by 1990.

In 1989, the Department of Health began its reforms on the structure of the NHS. It published a white paper called *Working for Patients*, which highlighted:

— The importance of quality assurance

— The need to create a customer-supplier chain (purchaser-provider split)

— The creation of an internal market which will be encouraged to compete on price and quality

— The setting up of NHS trusts

— The need for having specification based on quality standards and measurements.

The White Paper also introduced compulsory medical audit, described by the Department of Health as 'the systematic critical analysis of the quality of medical care, including the procedures used for diagnosis and treatment, the use of resources, and the resulting outcome and quality of life for the patient.'

TQM in Bradford Hospitals (NHS) Trust

In the NHS, for some considerable time, quality control has been a feature of departments such as medical physics, radiology and pathology, where it is part of the accreditation requirements of the relevant professional bodies. During the 1980s, several isolated quality assurance projects were initiated with the Bradford District hospitals. Most of them, like the nursing audit process, were associated with nursing issues and mirrored other quality assurance efforts which were taking place elsewhere in the country or had been favourably reviewed by the Royal College of Nursing.

In Bradford, as in every other district, TQM is of fairly recent origin. Bradford is, however, among the first to give quality a corporate identity and to embark on its development on a co-ordinated organisational basis. In 1988, the hospital administrator of Bradford Royal Infirmary was made the Quality Manager, with responsibility for all quality issues in the acute sector. His position was supported by the appointment of two quality assurance managers, his goal: to move towards Total Quality Management. Together they began to implement a strategy aimed at changing the culture of the organisation by focusing on the patient; promoting the delivery of a high standard of quality of care and encouraging self-ownership for quality standards.

The quality assurance managers encouraged staff to seek their assistance, set up quality circles, advised on quality improvement programmes and began the drive to establish hospital-wide standards of quality.

On 1st April 1991, Bradford Royal Infirmary, St Luke's Hospital, Woodlands Orthopaedic Hospital and Bierley Hall Hospital were granted Trust status by the

Minister of Health. The new Bradford Hospitals (NHS) Trust placed specific emphasis on quality, the Trust prospectus defining a mission statement as: "to provide high quality health care promptly and equitably to the people of Bradford."

One of the two Deputy Chief Executives was given responsibility for organisational development and quality leadership and a third quality assurance manager was appointed. The quality strategy was further developed to include the following actions:

Identification of customer requirements : A survey of Bradford general practitioners was undertaken during this year and published in August 1991. So far, there has been no patient survey, nor has any attempt been made to seek the opinion of the internal customers — the staff. It is the intention of the Trust to ascertain patient opinion in the future by using a qualitative methodology known as Critical Incident Technique.

Introduction of a quality culture : The Trust takes the view that quality is a multi-faceted concept that encompasses excellence, economy, efficiency, effectiveness, equity and enterprise. It also recognises that quality of care cannot be imposed and that its delivery is specific to each department. Directors are asked, therefore, to agree with their members on the best way of incorporating these six Es into the Directorate's objectives and to report back at regular intervals on progress and success.

Quality is a multi-faceted concept that encompasses excellence, economy, efficiency, effectiveness, equity and enterprise.

Specification & introduction of standards : The Trust's quality manual was published in November 1991. It contains broad contractual quality standards for individual directorates. It is based on the standards outlined in the King's Fund Organisational Audit programme, which sets national standards for hospitals. During 1992 the Trust's audited all its directorates against these standards in order to ensure compliance before seeking accreditation in March 1993. The Trust expected all directorates to meet the standards for accreditation set by their own professional bodies. In 1992 the Trust paid particular attention to the ability of the Directorate of Medical Physics to comply with BS 5750. It also investigated the Directorate of Pathology's ability to meet the requirements of the Committee for Accreditation of Pathology (CPA).

Installation of outcome measurements

Organisational audit

Medical audit is already established and co-ordinated by Bradford Health. It is the intention of the Trust to carry out nursing audit at directorate level. Presently there are pilot schemes being undertaken in the Directorate of Medicine and in nursing education.

Clinical audit assesses service quality and requires the participation of a multi-disciplinary team. Its development is expected to follow medical and nursing audit.

Bradford Health (BH) is the Trust's main purchaser, responsible for approximately 80 per cent of annual revenue through contracts. These specify required quality standards which will be monitored by BH to ensure contract compliance. At present, contract compliance is global. It is expected that over the years measurable health care outcomes, developed through dialogue with BH, will become an increasing feature of the contracting process.

The Patients' Charter

The Charter which came into effect on 1st April 1992 is viewed by the Trust as a vehicle for feedback information on patients' experiences of service and clinical quality. Comments, both good and bad, may require a readjustment of standards. The Trust has established a system which should ensure a prompt response to customers' complaints.

Dialogue

The Trust executive has monthly meetings with general practitioners in order to discuss issues of a strategic nature. These meetings are invaluable for establishing strong links with one of its major customers, for defining customer requirements, and, occasionally, for managing the customer. The general practitioners also meet each of the directorates on a yearly basis, this promoting dialogue between provider and purchaser at more than one level in the organisation.

Implementation

Having established a good baseline for TQM implementation, the strategic plan undertook implementation on 1st January 1992 in two directorates: Medicine and Pathology. Training and development have been

undertaken by the Organisational Development Unit in conjunction with the Trust's training department.

The Yorkshire Regional Health Authority (YRHA) approved the TQM implementation strategy and has chosen Bradford Hospitals (NHS) Trust as one of the region's demonstration sites. The introduction of contracts which include quality clauses ensure that:

— Health care delivery focuses on quality of care

— Beneficial partnerships will develop between purchase and provider

— The customer's opinion, needs and desires will become of paramount importance to the Trust

— Monitoring of outcomes will ensure high quality standards and constant improvement in the provision of healthcare.

Internal and external audit

— give a public demonstration of the Trust's commitment to quality;

— provide a systematic hospital-wide review of services resulting in the validation of good practice and recommendations for change;

— bring together all levels of staff for a common purpose and encourage multi-disciplinary working.

Implementation of TQM within the Bradford Hospitals (NHS) Trust is an opportunity to gain the following:

— Customer satisfaction

— Customer loyalty

— Continuous improvement in quality of patient care

— Better patient clinical process outcomes

— Raised performance standards

— Efficiency improvements

— High staff morale

— Motivated staff

In real terms, the Patients' Charter is extremely desirable. However, in the immediate future it will be seen by some healthcare providers a a potential threat because many institutions will not be able to deliver, and they have not been allocated enough time to get things right. The present NHS reorganisation has created an internal market, and, theoretically, competition can come from any part of the country. In reality, Bradford's main competitors will be the Leeds Trust and the soon-to-be Airedale Trust. Because there is very little difference in the cost of healthcare across Yorkshire Region, it is expected that the deciding issue will be standard of quality, in which case the Bradford Hospitals (NHS) Trust must do everything possible to ensure that its TQM strategy is successful.

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"Take a look around ya boy, it's bound to scare ya boy, and ya tell me over and over and over again, my friend, you just don't believe we're on the eve of destruction."

— Barry McGuire, "Eve of Destruction"

Work Culture in JIT Environment

Suresh Garg, Prem Vrat & Arun Kanda

In order to remain competitive, many Indian Manufacturing firms have attempted to implement Just-in-Time (JIT) manufacturing system. JIT imposes a different set of requirements on the typical work culture. However there is little research on the cultural aspects of the implementation of JIT in business operations. In this paper the specific cultural changes required in a JIT environment are explored and their presence in Indian industries is reported.

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JIT can be defined as producing the right part at the right time and in the right quantity. The implementation of JIT challenges traditional manufacturing practices and involves not only technical (Charry, 1993; Sohat et al, 1993; Vrat et al, 1993) and organizational (Guinipero & Law, 1993; Vora, 1992) changes but also cultural changes. Technical changes include smoothing of production, pull system, change in layout and the control of quality. JIT requires a work culture that allows: the worker to become a participant in decision making and thus necessitates putting trust and responsibility in the hands of the workers and the suppliers to become the same interest group by way of having long term relationships.

Overview of Work Culture

Culture is the manmade part of environment. It reflects the way of life of people, their tradition, heritage style of living etc. Culture is the totality of beliefs, norms and values which are related to the patterned regularity in people's behaviour. Work culture means work related activities and the meaning attached to such activities in the framework of norms and values regarding work. These activities, norms and values are generally contextualised in an organization. An organization has its boundaries, goals and objectives, technology, managerial practices, material and human resources as well as constraints. Its employees have skills, knowledge, needs and expectations. The two sets of factors — organizational and organismic — interact, and over time establish roles, norms and values pertaining to work. It is this totality of the various levels of interacting factors around the focal concern of work which is called work culture (Fig. 1).

Work culture is the totality of work related activities, affect and cognition, norms and values regarding work in an organizational setting where technology and social cultural forces jointly determine managerial styles and practices, work climate, etc.

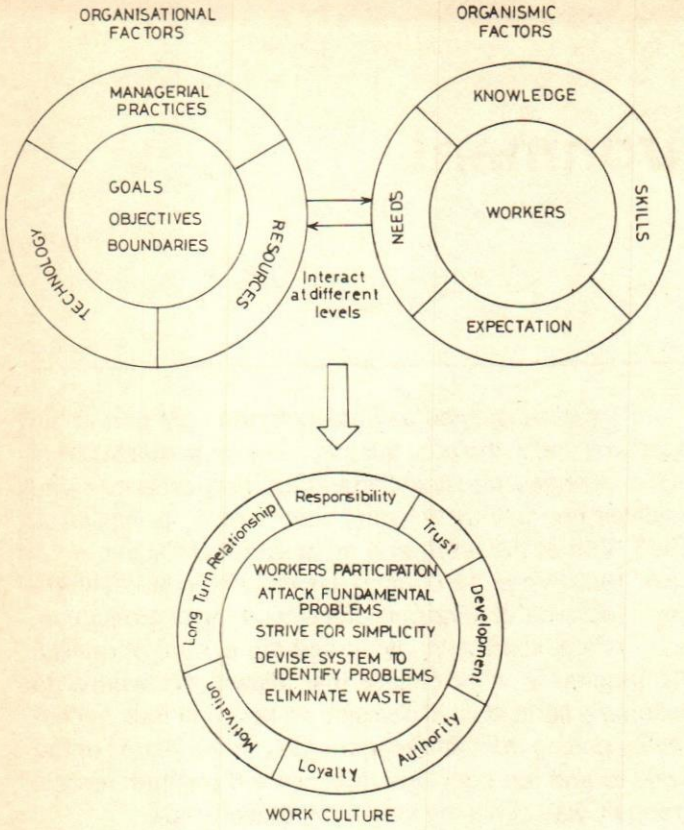

Fig. 1: Work Culture in JIT Environment

Historical Developments

Historically work culture in India has its philosophy in "Detachment of one's duty from any desire for the outcome" (nishkam karm), as preached in Shrimad Bhadvadgita. The meaning attached to work has been changing through the developmental stages of human society and technology. Earlier, work was considered as a physical activity performed for the mundane purpose of survival and existence. Later it was considered that people work to sustain life, to maintain contact with reality, to be part of a community, to attain status, to produce goods and services and to fulfill themselves through service to the society.

With industrialization and technological advancement, difficult and dirty jobs were assigned to automatic machines and eventually to robots; gradually, computers took over many of the routine jobs. All these led to greater impersonalization of the work place. A contractual relationship between organization and employees, thus emerged. An individual enters into a contract with the organization to occupy a position in the hierarchy and to play the role attached to that position. Job specification, work norms, job rating etc. become part of the work culture. Individualism and department feelings crop in and individual performance rather than the organization's performance dominate the work culture. This culture becomes mechanical and lifeless and fails to get the involvement of the employees.

Job specification, work norms, job rating etc. become part of the work culture.

Ideally work should consist of activities through which man may realize himself. According to Thorsrud (1972), work must provide:

- Variety and challenge to one's ability and competence rather than activities requiring sheer endurance
- Opportunity to learn and to develop one's skill and competence
- Social support and recognition of work place
- Opportunity to relate what an individual performs and produces to his social life
- Feeling that work would lead to a desirable future.

JIT Basic Philosophy

JIT is a philosophy that defines the way the work should be managed. It is concerned with creating the right environment for effective operation. This approach moves managers from tactical decision making to more strategic areas. It believes in doing the simple things well and gradually doing them better. It further emphasizes on developing competence and simplification in the way we do things and squeezing out waste every step of the way which enables meeting demand instantaneously, with perfect quality. JIT is best defined as an approach to achieving excellence in a manufacturing company.

JIT is a philosophy that defines the way the work should be managed. It is concerned with creating the right environment for effective operation.

These definitions lead us to put the essential objectives of JIT as:

- Attacking fundamental problems
- Eliminating waste

- Striving for simplicity
- Devising systems to identify problems

To achieve these objectives a very high degree of worker involvement, commitment and motivation is required. This has to be supplemented by management attitude and commitment, communication and other organizational factors. Thus for a JIT environment, the work culture required is marked by trust, loyalty, responsibility, development, motivation, authority, long term relationship and respect for human being. The work culture of JIT is influenced by micro and macro environmental factors. These factors construct a framework shown in fig. 2.

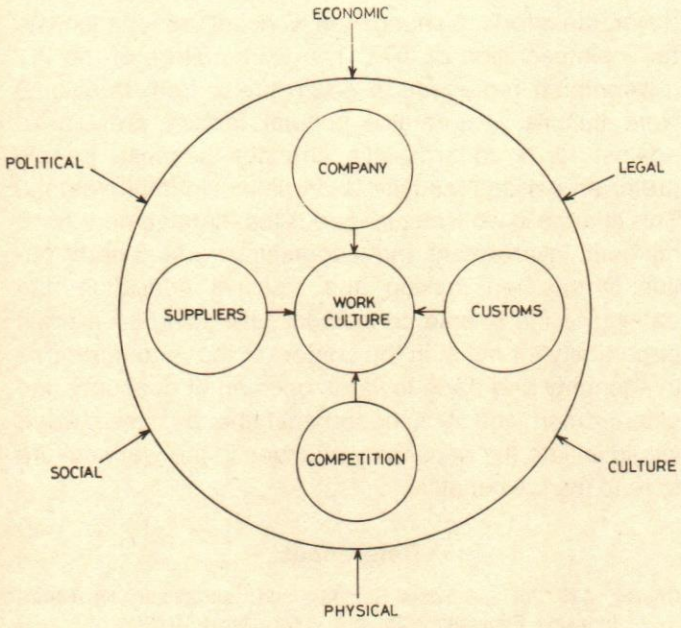

Fig 2.: Micro and Macro Environment Factors

Dimensions of Work Culture in JIT

JIT work culture has multiple dimensions. These are briefly outlined as follows:

Multifunctional Workers: Multifunctional cross trained workers are trained to do different jobs in the factory. In a JIT production environment, the company avoid its workforce becoming speacialized. They are made to work in different departments. With this flexible work force, when one worker falls behind in his task or is absent, another worker can do his job. Cross training induces better integration, communication and team work among the workers. This also enhances the company's competitiveness.

Long Term Employment Motivation & Trust: JIT requires very high motivation and trust between the workers and the company without which its successful implementation cannot be achieved. Continuous training for all workers is a must to help them understand the philosophy, concept and techniques of JIT. High turnover rate of workers is not appropriate for JIT. By giving life time employment, workers feel safe and committed to the job throughout their productive years. This helps in achieving low turnover rate of workers. Employees also have a strong commitment to behave responsively and equitably towards one another.

Continuous training for all workers is a must to help them understand the philosophy, concept and techniques of JIT.

Top Management Attitude & Commitment: JIT tries to reduce waste by having less inventory. As a result, problems are highlighted and the causes of problems are identified and solved. Problems should not be considered as mistakes as this will hamper the process of attacking fundamental problems, which is necessary for JIT.

Support from Union Leaders: JIT is a completely new concept. Implementation of JIT constitutes a very basic change in the manufacturing system. Such a change requires full support from every person in the organization. Support of union leaders is especially important because most of them oppose concepts like multifunctional workers and zero buffer stock.

Effective Communication: In JIT environment effective communication at all levels of the organization both horizontally and vertically is very important to make it efficient.

Poka Yoke Inspection Method: Poka Yoke is "error proof" design of equipment, tool, jigs to ensure no error is made by the workers. This helps in achieving high standards of quality which is a prerequisite for implementing JIT.

Incentive Scheme: JIT concentrates on teamwork and on synchronized work stations. An individual incentive scheme can destroy good teamwork and synchronized production. Group incentive scheme based on schedule adherence and quality level of the whole group of workers or no incentive system at all should be applied.

Payroll System: In a JIT environment there is a greater need for flexibility of workers. A worker should

have the capability to do several functions. therefore, payroll system should be based on the number of tasks a worker can do for supporting the need for flexibility.

Kaizen: Kaizen means gradual, unending improvement, doing "little things" better; setting and achieving-ever higher standards. It involves everyone — top management, managers and worker.

Line Stop Strategy: Line stop strategy is the authority given to workers to stop the line in the event defective products are detected or expected to occur. The rationale for the line stop strategy is that it can ensure quality at the source and subsequently prevent rework and unnecessary safety stocks. because line stoppage does not allow the worker to pass a defective unit to the next work station. This is a part of the delegation of quality control responsibility to workers at every phase of the production process.

Indian Scenario

A Delphi study (Mittal & Tyagi, 1992; Vrat et al, 1993) conducted to assess the applicability or difficulty of implementing JIT characteristics in Indian scenario indicates that Quality Circles and good communication are not very difficult to implement having a rating of 30 and above on a 40 point scale. Top management attitude, support from union leaders, multifunctional workers and long term relationship with vendors have ratings between 25-29 whereas long term employment has a rating of 24. These high ratings indicate that adapting JIT culture in India is not an impossible task.

An Indian manufacturing organization was studied with special reference to its work culture profile. This company is a large scale automobile manufacturer. JIT philosophy was introduced along with the conception of the plant with Quality Circles, suggestion schemes and Kaizen being part of the manufacturing system. The organization has about 285 Quality Circles, which in 1992-93 generated about 53,000 suggestions out of which 23 per cent were implemented resulting in savings to the tune of Rs. 65 million. During 1993-94, 15,400 kaizens were effected, resulting in following achievements:

— 56.6 tones weight reduction

— 3693.6 tones-km. per year material handling reduction

— 1430 km per month per man movement reduction.

The employees actively participate in the decision making, as a result, the workers are highly motivated. During 1994, average attendance of employees, was 94 per cent and zero employee turnover rate existed in the group of skilled, semi-skilled operators and supervisors.

With regard to long term relationships with suppliers, for about 50 per cent of the components, company has single source. Training at all levels is compulsory. The company has an inhouse training department which helps in achieving the company's target of minimum 64 hours/year training for every employee.

Conclusions

It is critical for a firm to make conscious and deliberate efforts to change the work culture for successful implementation of JIT. The work culture of the JIT environment represents a sharp break from traditional work culture. Generally, cultural factors are biased against rapid and massive changes because people prefer an existing inequity to an unknown improvement. This change in work culture needs top management commitment, involvement and leadership, workers participation in decision making and massive education and training to the people concerned. JIT could be a great opportunity for India, in the context of the recent reforms in economy and trade towards opening of economy and globalization and it is hoped that the business world would initiate the necessary changes in the work culture to reap the full benefits.

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Nature, Significance & Rationale of Business Process Reengineering

P.N. Rastogi

The core processes of an organization change over time in accordance with the shifting requirements and the advent of new technology. Redesigning a business process involves reducing the complexity, cost and time of operations. This article formulates the guidelines for the implementation of business process reengineering.

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Business Process Reengineering (BPR) refers to the analysis and redesign of workflows and processes within and between organizations. The orientation of the redesign effort is radical i.e., a total reconstruction of a business process unconstrained by its existing structure and pattern. The objective is to obtain quantum leaps in performance of the process in terms of time, cost, output, quality, and responsiveness to customers. The redesign effort aims at simplifying and streamlining a process by eliminating all redundant and non-value adding steps, activities and transactions, reducing drastically the number of stages of transfer points of work, and speeding up the workflow through the use of IT (Information Technology) systems.

The redesign effort aims at simplifying and streamlining a process by eliminating all redundant and non-value adding steps, activities and transactions.

Need for Process Redesign

BPR concentrates on the few core business processes out of the many processes that go on in any company. A core business process creates value by the capabilities it gives the company for competitiveness. Core business processes are critical in a company's evaluation by its customers. They are vital for success in the industry sector within which a company is positioned and crucial for generating competitive advantages for a firm in the marketplace. The core processes of a company may change over time in accordance with shifting requirements of its competitiveness. The business process capabilities may be viewed as ranging along a continuum. Their minimum level corresponds to the re-

quirements for entry in any given industry. Their maximum level analogously corresponds to the requirements for achieving a leadership position in the industry. Competitors and customers define the level of process capabilities required for entry or leadership in any industry segment. On account of intensifying competition, the earlier requirements for achieving leadership, tend to get reduced to mere entry level requirements.

Existing business processes and work patterns are largely obsolete and irrational. They organize work as a sequence of narrowly defined individual tasks/activities, specify restrictive job roles based on their execution, aggregate these roles into departments, devise elaborate mechanisms to monitor and control the performance of tasks/activities, and provide managerial positions to administer the incumbents of narrow job roles. Hierarchic layers process and transmit work information upwards for appraisal and decision-making. Such a fragmentation of inclusive and integrated work processes not only makes it difficult to improve the quality of work performance, but also engenders a tunnel vision among the employees. They tend to focus primarily on the narrow goals of their particular departments to the detriment of the larger goals of the organization. As the pieces and fragments of work move from person to person, and unit to unit, delays mount and errors increase. Emerging critical issues often remain unaddressed, as they do not usually fit the narrow definitions of tasks and work roles.

Fragmentation of inclusive and integrated work processes not only makes it difficult to improve the quality of work performance, but also engenders a tunnel vision among the employees.

Most of the existing business work processes were developed before the advent of computers and information technology. Even after the adoption and spread of information technology, companies have usually applied the technology to automate the extant work methods and procedures, or to speedup the isolated or narrow components of a larger existing process. Different sub-units of organizations have also tended to automate their own specific and limited domains of work, without any sustained attention being given to the purpose and logic of a business process in its entirety. This has resulted only in the mechanisation of existing poor and deficient work practices.

Underlying Premises of BPR

The underlying premises of business process reengineering may be outlined briefly as follows:

- Operational excellence of a company is a major basis for its competitive effectiveness.
- The business strategy of a company should be oriented around leveraging its operational excellence into the marketplace.
- A customer focused organization needs to be defunctionalized, and realigned in a process orientation.
- Processes need to be managed, not functions.
- For considering totally new ways of redesigning processes, every concept, assumption, purpose, and principle, needs to be abandoned temporarily.
- Continuous improvement (kaizen) is a deficient approach when a company is far behind the best industry standards, and needs rapid quantum leaps in performance.
- Dramatic improvement in performance is the prerequisite for leaping across competition.
- How to compete is more important than deciding where to compete (portfolio theory of business).

Redesign of Business Processes

Changing or redesigning a business process means reducing the complexity, cost, variation, and time, and achieving markedly higher levels of speed and efficiency of work operations toward meeting customer needs and expectations. These objectives are not mutually exclusive. Rather, they are mutually supportive in terms of a holistic approach toward an end-to-end redesign/reengineering of an entire process. Business process reengineering (BPR) examines and analyses the work flow structure of a process incisively, and reconstructs it in a logically parsimonious manner by suing the capabilities of IT systems as necessary. It cuts across functional and departmental lines, and integrates the process from beginning to end across organizational boundaries.

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Process redesign involves a series of steps which have been outlined and elucidated by a number of writers. According to Daveport and Short (1990) for example, the redesign of a process involves the following five steps:

- Developing the business vision and process objectives
- Identifying the process(es) to be redesigned
- Understanding and measuring the existing process
- Identifying IT levers
- Designing and building a prototype of the new process.

The redesign objectives are specified by them as cost reduction, time reduction, and quality of worklife/learning/empowerment of employees. They also state that for initial efforts, only a few key processes should be selected. The scope of process redesign includes its beginning and end points, and interfaces and organization units (function/departments) involved, with special reference to customers' concerns.

The role of IT is crucial in process reengineering. IT's capabilities in the present context involve improving knowledge-based coordination and information access of organizational units. Improved coordination and information access enable a more effective and economical management of task interdependencies. IT capabilities and their organizational impacts can be thought of in eight different ways as follows: transactional, geographical, automational, analytical, information, sequential, knowledge management, tracking, and disintermediation or removal of intermediaries in the communication between two persons or work units. The enabling role of IT is critical in the formulation and implementation of BPR projects.

Contexts & Considerations for Process Redesign

Contexts or opportunities for redesigning business processes may be both obvious and non-obvious. The obvious opportunities are those related to apparent inefficiencies, delays, high cost structure, wastages, poor design of facilities, and so on. The non-obvious or unexpected opportunities however, need to be uncovered systematically. They may often be located in terms of the following considerations or guidelines:

- Identify underlying problems in the upstream activities. They may be rooted in the lack of adequate or timely information, errors in knowledge, and weak work skills,
- Reduce the number of stages or handoffs between functional areas/departments,
- Remove delays, errors, and ambiguities during handoffs between functional areas or work zones,
- Combine steps, workroles, or phases of activities, that span functions and/or businesses,
- Let those who use the output of a process, perform the process,
- Put the decision point where the work is carried out,
- Build control into the process,
- Capture information once, at the source.

These considerations or guidelines lead toward a non-hierarchic flattened business organization on the one hand, and multi-skilled empowered knowledge workers, on the other. Employees need to be empowered to do their best. This, in turn, implies giving them training in needed new skills, and access to the necessary technologies. The 'informated' new pattern of work involved in the reengineered work processes, demands new and more knowledge-based work skills in the application and use of IT tools and systems.

Rationale of BPR

Business process reengineering represents a new revolutionary approach toward a radical and total restructuring of organizations. It engenders cascading consequences that profoundly alter and change almost every aspect of an organization's work and functioning. Its nature and rationale have been elucidated by Hammer (1990) among others. They may be recapitulated briefly as follows:

- The approach of BPR involves discontinuous thinking. It requires recognizing, challenging, and breaking away from, the extant rules and basic assumptions that underlie the existing work operations of an organization. BPR does not aim at improving at existing processes; it aims to achieve breakthroughs in performance by redesigning them radically and entirely.

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- The BPR approach holds that the existing rules and form of work design are based on assumptions about technology, people, and organizational goals, that are no longer valid. The existing rules and pattern of work structuring do not take into account the vast and expanding potential of IT for the most rational, simple, and efficient redesign of work structures.
- The BPR approach requires viewing a process from a cross-functional perspective. The redesign effort must be broad in its focus and scope. It must disregard the constraints of existing organizational structure and internal boundaries toward conceptualizing and envisioning the process anew. BPR uses IT to enable and actualize a new process, instead of automating an existing process. Creativity and imagination must guide decisions about the use of IT in process redesign, and not the other way round.
- BPR effort involves managing massive organizational change. The change involves not just a process itself, but also new forms and modes of jobs, procedures, management systems, career paths, recruitment, training programs, promotion policies, infrastructural facilities, and so on. Any and everything related to the redesigned process, must be revised and refashioned in an integrated manner to support the new process design.
- In view of the massive nature of organizational changes involved, an effective implementation of a BPR effort is bound up with the vision, commitment, persistence, and determination, of the managerial leadership to see the effort through toward completion.

Central Thrust of BPR

Although BPR is a multi-faceted and multi-dimensional undertaking, its central thrust may be identified as the reduction of the total cycle time of a business process. The total cycle time of a process is the time it takes to complete the performance of the process from beginning to end. It may also be viewed as the total duration from the time a customer need is expressed until it is satisfied. The longer the cycle time of a process, the more inefficient may it be deemed. A lengthy process is characterized by a large number of stages or steps, procedures, tasks, and activities. It drastically reduces a company's ability to provide customers with timely service. Lengthy processes result in large wastages of time and resources for ordering, purchasing, receiving, designing, producing, and selling.

BPR seeks to reduce the cycle time of a process by eliminating the redundant stages and non-value adding steps; by drastically simplifying and rationalizing work methods/procedures, systems, and flows; by coordinating the entire process through a single role position; and by eliminating as many transit and waiting points as possible; besides reducing delays and speeding up the flows of information, decision, and action. Even after the redesign of a process, BPR maintains a continuing lookout for 'improvement after improvement'.

Implementation of BPR

A typical reengineering project usually involves a set of five stages as follows:

- Analysis and assessment of an existing process including the mapping of its activities, tasks, locations, and boundaries
- Measurement of the transit times, delays, and costs associated with existing work flows
- Conceptualization of the process redesign and its prototying
- Deployment, testing, and evaluation of the redesigned prototype process including its further refinement as indicated
- Installation and use of the fullscale redesign process. Each of these stages involves multiple tasks and iterative steps in its progression toward the next stage. The initiation and implementation of these stages is however, preceded by a set of implementation requirements, specified as follows by Stewart (1993):

Get the Strategy Straight First

A company must take a long look at what business it wants to be in, and how it intends to make money at it. It must make a fundamental decision toward what it wants to emphasize in its product-market relationship. This decision would in turn, determine the company's aim in reengineering. The company may seek its competitive advantage in terms of lowest possible production costs and/or added value in delivery and service. A firm may achieve dramatic improvements in a business process in terms of 60 to 80 per cent reduction in cost and cycle time. But in the absence of a strategic focus, these improvements may at best produce only a marginal impact at the business-unit level, because the changes did

not have any bearing on the needs and expectations of the company's customers.

Lead from the Top

Reengineering of a process involves far-reaching changes in and across business functions and departmental boundaries. It must therefore be led by managers with the authority to oversee the redesign of a process from top to bottom or end-to-end. The project leader needs to create a small team of highly competent, knowledgeable, and motivated people from all relevant departments/sections including human resources, and information systems.

Create a Sense of Urgency

The term members should share and diffuse a sense of the crisis conditions faced by the company. They should accord critical priority to learning from customers about their needs and expectations, and learning about areas where competitors are ahead. For this purpose, benchmarking is essential. A company must know where it stands function by function, and process by process, in order to visualize and realize the breakthrough points.

Design from Outside in

Reengineering begins with customers and is validated with reference to them. Only through an outside view of the customers' expectation from the company in terms of their needs, can an agreed framework of change and redesign emerge. The focus should rather be on identifying the points of leverage or breakthrough where new thinking will provide the maximum impact.

Reengineering begins with customers and is validated with reference to them.

Manage your Consultant

Outside consultants may be needed not only for providing new insights and perspectives toward process redesign, but also for helping in implementation. They should also be required to train in-house personnel who can carry on and accelerate the implementation work.

Combine Initiatives

Although BPR is essentially a top-down effort in so far as it requires strong leadership, technology, and radical change, it is best facilitated by a combination of top-down and bottom-up approaches. The bottom-up effort, apart from a lack of necessary expertise at the lower level, would also be blocked by internal boundaries within the organization. The top-down approach may specify targets, and the bottom-up approach may specify how best to achieve them and complement the top-down approach by providing an environment of continuous improvement or total quality management (TQM).

Culture Counts Big

Culture of an organization refers to the shared values, beliefs, and vision of its members. A strong organization culture of excellence, innovation, and achievement, is an extremely valuable resource for managing change. Reengineering is a massive effort of change in the way people work. A supportive organizational culture can substantially ease this difficult process of transition.

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BPR is primarily an IT-enabled effort. Without the availability of requisite IT infrastructure and capabilities, the redesign process may not go very far. Yet another key requirement relates to the managerial skills needed for leading a BPR effort. BPR is a information-focused process of managing planned change. It thence needs to be managed by a new or different type of executive, who possesses a combination of multi-disciplinary business, technology, and information, skills.

'Principles' of Reengineering

The foregoing implementation requirements specified by Stewart (1993) are instructive, but rather broad and general. In this context, Hammer (1990) also provides a picture of the implementation requirements termed as 'principles' of reengineering:

- Organize around outcomes, not tasks.
- Have those who use the output of the process perform the process.
- Subsume information-processing work into the real work that produces the information.
- Treat geographically dispersed resources as though they were centralized.
- Link parallel activities instead of integrating their results.

- Put the decision point where the work is performed, and build control in the process.
- Capture information once and at source

A reengineering team, as a rule, should represent the functional units involved in the process being reengineered, as well as, those units that depend on the process. The team must map and analyse the existing process to understand clearly its structure and purpose. It should then determine which of its stages/steps really add value, and search for new ways to achieve the desired results. It should not waste its effort toward trying to improve the existing process, and must concentrate on raising probing 'why?' and 'what if?' questions. These questions may usefully be supplemented by wishful questions — "How wonderful it would be if we could ....?" The questions must focus on challenging the current assumptions, challenging the existing practices, and challenging the value added by each step. It is only through raising and resolving deeper questions, that a team may be able to sift out what is fundamental to the process from the mass of available data.

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The team must next focus on evolving a picture of what the company might be able to do. This picture, in turn, needs to be matched against the current best practices in the industry, in order to analyse the gaps to be overcome. After analysing the process, the gaps, and the envisioned creative redesign alternatives, the team must rescan the marketplace to see: 'Do the customers want or value what the company can provide?" In the absence of such an appraisal, a BPR effort may be reduced to a mere cost-cutting exercise.

Evaluation of customer feedback on process redesign has to be followed by a detailed specification of the supportive measures to be initiated and implemented as part of completing the BPR exercise. These measures include the following:

- Rewriting job descriptions for employees
- Creating new recognition and reward systems
- Creating new career paths
- Expanding and/or reorganizing the computer facilities
- Organizing the employees' training in new work skill
- Making substantial changes in documentation and reporting systems.

The foregoing and related requirements have however, to be preceded by, or be concomitant with, the mapping of activities for process redesign.

Activity Mapping for BPR

Activity mapping involves two basic steps — activity analysis and linking as follows:

Activity analysis inquires

- What activities take place?
- Why do they occur?
- What resources do they consume?

Activity linking links the identified activities to the 'cost object' i.e., a business function or process. Viewing the business process as the cost object leads to an 'activity map'.

Analysis of activities for process improvement or redesign then proceeds to focus on the three essential aspects of an activity. These three aspects are (Morrow & Hazell, 1992):

(a) What causes the activity to take place as soften as it does?

(b) Why the activity consumes as much resource(s) as it does?

(c) What are the linkages between activities i.e., what is the chain of activities that comprises the business process?

Point (a) is fundamental for understanding the nature and rationale of an activity. Point (b) involves identifying the cost input drivers i.e., those factors which determine how much resource is used to perform the activity. These factors may include product design, operating tasks/procedures, and productivity of workers. Point (c) looks at the linkages between activities to create an activity map.

In order to understand the linkages between activities, it is necessary to learn and examine the following facets of work:

- Who and what triggers the activity to be carried out?
- On whom are the person(s) carrying out the activity dependent for information, or product or ser-

vice flow, in order to enable him (them) to perform the activity?

- What subsequent activities are triggered by the given activity?
- Who is/(are) dependent on the performer(s) of the activity to enable him/(them) to perform his/(their) activity(ies)?

The information regarding the above facets may be obtained from the person(s) responsible for the activity concerned, and confirmed through observation.

Work-Flow Management Software[1]

One of the most difficult issues associated with BPR is the disruption caused to business while its processes are being radically reengineered. A software tool called workflow automation provides an easier method of moving toward the accomplishment of BPR-like goals. This software tool also provides an analytical approach. It begins by examining how documents, business forms, and other information, move through an organization and among businesses. Such an examination serves to bringout the blocking points, and outdated procedures, that slow down things and drive up costs. This enables laying out new routes. At this stage, workflow software is installed on computer networks to convey information instantly to the right desk — whether it is a digital image of an invoice, or an electronic mail query from a customer.

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The workflow software network represents a meaningful step in improving the flow of work, because in most offices, information spends most of its life moving from desk to desk, waiting to be used. This state of affairs may be illustrated with reference to the creation of a document such as a marketing plan. In this context, first of all, research reports, memos, letters, and other relevant papers are gathered. Data are retrieved from computer databases. A first draft is then written which begins its long movement from one desk to another for review, editing, reediting, illustration, and approval. At each desk, the document may remain for hours or even days. As a consequence, gathering and transferring paper documents takes up as much as 90 per cent of the time needed to finish typical office tasks.

The workflow software makes the movement of documents automatic. It eliminates the need for a person to figure out who should get the information next, collapses the travel times, and avoids misrouting. The system can also be programmed to send documents along different paths, depending in content. Some workflow packages do this by maintaining a central database that tracks each document's location along its specified path. Other packages provide a sort of electronic envelope to guide each document through the e-mail system. The packages allow the retrieval, display, and movement along specified paths, of document images to multiple workstations at once for simultaneous viewing and processing.

The workflow packages are based on the technological capability to scan, store, and move paper documents electronically. This capability which became available in 1980s, has further evolved to manage all types of office information, including personal-computer files, incoming phone calls, and even video clips. One software package (File Net) allows a user to sketch detailed roadmaps on screen that describe where each item should go, and what should be done to it, before it moves on.

Installing a workflow system forces a company to consider what it really wants to do and achieve in terms of its existing work processes. Once a work-flow map of existing sequence of work steps is in the network, managers can modify it as often as they like to generate new efficiencies, or accommodate changing work patterns. An American utility company for example, changes its workflow maps daily to meet shifts in the customer-service requests it receives, and spread the work evenly across a pool of operators, and cut response time. The workflow management through computer networks is being used increasingly by companies to collect and move documents, develop applications programmes as needed, and do various other things.

Installing a workflow system forces a company to consider what it really wants to do and achieve in terms of its existing work processes.

1. This section is based on Staffwriter (1993).

The companies using workflow software find it a convenient method toward accomplishing BPR-like goals, without incurring the costs of dislocation associated with a transition to BPR. Workflow software is however, not the same thing as the radical redesign of core business processes envisaged by BPR. Taking advantage of the information embodied in electronic forms and computerized documents, it automates the information's movement from person to person. It may as such be viewed as a tool that can facilitate the planning and implementation of BPR.

Pattern and Workmode in Redesigned Processes

An existing process is depicted in Fig. 1.

The pattern of a redesigned/reengineered business process may be depicted as in fig. 2. A reengineered process is characterized by higher speed i.e., a very low cycle time as compared to that of an existing process.

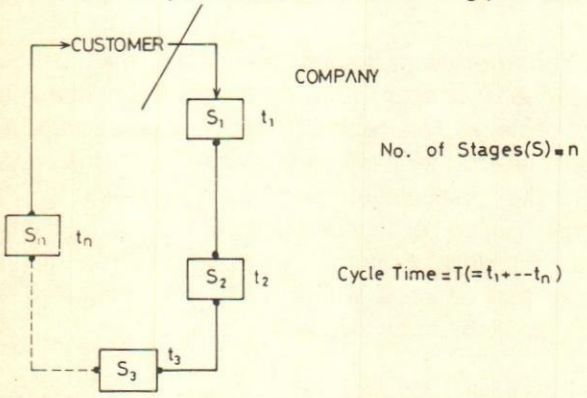

Fig. 1.: Pre-BPR Process

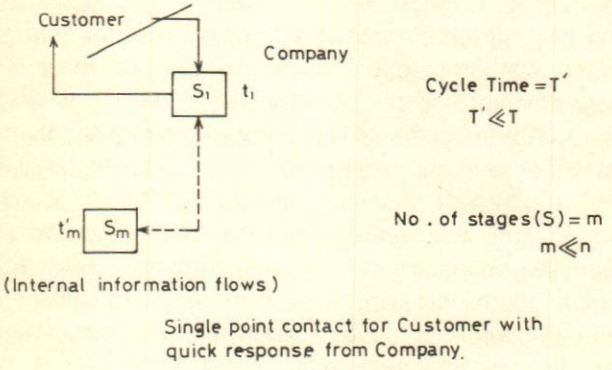

Fig. 2.: Reengineered Process

A reengineered process in mostly a single stage process, or at best possesses extremely few stages/steps as compared to the pre-engineered one. It also provides a single point contact for the company's customers in the form of a 'case manager' or 'coordinator' position. It is focused on meeting customer needs and expectations quickly and adequately. For this purpose, it makes full use of IT devices like databases, expert systems, computer and communication networks. Most of all, it is characterized by highly simplified, speedy, and logically streamlined few work procedures, each of which adds value to the work. The redesigned process as a whole is also highly economical in terms of cost.

The work mode underlying BPR may be depicted as in Fig. 3. It may be termed as the 'informed' way of work. Here, the worker (or a self-managing small team) controls the process (i.e., decisions and action) on the basis of information-processing capability and repository(ies) of data/information available to him. The role of a manager is limited to providing counsel or guidance when requested, or on the basis of his monitoring of performance. A more evolved and elaborate version of the 'informed' mode of work leads to the role of a 'knowledge worker' who makes a much greater use of IT tools and devices.

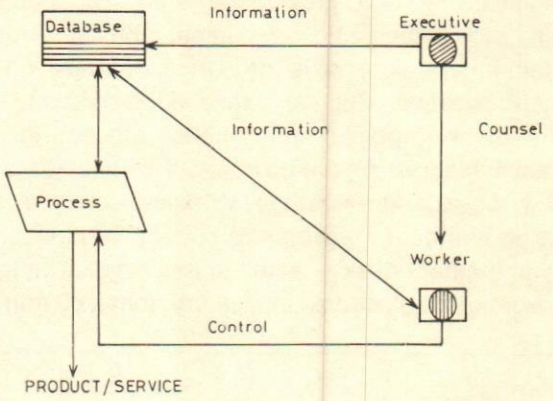

Fig. 3: The "Informed Way" of work underlying BPR

Figs. 3 and 4 show the nature, basis, and empowerment of work in non-hierarchic, flat, flexible, and lean organizations in today's highly competitive global business scene. The work mode of a knowledge worker, with his multifunctional skills and very high levels of work productivity, may be depicted as in fig. 4. Such a work mode also underlies and attainment of fast-cycle capability by business firms.

Conditions for Success of BPR Projects

BPR projects even after months of careful planning and implementation of redesign efforts, may often fail to accomplish their overall expected objectives of cost reduction. Even while dramatic improvements in individual processes may be achieved, and process costs may be reduced substantially, the overall results and operating incomes may decline. The BPR efforts may fail

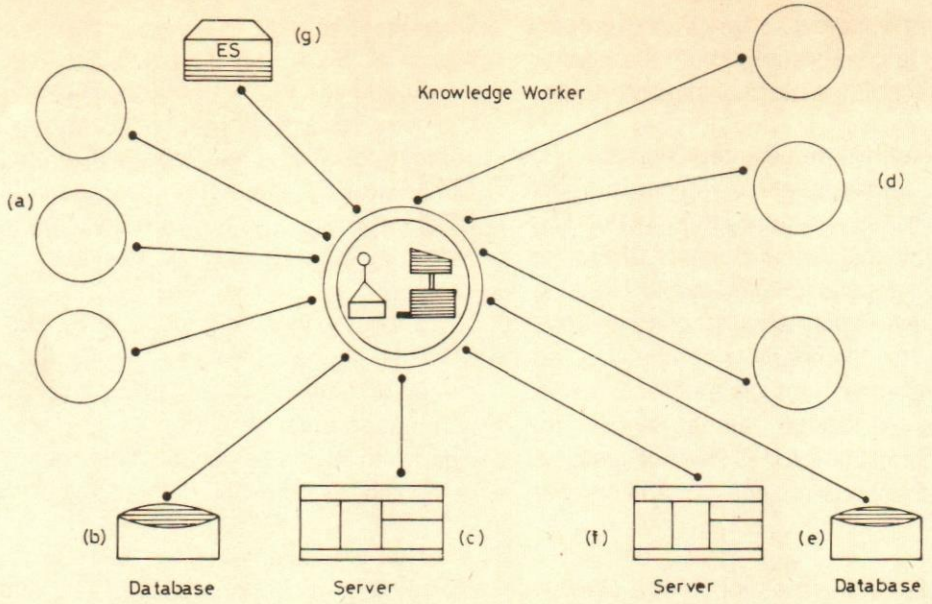

Fig. 4.: Work mode of a knowledge-worker in BPR

(a) The worker interacts with other people
(b) Uses facts stored in database/Inf. System
(c) Uses processing aids in client servers, which are often minicomputers with databases shared by many desk-top computers and printers in a LAN
(d) Decisions are communicated to other people
(e) Stores new facts
(f) Changes to programs
(g) Expert System.

to produce meaningful bottomline results, or impact, for the business unit as a whole (Hall et. al, 1993).

Two basic critical conditions must be met if the short-term, narrow focus BPR efforts are to be translated into long term profits and competitive benefits. These two crucial conditions may be stated as follows:

- The process to be reengineered must be defined broadly in terms of cost or customer value across the entire business unit.
- The process redesign must extend to a set of six core elements of the organization's configuration. These elements are:
  - Roles and responsibilities
  - Measurements and incentives
  - Organization structure
  - Information technology
  - Shared values
  - Work skills.

They together constitute the depth levers of change. They must be altered or restructured concomtantly as part of the process redesign effort (Hall et al, 1993).

Thus, a BPR project must be conceived, planned, and implemented in terms of both breadth and depth, in order to be successful. Performance trackling mechanisms should be developed relative to the business unit as a whole, rather than only with reference to the process being redesigned. Performance improvements should thence be specified along multiple dimensions of cost, revenue, time, and quality, with reference to the entire business unit, and not a segment thereof. Narrow process improvements efforts may improve efficiency in limited domains, but would be largely ineffective in terms of overall performance results.

The concept of breadth in the present context implies that the process being redesigned should include activities that are critical for value creation in a holistic business perspective. A process in its narrowest sense can be defined as a single activity in a single function such as a accounts payable process. The broader definition of a process however, encompasses a set of interrelated intra-functional or cross-functional tasks and activities, such as new product development, or fulfilling customer orders. The concept of breadth may also extend further to a cognate set of narrower processes which together however, comprise most of the critical activities or tasks in the business unit.

The requirement of breadth in process redesign is vital for two reasons:

- Inclusion of plural activities in the process would produce benefits of improvement at the level of the entire business.

- Inclusion of interrelated activities in the process may lead to an uncovering of incremental opportunities for a cascading pattern of improvements.

The concept of breadth in process redesign does not imply a too broad, indiscriminate, and uncritical approach toward improvement efforts. A carefully thought out diagnostic phase prior to any conceptualization of BPR effort is imperative. The diagnostic phase should focus on identifying those few key elements which comprise customer value, and/or the company's competitive advantage(s). The focus may then be amplified toward identifying processes in those areas where the company's observed performance falls short of customer expectations, management criteria, and competitors' performance.

The concept of depth in the present context signifies a comprehensive restructuring of the six depth levers enumerated earlier. Such a restructuring is vital for bringing about indepth behavioural change that is needed for achieving radical improvements in cost and performance. This, in turn, requires a **clean-slate** approach to process design in order to avoid the entrapment of existing and obsolete systems and procedures.

Transformation of the six depth levers is boundup with planning and building a new infrastructure to translate the visualized redesign into reality. The building of the new infrastructure must cover a wide spectrum of measures including long and sustained programs of training and skill-development, performance measurement criteria and systems, incentives and rewards based on objectives, communication programs that promote employees' understanding and commitment, imaginative development of supportive IT capabilities, and the pilot scale trials and simulations that test and refine the redesign and its implementation.

Conclusion

The key to initiation of a BPR exercise is confirming the company's strategy. In this context, a clear understanding of what drives competitive advantage in a particular industry, the industry's value chain and the basis for competition, and how a particular company seeks to gain competitive advantage, is vital.

Success in a complex BPR effort will be best achieved if the business's needs for such action are clearly understood by all participants. The overall effort and stages must be understood by, and communicated clearly, to all participants. This means that roles and responsibilities must be defined and communicated.

The implementation of BPR is a highly difficult, demanding, and risky process. The management of organizational transition from pre-BPR to BPR state, provides a severe test of managerial abilities, determination, and leadership.

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Dhal Milling at Rural Threshold — A Viable Agro-Processing Enterprise

R.P. Kachru & R.K. Gupta

Although rural areas produce the bulk of raw materials very few processing industries exist in the vicinity. The rural populace has now been reduced to mere producers who have to sell their raw materials to city dwellers at low prices but have to buy processed products from urban areas at higher prices. The authors examine the viability of establishing dhal milling in rural areas to stave of economic stagnation and usher in prosperity to the rural masses.

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Urbanization has resulted in capital drain from rural to urban areas, leading to decreased employment opportunities in the former and shifting the balance of trade in favour of the latter. This, in turn, has resulted in mismatched growth in economy and a yawning gap in the standard of living between the rural and urban areas. For getting more dividend for the hard labour put in, it is necessary to transform the farmer into a producer-cum-processor. The need is to evolve and propagate viable processing systems which could be owned, operated and managed in the vicinity of production catchment areas by local people preferably through cooperatives run by growers.

The need is to evolve and propagate viable processing systems which could be owned, operated and managed in the vicinity of production catchment areas by local people preferably through Cooperatives run by growers.

Farm producers can augment their income if they could sell refined/processed materials rather than selling them raw. Agricultural products refining/processing sector has considerable potential to offer in this regard. Refining in rural thresholds on area and commodity specific basis may include simple operations like cleaning and grading of farm produce, milling of cereals and pulses, grinding of spices, pearling of coarse grain, extraction of oil from oil bearing materials etc. and aesthetic packaging of the processed items. One such area/commodity specific activity is introduction of small scale dhal milling at rural threshold as a viable agro-processing enterprise. The suggested model will be able to produce adequate income for the farm producers.

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Production Scene

The major pulses produced in India (14-5 Mt in 1992-93) are Bengal gram, pigeon pea, black gram, green gram, lentil, peas and khesari. A number of minor pulses are also produced in different regions for food or feed. Bengal gram is the major legume produced and its production was about 5.2 Mt in 1990-91. The states of M.P., U.P., Rajasthan, Haryana and Maharashtra are its major producers. Pigeonpea forms the second largest pulse produced in the country. Its production was 2.43 Mt in 1990-91, mostly grown in the states of U.P., M.P., Maharashtra, Karnataka and Gujarat.

Legume Milling

In India, a substantial portion of the pulses is consumed after dehusking and splitting (i.e; as dhal), or after some other form of processing. More than 75 per cent of the pulses produced in the country are converted to dhal. Consequently, dhal milling is a major industry in India involving an approximate turn-over of about Rs. 45,00 crores (1986). This is next only to rice and flour milling industries. Conversion of pulses to dhal is an age-old household practice in India. It is generally laborious, time-consuming and involves considerable amount of wastage because of powdering and breakage. The methods practised in different parts of the country depend upon climatic conditions, mainly consists of two steps: loosening of the husk by wet or dry methods, and dehusking and splitting into the cotyledons using suitable machines. The methods and machinery used in the commercial operations are usually large-scale adaptations of the traditional household techniques. The amount of oil mixed with pulses varies from place to place from 50 g/q of grain in M.P. to 400 g/q of grain in Maharashtra. Similarly, addition of water also varies from region to region 4-20 kg/q of grain and for loosening of husk and its complete removal, in case of pigeon pea 3-7 kg/q.

A hand operated wooden chakki was probably the first machine introduced in place of the traditional motar and pestle, for the dehuksing and splitting of pulses. The Chakki which is still used in cottage level operations, is made of wood, stone or emery coated contact surfaces. It has undergone many changes and in recent times power operated chakkis of vertical or horizontal type, with stone or emery surfaces are in use in large cottage level pulse mills. The roller machine (Gota machine) with an emery coated tapering roller fixed in a horizontal position or cylindrical roller fixed at an inclined position is the most commonly used dehusking machine in dhal mills. Engleberg type rice hullers are also used for dehusking split black gram and green gram. In recent times, rubber rollers have been tried with limited success to polish split dhal. As a result of studies carried out at various places, improved technologies such as the CFTRI method, Pantnagar Dhal Mill, CIAE Dhal Mill, low cost multi-purpose grain mill, PKV dhal mill, TNAU Coimbatore, DPR Kanpur Dhal Mill etc. have been developed so that the processes can be independent of climatic conditions and give higher yields of dhal at lower cost of processing. A hand operated pulse dehusking machine has been developed by CFTRI consisting of an emery coated inverted metal cone fixed to a vertical wire mesh screen.

Mini dhal mills of varying capacities as listed are available in the market:

Capacity	*Cost, Rs. (approx.)*
350 kg/h	2 lakh
540-640 kg/h	2.5 lakh
820-1,000 kg/h	3.5 lakh
Automatic dhal mills	
0.5 tonne/h	3.25 lakh
1.0 tonne/h	3.75 lakh

There are about 11,000 dhal mills in India with average processing capacities varying between 10-20 tonne/day. The big dhal mills are scatered mostly in central and northern India. The wet-milling method is adopted by comparatively smaller units and mostly practised in south India whereas, dry milling method is being practised over large parts of central and northern India.

Model Scheme for Dhal Milling

Pigeon pea dhal

For the production of pigeon pea dhal at the Agro-Processing Centre (APC), dhal mill and pedal operated grain cleaner developed at CIAE were used. The specifications for the machines used are as follows:

CIAE Dhal Mill	
Type	Emery Carborundum toller dehusker
Capacity	100 kg/h
Power requirement	2.5 hp electric motor
Labour requirement	Two
Cost of machine	Rs. 7000

CIAE Pedal operated grain cleaner

Capacity	3.5-6.0 q/h
Cost of machine	Rs. 3,100

The actual process flow and mass balance for the production of pigeon-pea dhal at APC are shown in Fig. 1. Black gram and green gram dhal could also be made with the help of this mill.

Bengalgram dhal

For the production of gram dhal at APC, multipurpose grain mill and pedal operated grain cleaner were used. The specifications for the grain mill are as follows:

Type	Vertical stone burr grinder
Capacity	50 kg/h for gram dhal
Power requirement	1 hp electric motor
Labour requirement	One
Cost of machine	Rs. 2,700

The actual process flow and mas balance for the production of Bengalgram dhal at APC are shown in Fig. 2. The machine can also be used for the production of wheat flour, wheat grits, besan and coriander powder.

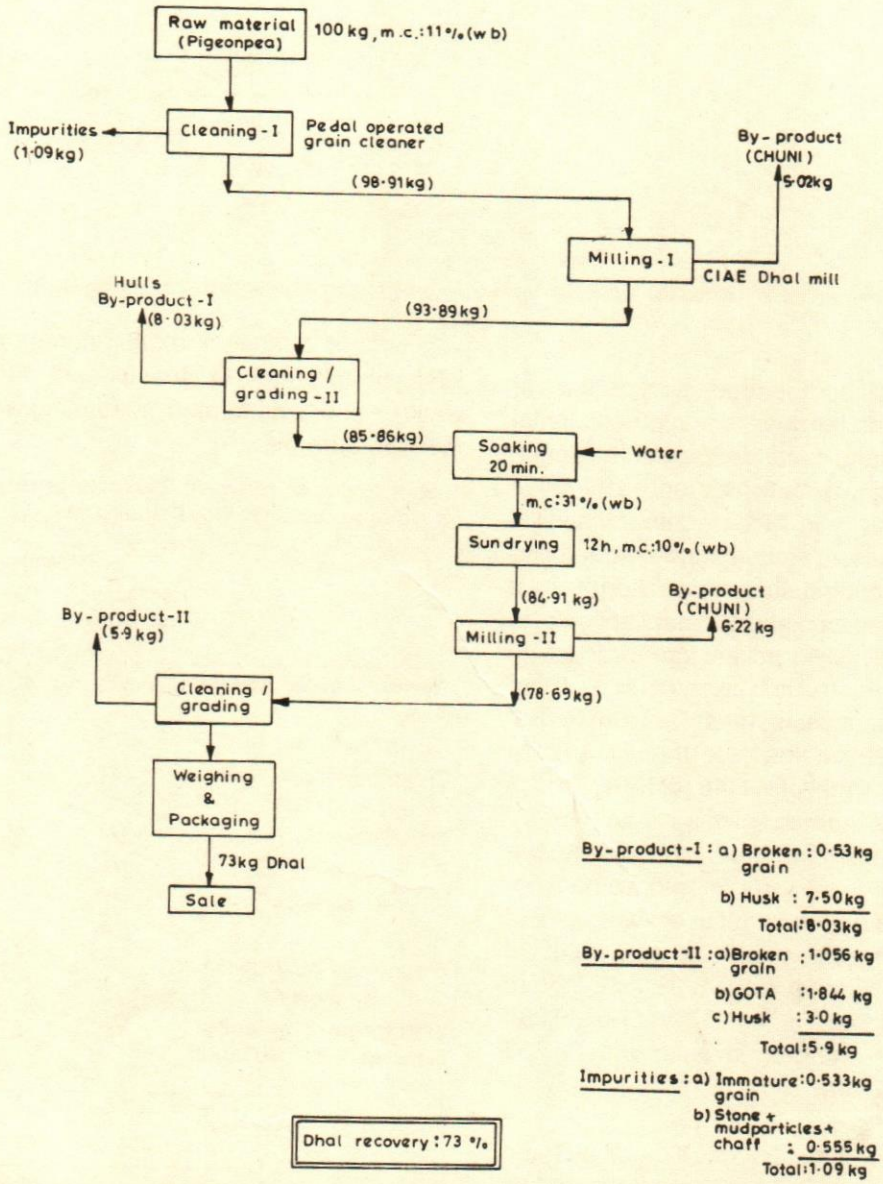

Fig. 1.: Process flow chart and mass balance for making pigeonpea dhal at Agro-Processing Centre

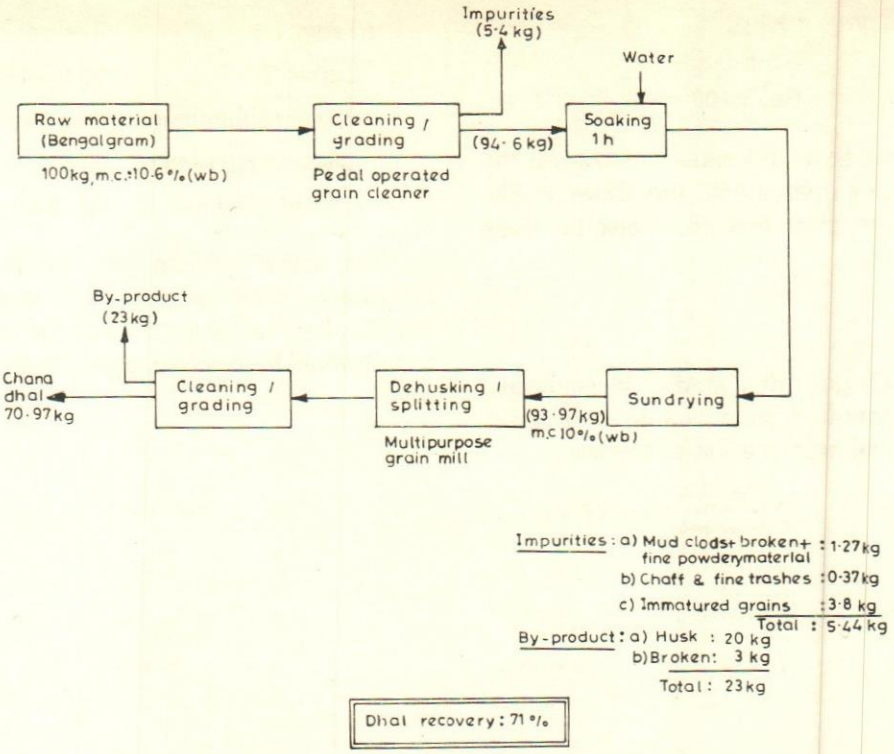

Fig. 2: Process flow chart and mass balance for making Bengal gram dhal at Agro-Processing Centre

Economic Analysis

The economic analysis for the production of dhals of pigeonpea, greengram and blackgram and production of Bengalgram dhal, besan and coriander powder has been worked out as two separate activities and also as a combined single unit activity in APC. Various financial parameters have been determined under three operating conditions, viz; 100 per cent custom-hiring, 50 per cent custom-hiring + 50 per cent sale and 100 per cent sale, to find the viability of dhal milling as an agro-processing activity (tables 1, 2 & 3). For the first case, (table 1), it can be seen that with a capital investment of Rs. 14,672, Rs. 20, 432 and Rs. 26, 192 for the said three operating conditions, an annual net profit of Rs. 48,474, Rs. 73,137 and Rs. 97,799 could be earned, giving a return-on-investment of 330,357 and 373 per cent, respectively. Besides, employment to the tune of 400 man-days per year would also be generated by running this activity at APC. Similarly for the second case (table 2), with a capital investment of Rs. 9,587, Rs. 10,652 and Rs. 11,718, an annual net profit of Rs. 9,548, Rs. 24,923 and Rs. 40,297 could be earned, giving a return-on-investment of 99,233 and 343 percent, respectively.

Combining all the activities as a single unit enterprise with a capital investment of Rs. 21,159, Rs. 27,985 and Rs. 34,810, an annual net profit of Rs. 59,195, Rs. 98,981 and Rs. 1,38,768 could be earned, giving return-on-investment of 279,353 and 398 percent, respectively. Besides, employment to the tune of 640 man-days/year would also be generated by running a small scale dhal milling enterprise.

Table 1: Economic analysis for the production of pigeon pea, blackgram and greengram dhal by CIAE dhal mill

Parameter	Operating condition		
	100% custom hiring	50% custom hiring + 50% sale	100% sale
Working capital requirement, * Rs	573	19,773	38,973
Capital investment, Rs	14,672	20,432	26,192
Cost of processing, Rs/q (for all three pulses)	12	13	15
Annual net profit, Rs	48,474	73,137	97,799
B.E.P., q/y (weighted)	143.5	128	120
Pay-back-period, month	3.5	2.3	1.8
ROI, %	330	357	373
Employment generated per plant, man-days/y	400	400	400
Employment generated, man-days/y/Rs 10,000 of capital investment	272	195	152

*for six days

Assumptions	
Cost of machinery & equipment	Rs 14,500
Useful life of machines	10 y

Salvage value	10%
Interest rate	15%
Labour requirement	1 (semi-skilled), 1 (unskilled)
Wages of labour	Rs 2.50/h (unskilled), Rs 3.00/h (semi-skilled)
Operation, h/day	8
Days of operation/y	
Pigeonpea	100
Greengram	50
Blackgram	50
Capacity of machine	100kg/h for all pulses
Raw material cost, Rs/kg	
Pigeonpea	11.00
Greengram	9.00
Blackgram	9.00
Recovery of dhal %	
Pigeonpea	73
Greengram	78
Blackgram	78
Sale price, Rs/q	
Pigeonpea	1600
Greengram	1200
Blackgram	1200
Byproduct price, Rs/q	200

Table 2: Economic analysis for the production of Bengalgram dhal and Besan (Bengalgram flour) by multipurpose grain mill

Parameter	Operating condition		
	100% custom hiring	50% custome hiring + 50% sale	100% sale
Working capital requirement, * Rs	291	3,843	7,395
Capital investment, Rs	9,587	10,652	11,718
Cost of processing, Rs/q Bengalgram split (dhal)	13	14	14
Besan	65	67	69
Coriander powder	65	67	69
Annual net profit, Rs	9,485	24,923	40,297
B.E.P. q/y (weighted)	114	57	40
Pay-back-period, month	11	4.4	2.8
ROI, %	99	233	343
Employment generated per plant, man-days/y	240	240	240
Employment generated, man-days/y/Rs 10,000 of capital investment	250	225	204

* for six days

Assumptions:	
Cost of machinery & equipment	Rs 9,500
Useful life of machines	10 y
Salvage value	10%
Interest rate	15%
Labour requirement	1 (semi-skilled)
Wages of labour	Rs 3.00/h (semi-skilled)
Operation, h/day	8
Days of operation/y	
Bengalgram split(dhal)	80
Besan (Bengalgram flour)	60
Coriander powder	100
Raw material cost, Rs/kg	
Bengalgram	6.00
Split gram for Besan	9.00
Coriander seed	15.00
Capacity of machine, kg/h	
Bengalgram split	50
Besan	10
Coriander powder	10
Recovery, %	
Dhal	71
Besan	98
Coriander powder	92
Sale price, Rs/q	
Dhal	900
Besan	1,050
Coriander powder	2,000
Byproduct (Bengalgram) price, Rs/q	200

Table 3: Economic analysis for the production of dhal of pigeonpea, green gram, black gram and Bengal gram, Besan and coriander powder at Agro-Processing Centre as a single unit

Parameter	Operating condition		
	100% custom hiring	50% custom hiring + 50% sale	100% sale
Working capital requirement *Rs	864	23,616	46,368
Capital investment, Rs	21,159	27,985	34,810
Annual net profit, Rs	4	3.3	3
Pay-back-period	month	59,195	98,981
ROI, %	279	353	398
Employment generated/ plant, man-days/y	640	640	640
Employment generated, man-days/y/Rs 10,000 of capital investment	302	228	183

* for six days
Cost of equipment, machines etc. Rs. 20,900/=

The analysis reveals that the dhal milling plant would be a financially viable proposition. Besides, the activity would be able to generate gainful employment opportunity in the rural areas. Generation of additional income will, in turn, increase total cash flow to the village, which will go a long way toward improving the standard of living of the local population. □

Small Scale Industries & Employment: Some Disquieting Dimensions

K.K. Subrahmanian

The mounting unemployment in Kerala despite substantial investment in human resource development is a cause for concern. The author argues that the continued importance assigned to small scale industries for employment generation is to be examined because smaller firms display low capital productivity. He recommends that attention be devoted to the interface between credit, technology and productivity performance to ensure efficiency-based growth of the SSI sector.

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Kerala presents development characteristics far different from the rest of India in several spheres. To illustrate, its achievement in human resource development (HRD) and in improving the physical quality of life (PQL) far exceeds the national average and enviably compares to the levels of the advanced nations. However, a disturbing feature of its development experience, is the massive unemployment. Almost all the estimates based on standard concepts put unemployment in Kerala two to three times higher than the national average. If NSS quinquennial survey data are to be believed, the problem also has accentuated over the years. Kerala continues to face the most severe unemployment problem, and particularly the highest proportion of educated unemployment youth, in the country.

The Diagnostic Perspective

It is a truism but it is worth mentioning that the increasing unemployment is the reflection of the growing mismatch between the supply of, and the demand for, labour. Given that Kerala has reached a stage of demographic transition marked by declining fertility and mortality, and the lowest rate of population growth in the country, it is the demand side that should receive priority in the employment strategy. Viewed from the demand side, the rise in unemployment, according to the neoclassical school, can be attributed mainly to the slow growth of income and to the distortions in the labour market.

Policy induced rigidities in the labour market have been identified as the principal reason for the slow growth in employment at all-India level during the eighties, a decade, which recorded the highest rate of manufacturing growth since independence (Ahluwalia Isher, 1992). The stagnation in employment and particularly, the decline in the registered manufacturing employment despite a significant acceleration in industrial growth are supposed to reflect the trend of substitution of capital for labour in-

duced by the rising wage rate caused by inflexibility in hiring and firing possibilities and rigidities in the labour market. Such a diagnosis tends to gain currency easily and to bias certain types of policy solutions to the problem. For instance, by tracing the problem to the distortions in the labour market caused by the government regulations and trade unionism, it has been argued that the faithful implementation of ongoing structural reforms can remove these labour market distortions and promote employment (Bhattacharya & Arup, 1993). The underlying logic is that the strengthening of market forces through structural adjustment can be expected to solve the unemployment problem.

The validity (Nagaraj, 1993) of the labour-market distortion based explanation of the low employment elasticity of Indian manufacturing during the eighties is questionable; however be that as it may, the employment strategy for Kerala has to be woven around a perspective different from the logic of ongoing market-oriented reforms. For, it is the economic stagnation and not the labour market distortion *per se* that lies at the root of increasing unemployment in Kerala. Although Kerala has been making substantial investment in human resource development, which has led to improvement in the quality of life, it has not at the same time led to increased growth rate in the output of productive sectors of the economy. This paradox in Kerala's development is well known and needs no elaboration. It is plausible that human resource development has not either got integrated with the commodity production or helped raising the factor productivity. As a result, the productive sectors of the economy have remained stagnant in growth and failed to absorb in any significant way the growing labour force. Clearly, the dimensional characteristics of economic growth in Kerala differ from that at the national level.

It is the economic stagnation and not the labour market distortion *per se* that lies at the root of increasing unemployment in Kerala.

The comparison of growth rates in income and employment illustrates the disquieting dimension of the difference (table 1). Against an annual growth rate of 5.24 per cent in domestic product all India, the achievement of Kerala is 2.16 per cent during the eighties. In more striking contrast, the annual growth rate of manufacturing income in Kerala is as low as 0.49 per cent against a corresponding national average of 7 per cent per annum during the period under review. The growth performance in the primary sector is also not any better: the annual growth rate is 1.58 per cent in Kerala against the national average of 2.78 during the eighties. With the stagnation in the productive sectors of the economy, the employment absorption of the development process has been marginal and below the national average. The situation is very poor in the manufacturing sector, where the employment growth per annum between 1981-1991, as shown by the Census data, is 0.87 per cent against the national average of 1.30 per cent. The overall growth rate in the work force in Kerala (2.01%) is also below the national average (2.34%).

Table 1: Annual growth rates of Income (1980-81 to 1989-90) and Employment (1981-91): Sector-wise.

(per cent)

Sector	Kerala		All India	
	Income (SDP)	Employ-ment	Income (NDP)	Employ-ment
Primary	1.58	1.28	2.78	2.05
Manufacturing	0.40	0.87	7.00	1.30
Construction	1.80	4.95	3.51	3.93
Trade & Commerce	1.52	3.36	10.76	3.99
Transport, storage & Communication	7.83	3.72	7.43	2.56
Other services	4.30	3.26	6.35	4.13
All sectors	2.16	2.01	5.24	2.34

Source: For estimates of income, C.S.O. National Accounts 1991, Estimates of SDP 1990. For employment, Registrar General, Population Censuses 1981 and 1991.

It is instructive that the difference in the relevant growth rates of Kerala *compared with* other major states in the country is also significant. Since the eighties have been the decade of industrial boom, all the states have recorded a high growth rate of manufacturing income except Kerala, which performed most poorly. Indeed, variations in growth rates across the states in a large economy would be natural, but the fact that Kerala ranks the lowest in income and the third lowest in employment growth-rate among the major states during the eighties should be a matter of serious policy concern.

The situation in Kerala has been very succinctly described by the State Planning Board: "There has been no perceptible improvement in generation of employment as a fall out of the growth process especially in productive sectors of the economy and it has led to mounting unemployment and underemployment in the State" (State Planning Board, 1992). It follows that the diagnostic perspective for seeking solutions to the increasing unemployment in Kerala has to be one different from that at the national level and should derive its logic from the stagnation in the economy especially, in the industrial sector.

Small Scale Industries: Employment Strategy

Given the above diagnostic perspective it seems logical that the State's Eight Five Year Plan has followed a strategy, which emphasises the integration of employment generation with the economic growth process. Instead of the partial approach of the past, the strategy now is to formulate major employment oriented schemes taking into account their total employment content. More significantly, the strategy now has been to build as an integrated part, the *Rupees thousand Crore Employment Programme* (for brevity called, the Employment Programme) into the Eighth Five Year Plan.

The employment programme has given the highest priority for industrial investments and in particular, has assigned major role to the small scale industries for generation of employment. Thus, among the sectors/thrust areas, the industrial sector has been allotted the largest slice of around 62 per cent of total investment of Rs. 9488 crores under the employment programme. There is a distinct bias in the employment programme towards integrating employment generation with manufacturing production as is evident from the fact that a substantial share of the employment target — about 40 per cent of the continuing employment and 16 per cent of non-continuous wage employment — is planned to be met by this sector. In particular, the small scale industry sector is assigned the most important place among the thrust areas/programmes in continuing employment for the educated categories.

Broadly, the approach of the employment programme in the State's Eight Five Year Plan is in the right direction. For, as emphasised in a well-acclaimed study on poverty unemployment and development policy in Kerala, ".... the larger part of the additional employment required will have to come through rapid industrialization ... with care in the selection of industries, which are sufficiently skill-intensive ... and which at the same time do not require large amount of capital for the additional employment generated ...." (Centre for Development Studies, 1975; 5).

Firm Size, Factor Proportion & Productivity

Prima facie, the logic of the promotion of small scale industries (firms) rests on the general belief that small firms are more labour-intensive and captial-saving than large ones and hence they are better suited to the factor proportion in the labour-abundant and capital-short economy. In operational terms, therefore, the small firms deserve special treatment only if they have lower capital-labour and capital-output ratios than the larger firms thereby reflecting their relatively higher efficiency in the use of the scare factor of production. Is the situation so in Kerala? There are no studies on this. The Indian evidence on this issue has long been controversial (Subramanian & Kashyap, 1975). Further, some recent studies (Little et al., 1987; Goldar, 1988; Desai & Taneja 1993) have pointed out that small firms are not unequivocally less capital-intensive than large firms and small firms do not necessarily save capital and promote employment.

Although a study of the relationship between firm size, factor proportion and factor-use efficiency in Kerala can give useful signals to policy making, the attempt will be constrained by the nonavailability of required data by size-classes in the factory sector. A rough idea of the relationship, however, can be formed by analyzing the data of the latest Census (Govt. of India, 1992) of Small Scale Industrial Units registered with the State/UT Directorate of Industries up to 31-3-1988. Indeed, the analysis draws contours of the phenomenon across size-classes within the small scale industries (SSI) only. It practically ignores the size-classes (small, medium and large firms) within the factory sector. Yet, the information is useful. For, it is the SSI firms (defined in terms of the upper limit of investment in plant & machinery) that are eligible for the benefits of government subsidies and assistance. A look at the key economic ratios (table 2) of different size-classes of the SSI sector, therefore, can be expected to give signals for guiding policies.

Small firms are not unequivocally less capital-intensive than large firms and small firms do not necessarily save capital and promote employment.

The analysis of capital-labour and out-put-capital ratios across the size-classes, grouped on the basis of the value of capital (plant & machinery), shows that capital-intensity is increasing with increasing size, and so also the capital productivity. In other words, smaller firms are generally labour-intensive but have lower capital-productivity. The case for the promotion of smaller units is thus not very strong. Here, it may be noted that there is the danger of Biased conclusions when the size is defined in terms of capital (Desai & Taneja, 1993). We therefore analyze the key ratios across size-classes defined on the basis of employment as well. It seems that capital-intensity decreases with increasing size and more significant-

Table 2: Selected characteristics and key ratios by size-groups of the SSI sector in Kerala (1987-88)

Size-groups	per cent distribution				Key ratios		
	Units	Y	K	L	K/L	Y/L	Y/K
capital (P&M) based (Rs. lakhs)							
Up to 1 lakh	80.99	37.01	44.18	57.60	0.18	0.43	2.46
1.0-3.0	14.02	24.44	24.80	23.41	0.24	0.70	2.80
3.0-5.0	2.46	10.51	8.54	6.42	0.30	1.10	2.89
5.0-7.5	1.17	7.25	5.86	3.78	0.36	1.29	3.61
7.5-10.0	0.42	3.76	2.76	2.09	0.30	1.21	3.63
10.0-20.0	0.63	5.97	6.39	3.85	0.38	1.04	3.99
20.0-40.0	0.35	11.06	7.46	2.85	0.58	2.62	2.74
40.0 & above	—	—	—	—	—	—	—
average					0.23	0.67	2.93
employment based (No. of persons)							
1-9	90.22	47.92	67.85	50.60	0.31	0.64	2.07
10-19	6.22	14.45	13.50	12.40	0.25	0.78	3.14
20-49	2.70	17.17	10.75	12.50	0.20	0.95	4.68
50-99	0.43	7.35	3.85	4.25	0.21	1.16	5.59
100 & above	0.43	13.11	4.05	20.73	0.04	0.42	9.52
average					0.23	0.67	0.65

Note: Y = Production; K = Fixed investment; L = Employment; P&M = Plant & machinery.
Source: Development Commissioner, Small Scale Industries (1992).

ly, capital-productivity increases with increase in size up to a particular employment size (99 persons) within the SSI sector. The evidence lends support to the inference of lower employment generation and lower factor-use efficiency of the smaller firms as compared to the larger firms with in the SSI sector in Kerala.

The foregoing findings may not help us to comment upon the rationale for promoting small scale industries in general as the relative characteristics of size-classes within the factory sector in Kerala are not known. Yet, the findings on the relationship between firm size, factor intensity and productivity within the SSI sector do reflect a disquieting dimension. Also, there is an implicit suggestion that the general case for subsidies, concessions and assistance for SSI units, irrespective of their size-efficiency correlates, is rather weak in Kerala. The policies should have built-in-flexibility to favour the promotion of larger units and not the growth of very small firms (tiny) within the small scale sector. This conclusion will be all the more relevant if the distribution of firms in the SSI sector is found biased towards the smaller firms.

Bias Towards Small Size & Low Technology

The distribution of SSI units across-size-classes clearly shows the heavy concentration in the smallest size group (table 2). This is so whatever the criteria used for the definition of size. In terms of employment-size groups, more than 90 per cent of the SSI units in 1987-88 are found in the smallest size-class of 1-9 persons. In terms of capital-size, units in the smallest size-group (value of plant & machinery less than Re. 1 lakh) account for more than 80 per cent of the total number of SSI units in 1987-88. If the next two size-groups are also added, almost all (97 per cent) SSI units are seen to have the basic feature of "tiny enterprise"[1] in Kerala. Obviously, there is a bias towards small size in SSI in Kerala, which is a disquieting feature. This is so, because the factor-use efficiency of the small units, as noted earlier, is relatively poor. The smallest employment-size group has the lowest output-capital ratio (2.07). The picture is not different when size-group is defined in terms of capital with the smallest size-group having the lowest output-capital ratio of 2.46. The output-labour ratio of this size-group is also very low and the lowest among the size-classes based on capital. Clearly, the units in the smallest size-group are most inefficient in factor-use and their factor productivity is low. With the low productivity,

1. For extending subsidies and assistance by the government, the "tiny" concept was introduced in 1977. Initially Rs. 2 lakhs was prescribed as the limit, which in 1991 was enhanced to Rs. 5 lakhs for "tiny" enterprises.

their contribution to the total production is also disproportionately low. The smallest employment-size group which accounts for 90 per cent of total units contributes less than 48 per cent of the total value of production in the SSI sector. The smallest capital-size class, which accounts for more than 80 per cent of the total number, contributes less than 38 per cent of total production of the SSI sector.

The predominance of small units in the SSI sector may be due to the constraints faced by the entrepreneurs to get finance, especially long-term and risk capital. This in turn tells upon the weakness in the existing policies for the promotion of efficient small scale industries in the state. Whatever may be the reason for the small size, it stands to reason that the small units with small capital-stock will have low technology-profile and hence, low level of productivity. They do not have the required resources to get access to technological progress, to modernisation, and to seek and introduce process innovations or product improvements. It is also plausible that the small size is a handicap to mobilise adequate credit capital, to manage the working capital, to expand the market reach, to shield against the vulnerability of the market fluctuations, and in short, to sustain with profitability in the business. The result is the growing incidence of "industrial sickness" of the SSI sector. As lucidly described by the State Planning Board (1992; p 33) 'A disquieting feature of the SSI units in the State is their tiny size as most of them have an investment less than Rs. 1 lakh making them susceptible to market fluc-tuations and preventing them from reaping the scale economies as reflected in the growing sickness in this sector.

The predominance of small units in the SSI sector may be due to the constraints faced by the entrepreneurs to get finance, especially long-term and risk capital.

A comparison of the average size of SSI units covered by the First and the Second SSI Census Reports shows that the average size has declined over time (table 3). By 1987-88 the average size of Kerala units in terms of all the indicators (except employment) has turned out below the all-India level whereas it was higher in 1972-73. That the average size in terms of employment in Kerala is still higher than all-India may be seen in some quarters as the bright facet, but the fact that the average employment-size declined from 20 persons in 1972-73 to 7 persons in 1987-88 in Kerala as against the corresponding figures of 12 and 6 respectively at all India, is indeed a disquieting trend. It is still more disturbing that the bias of SSI units towards small size (and low technology) has accentuated over the years.

As the bulk of the SSI sector in Kerala is composed of small firms with low technology, low factor-use efficiency, and low productivity, the overall growth performance of the SSI sector in Kerala has been different and relatively poor as compared to all-India. There is an implicit suggestion that the SSI sector in kerala is faced with a deep crisis in performance.

Table 3: Average size of SSI units (1972-73 & 1987-88)

Indicators	Kerala			All India		
	72-73	87-88	% change	72-73	87-88	% change
Fixed asset (Rs.)	73	46	–38	57	50	–12
Plant & Machinery (Rs)	36	25	–31	38	30	–21
Production (Rs)	193	137	–29	186	232	+25
Value-added (Rs.)	60	27	–55	60	55	–8
Employment (Nos.)	20	7	–65	12	6	–50

Rs. in thousands, 1972-73 prices
Source: Development Commissioner, Small Scale Industries (1992).

Conclusion

The seriousness of the performance crisis in the SSI sector can be gauged by recording the changes in selected indicators (table 4) between 1972-73 and 1987-88. The small scale industries in Kerala have rapidly grown in number but its growth record in net value addition (income) and employment generation appears awfully poor as compared to all India. The point to point annual compound growth rate between 1972-73 and 1987-88 in Kerala is less than one half in value-added, and one third in employment generation at the all-India level.

The signs of the performance crisis are also reflected in some key ratios and characteristics of SSI units in Kerala relative to all-India (table 5). These ratios also reflect some major problems currently being faced by the

Table 4: Growth of the SSI in Kerala (1972-73 & 1987-88)

Indicators	Kerala			All India		
	72-73	87-88	ACGR %	72-73	87-88	ACGR %
Units (No. lakh)	0.07	0.26	8.86	1.59	5.94	9.18
Fixed Assets*	44.00	122.00	7.03	797.00	2926.00	9.06
Plant & Machinery*	22.00	66.00	7.60	537.00	1745.00	8.17
Production*	116.00	358.00	7.80	2603.00	13528.00	11.61
Net value-added*	36.00	71.00	4.63	841.00	3230.00	9.39
Employment (lakh)	1.26	1.69	1.98	16.53	36.66	5.45

ACGR = Annual compound growth rate
* in Rs. crore at 1972-73 prices
Source: Development Commissioner. Small Scale Industries, 1992.

SSI in Kerala (Subramanian & Pillai, 1993) which include, low capacity utilisation, low factor productivity, unfavourable wage-productivity relationship, low proportion of self-employment, and shortage of credit capital, leading to the increasing incidence of "sickness" and the closure of SSI units.

Table 5: Key characteristics & ratios of the SSI sector (1987-88)

Items		Kerala	All India
K/L	(Rs. lakh)	0.23	0.25
L/K	(No. per Rs. lakh)	4.31	3.94
Y/K	(Rs. lakh)	2.73	4.62
NVA/K	(Rs. lakh)	0.58	1.10
NVA/L	(Rs. lakh)	0.13	0.28
W/L	(Rs. lakh)	0.05	0.06
wage share in NVA (%)		42.30	22.40
Self-employed as % total employment		14.16	18.80
CU (%)		42.62	50.60
CU of reserved items (%)		40.00	48.00
Closed unit as % working units		45.74	51.75
Share in total No. of closed units due to financial problem (%)		61.60	34.70

K = Fixed investment; L = Total number of persons employed
Y = Production NVA = Net value-added
W = Wages & salaries CU = Capacity utilisation
Source: Development Commissioner, Small Scale Industries, 1992.

The problem in Kerala has to be seen in the context of the stagnation in productive sectors of the state economy. Thus viewed, the strategy of the Eight Five Year Plan laying emphasis on integrating employment generation with commodity production, giving highest priority to industrial investment and in particular, assigning the key role to small scale industries for employment generation, is broadly in the right direction. However, it is wise to take note of some disquieting facets of small scale industries (SSI) in the state.

This helps to avoid some mistakes of the past (such as the profileration of units irrespective of their size-efficiency correlates and the neglect of the interface between credit, technology, and productivity-performance), and to ensure efficiency-based growth of the SSI sector and its integration with employment generation while translating the strategy into specific policies and programmes for the promotion of small scale industries.

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Feature

Growth vis-a-vis Sickness in Small Scale Industries in India

S.S. Khanka

The small sector in India has made an impressive growth over the years. However, the sector has been plagued by an ever increasing incidence of sickness causing serious concern to all those concerned with the industry. The crucial role of human factor in the business of detecting industrial sickness has been emphasized.

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It seems in the fitness of the context to define what is a small scale industry. As per the recommendations of the Committee on Village and Small Industries (VSIs) in 1956, the fixed investment in a unit continues to be the main criterion for defining a small scale industry which has been, of course, enhanced from time to time. For example, it was Rs. 7.5 lakhs (Rs. 10 lakhs for an ancillary unit) in 1966. Presently, it is Rs. 60 lakhs (Rs. 75 lakhs for an ancillary unit since 2nd April, 1991). For those small units which export 30 per cent of their output by the third year from the commencement production, the investment limit is raised from Rs. 60 lakhs to Rs. 75 lakhs. An ancillary unit is one which sells not less than 50 per cent of its manufacture to one or more industrial units. For small scale industries, the Planning Commission uses the term 'village and small scale industries' which include modern small scale industry also. The present study relates to the former excluding the powerloom sector.

Growth of Small Scale Industries

There is enough evidence to show that the vibrant role evinced by small scale industries in the process of industrialisation is not confined to one country or continent. In today's world, it is the small industry that holds the key to growth with equity (Vepa, 1988). India today operates the largest and oldest programme for the development of small industry in any developing country (Dhar & Lydall, 1961). Even long before Independence, Gandhiji emphasised the need for the revival of village industries as one of the main planks of his 'Constructive Programme' in 1934. Recognizing the pivotal role played by small industries in the Indian economy, all the industrial policies of the country have accorded high priority to the development of the small scale sector. To quote, the Industrial Policy of 1956, while emphasising the role of small units, stated that:

"They (SSIs) provide immediate large scale employment; they offer a method of ensuring a more equitable distribution of national income and facilitate an effective mobilisation of resources of capital and skill which might otherwise remain unutilized. Some of the problems that unplanned urbanization tends to create will be avoided by the establishment of small centres of industrial production all over the country (Planning Commission 1956-61: 47)".

There are certain features of small units that make them particularly suitable for a developing country like India. Small industries are generally more labour intensive. According to an estimate, the employment-generating capacity of the small sector is eight times that of the large-scale sector portending the feasibility of the former into the existing scenario of scarce capital and abundant labour in India. The small scale sector accounts for nearly 35 per cent of the gross value of output in the manufacturing, about 80 per cent of total industrial employment and over 30 per cent of the total exports from the country. In view of these, the Government of India has initiated several measures to develop this vast sector of high promise. Under the policy of reservation of items, 836 items are reserved for exclusive production in the small scale sector. Presiding over a meeting of the Parliamentary Consultative Committee of the Industry Ministry on December 23, 1993, the Prime Minister has even hinted at the possibility of setting up a technology mission for the small scale sector to give a fillip to modernisation of the small units. It is hoped that the technology upgradation would enable this sector to withstand the global competition. Besides, a new scheme of integrated infrastructural development for the small scale sector is in the process of being finalised. With suitable technology backup facilities, the scheme is expected to facilitate the location of industries in the rural and backward areas (The Hindustan Times, 1993: 17).

The small scale industries have registered an impressive growth over the years (Table 1). Their number has grown from 4.2 lakhs in 1973-74 to about 20 lakhs in 1990-91 i.e., a five fold increase within two decades. Similarly, while production has registered an increase of more than twenty-times, employment grew by about three-times during 1974-92. Growth in exports has been commendable from a mere Rs. 393 crores in 1973-74 to a record high of Rs. 12, 658 crores in 1991-92 — a very significant feature being the growing share in non-traditional exports. Thus, the high and impressive rate of growth of the small-scale sector holds good promise for India's industrial development in particular, and economic development, in general. The growth in employment strengthens the belief that absorption of surplus labour can take place in the small-scale sector, to a significant extent. If a push is given to this growing and promising sector, it can become a stabilising factor in a capital-scarce economy like India by providing a higher output-capital ratio as well as a higher employment capital ratio.

Table 1: Indicators of growth in Small-Scale Sector

Years	Production (Rs. Crores)	Employment (Lakhs)	Exports (Rs. Crores)
1973-74	7,200	39.7	393
1977-78	14,300	54.0	845
1980-81	28,060	71.0	1,643
1985-86	61,228	96.0	2,769
1986-87	72,250	101.4	3,648
1987-88	87,300	107.0	4,373
1988-89	106,400	113.0	5,490
1989-90	132,320	119.6	7,626
1990-91	157,550	126.2	9,100
1991-92	160,000	126.0	12,658

Source: Small Industries Development Organisation and Eighth Five Year Plan 1992-97

However, so far as the very high growth rates are concerned, two points need to be mentioned. First, the high growth rate in production, to a great extent, exaggerates the achievements since the figures of production are at current prices and, thus, conceal the impact of inflation on rise in production. This is well supported by the fact that the production, at 1970-71 prices, was Rs. 5,161 crores in 1973-74 and Rs. 17,840 crores in 1985-86, i.e. far less than the respective production, at current prices, of Rs. 7,200 and Rs. 61,228. Second, much of the growth, is brought about by the definitional change of small scale industry from time to time. Since 1973-74, the upward revision of the investment ceiling, has undergone changes in 1975, 1980, 1985 and 1991. As a result, a good number of erstwhile large and medium scale units shifted to the category of small scale industry. Inevitably, the growth rate of small scale sector has been faster both in terms of output and employment. Presently, the output-employment ratio for the small scale sector is 1:1:4.

Growing Sickness in Small-Scale Industries

A small-scale unit is sick when its accounts with banks are irregular continuously for six to nine moths, erosion of capital takes place at a rate of more than 10 per cent per annum, there is continuing default in the payment to the creditors and the unit has remained closed for the previous six months. In simple words. sickness refers to a firm performing worse than the average, not covering

its fixed costs, and frequently reneging on its debt repayment obligations.

Global experience indicates that in the process of economic and industrial development, a certain level of industrial sickness is inevitable as the inefficient units are bound to be displaced from the industrial scene by more efficient ones. For instance, in United Kingdom more than 10,000 industrial units are estimated to fail every year with nearly 20 per cent of the firms listed on the stock exchanges turning sick each year (Slatter 1984). During the period 1972 to 1983, the number of bankruptcies per annum increased from around 10,000 to more than 25,000 in the United States, from less than 7,000 to around 20,000 in Japan, from around 4,000 to more than 10,000 in West Germany and from 3,000 to more than 12,000 in the United Kingdom (Kharbanda & Stallworthy 1985). But, sickness in the Indian industries has grown rapidly in the recent years and has assumed alarming proportions, the number of sick units has increased by more than eight-times (81 per cent) from 24,550 sick units in 1980 to 2,23,809 in 1991. The industry-wise break-up of increase in sick units is noteworthy. During the period 1980-91, while non-SSI sick units experienced an increase of 67% per cent only — from 1,401 to 2,337 units, SSI sick units recorded an increase of the order of 857 per cent from 23,149 to 2,21,472 units. Thus, sickness has become endemic particularly in the small scale sector in India.

Global experience indicates that in the process of economic and industrial development, a certain level of industrial sickness is inevitable.

In a study of growth in sickness in small scale industries, it seems pertinent to make a comparative analysis between the growth of small-scale units viz-a-viz the growth of sick small units. Table 2 bears out the relevant data. A close look at the figures on the total small scale units and sick small units during 1977-91 clearly reveals that both have experienced stealy growth during the period. The growth of sick small units far exceeds the growth of small scale units whether indicated by the ratio of sick units to total units, annual growth rates or compound growth rates during the period 1977-91. It is also noticed that the incidence of sickness in small units assumed alarming proportions during the eighties. Till 1981, the ratio of sick small units to total small units trailed at 1:20 only. But, it reached 1:5 by 1988. It is, of course, a happy augury that the incidence of sickness in

Table 2: Growth of sickness on small scale industries

Year	Total Small Units		Sick Small Units		Percentage of 4 to 6
	Number	%Increase	Number	%Increase	
1	2	3	4	5	6
1977	2,95,720	—	16,730	—	5.66
1978	3,33,837	12.89	18,950	13.27	5.68
1979	3,91,750	17.34	20,975	10.69	5.35
1980	4,47,821	14.31	23,149	10.36	5.17
1981	5,23,185	16.83	25,342	9.47	4.84
1982	6,07,049	16.03	58,551	131.04	9.64
1983	6,87,295	13.22	78,363	33.84	11.40
1984	7,57,092	10.15	91,450	16.70	12.08
1985	8,54,843	12.91	1,17,789	28.80	13.78
1986	9,50,334	11.17	1,45,776	23.76	15.34
1987	10,48,253	10.30	2,04,259	40.12	19.48
1988	11,58,765	10.54	2,40,573	17.78	20.76
1990	19,40,000	67.41	2,18,828	(–) 9.04	11.28
1991	20,00,000*	3.09	2,21,472	1.21	11.07
Compound Growth Rate 1977-91		14.41%			21.86%

*Provisional

Sources: (i) State/Union Territory Directorates of Industries
(ii) Economic Survey of Respective Years, Government of India, Ministry of Finance (Economic Division).

small scale units has tended to decline for the first time in 1990 probably due to the positive impact of the new economic policy. Yet, out of every ten small units one is sick. So far as the causes of industrial sickness are concerned, these are many in number and varied in nature. The very high growth in sickness during the eighties is *inter alia* due to the liberalisation policy of the Government of India declared during the sixth and the seventh five year plans. As a result, numerous small units came into existence resulting in more competition and the units could not withstand the onslaughts of the tough market competition fell sick.

Not only has sickness spread to a large number of industrial units, but the incidence of sickness has also advanced to an extreme form making the majority of the units non-viable. A sick industrial unit is regarded as potentially viable, if in the opinion of the banks assessing its viability, "it would be in a position, after implementing a package of concessions spread over a period not exceeding seven years from the commencement of the package, to continue to service its repayment obligations as agreed upon, including those formulating part of the package without the help of any further concessions after the aforesaid period" (Ministry of Finance 1986). Information on the viability status of sick small scale units relating to the period 1987-91 is in table 3.

Table 3: Viability status of sick small scale units

Description	June 1987	December 1988	March 1990	March 1991
Total Number of Sick Units	2,04,259	2,40,573	2,18,828	2,21,472
No. of Units for which viability assessment has been made	1,99,318	237,113	2,16,543	2,19,138
No. of Units found viable	12,484	13,033	16,451	16,140
No. of Units found non-viable	1,86,834	2,24,080	2,00,092	2,02,998
Percentage of viable units to total sick units	6.1	5.4	7.5	7.3
Outstanding bank credit for units found viable (Rs. Crores)	359.50	471.92	590.50	693.10
Percentage of viable units in total bank credit given to sick units	21.7	22.0	24.3	24.8
Units under nursing programme	8,470	7,788	12,160	13,224
Percentage of units under nursing programme total viable units	67.8	59.8	73.9	79.4

Source : Ministry of Finance Government of India ; *Economic Survey* of respective years.

It can be seen that at the end of March 1991, out of 2,21,472 sick small scale units, 2,02,998 units (91.66 per cent) were considered non-viable with outstanding credit of Rs. 1,997.13 crores, i.e. 71.53 per cent of total outstanding credit to all sick small scale units. Thus, almost 9 out of every 10 sick small units are found to be nonviable. Of the viable units too, only about four-fifth sick SSI had been brought under nursing programmes. No information is available as to the follow-up of the programme. On the whole, a large number of non-viable sick small units are almost on the verge of closure, thus, resulting in wastage of scarce financial resources and loss of employment. According to an estimate (Datt, 1992), about 30 lakh workers are likely to be affected by the closure of sick units. In relative terms, about 6 per cent of the total employment in the industrial sector is likely to be affected of which more than two-thirds (68%) will be rendered jobless in the small sector alone. This presents a grim prospect in the employment scenario of a developing country like India (Khanka, 1993).

The growing incidence of sickness in Indian industry has become all-pervaise in terms of ownership (public and private sector), across scale (small, medium and large), States and industries. The statewise distribution of industrial sickness is presented in table 4.

Four distinctly different features are noticed from table 4. First, the magnitude of sickness, in absolute terms, is larger in the industrially developed states than the industrially backward ones. Second, the incidence of sickness, i.e. the percentage of sick SSI units to the total SSI units, is fairly higher in the industrially backward states like Kerala, Orissa, Rajasthan and Uttar Pradesh as compared to their developed counterparts like Gujarat, Tamil Nadu, West Bengal and Maharashtra. Third, increase in the number of both units and sick SSI units is higher in industrially backwards states than the industrially developed ones. The reason is no difficult to seek. Development of small scale industries has been the major policy plank of the State Governments. As such, several incentives and concessions are provided to the entrepreneurs to establish small units in the backward areas/ States. As a result, a large number of small units

Table 4: Statewise distribution of small scale units viz-a-viz sick small scale units

States	1979			1989		
	No. of SSI units	No. of Sick SSI Units	% of 3 to 2	No. of SSI Units	No. of Sick SSI Units	% of 6 to 5
Andhra Pradesh	20,287	1,323	6.52	70,149	21,461	30.59
Tamil Nadu	24,320	955	3.93	86,499	10,105	11.68
Gujarat	24,189	856	3.58	65,553	6,302	9.61
Maharashtra	25,983	2,763	10.63	54,610	14,497	26.55
Karnataka	15,627	1,039	6.65	62,534	8,318	13.30
West Bengal	96,288	6,948	7.21	1,31,656	25,648	19.48
Bihar	17,788	802	4.51	59,886	5,250	8.77
Orissa	6,207	772	12.43	16,061	4,486	27.93
Madhya Pradesh	24,636	525	2.13	1,38,729	14,675	10.57
Uttar Pradesh	19,080	1,125	3.87	1,45,797	24,401	16.74
Punjab	28,818	403	1.39	96,519	4,467	4.63
Haryana	14,470	225	1.55	61,229	2,179	3.56
Rajasthan	21,164	323	1.53	56,761	11,925	21.01
Kerala	13,984	653	4.67	30,178	17,021	56.40
Others	28,909	2,129	7.36	64,464	17,706	27.47
All India	3,91,750	20,841	5.32	11,58,765	1,86,441	16.09

N.B. * These relate to the year 1988.

Source: 1) For the number of total SSI units — *Hand Book of Statistics 1989, Small Scale Industries in India*, Development Commissioner, Small Scale Industries, Ministry of Industry, Government of India, New Delhi.

2) For the number of Sick SSI units — *Report on Currency and Finance, Volume I, Economic Review 1990-91* Reserve Bank of India, Government of India, New Delhi.

were established in these backward States during eighties. An increasing number of small units fell sick soon after their establishment due to the lack of infrastructural facilities in these backward States. Fourth, on the whole, increase in sick small units was about three times higher than increase in the total number of SSI units during 1979-89.

The lowest incidence of sickness was witnessed by the two agriculturally developed States like Punjab and Haryana. This suggests that development of agriculture, among other things, seems necessary for development of industries as to ensure input supply especially in the case of agro-based industries.

Development of agriculture, among other things, seems necessary for development of industries as to ensure input supply especially in the case of agro-based industries.

The latest available data on industry-wise distribution of sick units as at the end-September 1989 indicates that sickness is an industry phenomenon also. It can be seen from table 5 that four industry groups viz. engineering and electricals, textiles, chemicals and iron & steel accounted for 27 per cent and 46 per cent of the total sick SSI Units and outstanding bank credit respectively. These four groups are followed by paper and rubber industries in that order.

Table 5: Industry-wise classification of sick small scale Units

Industry	Number of Units		Outstanding Bank Credit (in Crore Rs.)	
Engineering & Electricals	23,597	(12.66)	514.10	(22.92)
Iron & Steel	2,356	(1.26)	110.49	(4.92)
Textiles	15,308	(8.21)	151.12	(6.74)
Chemicals	6,751	(3.62)	205.45	(9.20)
Sugar	371	(0.20)	14.27	(0.64)
Jute	203	(0.11)	12.75	(0.57)
Rubber	953	(0.51)	36.50	(1.63)
Cement	405	(0.22)	13.61	(0.61
Paper	1,881	(10.09)	46.02	(2.05)
Other Industries	134,616	(63.12)	1,138.00	(50.52)
Total	186,441	(100.00)	2,243.31	(100.00)

Source: *Report on Currency* and Finance Volume I, *Economic Review, 1990-91*, Reserve Bank of India, p. 74.

Concluding Remarks

Industrial sickness is not an overnight occurrance but is a gradual process taking 5 to 7 years to corrode the health of a unit (Gupta, 1983). Sickness also cannot be attributed to a single factor alone. In fact, it is an ultimate result of the cumulative effect of many factors which may be closely inter-related or even independent of each other which are broadly classified into internal and external causes of industrial sickness. Researches (Development Commissioner 1985, Reddy & Appa Rao, 1988; Khanka 1992) conclude that in most of the cases, small scale units fall prey to sickness due to external causes like infrastructural bottlenecks, economic cycles, industrial and fiscal policies of the government, shortages of raw material and working capital and marketing problems.

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A mother could not get her son to come home before sunset. So, she told him that the road to their house was haunted by ghosts who came out after dusk.

By the time the boy grew up he was so afraid of ghosts that he refused to run errands at night. So, she gave him a medal and taught him that it would protect him.

Bad religion gives him faith in the medal. Good religion gets him to see that ghosts do not exist.

The Song of the Bird
Anthony de Mello, S.J.

Integrated Approach to Equipment Management

J. Mohan Krishnaiah

Majority of today's industries are capital intensive; hence optimum utilisation of the capital assets has become imperative. Equipment management is the principal key to enhancing capital productivity. The author presents a detailed approach to the upkeep of plant and equipment stressing on preventive and predictive measures through Total Productive Maintenance.

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The global market is under the siege of unprecedented upheavals, where only the fittest can survive. The economic environment is becoming progressively harsh forcing the players in the market to strive for and sustain the competitive edge they have over others. Allround productivity growth and its long term sustenance is the unmistakable key to retaining competitiveness. Core factors such as price advantage, quality superiority, reliable support services and market assessment contribute significantly to developing competitiveness (Fig. 1). Each of the core factors has its own crucial dependencies.

Core factors such as price advantage, quality superiority, reliable support services and market assessment contribute significantly to developing competitiveness.

Price advantage is derived by producing a quality product at optimum cost. The prerequisites for this, in turn, are a sound manufacturing technology, equipment in peak working condition and people with relevant skills and attitude.

Quality superiority is the single most determining factor to sustain the competitive edge of a product over its other comparable counterparts. This is achieved by effective management of installed equipment, efficient process administration and involvement of people in quality building. Creation and sustenance of market for the current and future products is the challenging and the unenviable task of marketing function. Evolution of marketing strategies is dependent on sound data base highlighting the potential for product(s). The primary

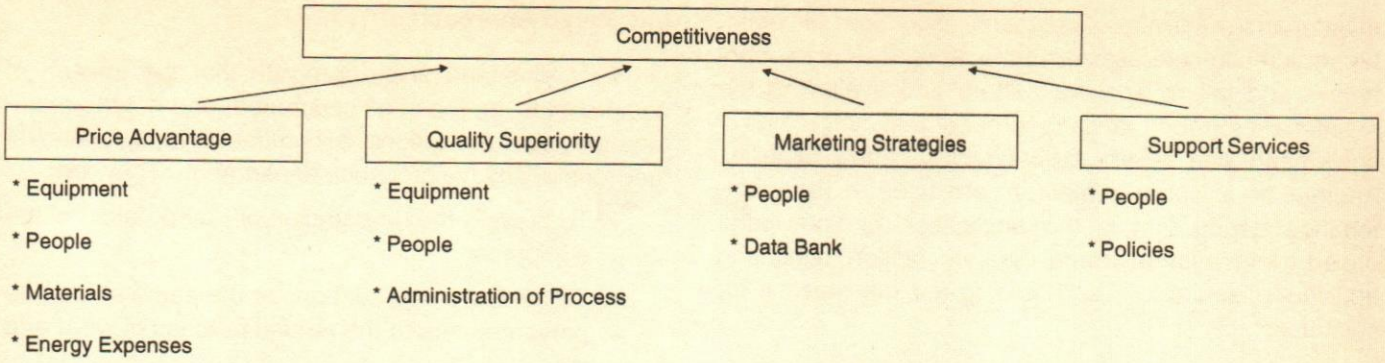

Fig. 1. Factors Responsible for Competitiveness

resource for achieving this is a group of committed and talented workforce.

Support services envisage taking into cognizance the requirements of customers relating to skill development, after-sales service and incorporation of user feedback for product upgradation. This involves instilling confidence in, and a sense of loyalty towards the product. Again, competent people and the company policies are the primary resources to assimilate market reactions.

In an ideal situation, the above factors will have to be in harmony to derive the concerted advantage of invincible competitiveness. Equipment and people run as common threads for achieving price advantage and quality superiority. Since equipment forms the chief constituent of the capital assets, and skilled people to operate and maintain the equipment constitute the chief human resource, together they have a profound influence on achieving higher capital productivity. Thus, capital productivity becomes the central entity around which the competitiveness of an organization revolves.

Equipment Management

Most of the industries today are capital intensive owing to the concept of economics of scale. Plant and equipment form the major constituents of these capital assets. Recent trends are witnessing a significant shift from extensive to intensive use of capital assets. While creation of massive capital assets is taking place to meet the ever increasing demand of various industrial goods, it is to be appreciated that such capital assets require substantial service support to achieve viability and long life-cycles. The existing assets, having seemingly reached the phase-out stage, require massive rejuvenation efforts to extend their useful lives. Thus, optimum utilization of the large investments made on capital assets (plant and equipment) involves not only correct decisions regarding their selection, but also their proper operation, upkeep and repair with adequate logistic support.

Equipment Management, therefore, is the principal key to enhancing capital productivity. Equipment management, besides encompassing the mundane task of operating and maintaining the plant and equipment, embodies the sense of collective ownership and the formally unstated responsibility fir quality, quantity, safety and higher levels of equipment effectiveness.

Approaches to Equipment Management

Traditionally the responsibility of upkeep of plant and equipment rested with the maintenance department alone. However, over a period of time, there has been a shift in this thinking. Today, with the advent of systems engineering and holistic approach towards equipment management, it has become the job of everyone concerned with equipment to manage them effectively. The list primarily includes the operations group besides others like technical services, design and development, utilities, quality control and spare parts groups. Besides, the approach towards maintenance has also changed gradually from the primitive type of operate-to-failure strategy (breakdown maintenance) to sixed-time-attention to the maintenance requirements (preventive maintenance). Subsequently, condition based maintenance (predictive maintenance) came into vogue as it determines the optimum maintenance attention required. Further, during the last few decades considerable development in instruments and other aids for monitoring the condition of components/equipment has taken place. All these changes have improved the possibilities of keeping equipment in good condition over longer periods of time, thereby reducing the requirements of maintenance; at the same time the cost of material for replacement has been reduced.

Another interesting development in the area of equipment management has been the extensive use of computers in planning maintenance activities, updating the equipment information system, scheduling preventive

maintenance activities, optimum allocation of maintenance resources, assessing maintenance cost control details and failure analysis pattern and evaluating the maintenance performance in terms of the 'availability' of equipment and their maintainability and reliability. Another area where computers are used in the maintenance department is the application of knowledge based expert system for machinery condition monitoring and fault diagnosis. The following are the reasons for such use:

- The pool of expertise available within a maintenance organization is constantly subject to depletion and erosion by virtue of the changing environment it works within.
- The drive for greater efficiency and reliability in equipment creates an increase in the complexity and sophistication of equipment design. Consequently, as new equipment is introduced, the level of expertise available to maintain that equipment lags behind the requirement.
- Additionally, increased reliability of equipment reduces the amount of hands on experience which can be gained during its lifetime and the natural evolution of experience through experience is impeded. Thus, the potential for the use of expert systems amply exists in maintenance function.

Though reasonable progress has been made by the industries by adopting condition based maintenance policy along with computer applications, the overall performance of the equipment has not shown significant improvement commensurate with the efforts put in. The single important reason assignable for such a state of affairs is the lack of integrated effort. Each department interacting with the equipment should participate in the joint exercise of improving the Overall Equipment Effectiveness (OEE) by eliminating not only the breakdowns but other losses associated with the operations performance and quality adherence. This ushered in practices like Total Productive Maintenance (TPM) which has its origin in Japan, and is being widely practised by USA, and many South East Asian and European countries. TPM suggests an integrated and participative approach to equipment management by involving all concerned.

TPM suggests an integrated and participative approach to equipment management by involving all concerned.

Integrated Approach of TPM

To understand and appreciate that the upkeep of equipment is the job of all concerned, and not the maintenance department alone, it is prudent to recapitulate the functions of any maintenance department. They are:

- To prevent the degradation or deterioration of the equipment
- To measure degradation, as the same cannot be prevented due to the natural process of wear and tear.
- To recover back from degradation. Once the condition of equipment reaches a state of unacceptable working limit. It has to be recovered back from that state through corrective maintenance measures.

The factors and strategies responsible for performing the above functions are presented in Fig. 2.

The first function of preventing the degradation is normally attributed to the level of direct preventive maintenance activities carried out on the equipment. These activities include regular cleaning, lubrication, painting, minor adjustments, etc. Since accumulation of dust and dirt on the equipment is the single most important reason for equipment deterioration, cleaning assumes an important role in the upkeep of equipment, though it looks rudimentary in form and contract. Similarly, lubricating the moving parts with either oil or grease at the right points with the right amount, and at the right intervals eliminates many premature failures due to wear and tear and aids in prolonging the life of the equipment. This further helps in reducing energy consumption by reducing the losses due to friction. Another common problem associated with equipment performance is corrosion, especially in chemical process industries, which has to be abated by preventive measures like protective coatings and paintings. Besides, minor adjustments like tightening the foundation bolts, adjustment of fastener tension, seals, etc. also help in preventing the degradation of equipment. Any amount of preventive maintenance measures carried out shall not yield full result unless the equipment is operated in accordance with specified conditions and within parameters laid out. As long as the maintenance department and operations department are viewed as two mutually exclusive identities, there will always exist a conflict of interests forcing them to lose track of their common objective of preventing equipment degradation. And precisely here that the TPM concept suggesting horizontal integration of people from all departments like maintenance and operation resolves these conflicts and

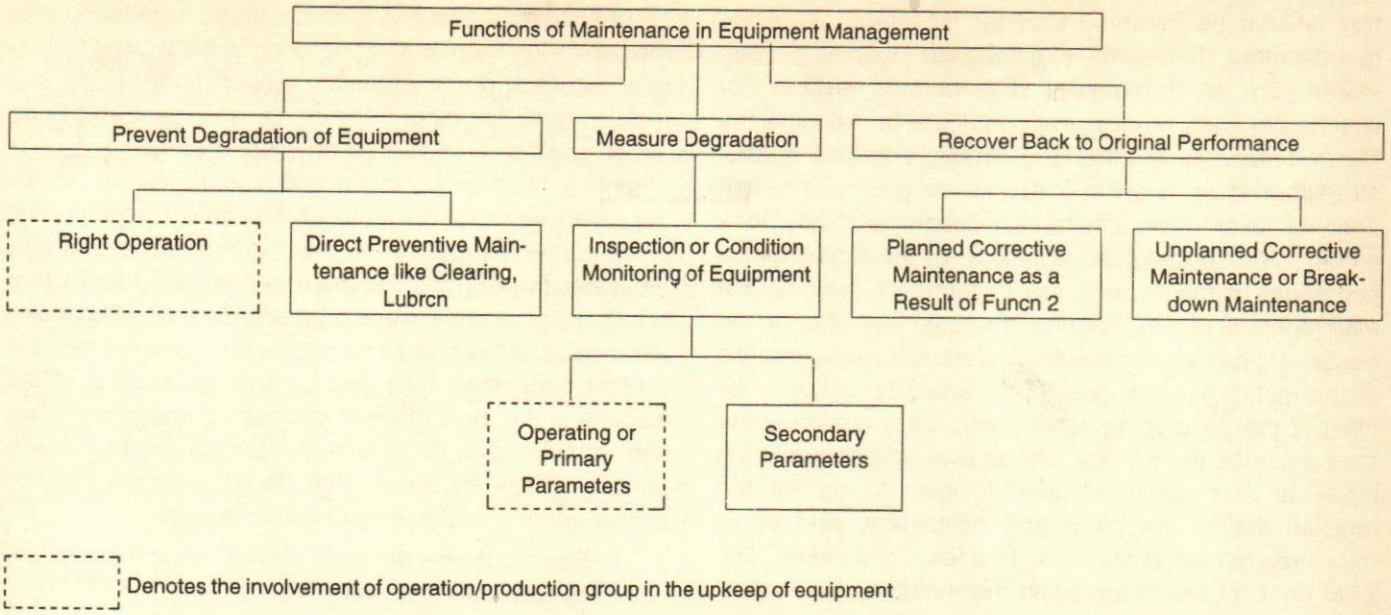

Fig. 2.

channeslises the energy to fulfil their objective with synergistic effect. TPM even suggests the operator undertaking the direct preventive maintenance activities himself rather than delegating them to his maintenance counterpart. The role of the operator is significant even in performing the second function i.e. measuring the degradation. As wear and tear is an inevitable phenomenon, if degradation cannot be adverted, it has to be measured. This is done by indirect preventive maintenance which includes inspection and condition monitoring. The role of condition monitoring and condition based maintenance has been elaborated in detailed fashion earlier on, emphasizing more on "secondary parameters". But the equipment performance can also be measured and the deterioration estimated by measuring the "primary parameters" or "operating parameters". This can be effectively done by the operator as he spends his entire time near the equipment. This reasoning also further strengthens the TPM concept of making the operator more responsible and involved in the task of equipment management.

If degradation cannot be averted, it has to be measured. This is done by indirect preventive maintenance which includes inspection and condition monitoring.

The third and last function of maintenance discipline is to recover the equipment back from the degradation, as it is no longer in operable condition. This situation occurs either through the advance information received through condition monitoring thus facilitating planned corrective maintenance, or due to unexpected breakdowns which give rise to "unplanned corrective maintenance". In either case the ultimate goal should be to avert or postpone such incidents as far as possible with their reliability improvement studies, demand design changes or material replacements or retrofitting which can be successfully effected by pooling the expertise available with the maintenance personnel, design and development group and operators. Several industries have benefited through such joint exercises in augmenting the reliability performance of the equipment more than was envisaged in the original design. This improvement apart, the congenial and cordial atmosphere created by such harmonious working of essentially different but interrelated functions boosts the general motivation level of the people. Thus, TPM envisages and provides guidance to integrate the organization horizontally breaking the barriers of all functions and departments in pursuit of achieving excellence in equipment management. The positive results of this integrated approach can be seen even while tackling the unplanned corrective maintenance activities arising due to sudden breakdowns. It is commonly believed that only fifty per cent of the time spent in restoring the equipment back to its normalcy is spent on actual repair work. In maintenance management parlance, this is referred to as Mean Time to Repair (MTTR). The remaining fifty percent of time is invariably spent in arranging the logistic support. Such unproductive loss of

time should be curbed. Counter measures like close coordination between maintenance planning and material/spares department shall help in reducing or eliminating such delays and contribute in reducing the Mean Down Time (MDT). These activities further strengthen the concept of horizontal integration of people bringing even stores/materials department into their ambit. The shortsighted approach of the maintenance personnel of the bygone era in terms of deciding the maintenance plans, ignoring the total lifecycle of the equipment has always resulted in frequent replacement s of the installed capacities. This would be a luxury for most of the developing nations which are reeling under capital scarce economies. World over, efforts are being made to sort out new methodologies to predict the residual life in the plant and machinery, and apply measures to extend the same to a few more years. The TPM concept which suggests the maintenance system for the whole life cycle of equipment helps in arriving at the right amount of maintenance to optimize and, if possible, prolong the life of equipment. The benefits of integrated approach to equipment management are shown in Fig. 3.

It should be ensured that the profile associated with the capital intensive equipment is provided with all necessary technical documentation, support spare parts and tools to maintain them. Moreover, a diligent and committed workforce should be developed by giving careful thought to the needs of the individual workmen and creating a work environment conducive to satisfy these needs. Work content is one of the most important factors that motivates the workforce favourably besides other factors like financial incentives and organization style. The maintenance objective should be expressed in such a fashion that the tradesman can make his own decisions to utilize his time in the most efficient manner. Besides providing him with varied work content, the job can be also made more enjoyable by allowing him to proceed towards the achievement of higher order needs through:

- Replacing the detailed maintenance instructions by clarification of objectives.
- Increasing the responsibility and providing greater chance of achievement by making planning, organizing, directing and controlling the joint functions of the employees.

	Maintenance	Operation	Design/Tech Services	Stores/Spares
Maintenance	*	Better understanding of equipment — Minimum downtime	Improvements in reliability and maintainability	Import substitution of spares and elimination of waiting time for spares
Operation	Better understanding of Equipment — Minimum downtime	*	Process improvements and development of additional features to equipment	Reduction in work in progress inventory (WIP)
Design/Tech Services	Improvements in reliability and maintainability	Process improvements and development of additional features to equipment	*	Standardisation of spare parts and identification of relevant suppliers
Stores/Spares	Import substitution of spares and elimination of waiting time for spares	Reduction in work in progress inventory (WIP)	Standardisation of spare parts and identification of relevant suppliers	*

Fig. 3. Results of Integrated Approach to Equipment Management by Involving all the Departments Concerned

Participative Approach of TPM

TPM also professes the use of a combination of both "bottom up" and "top down" approaches. The suggestions and ideas of the people down the line should move up. Similarly guidance, direction and support should come from the top besides being receptive to the suggestions coming from the bottom rung. This setup promotes the involvement of the top management at each stage of decision making concerning the equipment, initial spare parts provisioning, identification of outside repair facilities and plant layout in tune with maintainability requirements.

- Studying the organization of the jobs and designing them so as to give greater satisfaction of human needs.
- Replacing the control activities by emphasizing the role of the supervisor/supporter/tutor in developing abilities.
- Instituting a mechanism to build effective teams in the workforce.

The aforesaid points are incorporated in TPM and the whole basis of TPM implementation revolves on the prin-

ciples of participative management through Small Group Activities (SGA), and creating an atmosphere congenial for achieving motivation.

Objectives of TPM

Six major losses contribute to equipment non-availability. They are caused by failures of equipment, adjustments, idling and minor stoppages, reduced speed, process defects and reduced yield. The concept of TPM aims at maximizing equipment effectiveness and complete elimination of these losses.

TPM implementation revolves on the principles of participative management through Small Group Activities (SGA), and creating an atmosphere congenial for achieving motivation.

TPM has the following objectives:

- **Maximizing** equipment effectiveness.
- **Establishing** a total system of maintenance covering the entire life of the equipment.
- **Covering** all departments such as equipment planning, equipment users and maintenance.
- **Participation** by all employees from top management down to workers form the floor.
- **Promoting** maintenance through participative management i.e. by encouraging small group activities.

Practising of TPM in Japan and other countries has resulted in very encouraging and tremendous improvements in the overall productivity of organizations. Initially, its application was limited to the automobile industry; subsequently, it has spread to other industries like petrochemicals, refineries, cement, power generation and other process industries.

Developing countries also should go in for application of such new, yet proven, concepts like TPM. However instead of adopting the TPM concept in total, it would be desirable to mould the mechanics of its implementation to suit the local conditions.

We must take cognizance of the factors due to which TPM was successful in Japan, before envisaging its adaptation. Eminent Japanese expert Mr. Ouchi G. William, who proposed "Theory Z", identified a set of practices and procedures which lead to better job satisfaction and therefore better productivity in Japan. Some of these practices are long term employment, career paths wandering around functions, a climate which allows the employees to pursue projects which they believe would succeed, consensusal style of decision making etc. This theory-Z explodes the myth that some management practices are culture specific, and those who practise the above can certainly reap the benefits irrespective of their cultural lineage. It is easier said than done.

Industries in developing countries are plagued traditionally with factors like inadequate compensatory package, below-average level of worker awareness, segmented hierarchical kind of setup, age old maintenance practices etc. TPM provides the means to satisfy people's higher order needs and, promotes achievement motivation. So obviously, TPM would be more successful if it is tried in those industries where reasonable compensatory packages are offered and there is required protection for jobs.

TPM provides the means to satisfy people's higher order needs and, promotes achievement motivation.

The success of the implementation is greatly influenced by the existing maintenance practices. The places where modern maintenance techniques for troubleshooting and repair are employed shall have an edge over the others. Similarly, an organizational structure which possesses horizontal integration of maintenance crew and production team makes for easier adoption of TPM. So, it is essential that one should look into these basic aspects before launching TPM. Orienting the people's attitudes towards accepting and appreciating this concept by conducting meetings, workshops etc. is also equally important besides providing them with technical inputs to augment their maintenance skills.

Review of Existing Maintenance Practices

It would be appropriate to take stock of the practices adopted by the maintenance department before introducing TPM. Some of the important factors where the assessment has to be made are the degree of maintenance planning, level of equipment effectiveness, extent of engineering analysis carried out, mode of manpower deployment and the system for equipment management.

In many industries, maintenance planning is looked after by a separate Planning Cell. Most of the preventive maintenance schedules are executed through work order implementation. The Maintenance Planning Cell also looks after the requirements of maintenance budget preparation for each department and finally these budgets are integrated at the functional level. In addition, the performance of the maintenance department itself is evaluated by analyzing the complete work orders. The feedback of such performance indices is used to suitably amend the future plans and for identifying the areas to be concentrated upon. Thus, the maintenance planning cell involves itself right from the inspection list preparation to its effective implementation.

In spite of having maintenance planning cells, most industries do not care to assess the overall equipment effectiveness; instead they are satisfied with mere availability figures. The annals of maintenance department do not reveal any encouraging results in terms of improved reliability of the equipment, reduced maintenance costs and progressive increase in availability of the equipment. This is because of the general apathy of both maintenance and production personnel to record minute details like losses due to reduced speed, idle time, minor stoppages and set-up losses. Ultimately, there would be a vast gap between what is projected as availability, and what has been achieved as production. Besides this, if rejection rates are taken into consideration, then the net production outcome would be much less. To obviate such difficulties awareness and involvement of both the production operator and maintenance technicians are equally important.

While doing the hard core maintenance jobs, maintenance supervisors lose sight of the time lost for want of logistic support like men, material and services. Even the time they spend on repair is not productive in its true sense due to the fact that fifty percent of the time is normally lost either in identifying the fault or in locating the proper maintenance tools and tackles. Some of the critical machines which fail often have to be studied in more detail to isolate the cause behind the faults, instead of correcting it often. Such reliability improvement studies through systematic engineering analysis and design modifications would go a long way in improving equipment performance. The most common complaint of the maintenance department is the paucity of manpower. Paradoxically, the utilization of maintenance personnel is far less than what is anticipated. As a general practice, several industries follow the compartmentalized approach of dealing with the preventive maintenance work and break-downs separately. Due to random occurrences of break-downs and an adhoc estimation of preventive maintenance work, both the break-down maintenance crew and preventive maintenance crew are always under utilized. When the method of preparing preventive maintenance inspection list is unscientific, the effectiveness of such PM work does not necessarily reflect on the improvement of availability. On the other hand, it may adversely increase the corrective maintenance work. Adding to this, the horizontal polarization of production and maintenance functions makes the situation more complicated. This kind of complication results in equipment waiting for service for longer duration on many occasions. This polarization sometimes may even trickle down to the operating level making the production operators indifferent to the rudimentary needs of the equipment. Most often, they expect the maintenance technicians to carry out the activities like cleaning, lubrication and minor adjustments. This also adds to the problem of uneven distribution of maintenance manpower.

It is commonly agreed that the maintenance engineers should be involved while selecting the equipment, as was not the practice in yester years. Even afterwards, continuous interaction between the maintenance engineer and the machinery supplier should exist, resulting in improvement of equipment effectiveness and extension of its useful life. For the effective upkeep of these assets, constant assessment of the training needs is essential for both the maintenance and production personnel. Their operating as well as maintenance skills can be augmented through provision of appropriate inputs. Spare parts planning also forms an important constituent of equipment management and the same can be done rationally by having meaningful understanding amongst maintenance engineer, equipment supplier and the technical services department.

Rapid Review Assessment

As a first step towards implementing TPM, a rapid review of the existing maintenance practices can be carried out by suitably answering a structured questionnaire covering various points discussed in the above para. The proforma of the proposed rapid review assessment is given in Annexure 1. This questionnaire consists of thirty questions covering maintenance planning, calculation of equipment effectiveness, engineering analysis, manpower deployment and equipment management. The questions can be answered by appropriately choosing Yes/No in response to each question. Table 1 can be used as a guideline to assess the preparedness of the company for implementing TPM.

Table 1: TPM implementation

Factors	Conducive for TPM Implementation if number of 'YES' is equal or more than
Maintenance Planning	6
Equipment Effectiveness	4
Engineering Analysis	3
Manpower Deployment	3
Equipment Management	4

Companies whose score is less than the given guidelines have to strengthen the functioning of maintenance department in the respective areas, thus toning up the work environment suitable to implement TPM.

Skill Assessment & Development

Another important requirement to implement TPM is to raise the knowledge and skill levels of all the workers. Certainly all the operators in the production department need not know about the complete details of the equipment. Similarly all the maintenance technicians and millwright fitters need not be fully aware of reliability improvement studies, advanced condition monitoring techniques and modern reconditioning procedures. In general, some operations depend on the skill of the performer for effective outcome. Thus, it is essential to analyze the skills that exist to identify the areas for skill augmentation.

Knowledge plays a key role in enhancing the skill. Basic knowledge controls action, lack of knowledge leads to incorrect actions and operations, faulty analysis and in turn leads to ineffective corrective action. It generates outbreaks of new problems and accelerates the old ones. As the degree of automation increases, the area of relevant basic knowledge also expands.

Skill analysis can be done through studying the details of the equipment such as their design, material of construction and operation principles, and then arriving at the amount and types of skill these equipment demand for their satisfactory operation. Simultaneously, personal interviews can be held with the operators and technicians to analyze their present level of knowledge and by observing them at work, their skill levels can be estimated. By synthesising the outcome of above activities, the plan for knowledge and skill development can be drawn up. With the additional skills input, coupled with effective workplace and systems, TPM's implementation would be successful in enhancing the equipment productivity.

Conclusion

5-Ps Approach to Equipment Management

Synthesizing the features of TPM and the contemporary maintenance practices of industries in the developing countries, a more nationalized approach of 5-Ps to equipment management is proposed. The essence of this 5-Ps approach is its continued development oriented thinking and synergising the talents of all concerned towards enhancing equipment effectiveness. The summary of this approach is depicted in Fig. 4.

1P Proactive Maintenance

Normal practice in industry is only to react to any abnormalities or malfunctioning of equipment. Some of the reactive maintenance activities are replacement of a failed bearing, reconditioning of wornout parts, repairing of faulty electrical joints, etc. Instead, under proactive maintenance, the reasons for such repetitive faults/failures are analyzed and necessary peremptory actions taken to avert the need of reactive maintenance. This leads to adoption of concepts like design-out maintenance (DoM) and Maintenance Prevention (MP).

1P	PROACTIVE: Analysing the equipment needs in advance and undertaking the maintenance activities, than reacting to failures.
2P	PROCESS ORIENTED: Bringing in developments in the equipment through appreciating and encouraging the process oriented approach than aiming at mere results.
3P	PARTICIPATIVE: Involving all parties concerned such as operation, maintenance, design, utilities and stores in managing equipment.
4P	PROGRESSIVE: Effecting small improvements to increase the reliability and maintainability of equipment
5P	PERPETUAL: Managing equipment keeping in view their entire life span and continue this exercise on a continuous basis.

Fig. 4. 5-Ps to Equipment Management

Under proactive maintenance, the reasons for repetitive faults/failures are analyzed and necessary peremptory actions taken to avert the need of reactive maintenance.

2P Process Oriented Attention

While the equipment is operated by operators and maintained by technicians, the general tendency has been to focus attention on the output derived or the result achieved. Ideally, attention needs to be focussed on the processes adopted by the people, both operators and maintenance crew, in utilizing the equipment. The process of adhering to the stipulated operating conditions and maintaining quality standards should be the primary consideration. Likewise, the process of care, attention and improvements the maintenance personnel provide to the equipment equally important. This type of process oriented approach enhances the performance of equipment in the long run.

3P Participative Approach

Both the vertical and horizontal integration of organisation shall certainly enhance the effectiveness of equipment by channelizing the resources of all parties and levels from departments like production, maintenance, design, stores and other services. This participative approach has already proven successful in countries like Japan and Korea in eliminating all the chronic losses.

4P Progressive Steps

Instead of aiming at quantum jumps it would be worthwhile to bring in improvements in gradual increments and progressive steps. Accumulation of such small improvements shall increase the performance of equipment substantially. As the investment or effort required in effecting such changes is trivial, the overall productivity enhancement would be substantial.

5P Perpetual Efforts

All the approaches enlisted should be taken up on a continued basis, as sustenance over a long period determines the competitive edge of a company over others. With time, many advancements will take place in the areas of equipment design, process manufacturing methods, better materials and sophisticated instruments. Practice of the enumerated approaches shall certainly help a company in achieving excellence in equipment management. Finally, through enhancing the capital productivity — a logical conclusion to the above, one can retain the competitive edge and survive in the market.

ANNEXURE 1

Rapid Review Assessment of Maintenance Status

Put ✓ mark at appropriate place as your response.

Maintenance Planning

Do you have separate maintenance planning cell to look after implementation of maintenance schedules?	Yes/No
Do you have work order system for executing the maintenance schedules?	Yes/No
Is work order a basis for arriving at various performance indices?	Yes/No
Do you prepare maintenance budgets for each departments?	Yes/No
Are these individual budgets are integrated at functional level?	Yes/No
Do you categorise the equipment to fix up priorities?	Yes/No
Do you have a unique code for spare parts besides part no.?	Yes/No
Do you maintain a assets register/equipment card?	Yes/No

Calculation of Equipment Effectiveness

Do you calculate availability for each critical equipment based on the loading time and available time?	Yes/No
Are you estimating the set-up losses?	Yes/No
Do you account for idle time and the time lost for minor stoppages?	Yes/No
Do you optimise machining parameters?	Yes/No
Do you have process control charts for each of the machine?	Yes/No
Do you calculate the rate of rejections category wise?	Yes/No
Do you know machine capability of all/some machines?	Yes/No

Engineering Analysis

Do you analyse for the reasons of downtime in terms of repair time and waiting time?	Yes/No
Do you arrive at Mean Time Between Failures (MTBF) atleast for the critical equipment?	Yes/No
Do you analyse for the reasons which contribute more towards Mean Time to Repair?	Yes/No
Do you conduct Failure Mode Effect Analysis (FMEA)	Yes/No

Manpower Deployment

Can your maintenance crew take up both preventive maintenance and corrective maintenance as and when required?	Yes/No
Do you deploy the maintenance personnel more for preventive maintenance work compared to corrective maintenance work?	Yes/No
Do the maintenance crew report to both production supervisor as well as maintenance supervisors?	Yes/No
Does your crew gives importance for carrying out direct preventive maintenance activities like cleaning, lubricating and adjustments?	Yes/No
Are these direct preventive maintenance activities form part of machines operators' job description?	Yes/No

Equipment Management

As a result of engineering analysis, do you undertake the design modifications to improve the equipment reliability?	Yes/No
Do you bring to the notice of equipment suppliers regarding some repetitive failure?	Yes/No
Are you involving Maintenance Manager in the process of equipment selection?	Yes/No
Do you identify the training needs requirement of maintenance personnel at periodic intervals?	Yes/No
Do you have a policy for prolonging the useful life of equipment instead of discarding it after a fixed period of operation?	Yes/No
Do you use the process control charts feedback to review the equipments performance?	Yes/No

□

Feature

Purchase Management in Indian Dairy Cooperatives: An Exploratory Study

Madan Mohan T.R. & Singh N.P.

Purchase, as a pivotal function in any business organization seeks to achieve acquiring the right things at the right time in the right quantity. In order to meet the goals of the organization, the purchase managers are expected to comprehend their responsibilities clearly in concrete and precise terms. Indian dairy cooperatives form a substantial part of the Cooperative sector, employing a significant number of technically qualified people in purchase departments. This paper presents the findings of a survey of purchase management in Indian dairy cooperatives. It aims at clarifying the role perceptions of purchase managers and the significance of the purchase function, besides suggesting improvements in the required task competencies.

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A manufacturing firm's exchange relationship with its sources of input resources depicts a critical environmental interface. The responsibility for 'appropriate equipment, material, supplies and services in the right quantity, of the right quality, at the right price and from the right source at the right time' has traditionally rested with purchase managers, and managements are increasingly realizing the benefits of effective materials management. Studies of Chao (1989) and Handfield (1993) have revealed the importance of empirical studies focussing on descriptive assessment of purchase systems. However, till date there are no empirical studies attempted to assess the dynamics of purchase management in Indian diary cooperatives.

The responsibility for 'appropriate equipment, material, supplies and services in the right quantity, of the right quality, at the right price and from the right source at the right time' has traditionally rested with purchase managers.

Previous studies have recognized the influence of environmental uncertainty (Pfeffer & Salancik 1978; Wernefelt & Karmani 1987), opportunism (Provan & Skinner 1989); information sharing (Weick 1969; Dobler et al., 1990) and transaction uncertainty (Clark 1989) on purchase dynamics and purchase performance (Chao 1989). Milliken (1987) identified three forms of uncertainty: state uncertainty, effect uncertainty and response uncertainty. State uncertainty referes to unpredictability of what is likely to change in the environment, when and to what extent. Within the context of purchasing, state uncertainty refers to unpredictability of: market (demand

uncertainty), resources (supply uncertainty), and competitors (competitive uncertainty). Effect uncertainty refers to the inability to predict what the impact of environmental events or changes will be on the organization. Response uncertainty is associated with attempts to understand what response trajectories are at the disposal of the organization. Researchers have observed that under conditions of increased uncertainty, firms in the value chain engage in collective action in order to stabilize their environment (Ouchi 1980; Pfeffer & Salancik 1978). With high variability in demands, instability occurs within manufacturing plans and in such situations, purchasing seeks to increase its responsiveness by stocking for variations or by spreading the procurement over a large number of small firms (St. John & Heriot 1993). Supplier base consolidation, reduction in supplier base and high inter-organizational interdependence may also be the strategies adopted (Hahn et al., 1990) Researchers have observed that observed that information sharing plays a key part in purchasing (Dobbler et. al., 1990). Purchase managers, faced with uncertain environments attempt to communicate information through the channels to provide better and more accurate schedules of requirements to suppliers to allow them to plan their available capacities (Raturi et al., 1990).

While some interesting conclusions have been reached on the basis of these studies, the influence of certain factors of critical importance to purchase performance has not received sufficient attention. For example, structural variables (Thompson 1967), whose importance to better functional management has been recognized in organization behavior literature, have received little attention. Understanding of task related issues at cooperatives is imperative because of the structural arrangements in which they function. Moreover, very little is known about the purchase management function is structurally dependent firms (Pfeffer & Salancik 1978). Towards contributing to reducing this gap, a study was attempted to identify the critical decision areas related to purchase management, create responsibility-activity matrix for Indian Dairy Co-operative managers so as to integrate the diversified decision areas, to identify the strategies adopted towards uncertainty management, and to identify the issues and concerns of purchase managers in Indian diary cooperatives.

Purchase Function in Indian Dairy Cooperatives

Indian dairy cooperatives based on their structural linkages can be broadly classified into two types: Anand pattern and non-Anand type. Anand pattern cooperatives (derived from the highly acclaimed Amul experiment at Anand, Gujarat) has a three tier structure. The primary raw material is collected at village level societies and processed at district level member unions. While the member unions engage in marketing of consumables, the marketing of value-added final produce is undertaken by a state level apex marketing organization. For example, in the case of dairy-cooperatives, milk is collected from several village level societies by the respective member unions. Processed milk is sold by the member unions in their respective regions and the apex federations markets sell the value added products such as butter, ghee, cheese, etc.. The apex charts out the marketing plan for milk products and item-wise it is matched with the facilities and capacities of member unions. Anand-pattern cooperatives have a unique experiment in purchases (Rajagopalan, 1992). The Apex body for high value near-monopolistic products identifies and negotiates with the vendors to cover all the member unions. The centralized purchase of some of the critical items is believed to aid in increased bargaining strength and save a lot of duplicating effort in purchasing. The typical procedure for the specified products is as follows: The purchase manager from each member union sends the indent, giving the stock details and production requirements. The apex floats the enquiry and, after screening the supplier on various parameters, allocates the total required quantity amongst suppliers, with details of item-wise break-up for the various member unions. Each supplier is informed of the approved rate, total likely order and its break-up, item-wise and member-wise. Additionally, in case of shortages, the member is free to order the requirements at the approved rates from any of the approved vendors.

The centralized purchase of critical items is believed to aid in increased bargaining strength and save a lot of duplicating effort in purchasing.

The purchase manager at the district union is involved with non-specific high value items and other miscellaneous materials, including engineering spares. The typical purchase procedure at member unions requires the purchase department to obtain indents from stores (or user-section). Enquires are floated, item-wise rates are compiled and a comparative statement is sent to the managing director for approval. In some cooperatives, a purchase committee (usually consisting of department

chiefs, managing director and few-nominated members from the board) oversees the purchase recommendations. In case where high value of purchase is involved the board of directors must approve the purchase order. The purchase manager at a member union is involved not only in managing materials from specified vendors for the designated items, but also in buying non-designated resources.

Methodology

The data for the study was obtained from thirty two purchase executives. Of these, nineteen executives attended a week long management development programme. The other thirteen purchase executives were interviewed at their respective work places. A structured questionnaire based on Mohanty and Nair (1986) instrument, but with suitable modifications to reflect the complexity of the purchase function was employed to collect the data. Apart from collecting responses to the basic questions, a few open-ended discussions with the executives were also generated. Table 1 presents the profile of respondents.

Table 1: Profile of Purchase Managers

Age	
25-35	9
35-45	15
Over 45	8
Experience in Purchase	
Less than 10 years	18
10-20 years	9
Over 20 years	5

As the objective of the study was to identify the current dynamics of the purchase function in Indian dairy cooperatives, the following aspects of purchase management in these organizations were highlighted:

- Objectives of the purchase department
- Manager's reactions to supply uncertainty
- Critical problem areas.

Wild's (1984) constructs were used to measure the extent of responsibility, complexity and time and effort spent in the decision areas. Mohanty and Nair's (1986) instrument was suitably modified to measure the variables: techniques used in purchase decisions, the skills needed by the purchase manager and the factors influencing purchase performance. All the variables were measured on Likert type five-point scale. The Cronbach coefficient Alphas for the variables ranged from 0.81 to 0.9, remarkably high for a questionnaire measuring complex constructs.

Results & Discussion

Table 2 presents the objectives of purchase management in the Indian dairy cooperatives. Materials management, coupled with service as an informational center are the ranked objectives. It is interesting to note that wastage, generally associated with production function (Wild 1984), is seen here as an objective of the purchase function. This may be because some of these dairies are evolving towards a responsibility accounting system and non-manufacturing wastage is being attributed to both purchase (stores) and production.

Table 2: Objectives of Purchase Management (ranked by priority)

Rank	Objective
1	Ensuring arrival of material
2	Buying wisely (minimizing stock outs)
3	Minimizing waste
4	Ensuring better vendor relations
5	Serving as source for materials, equipment and specifications.

As seen from table 3, lack of standardization of materials and purchase procedures, low responsibility during negotiations, low control over vendors supplying critical resources, and interference from the elected board in purchase decisions were seen as the major problems. Lack of systematic drive towards standardization, coupled with lack of trained staff and high variability and seasonality of raw materials seem to be the major reasons for low standardization. The purchase managers felt they had little control over the suppliers of critical items identified by the apex body. Earlier experiments of information sharing to aid production scheduling

Table 3: Problems of Purchase Management (ranked by priority)

Rank	Problem
1	Low standardization of materials
2	Low standardization of purchase procedures
3	Low responsibility during negotiations
4	Low control over critical material vendors
5	Effect Uncertainty
6	Response Uncertainty
7	Interference from elected board in Purchasing
8	Working capital
9	Lack of trained staff
10	Late deliveries

at the supplier end were found to be unsatisfactory. Additionally, managers ranked effect uncertainty and response uncertainty as factors to be contended with. The effect uncertainty seemed to be emanate mostly from 'regulations'. Sudden changes related to MRP act and some aspects of FPO seem to have caused considerable uncertainty to purchase managers, especially to those with a stock-to-order policy. Involvement of the elected members in purchase procedures was generally perceived as the major source of high internal lead-time and a bottleneck to effective purchase.

Involvement of the elected members in purchase procedures was generally perceived as the major source of high internal lead-time and a bottleneck to effective purchase.

The decision areas of the purchase management function in Indian dairies are presented in table 4. Purchase managers seem to have maximum responsibility in market study, cost analysis and vendor management. Most managers consider purchase of capital equipment as a low responsibility area. Many purchase managers are not involved in product specifications. Historically, specifications have been emanating from user departments with purchase management having little say in suggesting alternatives. Most purchase managers opined that their involvement in specifications would improve the purchase department's ability in exploiting and exploiting alternate materials. Negotiations, market study, cost analysis and vendor development were seen as the most complex and difficult activities of purchase management. These activities were rated high not because of dearth of managerial tools and techniques, but due to low perceived authority and responsibility. This indicates that the purchase managers in Indian diary cooperatives score high on task variability and task difficulty. Vendor selection and analysis of bids are the activities figuring high in the purchase manager's time and cost efforts.

Purchase managers involvement in specifications would improve the department's ability in exploiting and exploiting alternate materials.

Table 4: Decision Areas in Purchase Management

Decision Areas	Extent of Responsibility (s.d. in brackets)	Complexity & difficulty	Proportion of Time spent & effort
Vendor selection	2.2 (0.9)	1.7 (0.9)	3.1 (1.1)
Analysing bids & prices	3.1 (1.2)	1.9 (1.1)	3.6 (0.9)
Negotiations	2.7 (0.9)	4.2 (1.3)	1.2 (1.9)
Market study & cost analysis	4.3 (1.7)	3.4 (1.9)	2.1 (0.9)
Standardization of specifications	3.9 (1.6)	2.9 (1.3)	1.2 (0.8)
Maintaining catalog library	1.4 (0.9)	1.7 (0.9)	1.0 (0.6)
Purchase of capital equipment	2.1 (1.1)	1.4 (0.9)	1.3 (0.9)
Scrap management	3.4 (1.3)	1.5 (0.9)	2.3 (1.3)
Vendor development	3.8 (1.2)	3.6 (1.7)	2.6 (1.1)
Emergency purchases	3.9 (1.1)	1.4 (0.9)	3.1 (1.4)

The strategies used for uncertainty management are listed in table 5. Promotion of a large group of small local vendors, increased information sharing, reduced supplier base for critical items and standardization were the widely used uncertainty management strategies. Capsizing the capacity for critical resources was also the preferred strategy by some managers.

Table 5: Strategies used towards Uncertainty Management (ranked by priority)

Rank	Problem
1	Increased information sharing
2	Promotion of small local vendors
3	Reduced supplier base
4	Standardization
5	Low order-quantities
6	Capsizing the capacity

Tables 6 and 7 present the techniques used and the skills perceived as needed by the managers. Subjective judgement and assessment by applying intuition and experience are more widely used to solve the problems concerning their domain of activities. Some managers also perceive computers as an important tool for decision support, especially during negotiations. The purchase managers of the Indian dairy cooperatives are basically concerned with managing vendors and communicating effectively with their users. Therefore, skills relating to

negotiations, and communications are considered important. However, there is a strong agreement by all managers to develop almost all skills mentioned in table 7.

Table 6: Techniques needed for Purchase Management

Decision Area	Mean (& s.d.)
Analytical/Quantitatives skills	2.7 (1.1)
Use of computers	2.4 (0.9)
Use of subjective judgement	3.3 (1.2)

Table 7: Skills needed for Purchase Management

Decision Area	Mean (& s.d)
Knowledge related to inventory management	3.2 (1.1)
Knowledge related to specifications, alternate material	3.3 (0.9)
Negotiation skills	4.1 (1.1)
Skills in managing people	3.6 (1.3)
Communication skills	3.6 (1.4)

Table 8 shows the factors affecting purchasing performance at member unions. Reduction in internal lead-period, low involvement of the elected members in purchase decisions and systematic procedures were perceived to be the factors that would significantly improve purchase performance.

Table 8: Factors influencing Purchasing Performance

Decision Area	Mean (& s.d)
Systematic purchase Procedures	3.2 (1.7)
Enhanced responsibility	3.1 (1.1)
Low elected member involvement	3.6 (0.9)
Reduction in internal lead-period	4.2 (1.2)
Openness of user-departments for alternatives	2.1 (1.3)

Concluding Remarks

The importance of the data obtained through this survey is directly attributable to the large number of decisions for which they are relevant inputs. The study reveals that, for a long time, no attempt has been made in Indian dairy cooperatives towards standardization of procedures and materials. Materials, as a competitive strategy, has yet to receive the attention it deserves. Involvement of the elected members in purchase decisions and large internal delays were seen as affecting the purchase performance. Purchase being a core function of the cooperatives, it is desirable that these organizations be assisted in developing effective structures and work processes so that long term cooperative performance is improved. This survey should be viewed as an attempt towards the attainment of such a goal.

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Financial Ratios as Predictors of Corporate Health

D.P. Mishra & P.K. Biswasroy

Recent years have witnessed a large scale incidence of sickness in Indian industries. The present paper deals with an empirically tested multivariate model to predict corporate sickness. It can serve as a forewarning system and assist the corporate sector, financial agencies and the government in their strategic decisions for rehabilitating the sick industrial units of the country.

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The increasing incidence of sickness in Indian industries has caused a serious setback to the financial agencies. At the end of December 1990 an outstanding bank credit of Rs. 9353 crore was locked up in 2.21 lakh sick units. Under such a situation, developing an effective forewarning system needs urgent attention. Towards this end, a study was attempted to predict sickness in Indian industries through an empirically tested mathematical model.

Financial Ratios & Corporate Sickness

Earlier corporate analysts utilised financial ratios to determine the firm's short-term and long-term solvency position. Today the predictive power of financial ratios especially in areas like corporate failure, bond rating, credit scoring and security classification, etc has been accepted.

Empirical studies by researchers on corporate failure/bankruptcy to predict the event of failure before its actual occurrence have given a new dimension to the assessment of corporate health. Notable among these are Altman (1968), Deakin (1972), Blum, (1974), Libby (1975), Taffler and Tisshaw (1977), Ohlson (1980) and Lau (1987). They used different sets of financial ratios as predictor variables with the application of statistical tools and techniques like principal component analysis, factor analysis and discriminant analysis and achieved a high degree of accuracy in predicting business failure. Empirical studies conducted by others like Kaveri (1980). Bhattacharya (1982), Gupta (1983), and Yadav (1986) contend that financial ratios have predictive power and exhibit a relatively high degree of accuracy in predicting corporate sickness before actual occurrence. However, none of these studies has been accepted as a standard for evaluating corporate health and efforts are on to iden-

tify a better forewearing model. The present study is an attempt in that direction.

Research Design & Methodology

The present study has been undertaken in the manufacturing public limited companies from the private corporate sector whose sickness was reported during the period 1980-85. The primary list of sick companies has been prepared from the ICICI study reports on the performance of the selected companies. For identification of sick companies, the Sick Industrial Companies (Special Provisions) Act, 1985 definition on sick company has been followed[1] Sample companies for the study comprised 45 sick and 45 non-sick companies. For each sick company, an identical non-sick company has been matched on the basis of the industry, size and fiscal year. The average capital employed by sick and non-sick companies was Rs 360 lakh and Rs. 390 lakh respectively. Initially, an estimation sample of 30 sick and 30 non-sick companies was drawn for developing the multiple discriminant model and the rest (15 each) kept for the hold-out test. Financial information of these sample companies was collected from the Stock Exchange Official Directory, for a period of five years prior to the occurrence of sickness. A total number of 30 financial ratios was selected for the study keeping in mind their popularity in literature, the performance of such ratios in earlier studies and the relevance of such ratios for the present study. These ratios have been broadly classified under six groups viz., cash flow, income, solvency, liquid assets to total assets, liquid assets to current liabilities and turnover to represent the different operational aspects of the sample companies.

The analysis and interpretation of this study has been made through a multivariate approach. The multiple discriminant analysis (MDA) has been applied as an appropriate statistical tool under the multivariate analysis. Besides this, tests like t-test, F-test, scaled vector test and multivariate F-test were also used.

Results & Discussion

In the multivariate analysis, a combination of financial ratios is studied simultaneously to achieve a linear discriminant function of such ratios in the form of $Y = \lambda_1 X_1 + \lambda_2 X_2 + \lambda_3 X_3 ..... \lambda_n X_n$, where λ_1, λ_2, $\lambda_3 .... \lambda_n$ are the discriminant coefficients and X_1, X_2, X_3 .... X_n are the independent variables (ratios). Putting the actual values of these variables in a discriminant equation, a score known as the Y-score is finally obtained. Thus, the multiple discriminant analysis calculates the discriminant coefficients λ_j, whereas the independent variables X_j are given actual values (j = 1, 2.....n). To determine the weighting coefficients X_1, X_2, X_3 .... X_n , the inverse of the groups variance-covariance matrix is multiplied by the vector of ratio mean differences, which is represented in a matrix notation $\lambda = c^{-1} d$. Here c^{-1} is the inverse of the groups variance-convariance matrix, d is the vector of the ratio mean difference and λ represents the weighting coefficients defining the best discriminating linear combination of the original Xn scores. Before designing the MDA model, the statistical tests like t-test and F-test (analysis of variance) were carried out to screen out the insignificant ratio variables. Based on the t and F values (table 1), altogether 19 financial ratios were found statistically significant. These ratios were introduced in a computer programme on multiple discriminant analysis. After running the programme, the coefficients of these ratios were derived (table 2.) To arrive at a final selection of important variables for developing the MDA model, the scaled vector test was conducted mainly to determine the relative contribution of each variable to the total discriminating power of the discriminant function and the interaction between them. It was calculated by multiplying the corresponding coefficients to the square roots of the diagonal elements of the variance-covariance matrix. The scaled vector scores are presented in table 3.

From all the test results i.e. t-test, F-test, MDA test and scaled vector test, finally one best ratio from each ratio group was included in the MDA model based on the judgement of the ratio's differentiating power, weightage and relative contribution within the group. For the development of the six variable discriminant model, the ratios namely, cash flow to total liabilities, net income to total liabilities, total liabilities to total assets, net working capital to total assets, quick assets to current liabilities and net worth to net sales were selected and introduced to the computer programme on multiple discriminant analysis. After several computer runs, the coefficients of these ratios were determined. The derived six variable discriminant model takes the form:

$$Y = 1.19X_3 + 0.88X_6 + 0.09X_{13} - 0.49X_{19} + 0.41X_{21} - 0.11X_{30}$$

1. The Sick Industrial Companies (Special provisions) Act, 1985 defined a sick industrial company as that (being a company registered for not less than seven years) which has at the end of any financial year accumulated losses equal/to exceeding its entire net worth and has also suffered cash losses in such financial year and the financial year immediately preceding such financial year.

Table 1: T and F values of financial ratios for the sick and non-sick Companies one year prior to Sickness

	Ratio Group	T-values	F-values
	Cash Flow Ratios		
X_1	Cash flow / net sales	3.28	11.11
X_2	Cash flow / total assets	5.87	35.06
X_3	Cash flow / total liabilities	6.21	39.63
	Income Ratios		
X_4	Net income / net sales	3.09	9.84
X_5	Net income / total assets	7.07	51.37
X_6	Net income / total liabilities	5.53	31.72
X_7	EBIT / total assets	5.74	33.37
X_8	EBIT / net sales	1.97*	3.99*
X_9	Operating profit / net sales	4.87	24.22
X_{10}	EBIT / interest	1.40*	2.02*
X_{11}	Net income / net working capital	4.06	2.02*
	Solvency Ratios		
X_{12}	Current liabilities / total assets	3.92	15.79
X_{13}	Total liabilities / total assets	7.38	52.91
X_{14}	Total liabilities / net worth	0.37*	0.14*
X_{15}	Long term liabilities / net worth	0.72*	0.54*
	Liquid Assets to Total Assets Ratios		
X_{16}	Cash / total assets	2.34*	5.00*
X_{17}	Quick assets / total assets	3.99	16.24
X_{18}	Current assets / total assets	2.84	8.27
X_{19}	Net working capital / total assets	6.42	42.36
	Liquid Assets to Current Liabilities Ratios		
X_{20}	Cash / current liabilities	2.84	8.14
X_{21}	Quick assets / current liabilities	3.96	16.21
X_{22}	Current assets / current liabilities	4.36	19.65
	Turnover Ratios		
X_{23}	Debtors / net sales	0.31*	0.08*
X_{24}	Inventory / net sales	1.77*	3.25*
X_{25}	Quick assets / net sales	0.14*	0.02*
X_{26}	Current assets / net sales	0.74*	0.52*
X_{27}	Net working capital / net sales	3.22	10.74
X_{28}	Fixed assets / net sales	2.06*	4.42*
X_{29}	Total assets / net sales	1.44*	2.16*
X_{30}	Net worth / net sales	6.17	39.17

X_{1-30} represents the variables
$T_{1, 58}(0.01) = 2.39$
$F_{1, 58}(0.01) = 7.09$
* denotes insignificant at 0.01 level.

Table 2: Coefficients of 19 Financial Ratios

	Ratio Group	Weight
	Cash Flow Ratios	
X_1	CF/NS	–1.73
X_2	CF/TA	–9.24
X_3	CF/TL	7.35
	Income Ratios	
X_4	NI/NS	2.30
X_5	NI/TA	7.38
X_6	NI/TL	–4.15
X_7	EBIT/TA	–4.41
X_9	OP/NS	0.49
X_{11}	NI/NWC	0.01
	Solvency Ratios	
X_{12}	CL/TA	0.21
X_{13}	TL/TA	–0.63
	Liquid Assets to Total Assets Ratios	
X_{17}	QA/TA	1.14
X_{18}	CA/TA	–0.51
X_{19}	NWC/TA	1.15
	Liquid Assets to Current Liabilities Ratios	
X_{20}	Cash/CL	2.20
X_{21}	QA/CL	0.82
X_{22}	CA/CL	–0.67
	Turnover Ratios	
X_{27}	NWC/NS	0.14
X_{30}	NW/NS	0.65

The above dicriminant function was found to be significant at 0.01 level, when multivariate F-test was performed. The Y-score values of both sick and non-sick companies in the first year prior to sickness were calculated (table 4.) The cut-off point for Y-score values was determined at 0.4587. It represents the mid-values of the summation of the mean y-score values of sick and non-sick companies. The companies are classified as sick if their Y-scores are below this cut-off point and non-sick if their Y-scores are above. Based on this cut-off point only 8 companies were misclassified. In other words, the classification accuracy of the model one year prior to sickness is estimated at 86.87 per cent. Type I and type II errors[1] are found to be 13.33 per cent each. The details of the classification accuracy and the error rates upto five years prior to sickness are presented in table 5.

1. Type I error would predict a sick company not to fail and type II error would predict a non-sick company to fail.

Table 3: Scaled vectors of 19 financial ratios

	Ratio Group	Scaled Vector
Cash Flow Ratios		
X_1	CF/NS	4.36
X_2	CF/TA	–10.53
X_3	CF/TL	11.55
Income Ratios		
X_4	NI/NS	5.75
X_5	NI/TA	8.91
X_6	NI/TL	–9.49
X_7	EBIT/TA	–4.99
X_9	OP/NS	0.92
X_{11}	NI/NWC	0.17
Solvency Ratios		
X_{12}	CL/TA	0.47
X_{13}	TL/TA	–1.46
Liquid Assets to Total Assets Ratios		
X_{17}	QA/TA	1.74
X_{18}	CA/TA	–0.67
X_{19}	NWC/TA	2.48
Liquid Assets to Current Liabilities Ratios		
X_{20}	Cash/CL	1.66
X_{21}	QA/CL	3.06
X_{22}	CA/CL	–2.66
Turnover Ratios		
X_{27}	NWC/NS	0.86
X_{30}	NW/NS	1.39

It can be observed from the table that the discriminant model retains classification accuracy of 81.66 per cent upto second year prior to sickness. However, the classification accuracy rate falls in the third year through fifth year prior to sickness because of the increase in the lead time and the indicators (financial ratios) becoming passive and less clear.

Again to test and validate the model a new set of 15 sick and 15 non-sick companies were put in the discriminant model and Y-score values of these companies were obtained. The Y-score values of sick and non-sick companies in the first year prior to sickness under the hold-out test are presented in table 6. The hold-out test gives 90 percent classification accuracy. From both the estimation test and hold-out test, it can be concluded that the discriminant model provides a high degree of accuracy.

Table 4: Discriminant scores one year prior to sickness

Sick Companies Code No.	Y-value	Non-sick Companies Code No.	Y-value
101	0.2213	201	1.3487
102	0.0406	202	0.9175
103	0.1385	203	0.5114
104	0.5017*	204	0.7672
105	0.3667	205	0.7475
106	0.2969	206	0.8015
107	–0.0579	207	0.4958
108	0.2195	208	2.5926
109	0.2914	209	0.6216
110	0.2629	210	0.5917
111	–0.0499	211	0.3588*
112	0.4447	212	0.5394
113	0.4868*	213	0.6161
114	0.5141*	214	0.5607
115	0.2529	215	0.7179
116	0.2364	216	1.0889
117	0.1891	217	0.6723
118	0.0097	218	0.6264
119	0.4719*	219	0.5283
120	0.4092	220	0.4610
121	0.3831	221	0.8274
122	0.1756	222	0.3398*
123	0.2652	223	0.5366
124	0.0479	224	0.5631
125	–0.0823	225	0.7719
126	–0.0049	226	0.3215*
127	0.3844	227	0.4649
128	0.3134	228	0.4619
129	–0.1351	229	0.3672*
130	0.4275	230	0.4681

* denotes the misclassified companies

Table 5: Five years classification accuracy of the discriminant model

Year Prior to sickness	Number of companies	Number correctly classified	Number Misclassified	Percentage of correct classification
1	60	52	8	86.67
2	60	49	11	81.67
3	60	46	14	76.67
4	60	45	15	75.00
5	60	43	17	71.67

Table 6: Discriminant scores of hold-out test one year prior to sickness

Sick companies Code No.	Y-values	Non-sick companies Code No.	Y-values
131	0.1954	231	1.0239
132	0.2987	232	1.0329
133	0.3826	233	0.7479
134	0.1007	234	0.8456
135	0.4392	235	0.7392
136	0.3087	236	1.4658
137	0.4041	237	0.5061
138	0.3450	238	0.5906
139	0.3697	239	0.6601
140	0.1369	240	0.4022*
141	0.2913	241	1.0775
142	0.6783*	242	0.5968
143	0.5014*	243	0.4978
144	0.3550	244	0.5048
145	0.3390	245	1.4447

* denotes the misclassified companies

Conclusion

The present study is a fact finding research on the prediction of sickness in the corporate sector. In this study the sickness in industries has been predicted for a period of 5 years prior to the actual year of sickness. From the analysis, it is observed that the profitability ratios are better indicators of impending sickness than the other ratios. The discriminant model of this study gives a high degree of accuracy in predicting as well as signalling corporate sickness. This discriminant model can, therefore, be relied on to a great extent for predicting the financial health of Indian companies. Potential investors and financing agencies, like banks and financial institutions may use the model to assess the financial health of a unit while lending their funds to the corporate sector. The management of sick companies may also find the model useful for taking suitable measures to improve the different parameters used in the model and start the process of revitalisation. The model, if utilised, properly and complemented with a follow-up action can check the malady of sickness and conserve the scarce resources of the nation.

The profitability ratios are better indicators of impending sickness than the other ratios.

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QCR: An Effective Measure of Management Performance Evaluation

K. Shankaraiah & M. Jagadeeshwar

The quality of products is an important aspect, as it improves the competitive ability of the company and increases the sales. High quality at reasonable cost is the goal of the management. The performance of management can not be measured with the help of traditional financial statements. The Quality Cost Report is useful as it reveals the quality costs in general and measures the performance of management in particular. This paper analyses the Quality Cost Report with a view to improving its utility and increasing its applicability.

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Though there are various financial and nonfinancial tools available for measuring and evaluating the performance of management, most of the accountants focus too much on financial measures such as profit or cost variances because such measures come directly from the traditional accounting system (Charles & Homgren Sunderm, 1990). But some non financial measures provide such information about performance that cannot be gleaned from the financial accounts. The information regarding quality performance is one such that cannot be obtained directly from traditional financial statements. In the present era of consumerism, adherence to high quality standards has assumed greater importance than ever before. In this context most companies recognise that there is a cost associated with the quality desired (Chaterjee , 1976) and seek ways and means of achieving quality performance at reasonable cost. Application of Quality Cost Report (**QCR**) proves quite useful toward this end.

Some non financial measures provide information about performance that cannot be gleaned from the financial accounts.

Significance

In this era of ever-growing competition a continuous watch over the quality of the goods produced, is essential (Gupta, 1987) because the goodwill developed for the product due to customer satisfaction regarding the quality and price in turn increase the sales. On the other hand, poor quality can result in large opportunity costs due to last sales and may even force the manufacturer to quit. The price is dependent on various factors and the company may not be in a position to fix the prices at its

discretion, since it has to also consider the competitive prices in the market. Hence, the price policy is not solely in the hands of management, whereas, the quality can be improved so as to improve the sales by satisfying the consumers. Thus, in the present context, the basic problem in any production process is not the quantum, but the quality of the product (Gupta, 1984).

The quality of the manufactured product depends on a number of factors, starting with its design and specification, the production process, the raw materials, machines and equipment, the expertise and skill of the persons who handle them and the inspection of the final product. In a nutshell the quality of a product is dependent on the materials, the manpower, the machines and the management, the last mentioned being the key factor because the rest are under management control. Quality has to be measured and evaluated from time to time, as the reports of these aspects provide the feedback to improve future economic decisions. Hence the quality performance measurement and evaluation assume importance. The concept of quality control is not a new one. For centuries, highly skilled artisans have striven to make products distinctive through superior quality. What is new about quality control is the use of statistical techniques which are helpful in maintaining and improving quality standards. Quality control involves the statistical analysis of the inspection data, the importance of which was realised only during world war II. The high pressure of the production needs led to the quality control concept in British and American war factories and resulted in great savings. Its success in the war was followed by its continued and expanded use in the postwar period. These days quality control has become an integral and permanent part of management control for attaining steady improvement in quality month after month, year after year.

The quality of a product is dependent on the materials, the manpower, the machines and the management.

Quality control has an important role to play in a country like India because of the wide variations encountered in raw materials and machines. The use of quality control is further emphasised in the context of the need of earning foreign exchange, which can be possible only by supplying quality goods. Though the quality is an important aspect, the management cannot exclusively concentrate on it, because the consumers are equally interested in reasonable price. The prices are generally affected by total costs, where the total costs include the quality control costs. Hence, the quality control costs have also to be taken care of, since they considerably affect the price of the product. Thus, the management has to strike a balance between quality and quality costs to provide quality at reasonable cost. In other words, QCR reveals the management ability in maintaining high quality whether with high cost or low cost.

Quality control has an important role to play in a country like India because of the wide variations encountered in raw materials and machines.

Many statistical models have been developed to construct quality control charts, whereas the QCR is less often used. In this context, an attempt has been made here to examine how the QCR is helpful in evaluating the management performance in terms of costs.

For this study, in order to have a clear understanding about the concept and utility of QCR the hypothetical figures (shown in table 1) are used for the analysis and the recommendations of the American Society for Quality Control and the model QCR, proposed by Allen H. Seed III (1990) are taken as a basis for preparing the QCR.

Quality Cost Report

The quality costs are generally spread over the organisation and associated with all departments. The production department often has to rework or revamp goods to maintain accepted standards. The marketing department has to handle all customer complaints, involving time and money by way of replacement and write offs. The purchase department has to ensure that the vendors supplying materials to the company comply with minimum quality standards. The distribution department has to absorb the cost of holding an inventory of goods whose quality is suspected (Chaterjee, 1976).

However, quality costs may be classified into four categories, as prevention costs, appraisal costs, internal failure costs and external failure costs.

Quality costs may be classified into four categories, as prevention costs, appraisal costs, internal failure costs and external failure costs.

Prevention costs: These costs are incurred to prevent the production of defective products, which include, the cost of engineering analysis to simplify the production process or to develop or improve the existing one; costs of programmes to train the personnel; cost of hiring the quality cost control systems form others and the cost of obtaining the supplier assurance etc.

Appraisal costs: These are the costs, incurred to appraise the existing system by inspection, testing etc. These include the cost of inspection of defective products; cost of testing; cost of inspection and testing of purchased materials; cost of quality audits; cost of maintenance of inspecting and testing equipments; cost of materials consumed in inspection and testing etc.

Internal failure costs: Every organisation has its own internal quality checking system. Due to failure of such system, some costs may be incurred such as costs of defective manufactured goods, that are scraped or reworked; costs of defective semi-finished products scraped or re-worked; cost of scraping or re-working the defective engineering of plan or process; costs of scraping of goods supplied by others or the cost of reworking the same; cost of failure of investigation, that resulted in bad quality etc.

External Failure costs: Costs caused by delivery of defective products to customers, such as, cost of returns, recalls; allowances; cost of handling the product complaints etc.

The traditional focus of quality control was on appraisal and internal failure costs. However, today, the emphasis has shifted to prevention, since preventing defects is less costly than identifying and correcting them.

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Application

The QCR (table 1) shows figures for prevention costs appraisal costs, internal failure costs and external failure costs and their respective variances between plans and actuals in rupees. It also reveals the sub division of each category of costs. The total production and total sales of the company are also shown in the statement to enable comparison. In order to understand the report easily, the total quality costs of four main categories along with their respective percentages and variances are shown in table 2. It also reveals the Total Quality Costs as a percentage of the Total Production Costs (% of TQC to TPC) and of the Total Sales (% of TQC to TS).

Table 1: Quality Control Report
(for the year ended 31st Dec, 1994) (Rs. in '000)

Quality Area	Plan	Actual	Variance
Prevention Costs			
Engineering	35	30	5
Training	4	5	(1)
Hiring Plans of Others	8	10	(2)
Suppliers Assurance	13	15	(2)
Total Prevention Costs	60	60	0
Appraisal Costs			
Inspection	45	50	(5)
Testing	23	20	3
Inspection & Testing of Purchases	10	15	(5)
Product Quality Audit	20	25	(5)
Maintenance of Testing & Inspecting Equipments	8	5	3
Material Consumed in Testing & Inspection	4	5	(1)
Total Appraisal Costs	110	120	(10)
Internal Failure Costs			
Scrap & Reworking of Manufactured Goods	280	300	(20)
Scrap & Reworking of Semi Finished Goods	50	50	0
Scrap & Reworking of Engineering	110	100	10
Scrap & Reworking of Goods Supplied by Others	60	50	10
Failure of Investigation	40	50	(10)
Total Internal Failure Costs	540	550	(10)
Total Internal Quality Costs	710	730	(20)
External Failure Costs			
Returns, Recalls	130	140	(10)
Allowances	80	85	(5)
Complaints	70	75	(5)
Total External Failure Costs	280	300	(20)
Total Quality Costs (TQC)	990	1030	(40)
Total Production Costs (TPC)	17000	20000	(3000)
Total Sales (TS)	25000	23000	(2000)

Table 2 highlights the important aspects and gives a broad view of the quality costs, whereas table 1 helps the management in getting the detailed version of quality costs. It reveals that the company has given first priority to control internal failure and external failure in its plans, whereas, prevention is given less importance. The variance in external failure is high, whereas, the actual and plan costs of prevention are equal. Further analysis made with the help of table 1 reveals that though the cost of scrap and reworking manufactured goods, engineering etc. are high, the cost of returns, allowances etc. are not much saved. Infact, the costs of such activities are more in plans and in actuals, which reveals that though there was concentration on the internal activity, the returns, allowances and complaints have not reduced. Basically, here the high internal and external failure may be attributed to management ignorance towards prevention and appraisal activities. The management has to shift its attention from internal and external activities to prevention and appraisal activities.

Table 2: Quality Control Report (for the year ended 31st Dec, 1994) (Rs. in '000)

Quality Area	Plan		Actual		Variance	
	Rs.	% to TQC	Rs.	% to TQC	Rs.	% to TQC
Total Prevention Costs	60	6.06	60	5.82	0	0
Total Appraisal Costs	110	11.11	120	11.65	(10)	25
Total Internal Failure Costs	540	54.55	550	53.40	(10)	25
Total Internal Quality Costs	710	71.72	730	70.87	(20)	50
Total External Failure Costs	280	28.28	300	29.13	(20)	50
Total Quality Costs (TQC)	990	100.00	1030	100.00	(40)	100
Total Production Costs (TPC)	17000	—	20000	—	(3000)	—
Total Sales (TS)	25000	—	23000	—	(2000)	—
TQC % to TPC	5.82		5.15			
TQC % to TS	3.96		4.48			

Thus the QCR draws the attention of management towards the probable reasons for poor quality and high quality costs and directs them to take an appropriate decision. Hence, QCR can be regarded as an effective management quality cost control system in general and an effective management performance evaluation measure in particular.

QCR draws the attention of management towards the probable reasons for poor quality and high quality costs and directs them to take an appropriate decision.

Conclusions

The QCR is a unique tool to measure costs ad performance of the management and enables the management to analyse performance and set targets in a much more rational manner as it permits comparison of performance and costs over a period of time and between divisions or product groups and helps to pinpoint areas where action is necessary. The QCR becomes an important report, when it doesn't impose unnecessary strains on the organisation and makes full use of the present accounting, costing, management accounting, standard costing systems. While recording and preparing the report, it should be noted that the categorisation of costs and their sub division may vary from company to company. So initially, the company may begin with a listing of only the four categories. gradually as the system takes root, the reporting and analysis can be extended to the sub categories also. Similarly, the company can start with yearly or quarterly reports, which can slowly be developed into monthly reports. The QCR has to be designed in such a manner to suit the company's own requirements.

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Sustainable Agricultural Production: Eastern Nigeria

Eric C. Eboh

The paper assesses how and to what extent population pressure has, through the interplay of social, economic and agronomic factors, been affecting sustainable agricultural production among small farmers in some Eastern Nigerian villages. Areas with higher population pressures were more directly associated with socio-economic factors such as land fragmentation, land conflicts, resource flight from farming; and agronomic factors such as cropping adjustments, soil fertility/crop yield decline. Agricultural/sustainability policy should necessarily take into account the social, economic and agronomic interactions, for it to be effective; argues the author.

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One major challenge facing small farmers in eastern Nigeria is to increase food production to meet the growing food demand without damaging the quality and productive potentials of their land. In response to this challenge, small farm research attention has been shifting to investigating those key factors that affect sustainable agriculture. Of particular importance is the interrelation between land use pressure and sustainable agricultural production.

Land use pressure and agricultural intensification are closely related factors that affect sustainable production in smallholder farms (Ogunfowora & Olayide, 1975; Biswanger & Pingali, 1987). Scholarly concern on land use pressure and agricultural intensification stems form the fact that both the processes could damage the productive resource base (land), if unaccompanied by appropriate soil augmenting practices. Under such conditions, the ecological balance of the production system and the sustainability of yields would be considerably endangered. But, if agricultural intensification is accompanied by adequate land maintenance practices, yields and land quality can be simultaneously sustained.

Agricultural intensification could damage the productive resource base (land), if unaccompanied by appropriate soil augmenting practices.

Land maintenance ensures the promotion of optimum use of land in accordance with its capability so as to assure its maintenance and improvement. It is only when this occurs, that an agricultural system can be said to be stable or sustainable; for as Metzner (1982) noted, a sustainable or stable agricultural system is that in which

the manner of cultivation could be maintained in the long run without destroying the ecological base of the system.

The sustainability of small holder agriculture, therefore, is predicted principally on the generation and adoption of more effective strategies to raise yields and conserve land (Eboh, Obasi & Uguru, 1990). A variety of factors ranging from the social, economic to the agronomic — play crucial roles in ensuring continuity of agricultural productivity. Socio-cultural factors include land use pressure, land tenure, community power and social relations. Economic forces that determine sustainability include farm incomes and access to production inputs and material resources. Agronomic considerations comprise soil conditions, weather constraints, crop varieties and cultural operations on the farm.

A sustainable or stable agricultural system is that in which the manner of cultivation could be maintained in the long run without destroying the ecological base of the system.

Thus, agricultural sustainability is a multi-dimensional concept requiring multidisciplinary analysis. A major theoretical and empirical challenge is to formulate and apply a multidisciplinary framework for describing, analysing and interpreting the web of interactions of the social, economic and agronomic forces as they affect sustainable agriculture. Research to improve understanding of these complex interactions, their mechanisms and effects would contribute to a greater understanding of the causes of the agricultural crisis in sub-Saharan Africa. Besides, it would also help to develop, implement and evaluate strategies for transforming sub-Saharan agriculture along the sustainability path. Therefore an empirical assessment was undertaken as to how and to what extent, population pressure has through the interplay of social, economic and agronomic factors, been affecting sustainable agricultural production among small farmers in some Eastern Nigerian villages.

Methodology

Anambra state, the study area, is one of the five states that make up Southeastern Nigeria and one of the twenty one states of Nigeria. Estimated 1985 population was 6.08 million (Anambra State Government, 1985), 75 percent of whom are rural-based (Federal Department of Rural Development, 1981). The present investigation was limited to Enugu and Nsukka, out of the five agricultural zones of the state. The choice of the two zones was governed by the need to minimise the differences in cropping and soil conditions and maximize the differences in population pressure and intensification rate.

Specifically, the farm survey was conducted in Oduma and Ndeaboth communities in Awgu local government area; Edem and Obollo-Eke communities in Nsukka and Isi-Uzo local government areas respectively. Projected man-land ratios in 1989 were 815 persons sq. km, 484 persons sq. km and 239 persons sq. km for Nsukka, Awgu and Isi-Uzo local government areas respectively. Thus, within the context of this investigation, Edem represented an area of relatively high population density whereas Oduma/Ndeaboh and Obollo-Eke represented areas of relatively medium and low population densities respectively.

Farmer contacts and interviews commenced after the random selection of fifty farmers from each community's sample frame. Practical measurements and participatory observation were also used to gather relevant farm specific data.

The empirical analysis was done within a tri-sectoral framework comprising the socio-cultural, agronomic and economic dimensions of the inter-relations of population pressure and smallholder production. The sociocultural perspective dealt with the interrelations of land use pressure, land tenure and land use intensification. Land conflicts as they affect sustainable production were also investigated. The agronomic analysis involved the determination and assessment of the soil fertility and yield problems of land use pressure and land use intensification. On the other hand, the economic analysis evaluated the effects of land use intensification for farm incomes, employment and output in smallholder agriculture.

Socio-cultural Aspect

Population pressure was found to be a significant determinant of the land use patterns in the communities. The available land area per farming family for the whole state was estimated to be 2.14 hectares in 1985. This compares poorly with the observation (Ogunfowora & Olayide, 1975) that in rainforest areas, a farm family will require about 40.47 hectares of land if the bush fallow system of cultivation were to continue. With the evident great pressure on land, it is not surprising that land fragmentation was pronounced in the communities. The mean number of fields per farmer 'now' was 6.32, 4.88 and 7.04 compared to ' decade ago' values of 5.44, 4.32

ad 5.72 in Oduma/Ndeaboth, Obollo-Eke and Edem respectively. Fragmentation values of 7.04, 6.32 and 4.88 correlated positively with land use pressure values of 815, 484 and 239 persons sq. km in Edem, Oduma/Ndeaboth and Obollo-Eke respectively. Mean field size varied negatively with man-land ratio. Edem with the highest man-land ratio had the least mean field size (0.98ha) and Obollo-Eke with the lowest man-land ratio had the highest mean field size (0.98ha). Further evidence of land fragmentation is contained in Nweke (1981).

Also, the tendency towards the individualization of land ownership became greater under increased man-land ratio. Similar empirical observation was made by Morgan (1972), and Mortimore (1972). There still exists however, community ownership of land in the studied communities. Major criteria for allocating community land included age, marital status, need and social status. Some farmers complained of undue favouritism on the part of community leaders; a situation that often gave rise to intra-family and inter-family disputes. Majority of the farmers were not satisfied with the number of farmlands available to them and made many attempts to secure more through purchase. But, because of increased competition for available land, only very few succeeded. Farmers agreed that their lands were not enough for them to produce the desired output; others said even if more lands are made available, they cannot produce more because of severe input constraints. Farmers in Edem suffered inter-family land disputes more than their counterparts in Oduma/Ndeaboh. Greater land shortage in Edem was the major explanation. Social tensions arising from land conflicts were observed and about 63 percent of farmers have experienced land disputes especially during the start of a new farming year. Such disputes were resolved by mostly 'Umunna' (that is, members of the extended family) and in other cases, by the intervention of community leaders. In few cases, the contending parties went to the law court for settlement.

Agronomic Aspect

A tendency towards shorter fallows was found in all the communities. Pre-cropping fallow length was adversely affected by population pressure, Observed mean fallow lengths were 3.97 years, 3.64 years and 2.56 years in Obollo-Eke, Oduma/Ndeaboh and Edem communities respectively. As was expected, post-fallow cropping years became longer as man-land ratio increased. Land use intensity values were computed to measure the degree of land use intensification. Mean land use intensities were 47.83 percent, 48.29 percent and 52.68 percent in Obollo-Eke, Oduma/Ndeaboh and Edem communities respectively. Observations regarding the negative correlation between fallow length and population pressure have been made by Ruthernberg (1980), Biswanger and Pingali (1987) and for Southeastern Nigeria particularly in Unamma, et al. (1985).

Soil investigation revealed that soil fertility indicators declined with shortening fallow period. Fallow length positively correlated with the principal nutrient elements such as nitrogen and organic carbon. The coefficients were +0.493, +0.189, and +0.666 for Oduma/Ndeaboh, Obollo-Eke and Edem respectively. The correlation was strongest in the high population pressure community.

Soil fertility indicators declined withshortening fallow peroid.

On the average, the near farm (farms near households) soils were richer in nitrogen, organic carbon and organic matter. The reverse, however, held for calcium, magnesium and phosphorous. The potassium content of both near and distant fields was more or less similar. The higher levels of nitrogen, organic carbon and organic matter in the near farms could be attributed to the more frequent droppings of household wastes on them (near farms). The heavy drudgery and lack of transport make manuring of distant farms less attractive. Nevertheless, farmers used more artificial fertilizers on distant farms probably because of the amenability of artificial fertilizers to conveyance. Higher phosphorous values on distant farms also derive explanation from this trend. Between the communities, differences in soil fertility of near fields were observed. The mean percentage organic matter and nitrogen contents were highest in Obollo-Eke for which two reasons could be suggested: Obollo-Eke farmers utilized higher quality and quantity of household wastes; and practised higher levels of bush fallowing. Soil fertility differences regarding distant fields in different communities were less pronounced. Organic carbon and organic matter contents of distant fields declined from Obollo-Eke (low pressure area) to Oduma/Ndeaboh (medium pressure area).

The effects of soil manuring on yam yields and cassava yields were also investigated. Yam yield, without fertilizer, was relatively low. Obollo-eke data showed higher yam yield response to organic manure applications. Even though greater fertilizer use was found in Edem, percentage increments in yam yield was least

there (+42 percent) compared to +43 percent and +53 percent in Oduma/Ndeaboh and Obollo-EKe respectively. This is probably due to three factors: Edem and Oduma/Ndeaboh farmers may have used lower quality organic manure; the applications may have been done at less appropriate stages of crop growth and development, and the quantities of organic manure used may have been too inadequate to make significant impact on the growth and yield of the crop. On the other hand, the relatively better yam response in Obollo-Eke corresponds with the higher percentage organic matter and nitrogen contents observed there. Cassava yield responded positively to fertilizer application in all the communities. However, compared to yam yield data, cassava responses were rather low and hardly different with and without soil amendments usage. A major explanation for this is the use of local cassava cuttings by majority of the farmers (local cassava cultivates have relatively low yield potential and are unlikely to respond rapidly to soil manuring). It is also possible that manuring was poorly timed and executed.

Economic Aspect

The negative effects of land use intensification in yields would *ceteris paribus* translate into decreased farm incomes. This trend has been clearly demonstrated by the analysis conducted to evaluate the impact of land use intensification and manuring on gross returns per cultivated hectare of land. Land use intensity, organic manure and inorganic manure were found to have significant joint impact on farm income. Whereas land use intensity had significant negative impact on farm income in all communities, the impact of organic manure and inorganic manure was positive throughout, even though it was significant in Obollo-Eke only. In conformity with earlier observation (in this paper), the use of organic manure did not save yields in Oduma/Ndeaboh and Edem. Lagemann (1977) also found substantial negative marginal returns to land use intensification in Southeastern Nigeria.

Prospects for Sustainable agriculture

It has been shown that the factors which affect sustainable agriculture are multifarious. Thus, sustainable agriculture has preconditions that cut across disciplinary boundaries. It is best described as a holistic phenomenon. Accordingly, for present levels of agricultural productivity to be maintained and improved, the interacting preconditions, no matter their disciplinary sources, would have to be met.

Social Sustainability

Land fragmentation and incessant land disputes provide an unfavourable environment for continued employment of individuals in farming. Intra-community switching to off-farm employment (as observed in Edem) exacerbates the situation. For social sustainability to hold, these inhibitors to smooth framework would have to be ameliorated. Creation of a congenial social environment in Ibo land is an urgent need and the solutions take on a geo-political perspective: The geographical limitations consist of a fragile ecosystem and lack of adequate farmland. Added to this is the high population growth in many constituent parts. The potential component of the problem derives from the contextual position of the Ibos in Nigeria's contemporary society. Prior to the Nigerian civil war in 1967, the Ibos migrated,freely to other parts of the country to engage in various economic activities. As a result, the land use pressure problem was less severe; especially because there existed a conducive political environment which enabled them to acquire land elsewhere instead of competing for land in native communities. But the atmosphere of mutual suspicion, insecurity and fear arising from inter-ethnic hostilities that preceded and culminated in the Nigerian civil war has not significantly changed many years after the war (Eboh, Obasi & Uguru, 1990). It is therefore not surprising that non-resident Ibos still compete for land in their native communities — a situation which has aggravated the land shortage problem.

Social sustainability of agricultural production requires that farm employees work without fear of attack by contending land owners. It also requires that farmers from land-scarce areas migrate in obstructed to land-abundant areas to continue their farmwork. Furthermore, intra community and inter-family land sharing should be devoid of conflicts and community leaders as well as the 'Umunna' would need to be mobilized towards more effective land dispute settlement modalities.

Agronomic Sustainability

Under increasing population pressure, the bush fallow system breaks down as a stable ecology (Morgan, 1982; Webster & Wilson, 1980). Yet, the continuity of yields depends to a large extent on the ability of the soil to supply plant food in adequate amounts. This ability is considerably diminished through shortening of fallow periods and the consequent drop in soil fertility (Obi & Tuley, 1973; Nwosu, 1974; Lagemann, 1977; Eboh, Obasi & Uguru, 1990). Other threats to agronomic sustainability to agricultural production are the use of low

yielding crop varieties and inadequate crop management practices. Unstable crop yields are worsened under such conditions.

Agronomic sustainability of agriculture under increased population pressure requires adequate offset of the negative effects of declining fallow lengths on soil fertility and yields. This involves maintenance and improvement of soil fertility as well as the removal of other constraints to productivity by the use of improved crop varities, better pest and disease control, better crop husbandry and more efficient labour use. Whichever way, the search for practicable means by which smallholders can maintain or improve soil fertility remains a major challenge in research and policy analysis.

Agronomic sustainability of agriculture under increased population pressure requires adequate offset of the negative effects of declining fallow lengths on soil fertility and yields.

One alternative is to maintain soil fertility by heavy use of inorganic fertilizer as practised under intensive farming systems of temperate countries. For many small farmers, this is hardly possible considering their poor economic access to marketed fertilizers. Other means of maintaining soil fertility include green manuring, household refuse, ashes, composts, animal manure as well as organics such as oil seed residues. However, the extent to which fertility gains are achieved using these techniques depends largely on the customary attitude and the skills employed. Experimental studies reported extensively in Webster and Wilson (1980) show that it is possible to maintain modest levels of soil fertility using adequate labour to collect and prepare materials of manurial value. Besides the scarcity of labour to collect, prepare and convey materials, the limited availability of these materials makes it impracticable to replace all the nutrients drawn by crops and those leached out of the top soils.

It is impossible to maintain soil fertility and raise crop yields simultaneously without soil re-nourishment. The impossibility becomes more real under increased land use pressure and attendant agricultural intensification. Small farm planners need to address these constraints in order to improve the efficacy of the various manuring practices. One issue to be addressed is farmers' ignorance about the generation, preparation and utilization of soil ferilizers. Agricultural extension work would have to be directed more towards farmer education and enlightenment on soil maintenance. In particular, farmers need to be taught about the right kind of manures, optimum application rates, appropriate timing as well as manuring techniques. Better access to production credit would enable farmers to obtain more labour for mauring operations. However, although increased use of manures should be encouraged where and when practicable and profitable, the problem of maintaining crop yields cannot be adequately tackled without complementary technologies. Some of these technologies are better crop varieties, improved cultural (planting, weeding, tillage) operations and adequate pests and diseases control.

Agricultural extension work would have to be directed more towards farmer education and enlightenment on soil maintenance.

Economic Sustainability

Poor and declining levels of farm income which accompany increased land use intensification are a great threat to economic viability in smallholder agriculture. One possible outcome is the allocation of resources away from farming into more profitable uses. This was the case in Edem community (the high pressure area) where many farmers resorted to out-of-farm jobs in order to supplement dwindling farm incomes arising from yield decline and soil fertility problem. For restoring economic viability in smallholder farming access to production inputs would have to be greatly improved. Besides, extension workers need to educate farmers on the optimum combination of production inputs under prevailing local conditions.

Policy Lessons for Sustainability

Agricultural sustainability has been demonstrated to be a holistic phenomenon. The social, agronomic and economic dimensions of the sustainability problem would have to be tackled tp engender a long term solution. Any policy option that is devoid of these elements can at best achieve only partial success. Prior to policy a more succint understanding of the multidisciplinary linkages is essential.

Social, agronomic and economic dimensions of the sustainability problem would have to be tackled to engender a long term solution.

Socio-demographic forces cause fallow length to decline. The agronomic effects of this decline are the decrease in soil fertility and crop yields. These translate into low farm incomes which act as a disincentive to continued employment of resources in farming. The labour moves out of farm employment thereby reducing the supply of man days to farming. This constitutes a threat to the social sustainability of agricultural productivity.

But if adequate and appropriate soil manuring techniques are employed to offset the negative effects of decreased fallow periods, yields could be saved. In this way, the agronomic sustainability of agricultural productivity is ensured. Then, farm incomes could be maintained or even improved and farmers encouraged to retain resources in farming. As such, the continuity in economic opportunities, in other words, the economic sustainability of agricultural productivity, will be guaranteed. However, even if farm solid are fertile and farm incomes satisfactory, total sustainability cannot be achieved unless there exists a congenial social environment: Land dispute and attendant social tensions are capable of causing large expanses of farmland to lie uncultivated for fear of attach by contending land owners. This aggrevates land shortage and requires government intervention measures. Otherwise, the sustainability gains achieved through agronomic and economic measures would only bring about short-lived results. Small farm planning and research should simultaneously address sustainability measures that are socially acceptable, culturally compatible, agronomically feasible and economically beneficial to smallholders. Institutional capacities need to be developed and fully tapped to improve small farmer management capabilities under increased land use pressure in sub-Sahara Africa.

Acknowledgement

This paper is based on a research assisted by a grant from the Project on African Agriculture of the Joint Committee on African Studies of the American Council of Learned Socieities and the Social Science Research Council with funds provided by the Ford Foundation and the Rockefeller Foundation.

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Subsidies & Agricultural Productivity

K.N. Selvaraj & C. Ramasamy

The government has been offering various policy packages to encourage the use of modern inputs and enhance agricultural productivity. But these subsidies have resulted in indiscriminate use of scarce resources by the farmers leading to a drain on government funds. Hence all subsidies should be removed in a phased manner suggest the authors.

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Agricultural production in India has been undergoing dramatic changes over the last four decades. The fundamental factors responsible for this progress are: improved technology like introduction of high yielding pest and disease tolerant hybrid varieties, better quality and optimal combinations of variable inputs such as fertilizer, pesticides (recommended level) and irrigation (conjunctive use), enhanced operational and managerial efficiency due to farm mechanisation and timely availability of inputs, improved infrastructural facilities such as development of rural institutions, and government intervention namely altering the farm output and input prices and changing the institutions in which the farm output and input markets operate. Table 1 presents the productivity figures of major agricultural commodities in India.

Table 1: Productivity of major agricultural commodities in India.

Crops	Productivity kg/ha	
	1950-51	1991-92
Foodgrains	522	1382
Groundnut	775	919
Sugarcane (cane)	33422	65269
Cotton (lint)	88	224
Other oilseeds	481	769

Source: Fertilizer statistics, 1991-92

The factors instrumental for the incremental productivity are fertilizers, irrigation, electricity and institutional credit increasingly made available to agriculture. The total fertilizer consumption increased from 69.8 thousand tonnes in 1950-51 to 12,728.0 thousand tonnes during 1991-92 (table 2).

The objective of government intervention in the market for farm inputs is mainly to accelerate the adoption of new technology. For example, in the case of suboptimal demand for a modern input, the provision of input subsidies in the early stages of its adoption could stimulate its use and lead to the net welfare of the society, provided adequate supplies of the inputs, along with other

complementary inputs are available. It is clearly evident that the total nutrient (NPK) consumption which was 0.55 kg per ha in 1951-52 increased to 70.66 kg per ha in 1991-92, due to the provision of fertilizer subsidies along with other inputs which stimulated its use. (table 2).

Table 2: Fertilizer consumption per unit if gross cropped area

Nutrient	Rate of consumption kg/ha	
	1951-52	1991-92
N	0.44	44.67
P	0.05	18.44
K	0.06	7.55
Total	0.55	70.66

Source: Fertilizer statistics, 1991-92.

The objective of government intervention in the market for farm inputs is mainly to accelerate the adoption of new technology.

The government offers different policy packages for the welfare of the producers and consumers of agricultural commodities. One such measure is provision of subsidies where the consumers or producers are allowed to pay less than the market price. These subsidies are generally classified into three categories: direct subsidies, indirect subsidies and cross subsidies (Reddy, 1992). Direct subsidies are those shown explicitly in the government budgets, under the major relevant heads as "subsidies" (eg) fertilizer subsidy. Indirect subsidies are those which are hidden under various entries in the budget. For example, water rates collected from the farmers by the government are too low to cover the cost of irrigation and the loss incurred is treated as an indirect subsidy. Cross subsidisation takes place when the profits earned in one economic activity are transferred to the loss making sector or sectors. For example, the Electricity Board follows a differential tariff rate system among its consumers. For the agricultural sector the tariff rate is much lower than for other sectors like industry, etc. Another important subsidy is credit subsidy in which the rate of interest on loans to farmers has been subsidised and at times, loans are written off for political and economic reasons. The reason for the subsidised interest rate is to induce small farmers to adopt modern agricultural technologies and to meet the financial requirement of various production activities.

Structure of Input and Other Subsidies

In the Indian context, subsidies were introduced in the fifties on irrigation water, fertilizer and pesticides in order to lubricate the process of adoption of modern agricultural technologies and commercialisation of agriculture. Both the Central and state governments have been allocating a substantial amount to subsidies (table 3).

Table 3: Subsidies provided by the Central Government

(Rs. crores)

Subsidy	1981-82	1984-85	1989-90	1990-91	1991-92	1992-93 (R.E)	1992-93 (B.E)
Food	70 (36)	1101 (27)	2476 (24)	2450 (20)	2850 (23)	2800 (23)	3000 (36)
Fertilizers	381 (20)	1928 (48)	4542 (43)	4389 (36)	5205 (43)	5800 (48)	3500 (41)
Export	477 (24)	518 (13)	2014 (19)	2742 (23)	1754 (14)	880 (7)	500 (6)
Major subsidies	1558 (80)	3547 (88)	8032 (86)	9581 (79)	9809 (80)	9489 (78)	7000 (83)
Debt relief	—	—	—	1502 (12)	1425 (12)	1500 (12)	500 (6)
Other subsidies	383 (20)	491 (12)	1442 (14)	1075 (9)	1036 (8)	1128 (10)	876 (11)
Total	1941 (100)	4038 (100)	10474 (100)	12158 (100)	12270 (100)	12108 (100)	8376 (100)

Source: Selvam (1993)
Note: Figures in parantheses are percentage to total
R.E. — Regal Estimate
B.E. — Budget Estimate

Total central subsidies of Rs. 1941 crores in 1981-82 rose to a peak of Rs. 12,270 crores in 1991-92 and the contemplated figure for 1993-94 is Rs. 8376 crores. Fertilizer subsidy has gone upto Rs. 381 crores in 1981-82 from the 25 crores during the year of introduction and further rose to Rs. 5,800 cores during 1992-93. It is estimated to reach a staggering Rs. 12,000 crores on a projected consumption of 20 million tonnes of nutrients by 1999-2000 in order to achieve a production of 240 million tonnes of foodgrains. However, 1993-94 central budget has slashed down subsidies.

According to Gulati (1989), the real economic costs of input subsidies (at 1980-81 prices) was higher in the case of irrigation followed by credit, electricity and fertilizer. The aggregate subsidies on fertilizer do not constitute the largest proportion of input subsidies. The real economic costs of input subsidies (at 1980-81 prices) are furnished in table 4.

Table 4: Real economic costs of input subsidies

(Rs. Million at 1980-81 prices)

Year	Fertilizer	Irrigation	Electricity	Credit	Total
1980-81	6592.27	6512.80	3530.19	5954.52	22589.78
1981-82	6219.96	6756.00	3870.40	6827.15	23673.51
1982-83	356.71	6943.30	5187.52	7220.20	19707.93
1983-84	2705.96	7295.60	5760.17	8084.99	23846.72
1984-85	9788.67	8134.10	6906.29	8935.78	33764.84
1985-86	11097.01	10301.00	7945.12	9710.89	39054.03
1986-87	1646.53	12865.10	9369.63	10555.58	34436.84
Total	38407.31 (19.48)	58807.90 (29.84)	42569.32 (21.60)	57089.11 (29.07)	197037.65 (100.00)
Annual Average	5486.76	8401.13	6081.33	8184.16	28153.38

Source: Gulati (1989)

Note: Figures in paratheses are percentage to total

Irrigation subsidies are recurrent costs.

In case of water, there has been poor cost recovery on the one hand and low water rates on the other. According to the Committee on Pricing Irrigation Water reports, the irrigation charges of Rs. 167 crores accrued during 1986-87 were not even enough to cover the working expenses of Rs. 493 crores on medium and major irrigation systems. The estimated uncovered costs of irrigation burgeoned to Rs. 1379 crores in 1986-87 from Rs. 403 crores according to the Central Water Commission. In addition, there is the burden of interest payment on irrigation investment.

Debt relief by way of writing off interest and sometimes even the principal on institutional loans is one of the methods of extending credit subsidies practised both by Central and State Governments. In India, debt relief is a recurring phenomenon: it accounted for 12 per cent of the total subsidy during 1990-91 and 1992-93. However, in 1993-94 budget estimate, it has been decreased to six per cent. The tight financial position and low profitability of lending institutions on loans advanced to rural sector may not justify the waiver of loans, and the move to write off such loans by deploying public and bank funds may only vitiate the general repayment climate and adversely affect the viability of the credit institutions. More often, writing off loans is more of a populist measure rather than based on any economic rationale.

Subsidy Issues

Increasing population, fiscal imbalances in the central government budget and unfavourable balance of payments have forced the government to slash down the burgeoning subsidies in recent years. It is also argued that input subsidy is a short-term programme, designed to meet specific objectives and will be phased out as development occurs. Input subsidies may lead to skewed cropping pattern that can result in the overuse of subsidised fertilizer and other inputs thus increasing the financial burden. Specifically, the larger share of subsidy in annual budgets may deprive a sector of badly needed funds to finance continuing technological change. However, input subsidies are more efficient than product subsidies in redistribution of income in the early stages of economic development when the low capital base for investment leads to low adoption rate of modern inputs and suboptimal level of production.

Input subsidies may lead to skewed cropping pattern that can result in the overuse of subsidised fertilizer and other inputs thus increasing the financial burden.

Dunkel Draft Text & Subsidy

Aggregate Measure of Subsidy (AMS) has been considered as an index of subsidy in the Dunkel Draft (DD). The Draft recommends the non product specific subsidies in cases of fertilizers, water, seeds, credits, pesticides etc to be below 10 per cent of the total value of farm output and in India these subsidies did not cross the five per cent mark. So there is no question of India having to reduce any non-product specific subsidies. The second type of subsidies mentioned in the Dunkel Draft are product-specific subsidies like the minimum support price for some crops. Here too the stipulation is that the subsidy should not cross 10 per sent of the value of output. In Indian conditions, for 17 out of the 20 items, the subsidies are negative. Only in the case of sugarcane, groundnut and tobacco, the subsidies are positive. But even then, they are below 10 per cent and India does not have to compromise on anything. AMS was suggested to be brought down to 13.3 per cent GNP by 2003 (Dasgupta, 1993; The Hindu, 1993)/ According to Gulati and Sharma (1992) PSE (Producer Subsidy Equivalent) is taken as proxy for AMS and PSE for India is negative as against 72.5 for Japan. Sharma (1992) also used the concept of Producer Subsidy Equivalent (PSE) to assess the implications of producer subsidies in cereals economy. This supports the view that if DD is accepted, Indian agricultural products will become competitive in the world market and agriculture will be a significant foreign exchange earner. In sum, the provisions in DD do not seem to affect the subsidies extended to agriculture in India.

Fertilizer subsidy

Over the years the cost of producing fertilizer has increased but the price charged to the farmers has not changed in a decade. The price paid by the farmer for the fertilizer until July 1991 was the same as in 1980-81. However, the price received by the farmers for wheat and rice has doubled. Keeping the price charged to the farmer fixed has meant a larger subsidy from the government budget. In a recent policy change, the government had increased the price of phosphatic and potassium fertilizers by 40 per cent. Shortly afterwards, it was reduced to 30 per cent and the policy also exempted small and marginal farmers from the fertilizer price hike. However, the 30 per cent increase is still subsidised to a significant extent. Originally, the price rise of 40 per cent effected a saving of Rs. 1,800 crores but after the 10 per cent relief, the saving got reduced to Rs. 950 crores. The decline in the savings will generate further inflationary pressure on the economy.

In agriculture, the diminishing returns to variable inputs has been well accepted in theory and empirically found to be correct at least in the case of fertilizer use, which is the most important input for increasing productivity. Fertilizer consumption and yield rate of different countries are presented in table 5. One could observe that India has fared well in the consumption of fertilizers. But there are significant variations across the regions. There are also evidences that the phenomenon of dimishing returns has set in some pockets. So, in order to make the use of fertilizer more efficient, the subsidy could be eliminated in a phased manner without causing severe fall in fertilizer use of yields. However, one should be concerned with some of the agriculturally less progressive states such as Orissa, Bihar, Assam etc., wherein the fertilizer use is still at sub-optimal level. When fertilizer prices increased earlier during 1970-80 and 1980-81, the consumption of plant nutrients declined by 8.3 per cent on small farms while it increased by 6.7 per cent on large farms (Vidyasagar, 1991). Reddy and Deshpande (1992) found from the responses of the farmers in different regions of Maharashtra that due to the hike in fertilizer price, the productivity would slide down and distort the technology package. They suggested that it would be detrimental to the long-term objective of sustained growth if a blanket policy of subsidy withdrawal is effected overall the regions at the sametime. What is essential now is a regionally differentiating policy through a well designed input delivery system. The policy of eliminating fertilizer subsidy in a phased manner is theoretically supported based on the dynamic disequilibrium argument (Ellis Frank, 1991).

Table 5: Fertilizer (NPK) consumption and yield rate of selected crops in selected countries

Country	Fertilizer consumption kg/ha Arable land	Yield rate Kh/ha Cereals	Pulses	Sugarcane
USSR	94.2	1582	1478	—
Canada	45.2	2600	1665	—
China	277.7	4286	1566	68384
USA	97.0	4511	1966	77910
Brazil	52.2	—	—	—
Australia	23.8	1347	992	74221
India	74.3	1897	582	64594
Mexico	63.2	2330	743	67986
Philippines	73.9	—	—	—

Source: Fertilizer statistics, 1991-92.

In order to make the use of fertilizer more efficient, the subsidy could be eliminated in a phased manner without causing severe fall in fertilizer use or yields.

The economic logic of the dynamic disequilibrium argument for implementing price subsidies on a variable input like fertilizers can be explained through simple graphical illustration. Figure 1 displays two contrasting

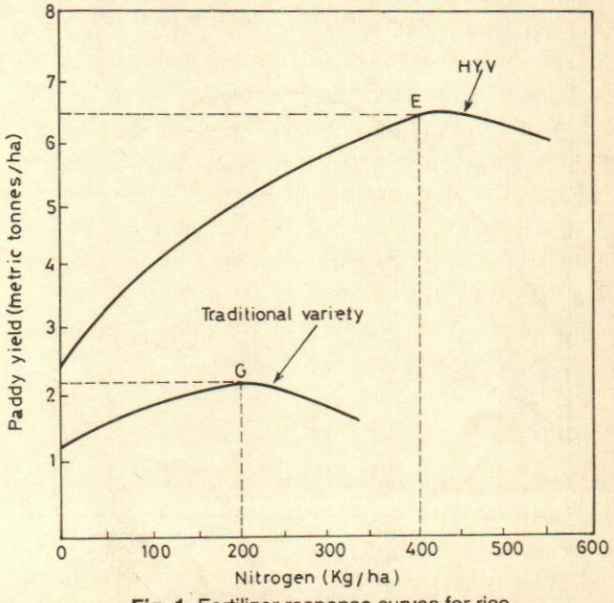

Fig. 1. Fertilizer response curves for rice.

yield response curves for rice. The lower curve represents the low initial yield and relatively small yield gain for a traditional rice variety at different levels of nitrogen use by the farmer. The upper curve shows the higher initial yields and much greater response to nitrogen of a high yielding rice variety, assuming that all other inputs are available in required quantity. Both the curves embody diminishing returns to scale. This feature also ensures that a biological maximum yield is defined (point G on the lower curve and point E on the upper curve) and yield falls if excessive quantities of nitrogen are applied.

Figure 2 shows the economic optimum level of nitrogen use for given prices of rice and fertilizer. The profit maximising levels of nitrogen use are at point F on the lower curve, and point C on the upper curve, and the tangent line at each of these points represents the fertilizer/paddy price ratio. At these points, the profit maximising condition holds that the marginal value product of nitrogen (MVP) equals its marginal factor cost (MFC). The problem is how to persuade the majority of farmers to move from F to C, or in some cases, to move to C from zero fertilizer use. The answer to this varies — some economists suggest that attention should be focussed on the technical and physical requirements of that upward shift — factors such as yield improvements from research, diffusion of research results to farmers, distribution of new seeds, and physical availability of variable inputs would encourage the farmers to combine the variable inputs in the correct proportions relative to their market prices.

On the other hand it is argued that in order to encourage them to use new methods, it is necessary to demonstrate the gains of making the change, and the only way to do this is to provide a special incentive in the form of lower prices for those inputs that farmers must use in large quantities.

Figure 3 shows improved technological environment, represented by upward shifts in the nitrogen response function, where the farmers either continue to use no fertilizer at all (Point A), or stick to the level of fertilizer use they are already accustomed to the previous technology (Point B). This causes a divergence between the yield levels and that which could be achieved as technology changes even at zero level of fertilizer use. This is clearly indicated by the upward shift in the production curve. The divergence between the yield levels that are actually obtained by staying on the same fertilizer use is shown by the upward shift from point F to B. There is a dynamic disequilibrium between the economic optimum level of yield (Point C) and actual levels of yield (Point A and B). Lowering the price of fertilizer causes the fertilizer/paddy price ratio to fall; this lowers the slope of the price ratio line, and the equilibrium level of fertilizer use is increased, such as from C to D. The equilibrium level of fertilizer use is not what farmers on average should reach (Point D), but rather they are given an incentive to make the jump from negligible fertilizer use to a level closer to the optimum requirements of the new technology. If farmers were actually to move to D their level of fertilizer use would be excessive in terms of the social opportunity cost of the fertilizer and even from the private profitability view point.

It is in this sense that a fertilizer subsidy (or any other kind of input subsidy) should be strictly a temporary policy

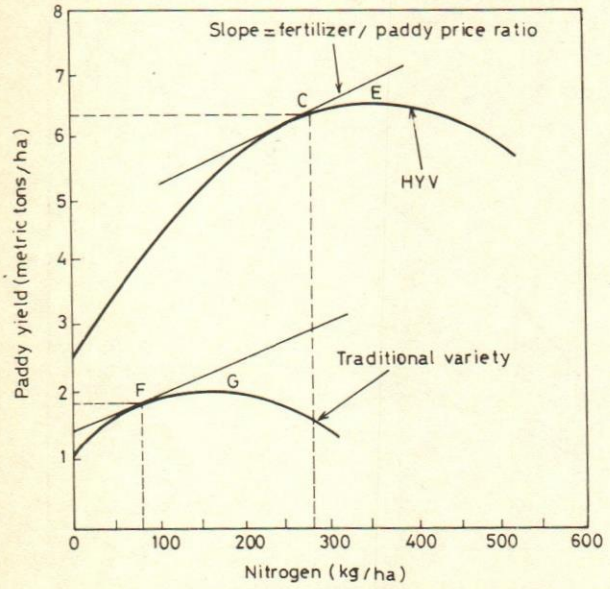

Fig. 2. Optimum levels of fertilizer use.

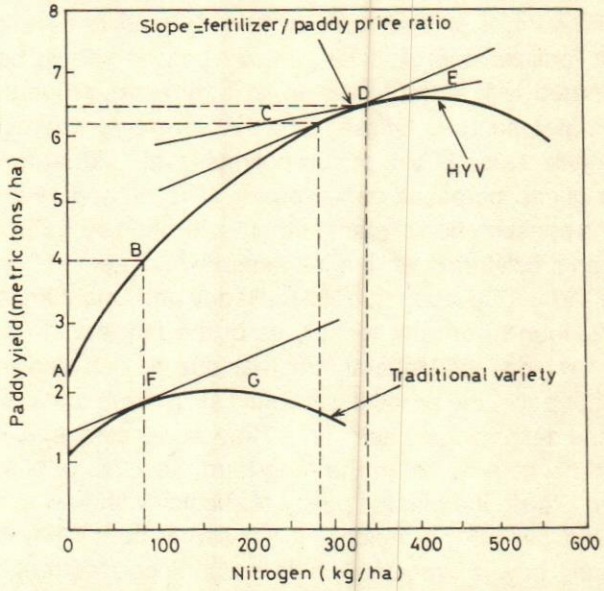

Fig. 3.: Incentive effect of lower fertilizer price.

instrument, because if farmers are given time to adjust fully to low price it leads to socially inefficient resource use. However, in terms of real economic costs of input subsidies (Gulati, 1989). the aggregate subsidies on fertilizer do not constitute the largest proportion of input subsidies in India hence singling out fertilizer subsidy alone was not the right step forward (Table 4).

Input subsidy should be strictly a temporary policy instrument, became if farmers are given time to adjust fully to the low price it leads to socially inefficient resource use.

According to Sankaran (1990), the Fertilizer Use Efficiency (FUE) was 17.1 in 1970-71, but decreased to 10.3 in 1980-81 and 8.1 in 1988-89 for additional food grain production (base year 1951-52). He further calculated that for obtaining 240 million tonnes of foodgrains by the year 2000, the estimated quantity of fertilizer will be 20 million tonnes and its use efficiency will be only 6.5 (table 6).

Table 6: Fertilizer use efficiency and food production

Year	Total food Production		N+P+K used		Extra yield due to fertilizer alone	FUE kg. grain/kg NPK.
	(a)	(b)	(c)	(d)	(million tonnes)	
1970-71	108	56	2.25	1.46	25.0	17.1
1980-81	130	82	5.51	3.58	37.0	10.3
1983-84	150	100	7.71	5.00	45.0	9.0
1988-89	170	118	10.0	6.50	53.0	8.1
2000(1)	240	188	12.0	7.8	84.6	10.8
2000(2)	240	188	20.0	13.0	84.6	6.5

(a) Total food production in million tonnes
(b) less the food production level of 1951-52
(c) total N+P+K used for all the crops
(d) 65 per cent of the total (c) is used for food crop only.
(1) Possible production with only 7.8 million tonnes of NPK under disciplined agronomy at 10.8 FUE.
(2) Even with 13 million tonnes of NPK for food crop, current agronomy may yield 240 million tonnes but only at the FUE level of 6.5.
Source: Sankaran, 1990.

Dramatic changes in agricultural productivity have been recorded through the use of fertilizers, but the overuse and unbalanced use of fertilizers in the assured areas of irrigation is leading to declining output/input ratio and increasing micronutrient deficiency (Kanwar, 1991). This clearly indicates the inefficiency in fertilizer usage — hence fertilizer subsidy should be phased out and the government should take steps to increase the use of organic and green manures.

Water Subsidy

Water is one of the most inequitably distributed natural resources in India, The benefits of flow irrigation hardly reach a fifth of India's cultivating households. And the small section which could avail of irrigation services do not pay enough. This has been mainly because charges are based on the area irrigated irrespective of the amount of water drawn. A a result the tendency has been to draw excessive water. There is also laxity in the assessment and collection of revenue. Presently, the incidence of irrigation charges varies a great deal across the states and the rate per unit volume of water consumed varies greatly across the crops too. For example, in most states water intensive crops such as paddy and sugarcane are charged less per-hectare-cm than coarse grains and oil seeds which require relatively less irrigation. Thus, there is a scope for a rationalisation of the rate structure.

A survey conducted by the International Commission on Irrigation and Drainage as reported by the Task Force in Sustainable Livelihood Security (1990) has shown that surface irrigation systems has efficiencies ranging from 35 to 70 per cent and conveyance deficiencies 30-90 per cent. The overall efficiency is hardly 10-30 per-cent. Thus, the future of irrigation farming is linked with the improvement of irrigation water use efficiency (Kanwar 1991).

In the context of efficiency in resource allocation to achieve the desired objective of raising foodgrains production, Gulati and Kalra (1992) disclose that the elasticity of foodgrain output to irrigation is much higher than that to fertilizers and the investment in irrigation is superior to subsidising fertilizers from the point of view of raising foodgrains production (Quizon, 1985; Parikh & Suryanarayana, 1989; Gulati & Sharma, 1990)[1].

Investment in irrigation is superior to subsidising fertilizers from the point of view of raising foodgrains production

1. In Quizon's study it was taken as Rs. 18,713 per hectare at 1980-81 prices fro major and medium schemes in Parikh and Suryanarayana's study it was taken as Rs. 10,000 at 1989 prices. The cost of Rs. 10,000 per hectare seems to be quite low, but the authors maintain that their results do not change significantly even if Rs. 20,000 is taken as the cost of irrigation per hectare.

The inefficiency in use of water is also borne out when we compare the yield rate of India with that of China (Table 7).

Table 7: Cereal Yields of India and China

Country	Area under Cereals ('000 ha)	Total Irrigated Area ('000 ha)	Average Yield (kg/ha)
China	93680	47837	4312
India	102660	43050	1897

Source: Fertilizer Statistics, 1991-92.

Both India and China have almost the same irrigated area. However, the irrigation share to agriculture was 23.80 per cent in India and 9.60 per cent in China during 1990. But China has higher productivity per hectare compared to India. The future of agriculture depends on the policy and direction of water resources development and management.

Credit Subsidy

Subsidised credit enhances the ability of the farmer to increase the use of all cash inputs, without interfering with the relative opportunity costs between inputs. Thus, socially inefficient input substitution is avoided by credit subsidies because credit improves the ability of the farmers at critical times of the year to buy the variable inputs and it is also used to buy today what would otherwise not be possible to buy tomorrow.

Subsidised credit enhances the ability of the farmer to increase the use of all cash inputs. Thus, socially inefficient input substitution is avoided by credit subsidies.

On the agricultural finance front, the financial sector reforms do not seem to be sector friendly. Subsidised interest rate and written-off loans create several negative effects for the long run viability of rural financial institutions, as well as for borrowers and savers. There are instances when the real rate of interest in credit schemes was negative. It causes a transfer of real resource from lending institutions to borrowing farmers. It further creates the problem of non-recovery of loans on time and continuous increase in overdues. This severely limits the capacity of the financing agencies to recycle the funds and the process of development is impeded.

Conclusion

The government had taken a bold step to increase the fertilizer price by 30 per cent and exempt small and marginal farmers from the price hike. This dual price mechanism will work efficiently if there are no leakages and administrative problems and an efficient delivery of inputs, credit etc. is implemented. In other words, it must be cost effective. The inefficiency of the fertilizer industry must be plugged by a well designed input delivery system.

There is an urgent need for increasing the cropping intensity which requires a large amount of investment in irrigation. It has been found that minor irrigation is not only more efficient but also less costly, costing hardly 1/6th to 1/10th of major irrigation systems per hectare of irrigated area (Kanwar, 1991). In the recent policy package of reducing fiscal deficit, the major victim is the development sector including irrigation. The policy and direction of water resources development and management remain the key issues for future agricultural growth. It is also evident that the response of agricultural output to irrigation is high as compared to other variable inputs. Hence, it is high time the government invests more on minor irrigation, as it has high pay-off, by diverting from other subsidies, which showed inefficiency in increasing the agricultural productivity.

The policy and direction of water resources development and management remain the key issues for future agricultural growth.

Another alternative is to increase the yield rate either through increasing the use of fertilizer or HYV seeds which again require credit. A more rational approach would be to provide more credit at a minimal subsidy to the small and marginal farmers. even in the case of waiver of loans, the government should opt to convert the existing ones as soft loans as opposed to total waiver. On the export front, the government should provide selective incentives in order to boost agricultural exports thereby reducing the unfavourable balance of trade. Overall, in the long run, all kinds of subsidies may be removed in a phased manner without creating serious disequilibrium in any sector of the economy. It is possible to design ways and means of achieving this without the loss of economic rationale.

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Let us enjoy the process of quest together and discover and experience the truth together

—Sanskrit couplet recited by
the Guru and the Sishyas
before starting *Upanishad* sessions

Resource Use Efficiency in Wheat Production: In Punjab

Inder Pal Singh & S.S. Grewal

The article presents a study of the resource use efficiency of key factors of production and the overtime shifts in the response of wheat production to fertiliser use in Punjab in the context of the overuse of precious resources like fertilisers and irrigation water. To make Punjab agriculture cost efficient, it is suggested that the existing extension services in the State be strengthened to educate the farmers on the rational use of critical inputs like fertilisers. The pricing mechanism of irrigation water in Punjab also needs to be streamlined so that the overuse of this scarce resource can be rationalised.

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The success story of Punjab's agriculture started with the introduction of high-yielding varieties (HYVs) of wheat during mid sixties, which necessitated an increase in the use of two critical inputs, viz., fertilisers and irrigation. To meet the increasing demand for irrigation water, there was a significant build-up of irrigation infrastructure through installation of shallow tubewells in most parts of the State. The number of shallow tubewells in Punjab was only 26,606 in the year 1965-66, which increased to 2.80 lakh during 1980-81. Per hectare fertilizer nutrient consumption also increased from a mere 9 kg to 112.67 kg during the same period. The process of green revolution got a further fillip during mid seventies with the introduction of HYVs of paddy. With this, the need for assured irrigation increased manifold and consequently there was further exploitation of the underground waters of the state as is evident from the 215 per cent increase in the number of shallow tubewells during 1980-81 to 1990-91 period. Simultaneously the fertilizer use on per hectare also increased from 112.67 kg. during 1980-81 to 162.82 kg. during 1990-91. The need for timely performance of various operations during the peak workload periods warranted rapid mechanization of Punjab and this resulted in large scale introduction of tractors as associated machinery.

Over time, a tendency towards irrational use/over utilization of the key inputs like fertilisers and irrigation has been observed. In view of the already precarious land man ratio in Punjab, the only way of argumenting production and raising farm income would be through increasing the level of productivity of different crops. An attempt was made to study the resource use efficiency of the key factors of production for wheat crop in different agro-climatic regions of the State. Overtime shifts in response of wheat productivity to fertilizer use in Punjab were also analysed.

Methodology

The data have been taken from the Comprehensive Scheme to Study the Cost of Cultivation of Principal Crops in Punjab in which the State has been divided into three homogeneous zones on the basis of similarities in cropping pattern soil type, irrigation, rainfall and productivity. Zone I lies in the north-west of the State covering 21 tehsils and 41.85 per cent of the total cultivated area. Zone II covers 27.60 per cent of total cultivated area in 12 tehsils of the central parts of Punjab whereas zone III is located in the south-western parts of the State covering 9 tehsils and 30.35 per cent of the cultivated area. The sample included 90, 49 and 60 farmers during 1981-82 and 120, 79 and 100 farmers during 1985-86 from zones I, II and III respectively. In addition to these two points of time, the data regarding fertiliser use and wheat yields for the year 1987-88 were taken from the Crop Cutting Experiments of the department of Agriculture, Govt. of Punjab.

The following econometric model was tried, both in linear and log-linear form, to estimate the resource use efficiency of the various factors of production. The log-linear form gave better results and hence was ultimately retained:

$$Y = f(A, ML, S, FN, M, HL, BL, C, IR et)$$

where

Y	=	Production of wheat in the farm (Quintals);
A	=	Area under wheat (hectares)
ML	=	Expenditure on machine labour (Rupees)
S	=	Quantity of seed used (Kg.)
FN	=	Fertilizer nutrients used (Kg.)
M	=	Quantity of manure used (Quintals)
HL	=	Human labour (Man Hours)
BL	=	Bullock labour (Bullock hours)
C	=	Expenditure on chemicals (Rupees)
IR	=	Expenditure on irrigation (Rupees)
et	=	A random variable to reflect the impact of left over variables.

The marginal value productivity of each resource was estimated by multiplying the regression coefficients with the ratio of geometric mean of the dependent variable to independent variable. This was further divided by the price of independent variable to work out the ratio of MVP/Cost and the same was tested for its difference from 1.

Resource Use Efficiency: State Level Analysis

The regression coefficients of the factors affecting the yield of wheat and their estimated values of the ratio of MVP/cost are presented in table 1. Factors like area under wheat, use of machine labour, fertilisers, human labour and chemicals contributed positively and significantly towards wheat production in the Punjab State as a whole, whereas, bullock labour had negative impact. The MVP/cost ratio for land indicated that a further investment of rupee one will yield a return of Rs. 2.14. However, due to non-availability of land in the physical sense, this variable has little role to play from the policy point of view. An investment of one rupee in fertilisers shows a return of only 26 paise. The simple economic logic, therefore, indicates that the use of this resource has crossed the limits dictated by economic calculus. The role of irrigation is non-significant in the State, the major reason being the flat rate charged for both electric tubewells and canal irrigation.

Another important resource used in the production process is machinery. The MVP/cost ratio for the machine use is 0.22 which again indicated that the expenditure on this resource is very high which is largely due to under use of machine resulting in high overhead cost. The returns from expenditure on chemicals (insecticides, pesticides and weedicides) are also low. The ratio of MVP/cost of human labour was estimated at 2.38. This high value is probably due to under use of this resource due to its substitution with machine labour in case of wheat crop which is the most mechanized crop in the State.

Resource Use Efficiency: Zone-wise Analysis

The behaviour of almost all the variables in Zone I was similar to the case of the State level analysis (table 1). Since this zone covers 41.85 per cent area of the total croped area of the State and is equally represented in the sample, the observations of this zone have, therefore, influenced the results at the overall level. In zone II, where assured irrigation is available and intensive agriculture is being, practised, none of the physical inputs except land contributed significantly towards wheat production. Similar is the case of Zone III, which comprised most parts of the sourth-western Punjab covering about 30 per cent of the total cropped area of the State.

The above analysis implies that to increase the productivity in future the role of non-monetary and other intangible inputs has to be recognised. These include time and method of sowing, timeliness of various opera-

Table 1: Factors affecting wheat yield and their MVP/Cost ratios in Punjab, 1985-86

Variable	Zone I		Zone II		Zone III		Overall Punjab	
	Regr. Coeff.	MVP/Cost	Regr. Coeff.	MVP/Cost	Regr. Coeff.	MVP/Cost	Regr. Coeff.	MVP/Cost
	**		***		***		**	
Intercept	1.6279	—	3.478	—	0.9762	—	1.224	—
	(1.98)		(2.726)		(3.985)		(2.29)	
	***	***	***	***	***	*	***	***
Area (Hec.)	0.7456	2.52	1.0095	3.61	0.6503	1.87	0.6535	2.14
	(4.66)		(4.11)		(3.31)		(6.08)	
	***	NS	NS	NS	*	NS	***	***
Machine labour	0.0868	0.69	0.0419	0.36	0.0148	0.12	0.0262	0.22
(Rs.)	(2.59)		(0.98)		(1.53)		(2.63)	
NS	NS	NS	NS	NS	NS	NS	NS	
Seed (kg.)	–0.1600	–2.34	–0.1931	–5.49	–0.0883	–2.16	–0.0610	–2.74
	(1.10)		(0.91)		(0.49)		(0.60)	
	***	***	NS	NS	NS	NS	***	***
Fertilizer	0.0372	0.27	–0.0046	–0.05	–0.0070	–0.01	0.0386	0.26
nutrient (kg.)	(4.54)		(0.07)		(0.01)		(5.41)	
	NS	NS	NS	NS	*	NS	NS	NS
Manures (quintals)	–0.0046	–5.61	–0.0010	–0.55	–0.0037	–0.85	–0.3484	–1.78
	(0.70)		(0.17)		(1.48)		(1.35)	
	***	**	NS	NS	***	***	***	***
Human labour	0.3095	2.34	0.1560	1.06	0.4440	2.54	0.3570	2.38
(Man Hours)	(3.75)		(1.11)		(5.70)		(6.92)	
	***	***	NS	*	*	***	***	***
Bullock Labour	–0.0100	–0.34	–0.0016	–0.08	–0.0040	–0.20	–0.0083	–0.34
(Hours)	(3.16)		(0.45)		(1.48)		(4.36)	
	***	***	NS	*	NS	NS	***	***
Chemicals	0.0067	0.50	0.0004	0.04	0.0019	0.19	0.0042	0.36
(Rs.)	(2.55)		(0.12)		(0.80)		(2.58)	
	NS	NS	NS	NS	NS	NS	NS	NS
Irrigation	–0.0025	–0.10	–0.0279	–0.79	0.0051	0.15	0.0019	0.06
(Rs.)	(0.30)		(0.63)		(0.28)		(0.26)	
R^2	0.95		0.95		0.96		0.95	
F-value	238.38		146.09		257.60		561.30	
No. of observations	120		79		100		299	

Note 1: ***, **, and *: Statistically significant at 1, 5 and 10 per cent level
NS: Non-significant
2: Figures in parantheses represent t-value

Table 2: Sowing time and wheat yield, Punjab State, 1987-88

(Qtls/ha)

Rotation	Upto 15 Nov.		16-30 Nov.		1-15 Dec		After 15 Dec.	
	Per cent Farms	Yield	Per cent Farms	Yield	Per cent Farms	Yield	Per cent Farms	Yield
Paddy-Wheat/ Maize-Wheat	49.77	39.29	39.67	37.48	8.43	34.11	2.13	31.88
Cotton-Wheat	12.42	32.56	28.43	29.52	37.25	29.64	21.90	27.71
Other crops-Wheat	35.96	34.28	40.00	34.51	14.68	30.02	9.36	27.28

Source: Dept. of Agriculture, Govt. of Punjab, Report of the Expert Committee on Measures to Reduce Cost of Production of Principal Crops in Punjab, Chandigarh, 1991.

tions, time of application of major inputs viz. fertilizer, weedicides and irrigation, etc. In other words the managerial aspect has to receive more importance. The relationship between time of sowing and productivity of wheat in Punjab (table 2) illustrates this fact as in general there was decline in the yield of wheat in all the crop rotations because the time of sowing got delayed beyond the recommended period of upto Nov. 15.

To increase productivity in future the role of non-monetary and other intangible inputs has to be recognised. These include time and method of sowing, timeliness of various operations, time of application of major inputs.

Wheat Yield Response to Fertiliser

To further elaborate the role of fertilisers towards wheat productivity, the data on fertilisers nutrients used vis-a-vis wheat productivity was analysed. Since the use of Potassium nutrient in Punjab is negligible, nitrogenous and phosphatic fertilisers used were only considered for this purpose.

Table 3: Wheat yield relation to fertilizer ($N+P_2O_3$) nutrient use, Punjab.

Fertiliser use (kg/ha)	1981-82		1985-86		1987-88	
	Cumm. per cent farms	Average yield	Cumm. per cent farm	Average yield	Cumm. per cent farm	Average yield
Upto 50	4.52	1964	3.68	2365	1.36	2651
50-70	6.53	2060	6.35	2945	4.22	3150
70-90	12.56	2786	8.36	2978	7.26	3124
90-110	23.11	2716	10.37	2479	8.85	3318
110-130	33.66	2524	18.40	3090	12.88	3257
130-170	66.82	2963	46.83	3230	38.41	3406
170-190	77.88	2984	59.54	3487	44.41	3781
190-230	94.96	2992	88.64	3880	86.70	3717
230-250	97.48	2939	93.66	3858	91.62	4060
250 and above	100.00	3432	100.00	3752	100.00	4024

It is evident from table 3 that the cummulative per cent of farms using fertilisers nutrients upto 110 kh/ha declined from 23.11 during 1981-82 to 10.37 during 1985-86 and then to 8.85 per cent during 1987-88, whereas, those using higher doses of fertilisers than the recommended level of 187-5 kg. per hectare increased from 22 per cent to 40 per cent and then to 62 per cent during the same period. A critical evaluation of the yield level vis-a-vis the fertilizer use during different years indicated that the yield levels have not increased in proportion to the use of fertilisers. This shows that the irrationality in fertiliser use on Punjab has increased over the years.

The yield levels have not increased in proportion to the use of fertilisers.

Conclusions

The adoption level of fertiliser has been on the increase in Punjab. A tendency towards over use of this costly resource is more out of ignorance. The role of irrigation in Punjab has turned out to be non-significant, which is the outcome of the flat rates being charged for electric tubewells and canal irrigation. There is, therefore, a need to steamline the pricing mechanism of irrigation in the punjab so that the use of this scarce resource can be rationalised.

The returns from expenditure on the machinery were low because of its under use on farms resulting in high overhead costs.

The existing extension services be strengthened to educate the farmers on rational use of critical inputs.

To make punjab agriculture cost efficient it is suggested that the existing extension service in the State be strengthened to educate the farmers on the rational use of critical inputs like fertilisers. The farmers should be advised to use this input on the basis of soil testing. This can result in considerable saving of fertiliser and the same can be used elsewhere where the marginal value productivity of fertiliser is high. Emphasis should also be laid to educate the farmers with respect to the economics of making farm investments in future. □

Feature

Determinants of Entrepreneurship in Agriculture

R.C. Sarmah & A.K. Singh

Determination of entrepreneurial behaviour of farmers is gaining momentum to salvage agriculture from its subsistence state. Due to variations in size of land holdings, farmers' entrepreneurial behaviour also varies. This study brings forth two most prominent variables viz. farm mechanisation and socio-economic status among a set of 12 variables for defining entrepreneurship of big, small and marginal farmers. These variables can be used sufficiently to explain the entrepreneurial behaviour of big farmers while for small and marginal farmers these variables could explain their entrepreneurship only partially.

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Joseph Schumpeter regarded an entrepreneur as one who through new combinations of means of production, carries out the introduction of a new goods, new method of production, the opening of a new market, the conquest of a new source of supply of half-manufactured goods, and carrying out of the new organisation of any industry (Sharma, 1980). The entrepreneur always searchers for change, responds to it, and exploits it as an opportunity (Drucker, 1985). Thus, entrepreneurship entails the ability to identify the resources, to perceive their economic potential, the ability and willingness to utilise these resources and to invest in their development deferring immediate rewards in favour of future investment (Agarwal, 1975).

It appears that the entrepreneurship is essentially a function, creativity and behaviour manifestation of a person for shifting resources from areas of low productivity to higher productivity. It is traits like willingness to take risk, high economic and achievement motivation, self-confidence, problem solving disposition, adequate knowledge and skills, ability to face uncertainty and good managerial ability. An entrepreneur is one who can transform raw materials into goods and services, who can effectively utilise physical and financial resources for creating wealth, income and employment, who can innovate new products, standardise or upgrade existing products for creating new markets and new customers. In short, he is one who converts potential wealth into tangible wealth.

In order to give India's agriculture a commercial outlook, recognition and proper utilisation of entrepreneurial qualities of the farmers are of paramount importance.

The Study

Assam situated in the North-East India, is known to the world as a major tea growing region. Rice is the staple food of the people and cultivated in three seasons as *ahu*, *sali* and *boro* of which *sali* rice is widely cultivated. But the productivity of rice has been always below the national average. Around 80 per cent of the area under rice is rainfed, 30 per cent of the area is chronically affected by flood; less sunshine hours and occasional dry spells constitute the main factors hindering productivity. In addition to these, consumption of quality seeds, nutrients and adoption of other yield booster practices are the lowest in the country. Increase in productivity of crops in the state largely depends upon the development of entrepreneurial quality among the farmers. In this context, a study was planned to identify the characteristics of the farmers determining entrepreneurial behaviour. It is postulated that a farmer who has adequate knowledge on the recommended practices of rice as well as adopts these practices in full, is an entrepreneur. Therefore, the study is designed to see the relationship of the socio-economic and psychological characteristics of farmers of different categories with their level of knowledge and extent of adoption of recommended practices of rice cultivation.

The study was conducted in the Barak Valley which comprises two districts—Cachar and Karimganj. Cachar district with 63-89 per cent rice area under high yielding variety was more progressive than the other district, hence selected for the study. From this district, Lakhimpur Community Development Block was selected because area under HYV of rice, and consumption of fertilizers and plant protection chemicals in this Block were higher than in the remaining 6 C.D. Blocks. The Block has 3 Agricultural Extension Officer's circles wherefrom 11 villages were selected by proportionate random sampling. From these villages 150 farmers were selected for the study again by using proportionate random sampling. Among these were 63 marginal farmers (0.2 to 1.0 hectare), 64 small farmers (1.0 to 3.0 hectares) and 23 big farmers (above 3.0 hectares). The definition framed by the Dept. of Agriculture, Assam was adopted for categorising the farmers.

The study took into account 12 socio-economic and psychological variables and 2 dependent variables related to entrepreneurship. These were age, education, social participation, socio-economic status, farm mechanization, farm income, economic motivation, decision making ability, managerial ability. problem recognition, scientific orientation and risk taking willingness. The dependent variables were the level of knowledge in the recommended practices of rice cultivation and the extent of adoption of these practices.

Socio-Economic Status Scale, Rural (Trivedi & Pareek, 1963) was used for measuring education, social participation and socio-economic status. Chronological age was taken into account for age and for farm income a schedule was developed. Farm mechanization was tested by Farm Mechanization Index (Singh & Singh, 1970). Measurement scales were developed for economic motivation, decision making ability, managerial ability, problem recongnition scientific orientation and risk taking willingness. Statements in the scales were selected by calculating semi-inter-quartile range (Q) after they were rated by the appointed judges. The scales were then administered by following the method of summated ratings (Edwards, 1969). Split-half technique was used to determine the reliability of each of the scales used in this study and the reliability co-efficients came in the range of 0.71 to 0.78 which indicated high reliability. Knowledge and adoption were tested by a structured schedule on 14 recommended practices of rice cultivation. Weightage of the practices was decided by the judge's rating. Level of knowledge and extent of adoption were measured as 'Full', 'Partial' and 'nil' and scores were assigned accordingly. Final knowledge and adoption scores were attained by multiplying the weightage of a practice with the corresponding knowledge level score/extent of adoption score.

Findings & Discussion

The relations of socio-economic and psychological variables with the level of knowledge and the extent of adoption of the recommended practices of rice cultivation, are shown in table 1. It reveals that education, social participation, farm mechanisation and socio-economic status of marginal farmers were significantly correlated with the level of knowledge and extent of adoption as well. In the case of small farmers, significant correlation of farm mechanisation, socio-economic status and economic motivation was seen with the level of knowledge and extent of adoption while for big farmers, farm mechanisation and socio-economic status had significant relations with both the level of knowledge and extent of adoption of recommended practices of rice cultivation. Taking all the categories of farmers together, the characteristics viz, education, social participation, farm mechanisation, farm income, socio-economic status and economic motivation had shown significant correlation with the level of knowledge and extent of adoption. In fact, the level of knowledge on the recommended prac-

Table 1: Correlation of socio-economic characteristics with their level of knowledge and extent of adoption of recommended practices.

Characteristics	Co-efficient of correlation							
	Marginal		Small		Big		Total	
	Knowledge	Adoption	Knowledge	Adoption	Knowledge	Adoption	Knowledge	Adoption
Age	.143	.035	.162	.172	.121	.041	.161	.170
Education	.233*	.346*	0.92	.192	.124	.246	.261*	.338*
Social participation	.411*	.399*	.053	.099	.122	.216	.177*	.290*
Farm mechanisation	.246*	.338*	.293*	.387*	.513*	.517*	.531*	.558*
Farm income	.169	.182	.199	.213	.243	.167	.454*	.478*
Socio-economic status	.407*	.418*	.217*	.321*	.574*	.624*	.580*	.574*
Economic motivation	.054	.106	.259*	.288*	.314	.258	.314*	.229
Decision making ability	.024	.116	.042	.131	.344	.169	.065	.129
Managerial ability	.142	–.018	.079	.177	.194	.015	.002	.067
Problem recognition	–.178	–.144	.011	.035	.009	–.129	–.110	–.135
Scientific orientation	.105	.063	.079	.002	.135	.226	.005	.033
Risk taking willingness	–.091	.127	.004	.025	.160	.113	.093	.154
Level of knowledge		0.594*		0.673*		0.496*		0.705*

* Significant at 0.05 level of probability

tices had shown significant correlation with the extent of adoption.

Six characteristics were identified through this study for determining the entrepreneurial quality of farmers some of which played a more prominent role with respect of individual categories of farmers. However, farm mechanisation and socio-economic status were unequivocally the key determinants of farm entrepreneurship.

Table 2: Multiple regression analysis of farmers' level of knowledge with their socio-economic characteristics

N-150

Characteristics	Regression co-efficient			
	Marginal	Small	Big	Total
Age	0.580	0.333	1.416	0.977
Education	1.200	0.128	5.120	0.319
Social participation	2.205	0.153	–1.307	0.518
Farm mechanisation	0.980	1.150*	6.188*	1.862*
Farm income	–0.501	0.289	1.554	2.226*
Socio economic status	0.598*	0.285	1.260	0.636*
Economic motivation	0.331	0.526	1.228	0.213
Decision making ability	0.326	0.551	7.257*	0.296
Managerial ability	0.252	0.516	0.654	0.106
Problem recognition	–0.475	0.368	–0.884	–0.458
Scientific orientation	0.492	0.324	0.773	0.253
Risk taking willingness	0.613	0.103	4.825*	0.209
R^2	0.591	0.686	0.853	0.576
F Value	3.637*	3.634*	4.016*	7.447*

* Significant at 0.05 level of probability.

Research reports indicate that education, social participation, farm income, economic status are strong determinants of farm entrepreneurship (Misra & Sinha, 1980; Nandapurkar, 1982; Prasad 1989).

The multiple regression analysis of the data shown in table 2 indicates that the socio-economic status of marginal farmers, farm mechanisation of small farmers and risk-taking willingness, decision making ability and farm mechanisation of big farmers yielded significant values with their respective level of knowledge. This means that these variables had the highest contribution to the level of knowledge on recommended practices. However, from the R^2 values it appears that the selected 12 socio-economic and psychological variables explained 50, 68 and 85 per cent of the level of knowledge of marginal, small and big farmers respectively.

Table 3 reveals that education, farm mechanisation, farm income, socio-economic status and economic motivation of small farmers, education and scientific orientation of big farmers has significant contribution to adoption of recommended practices. R^2 depicts that the choosen variables explained 50 per cent of the adoption behaviour of marginal farmers, 60 per cent of small farmers and 80 per cent of big farmers.

Implications

Figure 1 illustrates the determinants of entrepreneurship in agriculture.

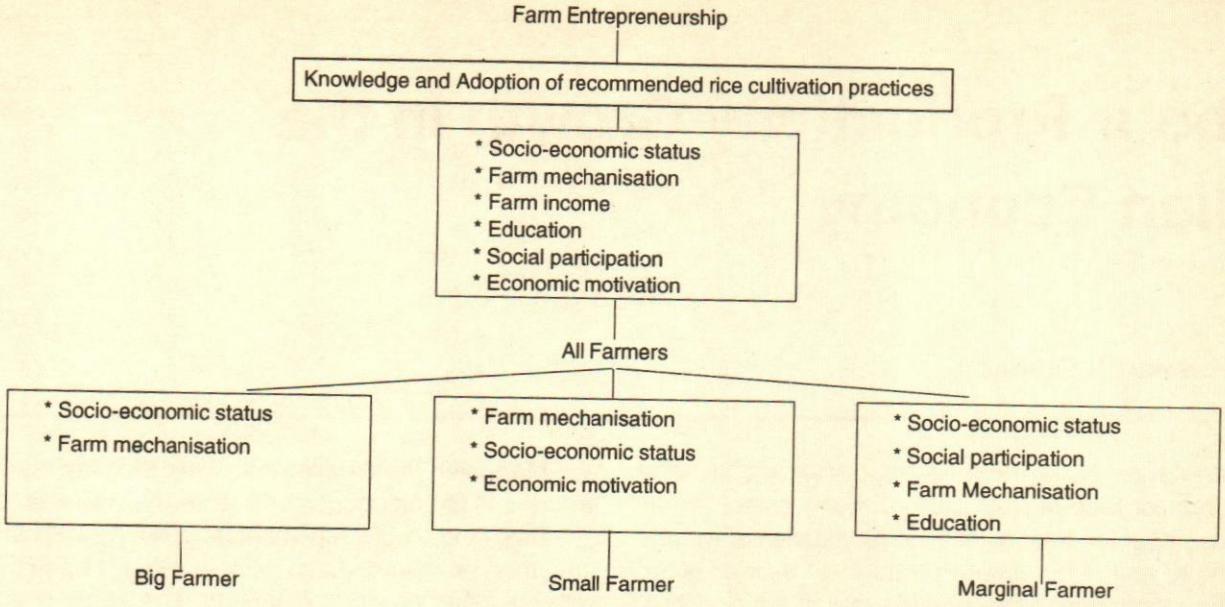

Fig. 1 Determinants of Entrepreneurship in Agriculture

Table 3: 3 Multiple regression of extent of adoption with their socio-economic characteristics

N = 150

Characteristics	Regression co-efficient			
	Marginal	Small	Big	Total
Age	0.095	2.879	4.879	1.366
Education	0.618	2.226*	5.414*	1.317*
Social participation	3.762	0.303	2.159	0.646
Farm mechanisation	1.278	2.949*	2.147*	2.040*
Farm income	–4.421	6.686*	5.644	2.669*
Socio economic status	0.144	1.012*	0.464	0.139*
Economic motivation	0.197	1.103*	–0.440	0.342
Decision making ability	0.453	0.870	0.983*	0.321
Managerial ability	0.703	0.296	1.173	0.111
Problem recognition	–0.590	0.296	0.586	–0.571
Scientific orientation	–0.620	0.114	1.732*	0.226
Risk taking willingness	0.263	0.634	1.427	0.111
R^2	0.515	0.607	0.818	0.526
F Value	2.071*	2.575*	3.110*	7.161*

* Significant at 0.05 level of probability

It is apparent that farm mechanisation and socio economic status are the key determinant factors of entrepreneurial behaviour of big farmers in increasing rice productivity. While these two characteristics are also pertinent in the marginal and small farmers there are other variables apart from selected ones which have almost an equal role in defining entrepreneurial behaviour of these two categories. Green Revolution has four planks of which Engineering Revolution has not taken the expected stride in rainfed areas. The need of the hour is to revitalise the engineering revolution in this region of the country.

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Labour Productivity Growth in the Indian Economy

NPC Research Division

In an earlier issue [Productivity, 33(4)], we made a comparison of labour productivity among select Asian countries. With the release of 1991 Census data, we are now able to revise our labour productivity estimates for Indian Economy during the eighties. As in the previous studies, labour productivity is defined as GDP per worker. The GDP figures for the study have been compiled from various issues of National Accounts Statistics, published annually by the Central Statistical Organisation. The number of workers in various sectors in 1981 and 1991 have been taken from the Census of India Reports, for the respective years. The same for the intervening years between 1981 and 1991 and also after 1991 are based on interpolation/projection assuming compound rates of growth between the Census years 1981 and 1991 and beyond. It should be noted that the 1991 Census did not cover the state of Jammu & Kashmir. We assume that the number of workers in various industrial categories in the state remain in 1991 as they were during the 1981 Census.

Moreover, the detailed information on the number of workers in the categories of 'Electricity, Gas and Water', 'Finance' and 'Public Administration' during 1991 Census are yet to be released and have at present been merged with the 'other services' category. The levels of employment in these categories in 1991 have been estimated based on their proportions in total employment during the 1981 Census.

Another notable aspect is that the GDP figure for and calendar year corresponds to the GDP for the financial year which covers 9 months of the calender year e.g. 1981 stands for 1981-82

Table 1 gives the year-wise GDP data (in billions of rupees) in current prices. Table 2 shows the GDP in 1981 constant prices (in billions of rupees) while Table 3 shows the number of workers in various industrial categories (in millions). Table 4 and Table 5 give the computed GDP per person in current and 1981 constant prices respectively.

Table 1: GDP by Kind of Economic Activity, in Current Prices (in Billion Rupees)

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
GDP	15940	18672	20853	23380	26003	29485	35270	40866	47560	55155	62791
Agriculture	5615	6750	7195	7722	8241	9238	11407	12075	14800	17605	19978
Mining	439	491	546	620	680	709	921	1031	1179	1264	1409
Manufacturing	2807	3304	3724	4178	4617	5287	6286	7708	8899	9672	10976
Electricity, Gas & Water	285	336	405	489	557	627	734	872	1050	1222	1368
Construction	808	942	1110	1295	1522	1761	2068	2359	2733	3152	3474
Trade	1997	2299	2669	3105	3455	3843	4522	5291	6193	7012	7963
Transport & Communication	860	1028	1187	1410	1654	1994	2387	2773	3390	4137	4974
Finance	1416	1559	1759	1988	2231	2476	2826	3358	3806	4580	5137
Public Administration	796	924	1084	1251	1493	1795	2086	2413	2713	3148	3579
Others	917	1039	1174	1322	1554	1757	2035	2357	2798	3365	3913

Source: Central Statistical Organisation, National Accounts Statistics, various issues.

Table 2: GDP by Kind of Economic Activity, in 1980/81 Constant Prices (in Billion Rupees)

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
GDP	1339.2	1448.7	1504.3	1565.7	1632.7	1703.2	1884.6	2014.5	2112.6	2135.9	2220.9
Agriculture	488.0	540.8	540.6	542.2	532.8	534.8	622.1	632.6	656.5	640.3	672.2
Mining	23.9	24.5	24.9	26.2	29.8	30.8	35.4	38.0	42.1	43.6	45.3
Manufacturing	249.1	273.8	291.5	303.2	324.5	348.2	378.7	422.9	449.2	434.7	443.6
Electricity, Gas & Water	24.2	25.9	28.6	31.0	34.2	36.9	40.8	45.1	48.1	51.8	55.2
Construction	61.5	65.8	68.3	71.8	75.4	77.8	83.4	88.1	93.9	98.2	98.4
Trade	165.1	174.2	181.7	196.5	208.5	218.0	233.9	252.3	266.7	267.5	280.2
Transport & Communication	62.8	66.9	73.0	79.5	84.8	92.3	98.0	106.6	111.8	119.2	126.6
Finance	121.1	128.6	137.1	147.1	159.2	168.7	184.2	204.0	209.7	236.4	243.1
Public Administration	65.5	67.8	74.5	80.2	88.1	97.0	103.4	112.1	113.3	115.9	120.8
Others	77.7	80.5	84.1	88.0	95.5	98.7	104.4	112.8	121.3	128.3	135.6

Source : Central Statistical Organisation, National Accounts Statistics, various issues.

Table 3: Number of Employed Persons by Kind of Economic Activity (in Millions)

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total	238.77	240.67	243.23	246.48	250.43	255.20	260.89	267.72	275.93	287.75	294.59
Agriculture	164.74	167.50	170.31	173.17	176.07	179.02	182.03	185.08	188.18	192.50	196.92
Mining	1.39	1.42	1.46	1.50	1.54	1.58	1.62	1.66	1.71	1.75	1.80
Manufacturing	26.84	27.03	27.23	27.43	27.64	27.84	28.05	28.25	28.46	28.87	29.29
Electricity, Gas & Water	1.07	1.10	1.13	1.16	1.20	1.23	1.26	1.30	1.34	1.38	1.42
Construction	4.08	4.22	4.36	4.52	4.67	4.83	5.00	5.17	5.35	5.59	5.84
Trade	15.46	16.02	16.60	17.20	17.83	18.47	19.14	19.84	20.56	21.40	22.28
Transport & Communication	6.63	6.77	6.92	7.06	7.21	7.37	7.53	7.69	7.85	8.08	8.31
Finance	1.96	2.02	2.08	2.14	2.20	2.26	2.32	2.39	2.46	2.53	2.60
Public Administration	6.27	6.45	6.63	6.82	7.02	7.21	7.42	7.63	7.85	8.07	8.30
Others	13.48	13.86	14.26	14.66	15.08	15.51	15.95	16.40	16.86	17.34	17.83

Source: Based on 1981 and 1991 Census of India Reports. For explanation see text.

Table 4: GDP Per Person by Kind of Economic Activity, in Current Prices (in Rupees)

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
GDP	6675.9	7758.4	8573.3	9485.6	10383.3	11553.7	13518.9	15264.5	17236.3	19167.8	21314.7
Agriculture	3408.5	4029.8	4224.7	4459.3	4680.5	5160.2	6266.7	6524.2	7864.7	9145.4	10145.3
Mining	31685.5	34530.8	37415.2	41397.7	44240.8	44945.9	56889.6	62052.8	69142.7	72093.7	78159.1
Manufacturing	10459.7	12221.6	13674.4	15229.2	16706.2	18990.6	22413.8	27283.0	31268.2	33496.8	37467.6
Electricity, Gas & Water	26648.0	30550.0	35808.0	42042.4	46567.9	50974.4	58027.5	67035.8	78493.4	88831.7	96338.0
Construction	19820.5	22333.3	25434.5	28679.3	32577.0	36429.7	41347.1	45584.9	51042.4	56371.6	59495.9
Trade	12916.6	14349.9	16076.7	18048.8	19380.9	20803.4	23623.0	26673.5	30128.8	32764.1	35736.2
Transport & Communication	12973.6	15183.2	17164.3	19961.9	22925.9	27059.7	31714.4	36071.3	43173.6	51216.6	59860.0
Finance	72091.3	77182.5	84682.1	93066.8	101562.0	109606.2	121649.3	140563.1	154921.7	181285.1	197723.9
Public Administration	12689.3	14323.5	16340.2	18337.5	21281.1	24880.1	28116.1	31626.5	34577.8	39015.3	43133.5
Others	6801.7	7494.1	8234.3	9016.6	10306.5	11331.5	12762.4	14374.1	16592.9	19404.9	21942.7

Table 5: GDP Per Person by Kind of Economic Activity, in 1980/81 Constant Prices (in Rupees)

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
GDP	5608.7	6019.5	6184.6	6352.2	6519.6	6674.0	7223.6	7524.7	7656.3	7422.8	7538.9
Agriculture	2962.3	3228.6	3174.2	3131.1	3026.1	2987.3	3417.6	3418.0	3488.6	3326.2	3413.6
Mining	17250.2	17230.2	17063.0	17493.9	19387.9	19525.2	21866.4	22871.1	24689.6	24867.8	25128.5
Manufacturing	9282.2	10127.9	10703.8	11051.9	11741.8	12507.2	13503.2	14968.9	15783.4	15054.9	15142.7
Electricity, Gas & Water	22627.4	23549.0	25313.2	26652.6	28592.9	29999.3	32255.1	34671.1	35957.4	37655.3	38873.2
Construction	15086.1	15600.1	15650.2	15900.9	16138.7	16094.4	16674.8	17024.3	17537.1	17562.5	16852.0
Trade	10678.7	10873.2	10944.7	11422.2	11695.9	11801.1	12218.9	12719.2	12974.9	12499.1	12574.7
Transport & Communication	9473.8	9880.9	10556.0	11255.1	11754.0	12525.6	13020.6	13866.6	14238.4	14757.1	15235.8
Finance	61654.4	63666.9	66002.9	68863.8	72472.7	74679.2	79291.6	85392.7	85357.6	93571.6	93569.5
Public Administration	10441.5	10510.1	11230.1	11755.9	12557.7	13445.0	13936.8	14692.6	14440.3	14364.3	14558.6
Others	5763.3	5806.3	5898.6	6001.9	6333.8	6365.5	6547.4	6879.1	7193.4	7398.7	7604.0

Compiled by
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Supporting sustainable, poverty-reducing growth

The poor are in a better position to gain from an increase in growth if spending programs to develop their human resources are protected during the adjustment process, and if the policy package eliminates distortions that prejudice their interests in labor, land, and output markets. More could have been done, and should have been done, to reduce poverty in the context of adjustment programs. This has been changing in the past few years as adjustment programs work to improve public expenditure in the social sectors. But the fundamental development challenge of improving Africa's human resource base requires more than policy change — it also requires sustained investment and institution building.

Adjustment programs in Sub-Saharan Africa can contribute to sustainable development by addressing policy reforms that affect the pricing of natural resources and energy. But macroeconomic and broad sectoral policies are very general, and cannot substitute for specific environmental interventions. Designing effective systems for environmental protection when institutional capacity is limited is a real challenge. It may be preferable to give firms and communities an incentive to protect the environment rather than to depend on governmental regulatory and enforcement capacity. As with poverty, many environmental problems require a combination of policy reform, investment, and institution building.

Source : World Bank Policy Research Bulletin, 5(2), March-April, 1994

Combustion Optimisation in Less Than 2 TPH Boilers

NPC Pollution Control Division

There are over 50,000 small (less than 2 TPH) boilers in the country. The fuel used are mainly coal, rice husk and oil. Some boilers even use wood, saw dust, bagasse etc., depending on the economic viability and availability.

The coal fired boilers are mostly conventional, manually fired with natural draft type. Oil fired boilers are based on forced draft, burner fired type system. Husk fired boilers, previously manual or step grate firing type are being converted into suspension or fluidised bed firing type boilers, with separate combustion chamber.

These small boilers form an integral part of many small and medium scale industries, producing different products, which require steam in their production process, e.g. for drying, cooking etc. Many of these small boilers are quite old or brought second hand being cheaper, from marine applications and thus operating at very low thermal efficiencies.

Status of Boiler Operations

Based on NPC's monitoring studies and experience with these small boilers, following comments have been made on the status of these boilers.

— Most of the boilers are found to be operating at very low thermal efficiencies. This could be due to improper firing practices, insufficient draft and thereby improper supply of air quantity, lack of secondary air for burning volatile matter, scaling on the tube's fireside, high stack losses, high excess air etc.

— Most of the boilers were found to be emitting thick black smoke for sometime after firing of fuel, in intervals. This could be due to improper combustion, leading to generation of soot.

— Many of the modified husk fired boilers (to suspension or FBC firing) were found to be operating at low thermal efficiencies. This could be mainly due to improper sizing of combustion chamber, improper pressure and quantities of primary and secondary air, wide variations in quantity of fuel fired but with steady air supply etc.

Need for Combustion Optimisation

By now, the industrial fuels, coal, husk, oil or bagasse have become expensive sources and their availability becoming scarce or less abundant which is playing a noticeable role in the cost of production of the small and medium scale industries. In today's open economy industrial policy, for the industries to sustain profitability and face the competition, it has become imperative to bring down their cost of production. One of the major reduction in the cost is possible through waste minimisation or pollution prevention through combustion optimisation.

Scope for Combustion Optimisation

The Pollution Control Division of NPC is presently engaged in carrying out a project on Combustion Optimisation in less than 2 TPH boilers, for the purpose of which, preliminary monitoring studies were conducted on a few boilers using different fuels to establish present status of combustion parameters and pollution emission. The monitoring data available from the project is consolidated is table 1.

A few of these boilers are being selected as model units for the purpose of demonstrating combustion optimisation, with the objective of propagating such studies by boilers all over the country.

Consolidated Table Showing Results of Preliminary Monitoring at Selected Boilers

Unit Code	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10*	B11
Boiler Capacity	2 TPH	1.1 TPH	2 TPH	2 TPH	2 TPH	2 TPH	1.5 TPH	2 TPH	1.5 TPH	2 TPH	2 TPH
Fuel Used	Saw Dust/ Rice Husk	Coal	Coal	Coal	Coal	Coal	L.D.O	L.D.O	F.O	Husk	Husk
Fuel Quantity (Kg/hr)	150	35	210	na	na	60	40-50 1ph	40 1ph	70-75 1ph	na	na
Type of Boiler	Fire Tube FB Type	Fire Tube Manual Firing	Fire Tube Manual Firing	Fire Tube Manual Firing	Fire Tube Manual Firing	Fire Tube Manual Firing	Fire Tube Auto Firing	Fire Tube Auto Firing	Fire Tube Auto Firing	Fire Tube Stepgra-te Firing	Fire Tube FB Type
Draft Employed	Balanced	Induced	Induced	Balanced	Natural	Induced	Forced	Forced	Balanced	Natural	Balanced
Gas Analysis											
O_2 %	18.0	16.9	17.4	15.2	16.4	18.8	11.2	7.8	8.0	17-10	14-11
CO_2 %	2.8	2.0	3.3	2.7	2.1	1.9	7.2	9.7	9.6	3.5-10	6-10
CO %	0.08	1.0	0.46	1.0	1.0	0.06	0.003	0.003	0.001	0.06-5.7	0.003
Gas Temperature (°C)	118	191	180	207	139	140	140	98	181	271-292	140-150
Chimney Dia (mm)	500	270	400	600	1250	500	500	535	600	770	600
Height (m)	30	6	30	30	30	30	30	42	30	30	30
Gas Flow Am^3/hr	6770	2540	14900	7350	9030	4890	na	2320	3290	5680	5470
Nm^3/hr	4920	1550	9300	4330	6170	3380	na	1740	2060	2840	3660
Dust Concentration (mg/Nm^3)											
Sample-1	551.7	96.7	548.9	5821	107.7	na	na	63.5	117.7	70.6	1610
Sample-2	1087.0	95.3	198.4	2965	98.0	na	na	62.8	214.5	628	1518
Sample-3	537.8	na	na	2950	na	na	na	59.4	412.7	1460	1269

* Eventhough the dust samples were collected during the different stages of firing, the samples collected does not represent the peak load emissions. It is expected that the dust concentration would be much above the monitored values and is expected in the range of 3000 mg/Nm^3 to 5000 mg/Nm^3 during the peak load operations.

LDO : Light Diesal Oil.

FO : Furnace Oil

na : Not available

FB : Fluidised Bed.

Compiled by
M.A. Patil,
S. Kalathiyappan,

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Book Review

Consumer Protection & Satisfaction: Legal & Managerial Dimensions, by *S.S. Gulshan*, Wiley Eastern Ltd. New Delhi, pp 356.

We line in a unique market system today. This system is open and competitive and offers choices and information to a burgeoning army of consumers. The same system however, betrays a marked tendency to fail and disappoint consumers. An increasing number of consumers now complain of getting shortchanged at the hands of marketers. The scenario is not just particular to India. It happens in the west too with similar frequency. No wonder therefore, that governments are intervening on behalf of the consumers.

To a great extent, marketers should neither be surprised nor complain against the intervention policy of the government in the forms of new laws and regulations. They have a sacred duty to protect the consumers. As Peter F. Drucker had to painfully point out, marketers themselves are to blame for the emergence of consumer protection agencies or crusaders or the tightening of laws on behalf of consumers. In fact, the consumer movement should be viewed as the 'shame of marketing'. Had marketers not failed to restrain and orient themselves towards the welfare of consumers, celebrities like Ralph Nader in USA and Mrinal Gore, Manuibhai Shah or H.D. Shourie in India, would have remained anonymous.

The book under review is, therefore, to be welcomed with open heart. It seeks to deal with the complex web of consumer protection laws. It explains them through cases and key points gleaned out from various judgements. It also updates the readers about the various amendments in the provisions of the Consumer Protection Act 1986 till 1994 beginning. Besides, the book also makes references to relevant business strategies to awaken and respond to customer satisfaction and welfare.

The primary objective of the book is to 'help college students preparing for various examinations'. Additionally, the author also aims to 'make the consumer law accessible to those concerned through handling of everyday instances to clarify how law works'. Besides a syntax error, the objectives as mentioned above are not easily reconcilable. They will only make the task of the reader difficult as the resultant focus will be far from clear. Another limiting consideration is that the book is a follow up of a seminar on the same theme. The seminar was sponsored by YMCA New Delhi, also the sponsor for the book, to mark the launch of the Y Centre for Professional Excellence under its aegis in 1992. Such after seminar books can rarely manage a focus expected of a text and reference book.

The book is built around seven chapters. The author exhorts Indian business to relate itself more with the consumers and the society in view of the changes occurring in the business environment. He forcefully argues why concern for customers and society is rather a necessity. He describes the long-standing laws of India that provided succour to consumers before the advent of the specialised and most comprehensive Act on consumer protection in 1986 the key provisions of the Indian Contract Act 1872, The Sale of Goods Act 1930 and the laws of Torts concerning the liability of business to consumers are elaborated.

The author strings together a score of laws that in his opinion 'echo the spirit of consumerism'. A special mention must be made in this otherwise summary of laws, of the Bureau of Indian Standards Act, 1986 and the Standard of Weights and Measures Act 1976. Chapter four builds up a rationale for the government to bring out the Monopolistic and Restrictive (Why the word was left out from the chapters index!) Trade Practices Act, 1969. The Act more popularly referred to as the MRTP Act, reflected the policies of Mrs Gandhi towards seeking an 'antibig business stance' in her power struggle than any apparent concern for consumers. In any event, the Act as well as the commision dealing with the matters were used by consumer protection agencies for the con-

sumers. It also witnessed a series of major amendments effected as the political climate became more favourable to the governments of the day.

Chapters five and six are the two chapters which really provide a rationale for writing the book. They deal with the Consumer Protection Act 1986 as one of the master treatises on consumer protection in India and indeed in the world. The Act has caught the fancy of every consumer willing to give the business a run for their money and seek redressal for unfair practices. It is an expression of consumer rights in India and has been hailed around the globe as free India's effort to a consumer Renaissance. The two chapters deal with the key provisions of the Act, their judicial interpretations and amendments as a result. The chapters have a lot of information on these aspects to fulfill the declared objectives of the book.

The seventh and concluding chapter addresses itself to the building of the culture and environment of consumer welfare. It lists the priorities and role of business state and the consumers as the 'agenda for Excellence'.

One of the highpoints of the book is that it deals with a theme of such importance in our life. The book should rekindle in the readers, particularly students an interest as to how the force of law can be invoked for onself and others. They will also learn how to include the implication of such laws in their role as future managers. The practioners too can benefit in a similar way.

However, the book leaves a lot to desire. While it seeks to help students in various professional courses, the organisation of contents and the process followed to carve out chapters are archaic, reader unfriendly and even unacceptable. The author seems to 'give an unusual new meaning to the word chapter'. There is no references or bibliography either to guide the students for further reading. This was essential since it has not been written in the mode of a text book. The chapters of the book read more like a collection of random thoughts. They betray a lack of organisation normally sought by students.

To the practitioners who are busy and usually on a tight time schedule, the book is hardly 'accessible'. There is no summary of the chapter or recapitulation of the key points. An index of the key terms covered in the book along with the corresponding page numbers, at the end of the book could have augmented the reference value of the book to them. Also, the writing style of the book in its current form can hardly hold the attention of such hurried and harried readers.

All this indicate an element of uncertainty in the author, the publisher and/or YMCA about the intended or real positioning of the book. The question as to whom the book is primarily beneficial, will be a tough one to answer. It is also evident from the fact that price is not mentioned on the cover. It appears therefore, that the book has all the ingredients to let it slide into the genre of those books that are dismissed as 'also there'.

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Technology & Competitiveness—The Case of Brazilian and Indian Machine Tools by *Jon Peter Wogart, Asha Kapur Mehta & Arun Mehta*, Sage Publication, 1993. PP. 175, Rs. 225.

Entropy is the tendency of deterioration over a period of time. Management and technology are no exception to this physical phenomenon. When the fresh air of creativity and innovation is not allowed its way into the fortress of protection and perpetuation of existing technology in the name of self-reliance, it hits, where it hurts most in today's changing environment–global competitiveness. In a developing country like India where tariff walls provided a highly protected domestic market for a long period of time, technology had taken a back seat thanks to the conspicuous absence of spirit of competition. Twenty five years back, for example, India was exporting machine tools to South Korea, while today we stand nowhere due to continuous upgradation of technology in machine tool industry in South Korea as elsewhere in the developed world.

The present work, based on both quantitative and qualitative data, provides a comparative analysis of the technological paradigm relating to Brazilian and Indian Machine Tools industries so as to draw useful lessons on Technology and competitiveness for developing countries. The choice of machine tools assumes significance in the sense that, though small, this industry constitutes a critical sub sector of the capital goods industry. Moreover, machine tools were among the first to incorporate the much faster rate of innovation and technological upgradation in electronics that led to automation using microprocessors. The advent of Computer Numerically Controlled Machine (CNC) revolutionised the machine tool industry in the world and the developed countries started phasing out conventional machines by concentrating on CNC machines, because the development of the microprocessor brought down the cost of

CNC to a level when they could compare with conventional machines on price-productivity terms.

The study in general uses Porter's famous prescription relating to competitive advantage. It, interalia, assesses the importance of the competitive spirit of individual firms and their importance, as also of his thesis of the limited role of government intervention in the development of specific branches of industry. While coming to the final conclusions, the authors have done well to draw lessons from Japanese, Taiwanese, Korean and other developed countries experiences in addition to Brazilian and Indian, which culminated into developing an outline of a New Strategy for East Asian Machine Tools Products.

An interesting aspect of the analysis relates to Government intervention and support which have either concentrated on making the industry more competitive in world markets or attempted to fend off foreign competition through protection. While the former gave a fillip to technological upradation, later proved to be a deterrent, as in the case of both Brazil and India, despite the differences in details. The authors rightly point out that the promotion of import substitution is a high-cost strategy, unless it is limited and time phased. Needless to over-emphasise that restrictions on imports are more costly in industries going through rapid technological change, in which processes and products get absolete within a fairly short period of time.

Hopefully, the recent move in India towards economic restricting, giving rise to a more competitive environment, provides opportunity for a more enlightened and pro-active role of Government Policy. The new strategy demands that changes in trade and technology policies must be worked out together with the manufacturers and the end users. Moreover, government incentives should encourage strategic long-term thinking on the part of machine tool manufacturers to penetrate export markets, particularly relating to CNC machines. One of the problem faced by countries like India and Brazil indigenizing the production of CNC systems is the rapid rate of change of the hardware. Full scale indigenisation is therefore, neither immediately possible nor desirable. The problem may be tackled at two levels. First, ancillary development must ensure quality and interchangeability of products from different suppliers. Secondly, a review of the policy with regard to Joint Working Arrangements between Indian and Foreign tool manufacturers and the experience of users who have bought and used such machines is necessary. Moreover, like Japanese, we will have to gradually develop a genuine talent for turning technological know-how into world-standard products. Re-inventing the wheel is not necessary. The authors, therefore, rightly conclude that it is not the inventing the products and processes, but the acquisition of capabilities needed for efficient production that is at the heart of technological development and successful industrialisation of developing countries.

The authors have not only given detailed statistical tables relating to machine tools industry in the world, technological information, present position of Brazilian and Indian Machine Tools industries, but have also included four brief case studies of successful Brazilian and Indian machine tools companies.

The coverage of the study is quite wide but the analysis remains brief and precise. It is a macro analysis where certain conclusions have been drawn on the basis of secondary data and other studies, Apart from the case studies, micro-level analysis is almost conspicuous by its absence. Perhaps it was not the purpose of this study. Overall, it is a good attempt in having an insight into the widely respected thesis of Prof. Porter as applicable to machine tools industry, particularly in two developing countries.

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Labour & Gender: Survival in Urban India by *U. Kalpagam*, Sage Publication, New Delhi, 1994, PP. 309, Rs. 285.

Discrimination against women is age-old and ubiguitous. The gender based discrimination, exploitation and role of women in societies can be traced back from the works of Marx and Engels 'The origin of the family. Private Property and the State' though the forms and scales of discrimination have been changing from time to time in different societies. In recent years, marketisation, globalisation structural adjustments are the ongoing slogans everywhere. While economic history and economic anthropology are providing evidence from different culture areas of the differential gender as well as class effects of marketisation process it is found that to a vast number of people, particularly for women, the involvement in the markets of both commodities and labour is involuntary and diadvantageous. To this extent the author who is an economist by training and is involved with the issues of feminisim marxism and the activities of

downtrodden for more than a decade provides a deeper insight into the very complex and interrelated issues of labour, gender and survival among the urban workers and the urban poor. This book provides a 'gendered' understanding of the functioning of the urban labour market and of the survival strategies of households. The author argues that gender issues can not be studied in isolation but only within the structural context and dynamics of the country.

The book has 10 chapters — each chapter very well tied with the following, creating interest in the reader to complete the whole text. A whole range of issues relating to the status of women in the family, society and labour market is dealt with their social, cultural, economic and historical perspectives. The author has brought to the center-stage the interaction of forces unleased by the institutions of the state and the marekt and the manner in which they impact on poor households and the lives of women. The author explains about the multistructural system, based on the differentiation of enterprise and type of labour used and establishes its linkage with the labour market. She has drawn some analytical insights on the implications of such segmentation on women workers. Here the author presents how the patriarchal assumptions of the male breadwinner being the provider and protector of the family afftects the terms and conditions of women's labour in the context of segmented market structures.

The book examines the characteristics and trends of the urban labour force in India, using different rounds of employment and unemployment data of the National Sample Survey organisation. It highlights the long term sectoral shifts in the status of labour force. It also deals with the employment and unemployment nexus, with specific reference in female labour force and the differences in their regional characteristics. Based on evidence drawn from across a range of industrial activities to explore the reasons for the demand for labour being women specific, the author suggests some ideas both on the nature of the industry and the technology and the organisation of production that may account for such a demand. Based on her observations, she offers suggestions about the nature of women's jobs, long term issues concerning women, technology and forms of productions, the role of state, trade unions and women's organisations. The work and lives of women factory workers in the garment export industry in Madras city, which employs a large number of female workers are presented. Based on the survey, she gives a detailed account of the nature of the labour force, their social origin economic status, the conditions of employment and the labour relations in various units, both of the factory and non-factory sector of the garment industry.

The book deals with the aspects of works, lives, and struggles of women workers in the informal sector with an ethonographic profile of workers in the informal sector, emphasizing their external crisis on multiple fronts occasioned by low wages, a low resource position, instability of lifehood option etc; the author provides some reflections on the nature of struggles and its perspectives for the women in that sector. Details are given about the structure and role of the Working Women's Forun (WWF), which is a grassroot organisation in Madras, in mobilising poor working women in Tamilnadu and othe cities of the country. This forum is empowering, motivating and raising the consciouness of poor working women through its credit programme, family planning and health programme and social activities. The book deals with various viewpoints of different political ideologies towards voluntary organisations and provides detailed accounts of the involvement of SEWA and WWF in organising self supporting enterprises at grassroot level for women enterpreneurs, especially of the Third World countries, who hold the majority of the informal sectors and according to Berger (1985), are in the process of turning the cities of Third World into their cities.

The work may raise some doubts among readers and policy makers as to being biased; but the volume is tightly written, provocative, analytical and materially rich. By blending together the theoretical insights and emperical evidence, she suggests ways of introducing genders as an analytical category into the discipline of political economy and of introducing patriarchy into the studies of the labour market. The book provides a deep insight into the emerging problems which all countries, especially the underdeveloped ones are encountering might ecncounter in the process of structural reforms and globlisation. With adequate references and latest information. The book has identified and raised many issues. It is, indeed, a useful volume for the researchers, policy makers economists, students, activists and those working on development and gender issues.

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India's Trade Policy & Export Performance of Industry Indo-Dutch Studies on Development Alternatives 12, by *Pitou Van Dijck & K.S. Chalapati Rao*, Sage Publications, New Delhi. 1994, pp. 225, Rs. 260.

The book under review comprises two parts. The first part dealing with the export performance and comparative advantage of India's manufacturing sector is contributed by Pitou Van Dijck, while in the second part, an evaluation of the export policies and the export performance of the large private companies has been done by K.S. Chalapati Rao.

Dijck was of the opinion that India has a tremendous potential for exports and a high capacity to successfully project itself with the rest of the world. However, it has not happened. The most important factor responsible for this is the inward oriented pattern of the manufacturing sector. Over-protectionism and the vast loal market further contributed to keeping exports at low priority.

Traditionally, India was the major exporter of manufactured goods amongst developing countries. However, of late India's markets have been snatched by other developing countries. During the period 1970-1987, the share of India in total manufactured exports to OECD countries from developing countries declined from 7.5 per cent to less than 3.5 per cent which shows that competitiveness of the Indian industry is gradually declining.

During the period of the present study, it has been found that India's interaction with the global economy is very limited. Moreover, because of the failure on the export front, the debt servives have gone very high. From 1975-76 to 1983-84, the ratio of total sales to total exports in all industries, has declined from 5.66 per cent to 3.59 per cent. This gradual decline further proved the earlier hypothesis that exports have never been on the priority for the Indian manufacturers which further consolidated the biased against exports. Although, some efforts for beralisation of the Indian economy were made during e 70's and 80's but degree of protectionism is still very h in comparison to most of the other countries of the ld. Hence, it will not be wrong to call it as one of the ly protected economy.

o doubt, number of schemes were framed in India t exports, however, these incentives failed to bring tial results. Further, these incentives were restricted to few sectors. The major ries were congineering and chemical industries. total incentives, more than half were given only wo industries. Dijck further observed that the IMF loan of 1981 can be considered as a turning point because it is only after this, India started to think seriously about liberalisation. 100 per cent export oriented units schemes, Narsimham Committee Report, New Import-Export Policies of 1985-88, 81-91, Seventh Five Year Plan and so on were some major steps initiated by India in the direction of liberalisation.

It has been found in the present study that there are extreme variations in labour productivity in India. Although, the share of manufactured exports from India has increased, its major share is from labour intensive industries. Textile and wearing apparel constitute around 44 per cent of the total manufactured exports. Another major sector is the leather products. The share of chemicals and transport equipments is just 8 and 15 per cent respectively. Imports of manufacturers are highly concentrated in capital intensive sectors. The major markets for India's manfuactured exports are USSR, USA, Germany, Saudi Arabia and UK. In a nutshell, India's comparative advantage is only in the labour intensive industries. the overall performance of the manufactured exports particularly in high-tech areas is still very dismal.

In the second part K.S. Chalapati Rao critically examines India's trade policy, export incentives and export performance of the leading 405 companies. From the Second Plan onwards, scarcity of the foreign exchange has been experienced forcing India to go for inward import substitution growth. Foreign collaboration was encouraged mainly in the public sector. In order to boost exports, number of committees were appointed from time to time, focusing their recommendations on the various aspects of India's foreign trade. However, serious thought was never given to overcome the structural constraints on Indian exports because of political and other factors.

In the period of 72-73 to 85-86, a huge trade gap wa noticed in India. In the same period, the share of traditional goods in India's exports had declined significantly while the share of manufactured goods had increased substantially. But, here it is important to mention that a substantial contribution in India's exports is made by small scale industries and public sector undertakings whereas the performance of the industrial houses and FERA companies is quite below the expectations.

The total exports of 405 companies taken in the present study was Rs. 489 crores in 1975-76 increased to Rs. 850 crores in 1983-84. However, there has been a decline in the exports of some of these companies over this period. Another major highlight of the present study

is that the net foreign exchange earnings of leading companies has been negative because the total foreign exchange issued to them for imports is larger than that earned by them. Even the 20 large houses and export houses of foreign subsidies are the net losers of foreign exchange. Moreover, most of these export companies depend mainly on the rupee trade markets. Further, these companies are exporting mainly items like marine, leather products etc. rather than their parent products. Rao suggests that unless the domestic market is made less attractive, exports are not likely to pick up.

The study conducted by Dijck and Rao can be considered as a pioneer work in this field. The methodology used can pave a way to carry some more studies relating to the recent developments. However, the drastic changes noticed in India in the early 90's have undermined the contemporary relevance of the present study. Another major limitation is that its scope is vague. In spite of this, the academic content of the study is of immense significance.

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Catering Management—An Integrated Approach by *Mohini Sethi & Surjeet Malhan*, Wiley Eastern Ltd., New Delhi, 1993, 438 p, Rs. 175.

The advanced economies of the world have followed a distinct pattern in the course of their development. From being agrarian economies they went on to become industrial and then subsequently service economies. India is also moving in the same direction. At the micro level, the overall trends are supportive of the boom in the demand for services. Major among them include increasing number of business corporations, women joining the workforce, rising income levels, new life style patterns, longer life expectancy levels and spirit in travel and tourism. The overall impact of these developments is going to show in an escalating demand for different kinds of services including the institutions whose core function will involve catering and hosptiality.

Already, massive efforts are being made at the governmental level to promote India as a tourist destination in Europe and the US. The new liberalised thinking in the economic and business field is also attracting business executives from various countries in no less way. But the flip side of this emerging new opportunity is whether we are really equipped to provide service to the customer in a satisfactory way. The issue is debatable. However, the experience with the service institutions has been by and large poor. Good service experiences is an exception rather than rule. Except for the big chains in the hospitality business which enjoy an access to expertise in the area of technical skills and customer care from their foreign counterparts, others are a case for a mjaor overhaul. One word that may adequately describe the casue of the this sorry state is lack of managerial inputs. The book under review will be eminently useful in helping the owner/manager to take a new organised and systematic look at the important functions of their business.

Structurally the book navigates through eight important decision areas of catering management. Each decision area is comprehensively dealt with in a unit. These units are devoted to the themes of Introduction to Catering Management, Financial Management, Personnel Management, Organisation of Spaces, Hygiene, Sanitation and Safety. At the beginning of each unit the authors give an introduction which is devoted to the ideas and issues that form the core of the following unit. This unitwise prologue is a plus point of the book because it sensitizes the reader with the theme of discussion.

The authors introduce the fundamentals of management as applied to catering business with management principles, tools and resource management. The discussion of resource management is particularly well written as it provides practical guidelines on how to manage various resources. It is a very good guidebook for entrepreneurs in the field. The unit on organisation of spaces focuses on three spaces which need to be managed carefully in order to make space utilisation optimal—the kitchen, sotrage and service area. In order to deliver satisfactory service at the 'front end' the organisation of 'back end' is very critical. Often improper kitchen design and layout is the cause of chaos in catering institutions. It is here again that the book very ably deals with the issues of kitchen design and layout. The use of picutres and figures with the text particularly aids the reader in understanding the concepts.

Automation and technology have revolutionised th methods of production and operations in the indust The catering institutions have not been isolated in tl regard and complex machines and equipments have b come integral to the efficient and effective operation the catering business. Unit three of the book deals v the issues related with equipment such as equipn types, design, installation, operation, care and m tenance, and purchase.

At the heart of any catering is the food. Also, from the customer's perspective, food and its manner of service is the building block for the service experience. Therefore the activities that form the inputs in the prepration and serving of food are critical areas of management. Unit four of the book takes the reader through the important issues of Food Management such as food characteristics, quality and recommendations as to what kind of food is appropriate for different types of catering establishment; food storage; menu planning; food production; and food service. Entrepreneurs and managers can learn a great deal about menu planning which has been a neglected area especially in the small scale establishment.

Jan Carlzon, the man who turned around the Scandinavian Airlines System applied a term of bull fighting into the area of service systems i.e. 'moment of truth'. The MOT implies an encounter which a customer has with a service system. Many service institutions driven by the industry's tunnel vision aim at controlling the technical solutions but miserably fail to create favourable MOT with the service personnel. Since services tend to be human intensive the need is to drive the system by employee ownership and commitment. This can only be achieved by excellent management of human resources. The sixth unit of the book forcuses on the importance of the issues concerning people in a catering establishment—recruitment, selection, compensation, training and development. The objective here is to achieve a high degree of compatibility between people and organisation so that the personnel willingly give their best to the customer. The other units of the book are devoted to the areas of Financial Management, Hygiene, Sanitation and Safety and Future Trends in catering business.

On the whole the book achieves a remarkable balance between theory and practice. The diverse ideas of management are very ably integreted and applied to catering business. The detailed treatment of the activities important in the management of catering establishments gives the book an added advantage of being a text book which can be used by a practising manager and entrepreneur. This book is a must for anyone who is associated with catering either as a subject of education or as a line of business.

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Talk is Cheap: Promoting your Business through Word of Mouth Advertising. Aditya Books Pvt. Ltd., New Delhi, 1993, 136 p, Rs. 95.

The book under review advocates one of the methods of advertisting considered to be effective and economical. Almost all aspects discussed in the book are drawn from practical experiences.

Work of mouth promotion is what people verbalize to others about specific products, services or activities. Thought it is related to advertising or public relations, word of mouth advertising is actually a different type of commercial communication. However, this should not be confused with paid testimonial comments by celebrities, printed promotional blurbs by critics or the broad reputation achieved by organzations over time.

The authors quote a few successful word of mouth advertising business areas like, entertainment, food companies, medical and legal practices, professional firms, security companies and illegal and socially marginal enterprises (prostitution, drug dealing, black market trading). It is stressed that word of mouth commentary may be the only form of promotion available to the last mentioned. Despite the random appearance of word of mouth promotion, it can be the most effective and least expensive form of promotion.

The basic word of mutho themes imply that the customers:

Are communicating– Hence, listen

Are reacting– Watch

Have ideas– Probe

Deserve recognition– Reward

Are part of business– Inform

Talk about fresh approaches– Be surprised

The book is rich with a host of practical ideas. For example, the word of month advertising relating to a restaurant along a lonely highway is suggested in the following way by the authors. "Leave cards on the tables with a little sign that the restaurant will pay the postage. The restaurant has not only laid the ground work for some word of mouth promotion between the sender and the eventual recipient, but has also fixed the restaurant in the mind of the customer for a possible return visit.

The authors have also made a point that positive word of mouth comments can only begin when the public believes that a company's products are good and the messages it sponsors are accurate, honest and sincere.

Like Walter mondale said "images are like mixing cement. When it's wet, you can move it around and mould it. But at some point it hardens and there's almost nothing you can do to reshape it".

A hundred and odd pages of presentation drawn heavily from real cases and consulting experiences make the book highly readable. The book presents a lot of information especially relating to United States of America. Changes are to be introduced to suit a naive population, in case some of the principles are to be followed, examined and adopted.

The printing is neat but the bibliography and the annexures require extra lens to read. The price, content, presentation, relevance, readability, expression expertise and exposure all seem to be loaded on the higher side of average. Hence, a readable volume.

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CAD/CAM/CAE Systems by *Mark Ceticchia and others*, *Marcel Dekker*, New York, 1993, 472 p, $ 135.

This book specifically focusses on considerations relating to the introduction of computer systems in an organisation.

With more countries taking to globalisation, it is not the Big eating the Small, it is the Fast eating the Slow'. In this environment, the key to survival and success will be the effective use of information technology wherever possible. For the manufacturing industries, the critical success factor is the firm's ability to quickly respond to the customer's specification in a flexible and dynamic manner. This is where CAD/CAM/CAE comes in.

This book answers all the questions relating to the requirements of acquiring and using CAD/CAM/CAE systems effectively and efficiently. Justification, Implementation and evaluation of CAD/CAM/CAE systems are provided with a check-list for ensuring the benefits out of the system to the organisation.

A notable feature of this book is the emphasis on the humanware component of information technology. Aspect of Personnel Management after the introduction of computer systems are critically examined. The in-depth analysis of Service Bureaus will be useful for the organisation. The check list given for the request of proposal is exhaustive and informative. With this as a model, the shuttling of proposal between the system proposer and deciding authority where maximum time is wasted can be minimized.

The book also shows how to quantify the benefits of CAD/CAM system through Payback method and Discounted Cash Flow-NPV method. These approaches can be applied for any Information technology cost/benefit analysis.

The insights given on Bench-marking are really eye-openers. System Administration and the Planning aspects given in the book will be useful for ensuring the effective utilisation of the system by carefully arranging libraries and designing data base developments. The subject of Preventive Maintenance, clearly specifies what to do to make the system run perfectly and ensure no future downtime of the system.

The qualitative and quantitative benefits mentioned in the book about the system are aimed at reducing the product cycle, which is essential to conquer the market. Product cycle with CAE ensures that the product is engineered, designed, machined and tested with state-of-the-art technology. This aspect creates confidence in the customer and ensures brand loyalty. The book gives some useful insights on total productivity considering every aspect from System Overview, Organisation, Personnel, Training, System's Library and Layering, Environment of the System etc. The approach of NGT and the case studies give a fair justification on evaluation using the Job Accounting Packages.

This book can improve the Return on Investment for an organisation. In short, it serves as a comprehensive administrative guide on CAD/CAM/CAE systems.

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