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S.K. Chakraborty

It has been realized that corporate governance is vital for better management of industry and business. Essentially the term signifies steering to rule and disciplining. The present paper enumerates issues in corporate governance from the viewpoints of ethical philosophy and psychology which have become important in the current globalization paradigm. The author emphasizes that the spirit of corporate governance must be reinforced with corporate credibility to ensure product quality, better delivery schedules, honest pricing etc.

Paper presented at the National Conference on Competitiveness, organised by NPC, New Delhi, April 6, 1999.

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The Greek root for governance is *Kubernau* – to steer, to rule, the corresponding Sanskrit word is *shasan.* Both these indicate a common keynote in governance – disciplining. Business activities today have assumed a character for which the word management sounds rather soft. Management as a process, and the actors in it, need to be more strongly disciplined. Hence the new coinage of the nineties: Corporate Governance. The attempt here is to outline a few issues for consideration in corporate governance from the viewpoint of ethical philosophy and psychology. Structures and systems of governance are, in our view, only the means to ensure fulfillment of such psycho-philosophy.

Issues and Problems

Corporations constitute a category of institutions to serve human beings. What model of this human is assumed by them? If it is simply that of the rational-economic model, then it is incomplete and faulty. The emotional – ethical model of the human, at the very least, needs to be included. And if man is the end, not the means, this aspect has to be put above the economic one.

From this it follows that the concept of the corporation too needs to be enlarged to cover the social-ethical dimension, in addition to its economic-entity core.

The stock market and CRB scams, the ITC and Indian Hotel scandals are a few highlights of the nineties which have forced upon us the need for serious reflection on the question: are corporations only economic entities or social agents as well? In a supposedly more enlightened and open era, can corporations continue to have a quarantined view of themselves? The philosophy of corporate governance will be deeply influenced by our response to this question.

The Anglo-American unitary Board model, based primarily on the principal-agent theory, is being severely

scrutinized for its ability to cater appropriately even to one and only one class of stakeholders—the shareholder. The thrust of US corporate governance strategy is to separate the monitoring and evaluation aspects from the execution aspects of corporate functioning. These experiments have been forced by not only efficiency criteria but by ethical considerations also. The 'steering' and 'ruling' functions of governance must operate at arm's length from the management and execution functions—in principle at least. But detailed research on these issues in the UK and USA is proving that reaching anywhere near such a state is yet a far cry. The obstacles on the way are chiefly ethical and not structural or systemic.

A wider dimension of corporate governance is the effort to create a market for the buying and selling of corporations themselves. This also stems from the Anglo-American faith in the invisible hand of the market to sort out all problems. But such confidence is shaken even in these countries. Yet hostile takeovers in the buyout-mergers market have recently been legitimised under law even in India entailing severe ethico-moral problems. The recent Sterlite-Indal imbroglio has raised many subtle issues which cannot be addressed by even the most detailed legislative framework.

A wider dimension of corporate governance is the effort to create a market for the buying and selling of corporations themselves.

As for the high-powered monitoring agencies, like SEBI and RBI, often they themselves have been found to have feet of clay. Thus, in the context of the Canfina scam of 1992, recently court judgement has severely indicted RBI's slumber and criminal apathy. Though it was well-established for some time that Canfina had been adopting unethical and devious market practices, flouting RBI/SEBI guidelines, no prudent and timely action was taken by these bodies. In other words, governance within those very bodies which are expected to govern others now seems to be in doubt.

The German Corporate governance system is distinguished by the 2-tier Board structure—the Supervisory Board (SB) and the Executive Board (EB). The SB is composed of two sets of elected Directors—in companies with more than 200 employees, upto 30 per cent of the members can be elected by employees and another 50 per cent by the shareholders. Thus, two major stakeholders, with likely conflicts of interests are nearly equally balanced at the SB level. The SB also has members from professional groups, banks and business-related firms. This SB appoints the EB which has high managerial autonomy. The functional difference between SB and EB is laid down by law and is quite clear. This contrasts with the muddled interface between strategic and executive functions in the unitary Anglo-American model. Besides, a person cannot belong to both Board, nor is there any promotion channel from the EB to the SB. The other two distinguishing marks of the German scenario are: the minor significance of shareholder value as the primary standard of corporate performance, and the near absence of hostile takeovers.

In Japan, though in appearance the unitary Board system prevails, yet in reality it is fundamentally different in philosophy and operation from the Anglo-American model. Thus, corporate governance emphasizes growth and market share, not shareholder dividends. The shareholder population is very stable. Again, there is no market for buying-selling companies and, like in Germany, takeover activities are almost non-existent. Strong government control through Ministry of Finance is a notable feature. Yet another significant characteristic is the pattern of cross-shareholdings amongst affiliated companies, including customers and suppliers.

On the other hand, as distinct from both the German and Anglo-American models, the Boards of Japan's major corporations represent the interests of companies and their employees as a collective. They do not uphold the interests of shareholders. Indeed, large sharehodlers sometimes collude for low dividends. The stable shareholders have no interest in participating in corporate management, but in the company's overall health and growth. Cross-shareholdings amongst business partners yield better returns and are a perfect answer to hostile takeovers. Institutional investors too tend to be more interested in long- term capital gains. Besides, for more than 80 per cent of large corporations there are no outside Directors.

Thus, by a curious turn of history, both Germany and Japan, who were severely damaged and defeated by the Anglo-American forces in the 2nd World War, emerged as victors on the economic front within a few decades thereafter—using their own distinctive models of corporate governance. The one common thread we notice in this Euro-Asian saga is the clear preference, at least hitherto, for controlled stability instead of market-driven chaos in these economies. They both also largely opted for long-term growth, rather than be dictated by volatile stock-market indices. Besides, at least one stakeholder group other than shareholders—employees—has figured more prominently in the philosophy of corporate governance in these two countries than in that of the Anglo-American model.

Case of India

Indian corporate governance has therefore, three major alternative models to look around. Has this been done? Is this intended to be done? It might be argued that for several reasons imbedded in India's economic history, mixed up with her political history since the middle of the 18th century, continuance with the Anglo-American model has been almost inexorable. Over the last few decades, financial restructuring enforced by the IMF and World Bank has been an even more compelling force to remain wedded to the Anglo-American model. But a closer look does not allow this argument to go unchallenged. The war-ravaged economies of Germany and Japan were much more heavily served with stupendous doses of US aid. How is it then that both these countries could achieve economic miracles with American aid while sticking to their own philosophical/cultural assumptions and corresponding structural and systemic arrangements? So, we in India are faced with a disquieting phenomenon: reluctance and inability to evolve home-growth approaches for both governance and management.

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Take for instance the recent adoption of the practice of publishing quarterly financial results by companies in newspapers. This is supposed to lead to greater public transparency and more shareholder information. They are rather superficial arguments. The grave hidden danger is that such measures are bound to encourage further short-termism keyed to the ephemeral stock market indices. Is this a healthy philosophy when the corporation is beginning to be deemed as a social entity? Several sordid business events during the 1990's should have convinced us that unethicality is born in the womb of short-termism. Should future corporate governance not therefore commit itself to a fundamental shift towards long-termism?

Legal Aspects: Company law in India says that the Managing Director is one who has 'substantial powers of *management*' for the company. What is the likelihood that henceforth there will be an independent outside Chairman of the Board who will have 'substantial powers of *governance*'? Will the challenge, both conceptual and structural, be accepted and grappled with seriously? Will law itself define 'management' and 'governance'? For instance, will the Managing Director with inside Directors, be primarily concerned with the 'management' of their fiduciary responsibility to only two stakeholders groups: shareholders and employees? And will this be complemented by the Chairman and outside Directors, along with the MD and inside Directors, 'governing' the enterprise for its fiduciary social responsibility towards all stakeholders?

The various downsizing exercises currently afoot in the Indian Corporate sector constitute yet another instance showing how the wider and socio-culturally relevant backdrop of governance is absent in Indian management. The 'low-unemployment, high-wage' model of economically advanced countries is being adopted in a 'high-unemployment, low-wage economy' that India is. And that, even amongst economically top class countries like Germany and Japan, unlike in the UK or USA, downsizing is not the route towards competitive strength—this too we forget. To be oblivious of the social-psychological-material consequences of downsizing in a society with no social safety nets is a crime of non-governance. The chimera of international competitiveness, a game where countries like India will generally remain losers, should never displace the much more pressing social concern for employment. Downsizing is not the best way to govern for better work-ethic and higher productivity.

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Ethics

From the standpoint of values-ethics an important issue for corporate governance to consider is: should it be envisaged against a scenario of competitive adversarialness or one of the cooperative trust? This takes us back again to the earlier theme—shall industrial corporations continue to be treated merely as economic-accounting entities, or begin to be viewed as social-moral agents as well? Should inter-firm competition be only one minimal condition under a wider umbrella of cooperative trust and honour? Can society move towards a healthier and nobler state of faithful mutuality amongst its members while its principal economic outfits continue to ignore this inspiration in a deregulated regime? In any case, even by economic criteria may sustained governance with this thrust not reduce considerably the burgeoning transaction costs

Corporate Governance – A Japanese Perspective

Masami Atarashi

New corporate governance models have become the need of the hour in view of the rapid changes engulfing the business world. The author analyses the background and features of Japanese corporate systems and presents a comparative study of the American and German models too.

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"I am going through varied experiences as a director of Japanese, American and European companies.", said Nobuyuki Ide, Sony President/CEO, in a Japanese economic weekly magazine on the occasion of being appointed external director of General Motors last November. Sony is one of the most advanced Japanese companies in applying the corporate governance model as such experiences of its CEO provide valuable opportunities to learn about global corporate governance practices.

Why Corporate Governance?

In the global mega competition age we live in, all Japanese companies are being required to immediately develop their own corporate governance model. Especially in view of recent scandals, Japanese companies need to establish accountability in their corporate governance framework to reassure their global partners. Corporate governance was not a popular term among Japanese business society until a few years ago. It, however, has become a hot topic and a requirement today as one of the needs to establish global standards in the business world.

Why did so many corporate scandals happen? This is one of the key issues to be considered in formulating corporate governance codes. When we observe cases of unreasonable profit offering and other scandals on the part of banks and securities companies, it is recognized that such deplorable events were caused, not on a one- time basis, but due to fundamental structural causes. Doubt remains as to why such irregularities of management could not be prevented.

Why is it that the board of directors could not stop it? What accounts for the fact that the auditors' team could not check it? How did the function and structure of management decision making work? For whom and how were such companies being managed? These issues

question the validity of the Japanese corporate governance model. Consequently, a question arises as to what should be functional and effective corporate governance? A healthy corporate governance not only deals with accidental and temporary mishaps, but aims at the identification of an excellent model of corporate management.

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For improving operational efficiency in companies, especially large-scale public companies, corporate governance should be discussed as an issue related to the following:

- What kind of management decision-making system should be established?
- How should the management decision system be checked?
- How to allocate authority and responsibility to stakeholders (shareholders, management, employees, creditors, related companies, business partners, customers, social partners, etc.), and also how to share the fruit of management?

In other words, discussions concerning corporate governance should deal with the topic "For whom, for what, and how should a company be run?" in a broad context.

Corporate governance is still a new concept in Japan. Even in the U.S. and European countries, it appeared just around 10 years ago. However, it has been rapidly getting popular in Japan in the past several years. For the reason that conventional framework of management, can not cope with the changes in today's active business environment, a new management system model and framework is being sought after. Corporate governance is explained as a kind of code developed by stakeholders when direction and activities are to be decided. Placed in the spot light of total quality management (TQM), stakeholders include stockholders, management, board of directors, employees, customers, business partners (suppliers), creditors, local society, etc. Corporate governance changes its shape and style depending upon movements and changes in the business environment. As conventional business customs become unable to cope with changing times, once a company's business scenario changes, corporate governance also has to change in its concept.

What Is Corporate Governance?

For establishing effective functional corporate governance, a company is required to clarify its strategy to show the fundamental direction of its corporate governance, secure transparency through active management information disclosure and also to realize the company's innovativeness by establishing a social orientation. Therefore, corporate governance can be said to be a structural framework to make a healthy and competitive company which realizes self-cleaning and competitiveness under such strategies, transparency, social orientation, and innovativeness.

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It is necessary to define who decides it, what are the rules/standards of accountability, and so on. The greatest concern of stockholders is a rise in stock prices and dividends as belies the saying "winner is a person who has the biggest cash-flow". Furthermore, a pension fund might be an important factor since it would be helpful for understanding the current situation, the future direction and the potential/possibility of corporate governance. Improved profits will extend to a pension fund by enlarging a company's stock basis and stock price rises when the company keeps investing its stocks in its own pension fund.

The main role of a board of directors relative to corporate governance is to audit their management on behalf of stockholders. Appropriate mechanisms and organisation in which the management perform their job of continuous accountability to the board of directors and their stockholders are to be put in place. In relation to these, there are several new steps, e.g., introduction of operating executives, reduction of directors, and active assignment of external directors. And it is the task of all participants in corporate governance to check and confirm a total point of view as to whether the decision of CEO is the right one which serves the long-term benefit of all stakeholders such as stockholders and other related partners, and not for the benefit of the CEO himself.

Corporate governance focusing on relations between management and stockholders provides us with a key point of corporate governance theory on "how stockholders monitor and control the activities of management in relation to the company's economic performance". Corporate governance theory addresses the issue of how and by which mechanism to provide operational responsibility to the management in order to bridge the gap between ownership and control.

Indeed, once a company is seen to exist as a public partner in society, and not merely as a property of stockholders, corporate governance should be discussed not only in a simple context of "who governs a company", but by going a step further to the issue of "for whom a company should function" in reflection of the voices of various stakeholders. In this respect, we see limitation in an approach where corporate governance is studied simply by addressing a conflict between stockholders and management. Furthermore, it is an important aim of corporate governance to realize an appropriate balance between related legal rules on the one hand and corporate performance on the other.

Models of Corporate Governance

Corporate governance system in each country has its own different characteristics depending on historical and cultural conditions. Therefore, it is neither possible nor advisable to simply adopt a system. However, in today's borderless environment where it is required to establish a world standard capable of coping with mega competition, Japanese companies need to pay attention to moves in other countries in the establishment of their own corporate governance models.

Corporate governance system in each country has its own different characteristics depending on historical and cultural conditions. Therefore, it is neither possible nor advisable to simply adopt a system.

American Governance Structure

The American corporate governance structure is stipulated by the legal system. There is an established corporate law in each State, and its principal contents are almost the same. Corporate organisations regulated by the American corporate law comprise a general committee of stockholders and a board of directors. In American companies which do not have an auditors committee, their governance system in its legal form is a unitary structure since the control function on executive management operations is entirely entrusted to the board of directors.

However, since board of directors monitors the execution of management, it actually serves as a dual structure in practical terms. American stockholders are, therefore, positioned as the supreme ruler of corporate governance since they have the power to appoint and dismiss members of the board of directors. In other words, at a general meeting of stockholders as the highest body within a company, stockholders are authorized to exercise their power on various management matters including the appointment and dismissal of directors.

Concerning the board of directors, it is regulated by the American law that all corporate operations are to be carried out by a board of directors, or under the instructions of a board of directors. Actually, however, it is difficult for large scale companies to have all daily operations executed by only the board of directors. Hence it has become an established business practice for the board of directors not to involve themselves in the daily operational matters of company management. For this reason, it is common practice for the board to set up an internal committee in order to delegate the authority, while reserving their own decision on such issues as dividend allocation, decision on agenda for a general meeting of stockholders, etc. A typical American governance structure is shown in Fig. 1.

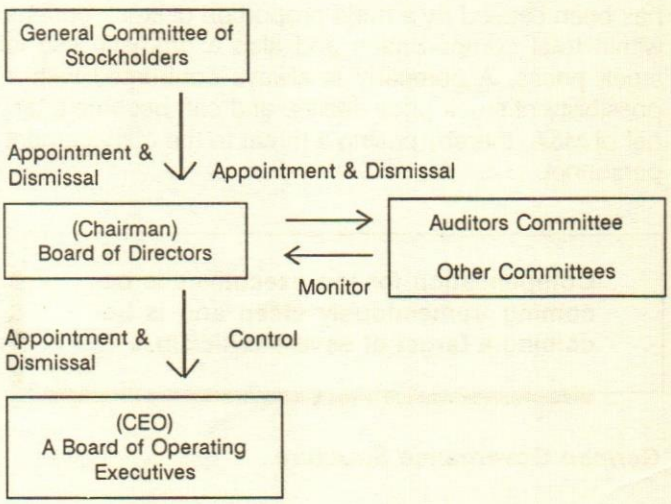

Fig. 1. Typical American governance structure

Under such a governance structure, Board Activism (an acting board of directors) has been appearing in recent America, in which a board of directors monitors

and controls the conduct on the part of management. In fact it is not a rare case for a board of directors to dismiss a poor performing CEO on the basis of assessment of management operations, as it happened in major American companies, like General Motors, IBM, Kodak, etc. where their CEOs were dismissed during 1992-1993. Also, Apple Computer did the same in 1996-1997. Initiators of such active moves are external directors who account for almost 80 per cent of the members of the board of directors. Supporting the moves are the institutional investors.

In such an American style corporate governance oriented toward stockholders, there emerge some merits and demerits. One of the merits is that a highly transparent corporate management can be expected because there is a strong check on management. In America, investor relations (IR) is fixed as one of corporate relations activities, thereby entitling their investors, especially to institutional investors and securities analysts, to disclosure of corporate information. The second merit is that management can accomplish drastic innovations by their own initiative since the support of internal managers and employees is not always necessary. However, this also means that management can easily shift in the direction of short-term orientation in order to maintain and raise stock prices as a reflection of the excessive importance they attach to the wish of stockholders. As a result, the interests of other stakeholders, especially employees and managers, tend to be neglected. Another issue is that the compensation for top executives is becoming tremendously steep and is becoming a target of severe criticism. This problem has been caused by a huge proportion of stock options within total compensation and also a dramatic rise in stock prices. A company is always confronted with a possibility of stock price decline and can become a target of M&A, thereby posing a threat to the management personnel.

Compensation for top executives is becoming tremendously steep and is becoming a target of severe criticism.

German Governance Structure

The structure of a general committee of stockholders in German companies is different from those in American and Japanese companies. The legal characteristic of German corporate governance structure is to have a dual structure based on the joint decision system. In German companies, three functions, i.e., a general committee of stockholders, an auditors' committee, and a board of directors, are statutory bodies. Among them, an auditors' committee, which is a checking function, and a board of directors, an operational function, constitute the governance structure. A typical German corporate governance is shown in Fig. 2.

Unlike those in the U.S.A. and Japan, the general committee of stockholders in Germany is not positioned as the supreme body of a corporation. The highest legal position is entrusted to the auditors committee, in which, based on the mutual decision law, participation of labour is mandated. The auditors' committee consists of representatives of stockholders elected by the general committee of stockholders and representatives of labour elected by the employees.

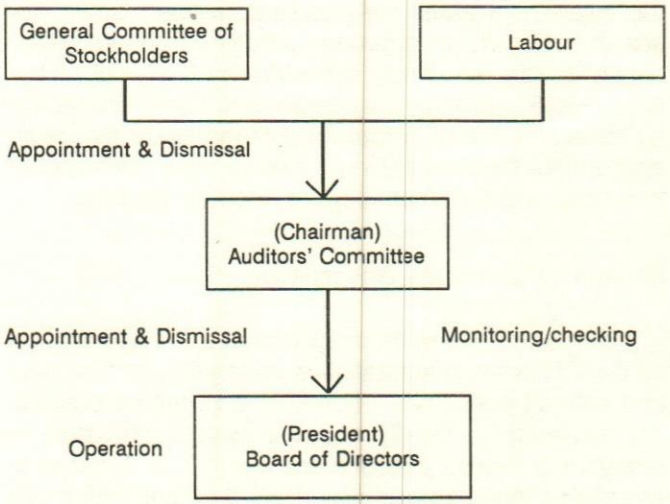

Fig. 2. Typical German governance structure

Members of the board of directors are appointed by the auditors' committee, and carry out operational duties as management under the supervision of the auditors' committee consisting of both labour and management. In this structure, an auditors' committee and a board of directors are separate from each other in terms of both constituent members and functions, with no member assuming dual positions in both the bodies.

A point of debate about German corporate governance model is the securities trust operation authorized under the universal bank system. Because of this system, banks, especially major German banks, have a major influence on German companies. Another point to note is that the German stock market is still underdeveloped compared with those in the U.S.A., the U.K., and even Japan. As a result, while characterized by its "institution-oriented structure", German corporate governance is shifting towards the market-oriented model of American type by correcting some of the flaws.

Japanese Corporate Governance Structure

The legally regulated Japanese corporate bodies are a general committee of stockholders, a board of directors, representative directors, and auditors. From a legal point of view, Japanese corporate governance has dual structures consisting of an operational function (a board of directors and representative directors) and a checking function (auditors and a board of director who check representative directors). A typical Japanese corporate governance structure is shown in Fig. 3.

Stockholders in Japanese companies, just as those in American companies, are positioned as the supremo of corporate governance in that they have the power of appointing and dismissing directors. Directors are elected at a general meeting of stockholders which is the highest corporate body, and a board of directors consisting of all the elected members assumes responsibilities for operational and managerial decisions. The board also elects representative directors and, while entrusting to them the management of the company, checks their operations and performance. On the other hand, a general committee of stockholders reserves the right to dismiss directors, and assigns auditors who are responsible for checking the operations on the part of directors. Furthermore, large scale Japanese companies set up their own optional operational bodies such as "Jyomukai" (senior executives committee) or the management committee.

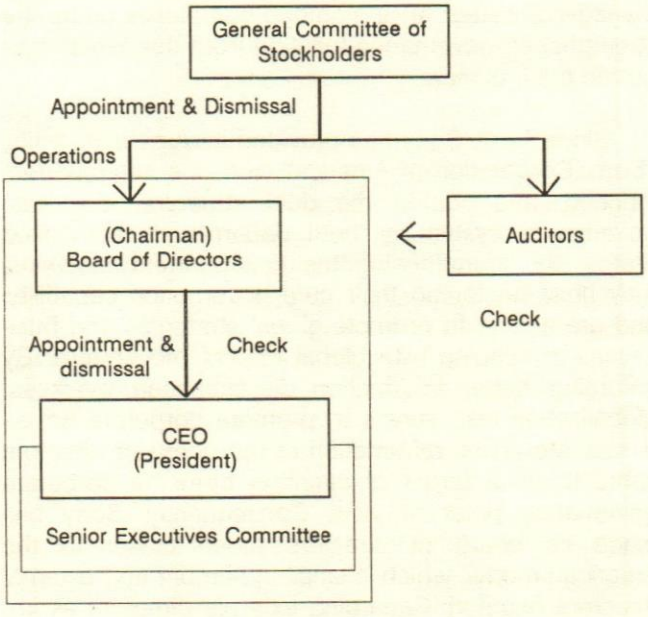

Fig. 3. A typical Japanese governance structure

The reality of the governance model in major Japanese companies is that there is a big gap between actual practice and theory. As is evidenced by the fact that almost all of the general meetings of stockholders of major Japanese companies are concentrated around the middle of June every year and are held in a short time, Japanese corporate governance is, in many case, only in name. For example, directors who should be in a position to check representative directors (management) are elected by the president or chairman who is a representative of management, making it impossible for the board of directors to perform its monitoring functions.

Japanese corporate governance is a characteristically internal-oriented closed loop structure, which is characterised by high presence corporate/institutional stockholders, and declining power of main banks and labour unions as a checking function.

Japanese corporate governance is a characteristically internal-oriented closed loop structure, which is characterised by high presence corporate/institutional stockholders, and declining power of main banks and labour unions as a checking function.

In order to address and minimize such gaps, Japanese laws relative to corporate governance have been changed on several occasions. Some of those are:

- To strengthen the checking function and secure transparency by strengthening stockholders' authority and the power of auditors.
- To increase flexibility of financial strategy (e.g., deregulation on the purchase of own stocks).
- To ensure corporate responsibility to society (e.g., Product Liability Law)
- To change and innovate reward systems (e.g., introduction of stock option system)
- To innovate corporate structure (e.g., removal of restrictions on a holding company)

Apart from these, endeavours are being made toward simplification of procedures related to company mergers, implementation of consolidated accounting system, conformance with global accounting system, etc.

Case of Sony

Under the ongoing changes where digitalization is rapidly developing. Sony have been promoting localiza-

tion of their businesses by reinforcing their headquarters functions in order to meet global business challenges. They have, in other words, established management organisation systems for dealing with rapid business structural changes. They are also establishing their own core governance structure by unifying Japanese internal-oriented self-governance model and American external oriented model by creating a board consisting of a select few.

The corporate governance of Sony is symbolized by "Digital Dream Kids" which shows the direction of future product development. Sony now finds itself in the midst of digital revolution shaking the world. The "Digital Dream Kids" motto showing Sony's direction aims at creating new businesses in the Information Technology area based on digital technology, and also projecting Sony as a total entertainment company by unifying hardware (electronics) and software (entertainment). For this purpose, Sony has set up mid- to long-term strategies to strengthen its electronics AV technology by digitalization, to increase profit by developing and introducing the most appropriate software technology in digital age in entertainment business, and also to develop new business areas by unifying electronics and entertainment.

Although Sony has various technologies and assets in terms of both hardware and software, it is trying to acquire more management resources by mergers and acquisitions with a view to making up for paucity, if any. Besides, Sony decided to enter into new businesses since 1997—one is to launch a broadcasting business by joining the digital satellite broadcasting company "J Sky B" and another a full-fledged entry into the advertisement business. By going into both broadcasting and advertisement businesses, the "digital dream" will become much greater in scope.

Sony, by promoting digital strategy, is placing before its stockholders its management objective of emphasizing cash-flow orientation, cash generation capability (profitability), controlling power, profit quality, etc. It is also an effort to cope with the overseas institutional investors who place priority on the corporate value of the company they are going to invest in. Furthermore, Sony has pledged to continue, for 3 consecutive years from the fiscal year 1996, maintenance of dividends payment of over 50 per cent on the average, thereby emphasizing their stockholder orientation. The resultant performance has been recognized as newly created added value, making it possible for Sony to achieve a rate of labour cost distribution, facilities distribution, and stockholder distribution, all of which exceed the industry average.

Sony's core governance is represented by the "company system". Another characteristic is the intensification of the headquarters functions aimed at promotion of localization in line with globalization of business. Sony was, in fact, the first Japanese company to start the "company system" in 1994, thereby changing the organisational framework of electronics business dramatically. By establishing eight companies within Sony and by establishing an integrated operation system encompassing development, manufacturing and sales in each "company", the management made it possible to meet the market changes. Independent profitability, responsibility and accountability of the president of each company are fixed and business operations are based on the balance sheet reflecting each company's asset evaluation. Furthermore, rapid and flexible management decision has been realized in the face of external business environmental changes with 'speed management', by implementing empowerment of company presidents. Such a "company system" was restructured in reflection of realistic necessity, and finally modified into 10 "companies" in 1996.

In addition to the existing Management Committee, Sony has newly established a "Board of Executives" for carrying out corporate governance and strengthening the corporate headquarters. In the Board of Executives, the president plays the role as chairman, and its board is the highest cross-functional operational body consisting of vice presidents, senior directors and managing directors. The Board of Executives aims at tackling managerial issues, arising among companies under the strengthened governance function from the overall corporate point of view.

Since 1997, Sony has provided its American entity, "Sony Corporation of America", with the headquarters function, and started the dual structural corporate governance system in both Japan and the United States. By strengthening the headquarters functions, they have reinforced their core governance capability, and are aiming to promote global strategies and businesses in keeping with global market movements. By enforcing better information dissemination overseas, globalization also serves to promote corporate governance. Moreover, reformation of the board of directors came to be a target of attention from the corporate governance point of view. Consequently, Sony has made its board of directors much closer to the American model, which is small in number and external directors oriented. Regarding external directors as important can be effective in monitoring and checking injustices and realizing healthy management. And, with a view to realizing separation of strategies and operations, Sony has started the new operational executives system. These steps are neither American nor Japanese,

but could be called Sony's own core governance structure combining the best aspects of both styles.

In addition to the above, there are the advanced investor relations activities, the CS structure which is working as a company-wide cross-functional organisation in the form of a CS Center, various global social contribution activities, etc. The governance model of Sony is characterised by an advanced strategic orientation, which has a management organisation capable of coping with globalization and localization through enforcement of headquarters functions, and also by its consistent transparency and innovation.

Future Direction of Corporate Governance

In the major corporations of today as social entities, the kind of management aiming merely at stockholders' profit maximization is inadequate. It is necessary to consider the interests of various stakeholders such as employees, labour unions, family companies, banks, business partners, associations, local societies, government, etc. Since the collapse of Japan's bubble economy, it has been pointed out that Japanese management system might have a structural deficiency and that the Japanese corporate governance ought to be substantially reformed. In parallel, not only legal and regulational innovations, but also independent voluntary innovations have been carried out at each company level. The issues relative to Japanese corporate governance can be summarized as follows:

- Relations between corporate governance and management
- Governance in relation to various stakeholders' influences excepting stockholders.
- Governance issues in cross-company relations, namely, holding of each other's stocks, relations among companies, etc.
- Governance issues relative to relations between companies and society, i.e., investor relations, customer satisfaction, social contribution of companies, etc.

Corporate governance is a concept which assumes higher priority than corporate management. The management concerns itself with decisions and selection of strategies and tactics in order to achieve corporate objectives. By contrast, governance is a system which concerns itself with the decision of company's objectives, thereby checking whether appropriate management is being carried out. The end objective is not to deploy a governance system itself, but to realize healthy development of a company through appropriate

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governance. Therefore, excessive costs and inability of management to make bold decisions (avoidance of risks) due to excessive deployment of governance would lead to ineffectiveness of the governance.

What kind of governance system, then would be ideal? The various current models have their own merits and demerits. The American model prioritises the interests of stockholders, who do not always have a long-term commitment. It is consequently difficult to reflect the voices of other stakeholders in a balanced way. In the case of German model, the power of financial institutions is too strong in practice. Japanese model finds it difficult to provide management with timely monitoring and checking. A governance model is deeply related to the view of a society about its corporations. Even if somebody may insist that the American governance model should be modified because its stockholder oriented system in a problem, it cannot be done so easily. The same is true with Japan. It might be practical to change the issues in each model in a patchwork fashion by selecting preferable conditions. In a situation where businesses are becoming increasingly borderless, in addition to theoretical study, it is essential to positively try out various management practices, and to look for more appropriate identification of corporate governance in line with the global standard.

Another issue to touch upon is that of customer satisfaction in a governance model relative to society. Customer satisfaction is both an old and new universal theme for management of a company. Growth of a company is determined by how much customer satisfaction can be realized regardless of business areas. A customer can use his/her power vis-à-vis a company by means of purchasing goods, or selecting/using services. A customer can also decide against the purchase and use of such products and services that do not satisfy him/her in price, quality, safety, etc. If their dissatisfaction about products and services extends to a societal level, it could extend to boycott which causes huge damages to a company. The promotion of environmental issues is the same. A company is required to take

appropriate actions under changes of customer preference and activities. This means a capability to grasp what customers expect, and also a system to meet them. For example, a company has to settle such concrete issues, as, e.g. analyzing reasons for customer complaints relative to improvement of products, establishing CS department with the involvement of top management, adjusting authorities between CS department and other internal organisations. In recent years, improvement of management quality has been strongly required. Increasing attention to the American National Quality Award and Japan Quality Award indicates in no uncertain terms that companies in general are seeking a new type of governance model.

The practices of American companies are a good reference in thinking about future Japanese corporate governance. Comparing the current situation of Japanese and American corporate governance, the whole balance of American corporate governance obviously inclines too much to stockholders, and the impact of local society is much greater than in Japan. On the contrary, Japanese companies' corporate governance structure depends quite a lot upon employees and customers. More than anything else, the top management of Japanese companies have the practical authority of appointing and dismissing directors and auditors, and the companies are, therefore, strongly characterized by self-governance by the management. In such a case, corporate governance becomes ineffective once the top management becomes corrupt and loses their self-purificatory role. As a result, the dynamism of a healthy market, and also the reliance on corporate society is lost. Consequently, in order that current companies establish real global standard management in future under a challenging business environment, and subsequently obtain endorsement from stakeholders, both American and Japanese need to construct a balanced corporate governance model. In the 21 century, the conditions of corporate governance that will become necessary, are an attitude strategy, a consistent transparency, and open policies. □

Corporate Governance Model & Disclosures

T.P. Ghosh

The article presents an in-depth discussion on the 'three pillars of corporate governance'—the nomination, remuneration and audit committees. Accounting standards, shareholder rights and disclosure norms are also analysed.

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Issues of corporate governance that emanated primarily from the Cadbury Committee Report [Cadbury, 1996] have finally received attention in India because of the initiative of the SEBI through setting up a committee (Kumar Mangalam Birla Committee) and the draft report of the Committee which has addressed the globally recognised three pillars of corporate governance [SEBI, 1999]. Earlier CII issued a set of Desirable Corporate Governance in India—a Code that called for instituting a system by which corporate entities are directed and controlled. As per the CII code, corporate governance encompasses the entire mechanics of functioning of a company and attempts to put in place a system of checks and balances between the shareholders, directors, auditors and management [CII, 1997].

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Three Pillars of Corporate Governance

Cadbury Committee in the U.K. talked about the three pillars of corporate governance—nomination committee, remuneration committee and audit committee. Formation of a Nomination Committee assumes importance as it selects the independent non-executive directors to the board. The appropriate composition of the board can be derived taking clues from the Hampel Committee's Final Report in the U.K., the OECD Principles, the Blue Ribbon Committee Report in the USA [Blue Ribbon, 1998] and the Kumar Mangalam Birla Committee [SEBI, 1999], but for instituting an effective board, besides a system of proper nomination, the term 'independent director' needs to be properly defined. At the same time attempts to by-pass the representation of the institution-

al shareholders despite their significant shareholding may not be an affordable proposition for a developing country like India (with substantial pressure of non-performing assets in the banks and financial institutions).

The matter of fixation of executive remuneration is another critical aspect of corporate governance which is aimed at preventing the practice of granting undue remuneration to self using the power to control the company. A schedule of the company law may guide the companies about the maximum limit of executive compensation but good governance demands establishment of pay–performance relationship. A remuneration committee, consisting wholly or mainly of non-executive directors (NED) and chaired by a non-executive director had been recommended by the Cadbury committee as a safeguard mechanism. This view has been echoed in the documents of the Institute of Directors [1995], The Association of British Insurers [1994], Institutional Shareholders Committee [1993] and ProNed [1992]. The Greenbury Committee [1995] in the U.K. also recommended that the Board of Directors should set up a remuneration committee consisting of NEDs. The Hampel Committee too recommended that decisions on the remuneration packages of executive directors should be delegated to the remuneration committee; the broad framework and cost of executive remuneration should be a matter for the board on the advice of the remuneration committee.

The matter of fixation of executive remuneration is another critical aspect of corporate governance which is aimed at preventing the practice of granting undue remuneration to self using the power to control the company.

Audit committee is the third pillar of corporate governance. Cadbury committee proposed the formation of audit committee to increase the effectiveness of financial audit. Independence of statutory auditors is questionable on several counts. Although auditors are technically appointed by shareholders, the latter have no effective say in the negotiation and enjoy no direct link with the former. Auditors are in fact appointed by executive directors, and they maintain a cordial relationship with the directors for continuance. Auditors are vulnerable because of involvement in other services such as taxation or general management which are requisitioned from them at the discretion of executive directors. Hampel Committee recommended that audit committees should keep under review the overall financial relationship between the company and its auditors to ensure a balance between the maintenance of objectivity and value for money. The Blue Ribbon Committee [1999] in the USA discussed way of improving the effectiveness of audit committees. Appreciating the success of audit committees in the USA ever since these were instituted in 1978 when the New York stock exchange first demanded them for all listed companies composed solely of independent directors, and observing its widespread use in the developed countries, the CII code had also recommended the constitution of audit committee.

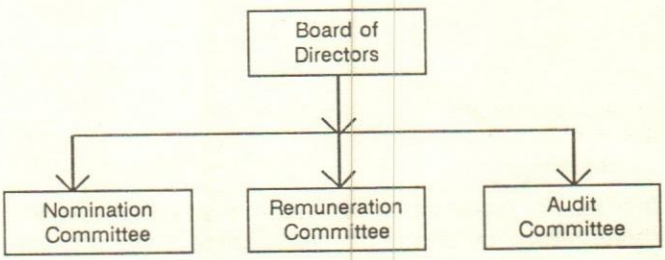

Fig. 1. Three Pillars of corporate governance

Working Group on Companies Act, 1956 (1997) suggested that "the requirement for audit committees and nomination or remuneration committees should not be mandated by the Companies Act. Instead, it should be voluntary, with the three apex industry associations-CII, FICCI and ASSOCHAM–playing a catalytical role." The Companies Bill, 1997, however, did not deal with the issue of mandated audit committee.

Indian Scenario

Major recommendations of Kumar Mangalam Birla Committee include composition of board of directors, representation of financial institutions in the board, composition and functions of audit committee, composition of remuneration committee and disclosure of remuneration package, accounting standard and financial reporting. However, the committee did not talk about the nomination committee nor has it given adequate importance to shareholder rights which could have been the major focus of a SEBI appointed committee. Although the committee has classified certain recommendations as mandatory, while coming down to shareholder rights, most of the recommendations are made recommendatory.

In its annual report 1998-99, Infosys Technologies Ltd. has claimed to be the pioneer in benchmarking corporate governance policies with the best in the world. This claim might be viewed as reasonable at the early stage of debate on the codes of corporate governance,

but a closer scrutiny would reveal undue concentration of non-executive directors (NEDs) in the corporate governance committee. Infosys has formed all the three committees—nomination committee, compensation committee and audit committee comprising wholly of non-executive directors. Out of ten members of the board, four are NEDs that constitute forty per cent which is well above the Hampel Committee's (U.K.) recommendation as carried in the Final Report: To be effective, non-executive directors need to make up at least one third of the membership of the board.

Infosys nomination committee and audit committee consist of four NEDs and compensation committee has three NEDs. One NED holds chairmanship of nomination as well compensation committee and also membership of the third committee. Attendance of NEDs in the board meeting is at the level of 2/9, 5/9, 5/9 and 7/9 which is not very much encouraging. Also two NEDs hold directorship of more than ten companies. So how far were such corporate governance committees effective?

Cadbury committee favoured the idea of board appointments through the nomination committee which should have a majority of non-executive directors in it and be chaired either by the chairman or a non-executive director. Infosys has preferred a nomination committee consisting of NEDs only. As per the Cadbury code the audit committee should have a minimum of three members. Membership should be confined to the non-executive directors of the company and majority of the NEDs serving on the committee should be independent. Cadbury code preferred a remuneration committee consisting wholly or mainly of NEDs.

Infosys report has not made any distinction between NED and independent directors. The board membership criteria does not specify the meaning attached to the term 'independent' directors. Same members who claimed to be independent have reigned the committees and drawn good compensation in Infosys. Cadbury code desired that NEDs would bring an independent judgment to bear on issues of strategy, performance, resources, including key appointments, and standards of conduct. All boards will require a minimum of three NEDs, and additionally two of the three should be independent. This means that apart from their directors' fees and shareholdings, they should be independent of management and free from business or other relationship which could materially interfere with exercise of their independent judgement.

Moreover, Hampel committee viewed that a senior non-executive director should be identified in the annual report, to whom concerns can be conveyed. The identification of such a non-executive director was described by Sir Ronald Hampel as an 'essential safety valve' but is not a substitute for initial voicing of concern by shareholders to the chairman or chief executive. Infosys annual report has not named such a NED.

Infosys audit committee had reportedly met twice which is the minimum number of meetings prescribed in the Cadbury code. There is no mention whether NEDs actually attended such meetings. Given the low attendance pattern of the NEDs in the board meeting, and their affiliation as directors to numerous companies this doubt is bound to arise. The voluminous Infosys annual report could have given details about the attendance statistics of NEDs in the committee meetings. Success of board committees depends on the active participation and independent views of the NEDs. As a pioneer Infosys could have broadbased committee membership to avoid unnecessary inbuilt bias in the system of corporate governance followed.

Success of board committees depends on the active participation and independent views of the NEDs. As a pioneer Infosys could have broadbased committee membership to avoid unnecessary inbuilt bias in the system of corporate governance followed.

In Reliance board (Annual Report of Reliance Industries Ltd. 1998-99), five external directors out of eleven members make a better balance. Its audit and compensation committees consist of external directors. But it has no nomination committee. Moreover, Reliance's corporate governance disclosure is not as transparent as Infosys.

Hampel committee recommended that companies should include, in their annual reports, a narrative account of how they have applied the broad principles of corporate governance. Companies should be ready to explain their governance policies and publicly justify any departure from best practice. Infosys and Reliance have initiated that discussion in India, but they have a long way to go.

Board Committees

Nomination Committee and Its Role: Kumar Mangalam Birla Committee has recommended a board with at least fifty per cent independent directors if chairman is an executive, and alternatively, a board with at least

one third independent directors if the chairman is non-executive. The committee did not favour representation of financial institutions in the board unless warranted by credit default. The term 'independent director' is defined as directors who apart from receiving director's remuneration do not have any material pecuniary relationship or transactions with the company, its promoters, its management or its subsidiaries, which in the judgement of the board may affect their independence. So judgement about the independence of independent directors is left with the board.

For constituting a balanced board, it is important to constitute a Nomination Committee comprising three to five outstanding personalities in the field of economics, accountancy, law and other related disciplines. This committee should be formed inviting nominations from the ordinary shareholders (excluding the top ten shareholders) through postal ballot. To facilitate easy nomination, the full group of non-executive directors should shortlist a panel. This nomination committee should advice the shareholders in the matter of nomination of independent directors. The nomination report of nomination committee should be placed in the general meeting of the company by the committee. Unless the process of nomination of independent directors becomes independent and free from the influence of the board, it is difficult to achieve the targeted balanced board.

Independent directors or any of their relatives (the term relative should carry the same meaning as is given in Schedule 1A of the Companies Act, 1956) should not have any interest in the company.

A recent NACD survey [Darazsdi, J, 1999] of 2200 companies in the UK reveals significant outside director representation, with approximately 100 indicating that more than half of their board members were not part of the management. An independent nominating committee with chairman/CEO input was the most predominant method used for new director selection. Only 16 per cent indicated that the choice of selection was left to the sole discretion of the chairman/CEO. An independent lead director or separate chairman was found in about half the companies responding to the survey.

Nominee Directors: Representation of major lenders in the board is crucial to protect their interest which should not be linked to default in debt servicing. Monitoring end-use of funds is of utmost necessity in India in view of the volume of non-performing assets which financial institutions and banks carry and the recent experience of siphoning off of funds through fictitious inter-corporate transactions. It is not expected that independent directors would perform the functions of nominee directors who have an assigned responsibility. Secondly, allowing representation in the board in case of default in debt-servicing is a delayed remedy which never satisfies a major lender. In India, conditions are not congenial for removing the nominee directors appointed by major lenders. That apart, financial institutions should continue to enjoy the right to have a berth in the board by virtue of their proportionate shareholding just like any other shareholding group. However, in case the major lender has already got a berth in the board by virtue of shareholding, any more representation with reference to the amount lent is not necessary.

Remuneration committee and the base of executive compensation: Schedule XII to the Companies Act suggests maximum ceiling of managerial remuneration with reference to the effective capital in case of companies having no profits or inadequate profits, and as a per cent of profit in case of companies having profits. What has been ignored in deciding the upper ceiling of managerial remuneration is whether a company has earned adequate profit with reference to the cost of capital.

The basic objective of the formation of a remuneration committee is to establish a pay-performance relationship. Increasingly, the preferred formula for executive compensation plan takes the synthesis of a fixed element and a variable element linked to turnover, assets, capital or profit and stock option schemes. An important form of the variable portion of executive compensation is bonus—cash bonus or stock bonus. Whether profit is a good parameter of deciding bonus remains a puzzling question as PAT (Profit after tax) or net profit, as it may be termed, does not indicate adequacy of profit in relation to the shareholders' funds.

The basic objective of the formation of a remuneration committee is to establish a pay-performance relationship.

Thus in profit linked bonus system, often a conflicting situation arises wherein an executive gets bonus even if return on the shareholders' funds is not adequate. Accounting profit is a very vague parameter for determining managerial performance. While determining accounting profit, only the cost of borrowed capital is deducted. Cost of shareholders' funds managed is never taken into account nor do the managers count the cost of free reserve. Disproportionately high size of free reserves in the capital structure as compared to dividend paying equity tends to bring inefficiency in capital utilisation to the detriment of shareholder inter-

est. Unless an executive compensation plan can address the issue of efficiency in capital utilisation it cannot establish pay-performance relationship. For this purpose it is possible to adopt the economic value added (EVA) linked executive compensation system.

EVA™ (EVA concept propagated by Stern Stewart & Co. USA) bonus is paid as a percentage of positive EVA. But this may encourage a shortsighted view as Managers may avoid new investments and cut capital cost for improving EVA. In case of profit linked bonus system, profit could be improved by not properly maintaining the assets, destroying the sales channel by cutting incentive bonus to wholesalers and so on. Eli Lilly (USA) has countered this issue squarely by adopting a long run bonus system. EVA bonus systems demotivate management against making bad investments. Every bad investment that generates less return than cost of capital or reduced return will reduce the level of bonus. If incentives are tied to the change of EVA, excess capital in current assets or over investments in mature businesses can do a lot of harm to bonuses [Ghosh, 1999].

In a developing country like India, an important objective of corporate governance should be to ensure proper utilisation of the scarce capital, and thus deployment of capital should never be a basis of executive compensation. So in addition to the constitution of independent remuneration committee, there is a need for setting a logical basis for executive compensation system as well, within which the committee should operate. After the emergence of EVA concept during the nineties [Stewart, 1990], many US based companies linked bonus to EVA. But it is not an accounting measure that is purely guided by accounting information. It is much influenced by market return which in turn influences the cost of capital. Often market return may be high and may push the EVA into negative zone. However, if a long run view of market return is taken, much of the problem can be avoided.

In a developing country like India, an important objective of corporate governance should be to ensure proper utilisation of the scarce capital, and thus deployment of capital should never be a basis of executive compensation.

Even if EVA is zero, shareholders earn a sufficient rate of return on their capital, but managers do not get any incentive. That may be a negative point in any EVA linked bonus system. However, many Indian companies have negative EVA in the long run. Shareholders of these companies would have been better off if the companies had positive EVA even though some part of it would have been paid out to the managers or employees. The idea of EVA bonuses is that even if management is paid bonuses, shareholders always earn higher return on their capital than they can expect. This kind of bonus system is usually beneficial both to the management and shareholders, because performance level is likely to rise. As an alternative, it is possible to consider an executive compensation based on the percentage of return on shareholder funds. An illustrative framework is given in Table 1.

About the composition of the remuneration committee, Kumar Mangalam Birla committee recommended that "to avoid conflicts of interest, the remuneration committee, which would determine the remuneration packages of executive directors should comprise minimum of three non-executive directors, the chairman of the committee being an independent director". In India, the company law has been so far controlling executive compensation by indicating the upper limit. If the remuneration committee works within the existing framework of the prescribed upper limit, then perhaps the idea of a remuneration committee with three non-executive directors sounds good. However, once the remuneration committee is in place, there is likelihood of a demand for further liberalisation of company law provisions as regards the upper ceiling of executive compensation such that the remuneration committee can decide freely what should be the level of executive compensation. Accordingly, it is necessary to have a remuneration committee that also has a representation of major lenders. This will protect the lenders group as a whole from a situation wherein a tendency to overdraw in the form of executive compensation can be better controlled.

Table 1: Executive Compensation

Return on shareholder funds	Managerial remuneration
Below 15%	Only sustenance salaries commensurate with the level of salary which is paid to a rank immediately below the position of the executive directors
15-20%	7.5% of PAT
20%-25%	10% of PAT
25%-30%	12.5% of PAT
Above 30%	15% of PAT

PAT – Profit After Tax

Audit Committee and its role: Blue Ribbon Committee, USA has identified certain restrictions to the meaning of independent directors who can serve in the audit

committee, for adoption by both the New York Stock Exchange (NYSE) and the National Association of Securities Dealers (NASD) for listed companies with a market capitalization above $200 million (or a more appropriate measure for identifying smaller-sized companies as determined jointly by the NYSE and the NASD). Members of audit committee shall be considered independent if they have no relationship to the corporation that may interfere with the exercise of their independence from management and the corporation. Examples of such relationships include:

- a director being employed by the corporation or any of its affiliates for the current year or any of the past five years
- a director accepting any compensation from the corporation or any of its affiliates other than compensation for board service or benefits under a tax-qualified retirement plan
- a director being a member of the immediate family of an individual who is, or has been in any of the past five years, employed by the corporation or any of its affiliates as an executive officer
- a director being a partner in, or a controlling shareholder or an executive officer of, any for-profit business organisation to which the corporation made, or from which the corporation received, payments that are or have been significant to the corporation or business organisation in any of the past five years
- a director being employed as an executive of another company on whose compensation committee any of the corporation's executives serves.

Persons who enjoy such relationships can be appointed in the audit committee only under exceptional and limited circumstances.

The Blue Ribbon Committee recommends that in addition to adopting and complying with the definition of independence set forth, listed companies with a market capitalization above $200 million (or a more appropriate measure for identifying smaller-sized companies as determined jointly by the NYSE and the NASD) should have an audit committee comprising solely independent directors.

To the contrary, the Kumar Mangalam Birla Committee has recommended that the audit committee should have minimum three non-executive directors, majority being independent, with at least one director having financial and accounting knowledge and the chairman of the committee should be an independent director. The Blue Ribbon Committee recommended that the audit committee should comprise a minimum of three directors, each of whom is financially literate or becomes financially literate within a reasonable period of time after his/her appointment to the audit committee, and further that at least one member of the audit committee should have accounting or related financial management expertise.

The Blue Ribbon Committee also suggested certain other measures for improving efficacy of audit which include:

- adoption of a written charter of activities approved by a full board specifying responsibilities of the audit committee.
- annual public disclosure of activities carried out by the audit committee.
- authority for audit committee, as the representative of the shareholders, to propose appointment and replacement of outside auditors.
- full authority for audit committee to carry out discussion with auditors with the board ensuring complete independence of outside auditors. This should form part of the listing agreement.
- The Generally Accepted Auditing Standards (GAAS) in the USA require that a company's outside auditor should discuss with the audit committee the auditor's judgments about the quality, not just the acceptability, of the company's accounting principles as applied in its financial reporting; the discussion should include such issues as the clarity of the company's financial disclosures and degree of aggressiveness or conservatism of the company's accounting principles and underlying estimates and other significant decisions made by management in preparing the financial disclosure. This should form part of the charter to encourage frank discussion.
- The Committee recommends that the SEC require all reporting companies to include a letter from the audit committee in the company's annual report to shareholders and Form 10-K Annual Report disclosing whether or not, with respect to the prior fiscal year: management has reviewed the audited financial statements with the audit committee, including a discussion of the quality of the accounting principles as applied and significant judgments affecting the company's financial statements; the outside auditors have discussed with the audit commit-

tee the outside auditors' judgments of the quality of those principles; the members of audit committee have discussed among themselves, without management or the outside auditors being present, the information disclosed to the audit committee and the audit committee believes that the company's financial statements are fairly presented in conformity with Generally Accepted Accounting Principles (GAAP) in all material respects.

- The Committee recommends that the SEC require that a reporting company's outside auditor conduct an SAS 71 Interim Financial Review prior to the company's filing of its Form 10-Q return.

The Kumar Mangalam Birla Committee has recommended that the audit committee should review important accounting policies, internal control system of the company, going concern assumption, related party transactions, risk management policies etc. However, in view of the present legal framework as regards appointment of auditors, their involvement in various other consultancy jobs in the company like taxation matters, company law matters etc. and continuity of the audit function with the same client, there is a need for considering certain basic issues:

The audit committee should review important accounting policies, internal control system of the company, going concern assumption, related party transactions, risk management policies etc.

- That auditors should be appointed by shareholders in the general meeting on the recommendation of the audit committee
- Time frame for statutory audit to be conducted by external auditors should be set out while entering into an audit contract
- Appointment of outside auditors should be for a period of three years which will give them better time frame to understand the accounting environment of the company. It is a better alternative than the present system of annual appointment of auditors. On the other hand, an auditor should get maximum two terms for external audit, i.e. for a period of maximum six years.
- Audit committee should liaison between the external auditors and the management.

Table 2: Comparative Position – International and Indian Accounting Standards

IAS nos.	Title	Corresponding AS
IAS 1*	Disclosure of Accounting Policies	AS 1
IAS 2	Inventories	AS 2
IAS 3	Superseded by IAS 27	
IAS 4	Depreciation Accounting	AS 6
IAS 5**	Information to be disclosed in Financial Statements	–
IAS 7 (Revised)	Cash Flow Statements	AS 3
IAS 8 (Revised)	Net Profit or Loss for the period, Fundamental Errors and Changes in Accounting Policies	AS 5
IAS 9 (Revised)	Research and development Costs	AS 8
IAS 10	Contingencies and Events occurring after the Balance sheet Date	AS 4
IAS 11 (Revised)	Construction Contracts	AS 7
AS 12	Accounting for Taxes on Income	AS 8
IAS 13**	Presentation of Current Assets and Current Liabilities	–
IAS 14*	Reporting Financial Information by Segment	–
IAS 15	Information reflecting the effect of Changing Prices	–
IAS 16 (Revised)	Property, Plant and Equipment	AS 10
IAS 17*	Accounting for Leases	–
IAS 18 (Revised)	Revenue	AS 9
IAS 19*	Retirement Benefit Costs	AS 15
IAS 20	Accounting for Government Grants and Disclosure of Government Assistance	AS 12
IAS 21 (Revised)	Effects of Changes in Foreign Exchange Rates	AS 11
IAS 22 (Revised)	Business Combination	AS 14
IAS 23 (Revised)	Borrowing Costs	AS 10
IAS 24	Related Party Disclosures	–
IAS 25	Accounting for Investments	AS 13
IAS 26	Accounting and Reporting by Retirement Benefits Plan	–
IAS 27	Consolidated Financial Statements and Accounting for Investments in Subsidiaries	–
IAS 28	Accounting for Investments in Associates	–
IAS 29	Financial Reporting in Hyper Inflationary Economics	–
IAS 30	Disclosure in Financial Statements of Banks and Similar Financial Institutions	–
IAS 31	Financial reporting of Interests in Joint Ventures	–
IAS 32	Financial Instruments: Disclosure and Presentation	–
IAS 33	Earnings Per share	–
IAS 34	Interim Financial Reporting	–
IAS 35	Discontinuing Operations	–
IAS 36	Impairment Assets	–
IAS 37	Provisions,Contingent Liabilities and Contingent Assets	–
IAS 38	Intangible Assets	–
IAS 39	Financial Instruments: Recognition and Measurement	–

*Revised and title changed **Replaced by IAS 1 (Revised)

Recently IAS 1, IAS 14, IAS 17 and IAS 19 have been revised. The new standards are as follows: IAS 1 Presentation of financial statements (effective July 1, 1998) – This standard replaces IAS 1, IAS 5 and IAS 13.

IAS 14 Segmental Reporting (effective July 1, 1998).

IAS 17 Leases (effective January 1, 1999).

There is a need for establishing an Independent Audit Oversight Board at the national level to review the quality of audit in listed companies. This Board may operate either under the Department of Company Affairs or the SEBI. The Oversight Board may take up review work on a sample basis across the industry. In fact the role of the Oversight Board may be in the line of the role played by the CAG in public sector.

Accounting Standards & Financial Reporting

The Kumar Mangalam Birla Committee has talked about the introduction of four accounting standards, namely, consolidated reporting by holding companies, segmental reporting, disclosure of related party transactions and tax effect accounting. Although these standards are important for improving the transparency of corporate reporting, a corporate governance code should also talk about global harmonisation of accounting standards. Table 2 presents a complete list of International Accounting Standards and corresponding Indian Accounting Standards and "-" has been marked against such International Accounting Standards against which there is no matching accounting standards in India.

The major issues missing from the list of Indian accounting standards are –

- Related Party disclosures
- Segmental reporting
- Accounting for Investment in Associates
- Accounting for Joint Ventures
- Impairment of Assets
- Accounting for Intangibles
- Financial Instruments
- Earning Per Share
- Provisions, Contingent Liabilities and Contingent Assets and
- Tax Effect Accounting.

There is a need for working towards global harmonisation of accounting policies. Unless this is achieved, quality of accounting disclosures cannot be ensured.

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Moreover, there are certain accounting issues wherein Indian accounting standards or Guidance Notes do not provide internationally acceptable accounting policies which include the following:

- Revenue recognition policy in construction contracts that allows completed contract method which is not an internationally recognised method
- Capitalisation of foreign currency loss on asset linked foreign currency loans which inflates value of fixed assets and permits no consideration to market value or replacement value of the related fixed assets
- Companies generally charge minimum depreciation as per Schedule XIV to the Companies Act, 1956 ignoring accounting depreciation taking into consideration original cost, estimated useful life and estimated scrap value
- Accounting for finance lease does not recognise leasehold asset as assets in the books of the beneficial owner
- Depreciation on long term investments is avoided on the plea that there exists a long term relationship between the investee.

To ensure transparency in corporate financial reporting, it is necessary that the quality of accounting standards is improved, an Independent Audit Oversight Board reviews the accounting policies of the company and auditors' reporting norm is specified in the corporate governance code.

Sub-section (3A) to section 211 (inserted by the Companies Amendment Act, 1999) requires that every profit and loss account and balance sheet shall comply with the accounting standards. Sub-section (3B) to section 211 requires that in case the profit and loss account and balance sheet of a company do not comply with the requirements of the accounting standards, disclosure should be made stating –

- Deviations from the accounting standards;
- the reasons for such deviation; and
- the financial effect, if any, arising due to such deviation.

This is a general approach towards the choice of accounting policies by a company and the auditor's

responsibility on the deviation of a company from accounting standards. The audit committee should issue a clarificatory statement as regards its view on the non-conformity of the company's accounting policies to accounting standards. The clarificatory statement should also include–

- Observation of the committee as regards availability of the information sought by the auditors
- Management approach as regards the discussion held by the audit committee on various audit issues
- Its observation as regards internal audit.

Shareholder Rights

The OECD Principles of Corporate Governance stress on protection of shareholder rights as international capital flow bears a direct relationship with the degree of good corporate governance. Major issues covered in the OECD Principles are as follows:

- Basic shareholder rights include the right to: secure methods of ownership registration; convey or transfer shares; obtain relevant information on the corporation on a timely and regular basis; participate and vote in general shareholder meetings; elect members of the board; and share in the profits of the corporation.
- Shareholders have the right to participate in, and to be sufficiently informed on, decisions concerning fundamental corporate changes such as: amendments to the statutes, or articles of incorporation or similar governing documents of the company; the authorisation of additional shares; and extraordinary transactions that in effect result in the sale of the company.
- Shareholders should have the opportunity to participate effectively and vote in general shareholder meetings and should be informed of the rules, including voting procedures, that govern general shareholder meetings:
  - Shareholders should be furnished with sufficient and timely information concerning the date, location and agenda of general meetings, as well as full and timely information regarding the issues to be decided at the meeting.
  - Opportunity should be provided for shareholders to question the board and to place items on the agenda at general meetings, subject to reasonable limitations.
  - Shareholders should be able to vote in person or in absentia, and equal effect should be given to votes whether cast in person or in absentia.
- Capital structures and arrangements that enable certain shareholders to obtain a degree of control disproportionate to their equity ownership should be disclosed.
- Markets for corporate control should be allowed to function in an efficient and transparent manner.
  - The rules and procedures governing acquisition of corporate control in capital markets, and extraordinary transactions such as mergers, and sales of substantial portions of corporate assets, should be clearly articulated and disclosed so that investors understand their rights and recourse. Transactions should occur at transparent prices and under fair conditions that protect the rights of all shareholders according to their class.
  - Anti-take-over devices should not be used to shield management from accountability.
- Shareholders, including institutional investors, should consider the costs and benefits of exercising their voting rights.

The second aspect of OECD principles lays emphasis on equitable treatment towards shareholders. OECD code emphasises that–

- All shareholders of the same class should be treated equally.
  - Within any class, all shareholders should have the same voting rights. All investors should be able to obtain information about the voting rights attached to all classes of shares before they purchase. Any changes in voting rights should be subject to shareholder vote.
  - Votes should be cast by custodians or nominees in a manner agreed upon with the beneficial owner of the shares.
  - Processes and procedures for general shareholder meetings should allow for equitable treatment of all shareholders. Company procedures should not make it unduly difficult or expensive to cast votes.

- Insider trading and abusive self-dealing should be prohibited.
- Members of the board and managers should be required to disclose any material interests in transactions or matters affecting the corporation.

The SEBI committee should address these issues in details and should make the board of directors ensure shareholder rights. Disclosures should be made in the Directors' Report covering each of these issues under the separate heading "Disclosure under Corporate Governance".

The third aspect of OECD principles covers issues relating to recognition of the right of the stakeholders. The major issues are–

- The corporate governance framework should assure that the rights of stakeholders that are protected by law are respected.
- Where stakeholder interests are protected by law, stakeholders should have the opportunity to obtain effective redress for violation of their rights.
- The corporate governance framework should permit performance-enchancing mechanisms for stakeholder participation.
- Where stakeholders participate in the corporate governance process, they should have access to relevant information.

The Board should be responsible for protecting stakeholder rights. In general, the observations of the SEBI committee on the role of financial institutions should be reviewed in the light of the concept of stakeholder rights.

Disclosure & Transparency

As per OECD Principles, corporate governance framework should ensure that timely and accurate disclosure is made on all material matters regarding the corporation, including the financial situation, performance, ownership, and governance of the company. Important disclosures under corporate governance should include–

- Financial and operating results of the company
- Company objectives
- Major share ownership and voting rights
- Members of the board and key executives, and their remuneration
- Material foreseeable risk factors
- Material issues regarding employees and other stakeholders
- Governance structures and policies.

In India, disclosure under corporate governance code should be framed in the line of OECD principles. The following points covered in the corporate governance disclosure of Barclays Bank in the U.K. are illustrative:

- The Board and Board Committees
- Remuneration Policy and Director's Remuneration
  - Annual bonus scheme and executive share award scheme
  - Barclays group performance share plan
  - Executive share option scheme
  - Long term incentive plan
  - SAYE share option scheme
  - UK profit sharing scheme
  - Service contracts
  - Pension arrangements
- Relations with the shareholders
- Accountability and audit
  - Going concern
  - Internal control
- Statement of Directors' responsibilities for accounts.

The quality of corporate disclosures is dependent on the corporate governance codes itself. The initiative of SEBI is a welcome step in the right direction. However, it is necessary that the draft report of SEBI committee is refined further in the light of internationally acclaimed codes of corporate governance. Finally, it is equally important to carry out management audit [Ghosh, 1998] to review the functions carried out by the board and the board committees.

It is necessary that the draft report of SEBI committee is refined further in the light of internationally acclaimed codes of corporate governance.

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Focus

Need for Ethics in Corporate Governance

R. Satya Raju

The author analyses the issue of corporate governance from the global and Indian perspective. He outlines the objectives that should be borne in mind while formating a code and presents guidelines based on the experiences of other nations.

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In recent years, considerable currency of literature has been gained on the concept of corporate governance. Several international and national organisations such as the World Bank, WTO, IMF and OECD have been developing policies to strengthen the management of the corporate world. Corporate Governance is, basically a system of making directors accountable to shareholders for effective management of companies, with concern for ethics and values. It is related to the management of companies by the Board of Directors, which hinges on complete transparency, integrity and accountability of the management comprising both executive and non-executive directors. Some synonyms of this concept are corporate disclosure, transparency or shareholder value. Corporate leadership or corporate citizenship is an important concept in the new millennium for survival of organisations in global markets. Corporate leader pays attention to its most valuable asset, its people (Kanaga, 1999).

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Global Issues

On the global front, there have been numerous activities on this subject. Some of the experiences are as follows:

* The United Kingdom's Combined Code (1998) consolidated guidelines for board reforms, included appointing board committees, separating the chairman from the CEO jobs and disclosing executive pay details. Under the London Stock Exchange listing rules, companies must report on their compliance with this code.

* In November 1994, South Africa's King Committee, chaired by businessman Mervyn King, issued a report recommending board reforms similar to those advocated in the Cadbury Code of UK, which was a predecessor to the Combined Code.
* A December 1994 Toronto Stock Exchange report, "Where were the Directors?" encouraged listed Canadian firms to disclose additional corporate governance information in their annual reports. The report also spurred many Canadian firms to restructure their boards.
* In June 1995, the Australian Association of Investment Managers issued the "Statement of Recommended Corporate Practice", which established stringent board standards regarding disclosure of the selection process of corporate directors.
* In 1995, in order to ensure that corporate governance strategies would be shared across markets, an association of global institutional investors, stock exchanges and governance experts formed the International Corporate Governance Network (ICGN). At its July 1998 conference, the ICGN adopted the world's first best practice standards for crossborder share voting.
* In 1995, the Centre for European Policy Studies, a Brussels-based think tank with ties with the European Commission, published a path-breaking study, "Corporate Governance in Europe". The report recommended that independent directors fill the top slots of European corporate boards.
* In 1995, in France, the Vienot Committee, a private sector group formed to assess French corporate governance, concluded that boards should institute audit compensation committees, as well as appoint a minimum number of independent outsider directors. In 1998, the Association Financiere Gestion (ASF-ASFFI) group, representing fund managers, proposed even tougher steps, such as stricter standards of independence for directors, greater disclosure, etc. (Davis, 1999).

Since 1996, Davis Global Advisors, Inc. (DGA) has compared the board practices of corporations in the world's top five markets—France, Germany, Japan, the United Kingdom and United States relative to the Leading Corporate Governance Indicators. Each indicator represents a yardstick against which international institutions can measure the effectiveness of the corporate governance environment, thereby evaluating a market's level of risk. Since most global shareholders in today's economy invest in American-and British-controlled companies, standards generally reflect those countries' governance values. The Leading Corporate Governance Indicators from the DGA report include the following aspects:

* Presence of national best practice codes for corporate boards
* Relative participation of non-executives on corporate boards
* Tendency to split the roles of Chairman and CEO
* Presence of key board committees
* Varying Degrees of disclosure of executive compensation information (Davis, 1999).

In corporate governance, trust is required between shareholders and directors. When investors trust that the board can act in the best interest of both minority and majority investors, they remain as loyal shareholders. There is a feeling that a board comprising several non executives will more likely uphold the interests of all shareholders relative to a board entirely dominated by executives. Another interesting observation is that an outsider non-executive may prove less able or independent than a board member who is an insider. The London Stock Exchange Combined Code recommends that one third of a board's members are to be independent non executives. In France, about one-third of the total members should represent executives. As per the study conducted by Davis Global advisors, the US ranks second, with 78 per cent of its corporate directors being non-executives; Germany and Britain each have 50 per cent of their respective corporate boards comprised of outsiders; UK firms have achieved this result voluntarily, but the largest German corporations are governed by supervisory boards that by law contain no executives and 50 per cent of their boards occupied by employees. Japanese companies have four per cent outside directors. As per 1994 Law, they have begun nominating non executives to boards of statutory auditors. In several countries, codes relating to best corporate governing factors have been prepared.

The Indian Perspective

Indian governance, which has come under much scrutiny in recent times, has been rated as better than other South Asian nations in a newly developed Human Governance Index (HGI). The New index which comes

as an addition to the multiplicity of indices developed by inter-governmental and non-government organisations, has been spelt out by the Pakistan-based Mahbub-ul-Haw Human Development Centre in its latest report on Human development in South Asia, 1999. The report places the HGI for India at 0.577 which stands better in comparison to those of Pakistan (0.502), Sri Lanka (0.465) and Bangladesh (0.462). India's HGI is also marginally higher than the South Asian average which has been placed at 0.56.

Milton Friedman, the Nobel Prize winning economist, once said that the sole responsibility of any business was to its shareholders to maximise the value of their shareholdings. According to him a company's only social responsibility was to stay profitable. One may not totally agree with Friedman in a general context. But in the limited context of enforcing corporate governance norms, it is prudent to emphasise that long-term economic viability should be the superordinate goal of corporate governance. (The Hindu, December 1999).

Long-term economic viability should be the superordinate goal of corporate governance.

The activisation of SEBI after the Harshad Mehta affair, the publication of Cadbury Committee report and the report of the CII have revived interest in corporate governance in India. The Cadbury Committee mainly emphasised financial aspects, reporting systems, the need to have an independent Chairman for the Board of Directors, proper procedures for the appointment of non-executive Directors and the constitution of an Audit Committee of the Board of Directors.

The CII report recommended the following in India:

* Concentrating first on listed companies
* 30 per cent of Directors, being professional and non-executive
* A ceiling of 10 company Directorship
* Attractive remuneration to non-executive Directors and providing them access to timely, adequate information on the company's working
* Measures for adequate financial and non-financial disclosure by the company
* Constitution of audit sub-committee of Board Directors.

The Government of India has been considering amendments to the Companies Act in order to bring it in line with the new economic policy, to ensure adequate disclosure by companies and to demarcate clearly the SEBI's jurisdiction vis-à-vis the government. Even after all the reports and seminars on corporate governance, there are tricky issues which need to be addressed. Some of them are:

* Should norms of corporate governance be externally imposed or voluntarily adopted and self-enforced? Or, should it be a combination of both?
* Is the purpose of defining corporate governance norms, a watchdog mechanism or a facilitating mechanism?
* Should the Board of Directors (BOD) be aggressive and activist or intervene only when imperative?
* If the BOD's job is to evaluate the CEO's performance, how should the BOD's performance be evaluated?
* Should norms of corporate governance be the same for private and public sectors?
* With the new emphasis on the role of independent, professional, non-executive directors, how to motivate or hold them accountable?
* Should there be a concept of ethics other than, and over and above, what is prescribed by law?

Ethical Issues

The corporate world should build trust among investors and other stockholders through transparent managerial practices. Corporate performance should always be positive and healthy competition is to be encouraged. Corporations should strive hard to satisfy their customers – both internal and external. Directors, executives and other decision makers should develop new vision, creativity and innovative skills to manage the organisations in a changing global economy. The boards should draw up a code of ethics and statement of business practices by publishing them internally and externally and set a role model by living up to those in practice.

The corporate world should build trust among investors and other stockholders through transparent managerial practices.

Ethics play an important role in good corporate governance. Ethical behaviour is required for executives and employees. Robert W. Austin in an article in Harvard Business Review suggested a code for executives as follows: The executive should affirm that he will place the interest of the Business for which he works before his own private interests. The executive should affirm that he will place his duty to society above his duty to his company and above his private interest.

Executives should avoid the following unethical practices: accepting gifts, gratuities and bribes, price discrimination, unfair pricing, dishonest advertising, unfair competitive practices, cheating customers, unfair credit practices, price collusion by competitors, dishonesty, unfairness to employees, etc. Usually, the influencing factors for taking unethical decisions are: the superiors and top management; ethical climate in industry, behaviour of equals in the organisation, lack of company policy for values; financial needs etc. (Satya Raju, 1999). Criticism of the role of outside directors representing the government has been threefold: They pursue objectives that may not augur well for the efficiency of the corporation. Such representatives do not make a distinction between their responsibilities as members of the board vis-a-vis their official power. Such directors are not necessarily technically competent (Y.R.K. Reddy – 1998).

Role of Corporate Governors

Corporate Governors or Board of Directors play a significant role because top management teams around the world face a period of unprecedented business opportunities and threats. The top management must recognize, grasp and achieve five fundamental objectives to secure a firm basis for competitive success: Achievement of sound business performance standards and concurrent strategic development in a highly competitive international scene; creation of committed strategic relationships with key customers; effective use of technology to satisfy customer's strategic needs; development and maintenance of a pro-active and dynamic role for top management and effective use and development of people. Even for today's successful management teams, these represent substantial additional workload. For the less successful companies, the tasks represent a substantial corporate development challenge and also present areas of significant risk.

Companies having some Part-time Directors on the Board are called Board-managed companies by the Department of Company Affairs. On the other hand, where the board has one whole-time employee MD and a few more whole time Directors, besides part-time Directors the firm is viewed as a 'MD Managed Company'. The external directors are expected to initiate in the board meetings, discussion on environmental developments and their implications for the organisation. The organisation would immensely benefit if people of eminence in society in the areas related to the organisation are selected for appointment as part time directors. People from the following walks of life can make significant contributions to the effectiveness of the board: outstanding technologists with considerable experience in a related field; renowned management experts; eminent persons from legal profession; well known business economists or management consultants/academicians, who can contribute innovative ideas or generate fresh thinking; distinguished administrators with useful innings in government administration.

A survey sponsored by the Financial Executive Institute (USA) found that an average of 72 per cent of the board members of nearly 800 companies were outside directors. It would be appropriate if the board appoints a Nomination Committee to identify potential incumbents for Part time Directors for eventual selection and appointment.

Like democratic governments, businesses must be governed by a set of rules that reflect the interests of their shareholders and the public at large. These "rules of the game" for business are an important dimension of reform efforts in developed and transition economics alike. Countries that ignore or lag behind in corporate governance reform will rapidly find themselves at a competitive disadvantage in attracting long-term capital for development.

In a global conference on corporate governance held at New Delhi during February, 1999, delegates from 80 nations concurred that the following efforts must be undertaken in their countries:

* Public education efforts are needed to promote better understanding of essential corporate governance principles and their relationship to democratic development.
* Companies need to undertake voluntary reforms by developing codes of conduct and best practices guidelines. Business associations can facilitate this process by developing model corporate governance programs.
* Independent, non-executive company directors with diverse talents and experience need to be appointed to corporate boards in larger numbers.
* Legislation needs to be passed to put in place

internationally accepted accounting principles, standards of financial disclosure, conflict of interest disclosure, antitrust laws, bankruptcy laws, and prohibitions on insider trading.

Much of this increased global activity has to do with the success of domestic corporate governance programmes. For instance, the California Public Employees' Retirement System (CalPERS) claims that its governance activities increased the value of its domestic portfolio by roughly $ 150 million. CalPERS advocates board independence, pay for performance structures and removal of anti-takeover devices.

Global custody banks play an important role in facilitating US institutions' global voting programmes. In each market, a global custodian bank usually has a link with a sub-custodian bank which holds the record for their clients' shares. These sub-custodian banks are entitled to receive proxy materials from foreign issuers. US pension funds and investment managers rely on their global custodians to gather proxy material from their subcustodians and deliver it to them in time to vote.

Motorola, a U.S. based multinational, evaluates its board by asking questions about:

* The level of involvement of the board in CEO succession
* Sufficiency of information for CEO evaluation
* Appropriate processes to assess the CEO
* CEO's commitment in time spent with regard to long-range future of the company
* Changes proposed by the CEO with regard to company direction
* The CEO's capabilities to formulate vision and mission
* The CEO's efforts to put in place appropriate structures to evaluate the company's strategy and objectives and resolve to effectively inquire into major performance deficiencies
* The CEO's capability to deal with unforeseen corporate crisis. (R.K. Mishra 1998).

Conclusion

Corporate governance is highly essential for corporate success. The specific issues which are significant in Public service management are: building accountability in government within the organisation; public service management, performance appraisal, sanctions and incentives; moulding bureaucracy for results and customer orientation; removing constraints for reform; evolving a character of values in civil service and combating corruption.

Public enterprises need to evolve a new framework to measure up to a difficult but interesting task. In such a framework, boards must:

* Set goals for the CEO and functional directors separately and collectively to measure their performance. Written statements are ideal. Self-assessment or evaluation by an independent organisation can be adopted.
* Appoint committees/sub-committees to ensure transparency with regard to financial transactions, payments of wages/salaries, etc., and ensure full disclosure to creditors and suppliers.

The boards of directors have to fulfill several responsibilities such as:

* Creating conditions for developing a sound business strategy in consonance with national/plan objectives
* Ensuring that the enterprise has a CEO of the highest caliber, and grooming certain senior managers to assume the CEO's position in future
* Creating systems of information, audit, and control to oversee whether the enterprise is meeting its objectives
* Ensuring that the enterprise complies with legal and ethical standards
* Ensuring that the enterprise is well equipped in prevention and management of crisis.

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Foreign Direct Investments: Some Corporate Governance Issues in Host Countries

N. Balasubramanian

Foreign Direct Investments (FDI) have become an important constituent of the business strategy of modern corporations for reasons as varied as marketing products and services, sourcing of materials and manpower, environmental and cost compulsions. Corporations that extend beyond the national frontiers are subject to the cultural, traditional, legal and regulatory requirements of the host countries. This paper considers certain corporate governance issues that arise in host countries, especially when the operations are structured as domestic incorporated companies with direct equity investment, with or without an identifiable domestic partner or retail investors. Some possible action alternatives available to the multinational corporation, the local shareholders, and the domestic regulators, are then discussed.

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Equity investments in overseas countries are an important constituent of the business strategy of modern corporations in search of access to global markets for their products and services on the one hand, and on the other, for their sourcing of materials and manpower. Often, environmental and cost compulsions also drive such corporations to site their operations in more amenable or affordable countries. Frequently, country regulations, also, mandate domestic incorporations with or without local participation in ownership.

When corporations extend their operations beyond their national frontiers, they subject themselves to the cultural, traditional, and even more importantly, to the legal and regulatory requirements and expectations of the host countries. These imperatives are, however, not easy to appreciate, much less to accept, particularly at operating levels of management that are usually driven by strong performance criteria at home. The potential for abuse by multi-national enterprises of their economic and technological power in organising and implementing such international operations, leading to conflicts with national policy objectives of the host countries is indeed enormous, and has to be circumscribed by enlightened self-restraint. Guidance on desirable or minimum acceptable behaviour under such circumstances has been provided from time to time by world advisory and consultative bodies, such as the Organisation for

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Economic Cooperation and Development, (OECD, 1997).

Basic Corporate Governance Principles

The commonality of the underlying principles of good corporate governance transcends national borders. The Cadbury Report (1992) in the United Kingdom captures the essence of corporate governance admirably when it bases its Code on the principles of openness, integrity, and accountability. The report defines corporate governance as the "system by which companies are directed and controlled", and asserts that the "boards of directors are responsible for the governance of their companies". The Canadian initiative (Toronto Stock Exchange, 1994) goes much further in defining corporate governance as "the process and structure used to direct and manage the business and affairs of the corporation with the objective of enhancing shareholder value, which includes ensuring the financial viability of the business" and postulates that "the direction and management of the business should take into account the impact on other stakeholders such as employees, customers, suppliers and communities".

Nearer home, the Securities and Exchange Board of India (SEBI) in its draft report (SEBI, 1999) postulates that "the fundamental objective of corporate governance is the enhancement of the long-term shareholder value while at the same time protecting the interests of other stakeholders". The earlier document on corporate governance (currently under revision) of the Confederation of Indian Industry (CII) defined corporate governance as dealing with "laws, procedures, practices and implicit rules that determine a company's ability to take informed managerial decisions vis a vis its claimants – in particular, its shareholders, creditors, customers, the State and employees" (CII, 1998). The Code also endorsed the view that maximisation of long-term shareholder value was the objective of good corporate governance.

The fundamental objective of corporate governance is the enhancement of the long-term shareholder value while protecting the interests of other stakeholders.

There is perhaps one other perspective that needs mention at this point. The board of directors of a company, the centre-stage institution in the corporate governance framework, is accountable to the shareholders as the residual claimants (Easterbrook & Fischel, 1991); and this onerous responsibility is a direct derivative of the separation of ownership and control in the corporate form of organisation (Berle & Means, 1932). Even where such separation is not as severe and complete as in the case of, say, the United States (Porta Etal, 1998), the accountability of directors is still to the shareholders at large, though the actual situation may well be exacerbated because of the control resting with some of the owners. This has special relevance to the governance issues in host country companies with foreign direct investment (FDI).

Structure Models of FDI Corporations

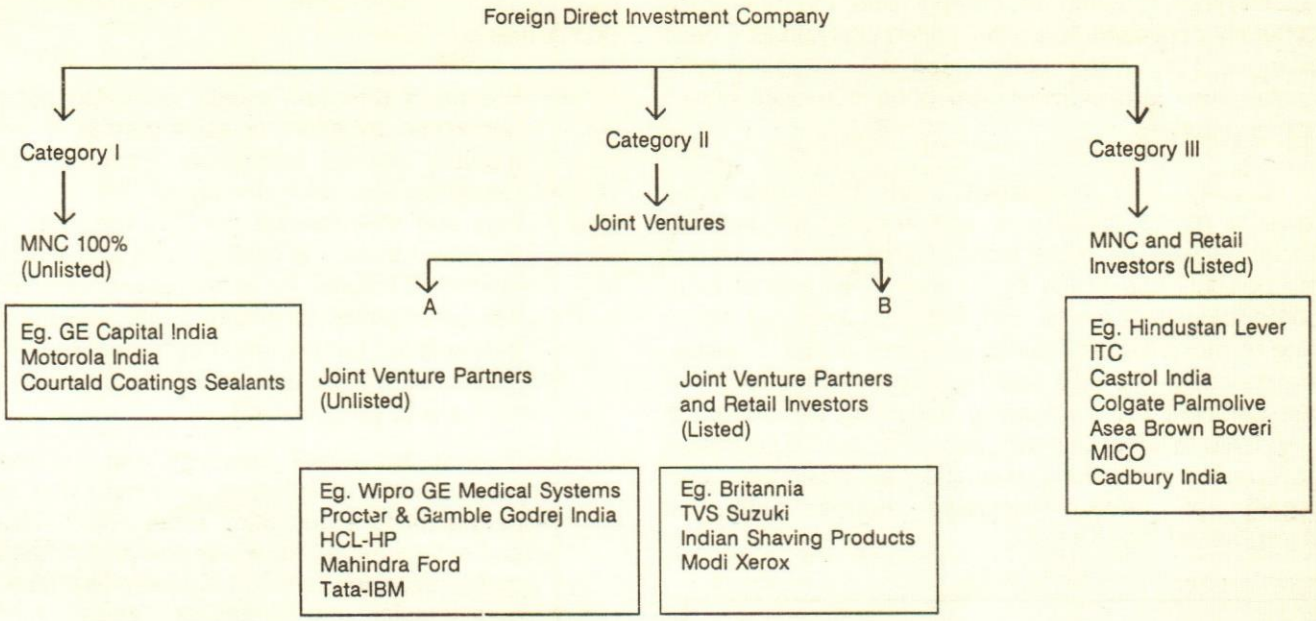
The following discussion is with particular reference to operations structured as limited liability companies in India (even though much of the material may be equally relevant in many other, especially, developing countries welcoming foreign direct equity investments). FDI companies can be of three categories: those with 100% FDI or wholly owned subsidiaries of overseas corporations, those having varying levels of FDI equity with one or more identified joint venture partner(s) and (optionally) retail investors contributing the balance of the equity, and those having varying levels of FDI equity with no identified domestic partner(s), the retail investors contributing the residual equity. (Fig. 1) The expression retail investors is loosely used in this context to mean all investors other than the multinational overseas investor and the domestic partner(s), and will thus include any institutional investors as well. There is a fourth situation that opens up an entirely different set of unique problems of corporate business behaviour, one where an MNC is associated with several business entities within the country, each falling into one of the three categories described above; the problems are further compounded when some of these units are in the same or similar fields of business as well.

Category I Companies (100% Subsidiaries)

These are the wholly owned subsidiaries of overseas parents who by themselves or through their other international or local subsidiaries own all the equity capital of the FDI company.

The principal features of Category I companies include –

- A board of directors exclusively comprising employees of the multinational parent, with, in some cases, a sprinkling of "outside" directors, usually from the who-is-who of business and society



Note: Examples illustrate arrangements at incorporation/acquisition, not necessarily present status.

Fig. 1

- The company being virtually run as a branch or a division of the parent, with functional and organisational reporting responsibilities designated in thick-line relationships in internal organograms
- Detailed financial and compliance reporting to the parent, often for "merger-accounts" purposes (read consolidation of group accounts)
- Local financial reporting usually minimal, as required by company law and other government departments asking for statistical information
- Professional management, usually modeled on parent organisation styles and values, frequent interactions, career-progression transfers, etc
- Board processes virtually negligible, meetings often not even formally held
- Accountability to "shareholders" considered discharged with regular reporting to the mandarins in the controlling office

Many of the corporate governance issues in these companies arise from a blinkered view of corporate responsibilities to the shareholders and other stakeholders. While accountability to the shareholders is not questioned, there are genuine doubts as to who these "shareholders" are; as far as the operating head of the local company is concerned, his line boss at the corporate or divisional or pole headquarters is seen to be the representative of the shareholders. Reporting to, and meeting his or her managerial demands are considered complete discharge of the obligations. And this comes so easily to an expatriate or headquarter- trained local manager in charge of the domestic company, who has no interface with the distant "shareholders".

The position of the directors of such companies is indeed onerous. Whether they are manager-nominees of the parent (often blissfully unaware of any local legal or other governance obligations) or members of the elite board-room-clubs (frequently adding directorships as so many more desirable trophies), directors of these companies may be unwittingly or otherwise, doing great injustice to their own reputation and governance obligations.

Domestic legislation must of course take a major share of the blame for this unsavoury situation. Being companies with no public shareholding population, they are not listed on any stock exchange and are clearly outside the purview of securities market regulations. Company law requirements are not very demanding as most of these companies will come under the category of private limited companies exempted from many of the demanding provisions of corporate law. Recent proposals of company law reform reportedly will also do away with the concept of deemed public companies under which many such private limited companies, depending upon their size of capital and/or business, were

nevertheless required to comply with the provisions generally applicable to public limited companies. These changes, if and when implemented, will drive such companies even farther away from good corporate governance practices.

Closely held companies, with their reluctance towards public disclosures and scrutiny are not unknown elsewhere in the world. Cargil and Levi Straus are possibly two of the best known instances of large corporations that are so held, but even these are beginning to move towards public company status. Developing countries like India could hardly afford the luxury of 100 per cent FDI companies not being persuaded or mandated to fall in line with globally accepted corporate governance obligations to employees, customers, and society at large. Disclosure norms must be strengthened, not diluted.

Developing countries like India could hardly afford the luxury of 100 per cent FDI companies not being persuaded or mandated to fall in line with globally accepted corporate governance obligations to employees, customers, and society at large. Disclosure norms must be strengthened, not diluted.

Category II Companies (Joint Ventures)

These companies need to be considered in two broad sub-groups, depending upon the contributors to the non-FDI equity in the company: those where only identified domestic partners contribute, and those where in addition, equity is subscribed to by retail investors as well. The latter group of companies will usually be listed on one or more stock exchanges since public subscription is involved.

Group II-A: Exclusive Joint Ventures

Most of these companies are in the nature of partnerships between two or more parties. To the extent that legislative and regulatory disclosure norms are limited by the fact that these companies will not be listed on stock exchanges, and may be able to qualify as exempt private companies, the observations made in respect of Category I companies apply to these as well with equal force.

Shareholder agreements are a common device that not only protect partners' interests but also lay down certain governance norms and areas of restricted access to each partner. Some of main features of such companies are:

- Boards of Directors usually comprise persons nominated by either or each partner, in some mutually agreed proportion. Partners should remember that each director on the board has only one vote (except perhaps the chair who may have a second casting vote) and therefore numerical balance or other committee formats will be essential to ensure protection of each partner's turf (an important consideration if their respective shareholder-wealth-maximisation objective is to be achieved)
- Quorum for board meetings and committee meetings are specified to take care that each partner is fully and fairly represented. This is particularly important where the committee format is used for sensitive subjects like technology transfer and protection, export market opportunities, etc.
- Reporting of information will need to be agreed upon to meet the requirements of each partner. This could be particularly problematic in case of 50:50 ventures (a model, though that is becoming increasingly uncommon)

The principal governance issue that is unique to this group of companies arises when the company decides to bring in retail shareholders at a later stage. This aspect is considered along with the Group II-B companies which share similar traits.

Group II-B: Ventures with Partners and Retail Investors

In this model of FDI companies, residual equity is held in varying proportions, partly by the joint venture partners and partly by retail investors. This structure was particularly popular in the pre-lilberalisation regime where the foreign partner was often restricted to holding 40 per cent of the equity in a large number of non-core businesses. The identified local partner in such cases also held 40 per cent of the equity to maintain some balance between the two key partners, with the remaining 20 per cent being offered to the public or retail investors. This led to the fairly common and popular 40-40-20 structures, which brought in their wake some unique governance issues.

The key features of such companies were:

- The board of directors usually comprised an equal number of nominees representing each major partner, and in addition also had a few outside directors

- Because of the public participation, these companies were listed on one or more stock exchanges, and were therefore subject to the discipline of regulatory compliance
- Again, the more demanding provisions of company legislation applied to these companies being categorised as public limited companies
- Board meetings and processes were normally gone through, but the directors, conscious of the dominant partners really running the company, may not always have minority external shareholder interests at the top of their agenda

Several corporate governance issues arise in this form of organisation. The directors, for example, unwittingly or otherwise, may fail to represent and protect the interests of all shareholders, a fundamental tenet of good corporate governance. Retail investors by definition are a dispersed lot, and either due to indifference or ignorance, hardly participate in members' meetings. By default, the key partners have an unfettered run of the business, and consequently the external minority shareholders become vulnerable to possible indiscipline and excesses of the dominant shareholders.

It is possible that the venture partners have a separate shareholders agreement setting out the conditions of their mutual relationships, and understandably, protecting their respective interests. This is not unlike the situation of Group II-A companies, but the significant difference in this case is the existence of an external minority shareholder population who may neither know of, nor be protected by such mutual agreements between the key venture partners. This leads to a huge corporate governance problem, particularly when decisions not necessarily in the interests of such minority shareholders are taken by the company.

Category III Companies (Ventures without Partners)

These are companies where the equity capital is subscribed by FDI and other retail investors, without the presence of any identified venture partner(s). Many of the large professionally managed foreign companies, which in the seventies and eighties, had to dilute their equity holdings to meet the requirements of the (then) Foreign Exchange Regulation Act (or cease doing business in the country) fall under this category. To the extent that they have a large external shareholder population, these companies are probably in the real forefront of having to discharge good corporate governance obligations. The key features of companies in this category are:

- They are listed on one or more stock exchanges in the country and thus are subject to disclosure requirements and other obligations enjoined by capital market regulators
- Being companies with public investors, these are all public limited companies and have to comply with the demanding provisions of companies legislation
- The board of directors usually has a large number of executive directors from within the company and several non-executive directors as well
- Disclosure and transparency are imposed in significant measure while complying with regulatory and legislative requirements
- Executive management may, in many cases, still have the freedom to run the company as they choose, with support from a compliant and/or indifferent board, but their actions are open to public scrutiny and criticism. the burgeoning corporate control market offers a salutary deterrence to major executive abuses
- The apathetic external shareholders do not in fact exercise their rights, and by default therefore, encourage freedom of operating action on the part of incumbent management

To the extent that the overseas investor is able to run the company with its hand-picked and-trained executive, and without too much interference from either the board of directors or the external minority shareholders, such investors can and do enjoy the fruits of control. As long as this perquisite is not abused, the shareholders are reasonably happy, especially with the market mechanism taking care of their return expectations (and of course the blame when the markets are depressed). This however does not preclude decisions being taken that are not in the best interests of the external shareholders. Both the boards of directors of these companies and the regulators will need to address the issue of preventing such abuses.

Some Corporate Governance Issues in FDI Environment

Like many other developing countries in a liberalisation and globalisation mode, India has quite correctly opened its doors for a relatively more open and competitive business environment in the nineties. This trend should and will continue as the country moves on in the new millennium. Corporate governance practices all over the developed world and elsewhere are being revisited to ensure greater accountability, fairplay and transparency. As capital markets mature in the country

and access to global financial markets becomes even more common, Indian industry will increasingly have to move towards higher standards of corporate governance not only in letter but also in spirit. As the SEBI draft code indicates, these practices have to become a way of corporate life. How can the companies, the legislative and regulatory authorities, and in fact every one in this field contribute towards achieving these objectives? Enumerated are a few issues (some transitional, others ongoing) and suggested measures for their resolution.

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Companies with Retail Shareholders Participation

This category of companies will include those that have some part of their equity capital subscribed to by retail investors, whether or not there is an identified joint venture partner or promoter group, and will be listed on one or more stock exchanges. In terms of our previous classification, these represent companies in Categories II B and III.

Selective Preferential Issues

Retail investors' shareholding wealth is in peril when any selective preferential equity issues are made by companies (Balasubramanian, Feb., 1999). These include instances such as when an allotment of equity shares is made to a section of the shareholder population such as the overseas MNC at an advantageous price. Quite frequently, such allotments are made to raise the controlling or dominant shareholders' equity stake in the company, either to convert it into a subsidiary or to enhance the status to a level such as 75% where the other shareholders can not block any actions of the dominant shareholders through the special resolution route provided for by company legislation. Usual reasons offered for such allotments are that the company will benefit from easier flow of updated technology, greater commitment or involvement by the overseas shareholders, etc. Whatever may be the justification for such issues, good corporate governance demands that the retail investors be assured that their interests are duly taken care of.

One possible way is to seek shareholder approval for such issues, with the interested parties abstaining from voting on the resolution. In a sense this will be an extension of the already accepted principle of interested directors not voting on board resolutions bearing upon their own interest. In this event, the affected shareholders can weigh the pros and cons of the proposal (for which purpose, explanatory statements should provide comprehensive material particularly highlighting how all the shareholders including the retail investors will benefit from the action) and vote appropriately. Dissenting voters could be given the option of selling their holdings either to the company (under a buy-back scheme) for extinguishment, or to the beneficiary shareholder group at a fair market price.

Setting up Competing Ventures

Given the continuing liberalisation of the Indian economy, there are more opportunities becoming available to overseas investors to set up fully owned subsidiaries in the country. While this is a welcome development from the perspective of intending foreign direct investors, this does create inequities in cases where they already have a less-than-100 per cent equity interest in a subsisting listed company – Pfizer India is a recent case in point. When such 100 per cent FDIs are approved, there is a demonstrable erosion in the value of equity in the subsisting company to the detriment of the retail investors (Chhabria & Suresh, 1999). While such erosion would also impair the wealth of the dominant or controlling holders, they have the countervailing advantage of improving their overall wealth from Indian investments through the 100 per cent subsidiary to which more profitable brands, technology, etc could be routed.

Good corporate governance requires that the company protects the wealth of all its shareholders equitably. In this type of competing companies being set up by the MNC (and for that matter even by domestic dominant groups), a satisfactory solution could be to convert the subsisting company into a 100 per cent subsidiary, the MNC or the dominant shareholders being asked to acquire the residual shareholdings from others at a fair price determined in line with SEBI guidelines or other independent valuation. Alternatively, the newly formed 100 per cent subsidiaries may be asked to acquire the subsisting listed company at a fair valuation so that the retail investors could at least be protected from value erosions due to the migration of the profitable business, even if not assuring them a share of the future prosperity.

Current requirements in such cases where a joint venture partner is involved in the subsisting company, require a "no-objection" clearance from the company's board of directors. Given the distinct possibility of the

identified joint venture partner's interests being fully protected either by covenants in a separate shareholders agreement or through private negotiation, such a "no-objection" procedure is likely to be dysfunctional as far as the retail investors in the company are concerned. The suggested route of obtaining shareholders' approval in general meeting with the interested shareholders not voting may be more equitable in protecting the retail investors' interests. Alternatively, any of the joint venture partners, namely the MNC and the identified domestic shareholders, may be permitted to buy out the residual retail investors at a fair price, thereby eliminating the need for such approvals.

Disclosure of Material Collateral Agreements and Intentions

Both the instances discussed so far raise another important corporate governance issue bearing upon transparency of communication. If the intention of the principal or dominant shareholders in a company is to acquire 100% ownership when permitted, it stands to reason that such an objective is highlighted in the offer document issued to the public when inviting equity investment. The company's standing and reputation for transparency and fairness in communication would greatly benefit by such a statement followed by a description of how the buy-back would be accomplished subject to regulatory provisions and guidelines. Retail investors would then be subscribing to the company's equity with their eyes wide open and will have no reason to complain later on when the eventuality actually occurs.

Similar is the case for disclosure of material details of any shareholders agreements or other understanding between the joint venture partners in a listed company. In the current stage of development in the country where several listed companies are controlled/managed by dominant groups with (or without) MNC association, it is important that companies disclose the principal contents of their agreements if to their knowledge any shareholder agreements exist between and among any of its dominant/controlling shareholders. Such a disclosure provision is not unusual in countries where several listed corporations are controlled by domestic or foreign dominant shareholders, as for example, in Belgium (Claeys, 1998).

Non-Compete Covenants

Competition is the foundation of a liberalised economy. But should listed companies with the same controlling or dominant shareholders (and obviously with different sets of retail investors) compete with each other? A somewhat similar instance of such a competing situation is offered by the (earlier discussed) 100% subsidiary route adopted by some of the MNCs with controlling interests in a subsisting company (even though there will be no retail investors in the fully owned subsidiary).

Company legislation does provide for material transactions between companies in which directors are interested, or companies under the same management. There is, however, no bar on such companies competing with each other so long as there are no material transactions between or among them.

Highest standards of corporate governance should, conceivably, seek an assurance from the controlling or dominant shareholders that so long as they retain that status, they shall not acquire control or dominance of another business that in material respects competes with the company. A report of continuing compliance in each year's annual report to the shareholders and other statutory or regulatory filings, would go a long way in building shareholder credibility on the professionalism and transparency of the incumbent management.

Group Company Transactions

Another source of possible wealth transfer from one company to another is through related company transactions not in line with arms-length principles. Inter-corporate investments and loans even between holding and not-fully-owned subsidiaries at non-commercial terms are a case in point (Balasubramanian, March 1999). While several provisions exist in law for disclosure and so on, it will be best that companies enshrine a preemptive assurance in their governance statements to the shareholders.

Compliance with this requirement may prove particularly cumbersome and suspect in case of companies which are subject to transfer-pricing of their input or output materials, technology, and services. The situation is compounded when the contracting party is an MNC with a direct or indirect equity control or management control in the company. While the issues related to international transfer pricing are beyond the scope of this paper, it is as well for such MNCs to recognise that when they are in partnership with retail investors in a listed company, the need for perceived transparency and fair play is that much greater and will have to be assured in the interests of good corporate governance. Perhaps, an annual affirmation in shareholder reports and other communications, that material transactions involving transfer pricing for the controlling or dominant shareholders, either directly or through control or dominance of the business, have been at an arms-

length basis, and in line with their international policies for such transfers, may be a good beginning.

Independence of Directors representing MNC Parent

A fundamental premise of good corporate governance is the independence of the corporate board of directors to ensure that the interests of all shareholders are taken care of. When, as is usual, employee-managers of MNCs are appointed to the boards of host-country companies, their independence may become an issue. Admittedly, shareholding is no bar to independence of the directors, but the issue in such cases is that the directors so appointed are not only shareholders' representatives, but more importantly, are also their employees. To some extent, the issues will be similar in case also of external individuals nominated by the parent as their representative, if such nominees have any material pecuniary relationships with the parent (for example, as counsel, advisers, etc on retainer or in professional practice).

A fundamental premise of good corporate governance is the independence of the corporate board of directors to ensure that the interests of all shareholders are taken care of.

Since criteria of independence recommended or prescribed in the country are as yet nowhere as stringent as in some of the other developed countries, this issue for the time being may be somewhat academic, but as time goes by, it may well become more relevant and contentious. Until then, the best approach will be for such nominee-directors to be as objective and transparent as possible while dealing with matters that may preferentially benefit the parent/ dominant shareholders.

Companies Without Retail Investor Participation

This covers the Category I (100% FDI) and Category II-A (joint venture) companies as earlier described, in which there is no retail investor equity participation at all. While good governance practices such as transparency of information, ethical behaviour, etc are all necessary, interests of the equity shareholders will normally be expected to be taken care of either by the home country practices of the MNC or by mutually agreed covenants between the joint venture partners. Good corporate governance practices do, in addition, also extent to other stakeholders in the business, such as the employees, the state, and so on. This calls for some transparent and comprehensive reporting of the activities of such companies, particularly since, not being listed, many of the statutory and regulatory disclosure requirements may not apply to these companies.

Since these companies operate within the country and interact with domestic and international markets from out of the country, there would appear to be a requirement as to accountability to the society of the host country represented by its government and its regulatory agencies. To an extent, some of these requirements are already recognised and complied with by these companies, such as for example, filing their audited accounts with the company registrars, filing their tax returns with the internal revenue departments, etc. From the corporate governance view point, following are some of the further disclosures and filings that need to be explored.

- Should there not be a national Registry, either under the Ministry of Industry, or at the Securities and Exchange Board of India or its delegated authority, where unlisted FDI companies are asked to make declarations and filings similar to what they would have, had they been listed? (Filing details are themselves an area with scope for vast improvements and enhancements, on the lines of the 10-K requirements of SEC in the United States, and clearly beyond the scope of this paper).
- Should not all such ventures (if not already incorporated as public limited companies) be treated as "deemed public companies" with the consequential requirement to comply with the more demanding and extensive provisions of corporate legislation? This is not as predatory a suggestion as it may first sound. After all, these companies are the local vehicles of companies which are themselves incorporated as public limited companies in their home countries. Additionally, based on this premise of public ownership at the ultimate holding company level, most of these companies receive public company status in their tax assessments in the host country as well, even though in their domestic format, they may not be eligible for such treatment.
- Some of these ventures, such as some of the international banks, especially those that are not incorporated within the country, have no significant accountability requirements except to their controlling agencies such as the Reserve Bank of India. Should these entities also be asked to make filings relating at least to their local operations with the Registry earlier suggested?

- What should be the role and responsibilities of the directors of such companies? Should the governance guidelines of the day not be made applicable to them as well, particularly in matters of operating transparence, board committee processes, information tabling and reporting at board meetings, etc? What should be the role and responsibility of the so-called "advisory boards" of entities not incorporated as companies? Should or should not the governance guidelines apply to these units?

Boards and Directors

The responsibility of the company directors and boards is to all the shareholders of the company, not just to its controlling or dominant shareholders. To be able to discharge this responsibility, company directors need to be independent of company management. In case of FDI related businesses, this need is even greater since the retail investors depend upon their boards and directors to safeguard their interests, not only from the managers but also in many cases from the other dominant shareholders. In their hands, and on their conscience, will eventually rest the total responsibility for ensuring the highest standards of corporate governance in their ward companies.

The responsibility of the company directors and boards is to all the shareholders of the company, not just to its controlling or dominant shareholders.

It is also up to the management of the foreign investor company to ensure, through their local executive team and their own representatives on the boards of their local companies, the standards of governance they are used to in their home enterprises, and which the host country retail investors come to expect by implication and reputation.

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Corporate Governance & Public Enterprise Boards

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The Indian corporate sector continues to be dominated by public enterprises which have been severely criticised for their sub optimal performance. Even the private enterprises in the corporate sector cannot be absolved of this shortcoming. Both the sectors have to brace up to meet the challenges of globalisation. The public sector culture in one or the other way influences the corporate culture in the private sector. In a large number of industrial activities it is the public sector which assumed the role of the trend setter. As it functioned in the monopoly environment for more than four decades, the issue of effective corporate governance did not sufficiently attract the requisite attention. The private sector had no reason to think otherwise. However, the process of integration of India with the rest of the world is forcing its corporate sector to rewrite the rules of the business. Public enterprises want to inject unto them the element of management to flush out the deep rooted culture of administration. They are faced with a new perspective embedded in the stake holder theory as presented by Mishra R.K. (1998) in his work Public Enterprises: A New Framework for Corporate Governance, Reddy Y.R.K. (1998) Corporate Governance and Public Enterprise and Disinvestment Commission in its First Report (1997).

The private sector enterprises are taking the cue from the Report of the Cadbury Committee on financial aspects of corporate governance, CII Code on desirable corporate governance, UTI Code on governance and SEBI Birla Panel Report on corporate governance. All these studies very forcefully point to the importance of the board of governors in the effective discharge of corporate governance. The present paper highlights the Functioning of public enterprise boards in this regard.

Methodology

A questionnaire was formulated seeking information

on the various aspects of public enterprise boards and circulated to 246 central public enterprises. 35 responses were received. It contained qualitative and quantitative questions. A 5-point option scale ranging from 1-5 was provided to rank the responses over the last 6 years.

Import of the Problem

Corporate governance is an instrumentality in the hands of society to ensure the healthy interface between business enterprises and society based on social contract theory which underlines the umblical relationship between society and corporate bodies. The governing boards are the most important link in the chain as their proactiveness is an important element to stir the other elements. These boards have to have a clear vision about their role, the role of the government nominees, appointment of subject committees for their improved functioning and evaluation of the contribution of the CEO and other board members.

Findings

That the government lacked the understanding of the role that boards could play in public enterprises is seen from the fact that 14 enterprises (40 percent of the sample enterprises) had vacancies on their boards to the tune of more than 50 per cent. Table 1 shows that 17 enterprises (about 49 per cent) had vacancies in the zone of 20-50 per cent.

Table 1: Vacancy Position in the Board

% Vacancy	No. of Enterprises	Name of the Enterprise
0-25	4	BDL (20),BEL (0), CMC (0), SCIL (14)
20-50	17	CMPDL (47), ECILL (42), GRJE (27), HAL (33), HFCL (33), ITI (27), MDL (33), MFL (35), NALCO (42), NHPC (33), NPCL (36), NSC (31), SIIL (25), NPC (36), STC (43), WPCS (25)
Above 50	14	ANTRIX (38), BCPL (50), HLL (50), HPCL (58), IOC (67), MAPL (50), MECL (58), MTNL (58), NEPA (58), RIPL (50), ONGC (52), TCIL (65), VSNL (58)

Source: Compiled from responses to questionnaire.

The stake holder theory propounded by Mishra 1998), brings out the importance of a balance composition of public enterprise boards.

Table 2 shows that 10 enterprises (29 per cent) had government nominees exceeding 50 per cent of the board strength whereas 25 enterprises (71 per cent) had government nominees turning out to be 50 per cent or less. 34 enterprises (97 per cent) were not in favour of increasing the presence of government nominees. Against the optimal number of 12 members suggested for effective corporate governance, the average size over the 6 year period turned out to be 7 in the case of enterprises under study with the average composition as given in the Table 3.

Table 2: Composition Internal Vs. Government Nominees

Composition (% of the present size of the Board)	No. of Enterprises (% of total)
Internal Members	
0-50%	24 (68%)
50	11 (32%)
Government Nominees	
0-50%	25 (71.1)
50	10 (29%)

Source: Compiled from responses to questionnaire.

Table 3: Average Composition

Average Composition of Board	Number of Members
Internal	3
Workers' Representatives	0
Government Nominees	3
Nominees from FIs	1
Ex-Officio Members	0
External Professionals	0
Others	0

Source: Compiled from responses to questionnaire.

As per the Articles of Association of the responding boards they should hold at least once in three months a board meeting. The new land marks suggested by the various committees referred to earlier indicate once a month meeting as an ideal frequency. The analysis of the frequency of board meetings of the enterprises under study shows that board meetings averaged to 7 per year.

The indifference towards recognition of the boards as an instrumentality of corporate governance was displayed not only by the government but also by the corporate management at the enterprise level. This is evidenced from Table 4 which shows the availability of agenda for board meeting to the members of public enterprise boards. 4 enterprises (11 per cent) sent the agenda papers less than a week before the board meeting whereas 21 enterprises (60 per cent) sent the agenda papers just a week before. 24 CEOs (about 69 per cent) felt that board members gave constructive sug-

gestions and 11 CEOs (31 per cent) indicated that it was only sometimes that the board members made value addition. In 13 (37 per cent) cases, the members of the boards were not consulted on the preparation of the agenda for the board meeting. In an equal number of cases they were only casually consulted in the formulation of agenda and in 9 cases (26 per cent) they were not at all consulted. On an average the governing boards discussed 2:3 routine items to new items and 3:4 policy to operational issues.

Table 4: Availability of Agenda for Board Meeting

No. of days in Advance	No. of Enterprises in Percentage
Less than 7	14
7	63
10	1
15	22

Source: Compiled from responses to questionnaire.

The queries relating to role of public enterprise board of directors revealed that among other things, they were involved in the formulation of overall policy guidelines, long range plans, appointment of key managers, setting corporate objectives, reviewing performance, framing corporate policy, SWOT, reporting to shareholders, stewardship, salary, perquisites, R & D efforts, new projects, professional guidance, growth oriented agenda, foreign collaborations, bridge in the knowledge gap in technical, human resources, operations, finance, management, visualise future scenario and evolve strategic plan. Table 5 shows the role of governing boards in the responding public enterprises. The HVOC equated the objectives mentioned in their Memorandum of Association and Articles of Association with the role it's board plays. ANTRIX and SCIL were not forthcoming on this issue. NSC had carved out a role on practical and operational aspects for its board. MDL confined the role of the board to setting up targets of production, its review and assessment of capacity utilisation.

That the governing boards had less than an adequate idea of corporate governance is seen from the fact that 14 enterprises (40 per cent) did not appoint sub committees. The various models suggested on the formation of sub committees provide a space for the inclusion of non-board members. They do not insist on every committee being headed by the CEOs. In the case of the central enterprises the members of the committees in most cases are the CEOs, directors from various functional areas, representatives of government and thin representation of management experts. In 21 out of 35 enterprises (60 per cent), the committees focussed on R&D, projects, share issue and transfer, delegation of power, financial restructuring and pay revision. These committees once on an average met once a month.

Table 5: Role of Board of Directors

Name of the Enterprise	Role of the BoDs Formal & Informal
1. ANTRIX	
2. BCPL	Over all policy guidelines: to help the company to prepare long range plans, appointment of key managers.
3. BDL	Board will have to the cohesive and play a progressive role in shaping the destiny of the company.
4. BEL	Setting corporate machine, objectives, goals, reviewing the performance, framing corporate policies and conducting SWOT analysis.
5. BPCL	Setting the companies strategic aim, providing leadership, supervising management of the business. reporting to shareholders on Board's/stewardship.
6. CMC	Guide lines of DPE should only be guidelines and not rules. Board should have powers to look into salary perquisites, profitability, etc.
7. CMPDL	Advising and guiding the Board, cautioning the board about pitfalls.
8. ECL	To provide directions for growth of the company and monitor progress in constructive manner.
9. GRSE	Board must be the supreme policy making body to manage the company in the best interest of the enterprise. Govt. should not try to do backseat driving through nominated directors.
10. GSYL	Chairman should take the decision with informal/formal advice from the Board.
11. HAL	Policy formulation and updating review, monitor implementation of plans, ensure compliance of laws, guide in technology updation, give fillip to R&D effort, monitor progress of new projects/diversification programmes.
12. HFCL	Give their view points and benefit of their experience in taking major policy decision.
13. HLL	BoD should be able to give professional guidance to the corporate body.
14. HPCL	Directors should meet in Board meetings to approve various growth oriented agenda with pragmatic views in regard to size, nature and tough external competition.
15. HVOC	As under MoA and AoA.
16. ITI	Formulation of policy guidelines, superintendence, formation of JVCs, foreign collaboration.
17. MAPL	To manage business of the company by exercising all such powers within the frame work of the Companys Act.

18.	MECL	To guide the company towards growth in today's competitive market, lay down policies and monitor its implementation.
19.	MTNL	BoD should give a feedback on the performance of the company based on the knowledge and interaction with the members of the public.
20.	MDL	Role of the Board should be confined to setting up targets of production in terms of quantity and value; review of actual production vis-à-vis targets; assessment of under utilisation of capacity by determining attainable production vis-à-vis firm orders/projected demand; prescription of standards of equipment utilisation, broad targets of inventory levels.
21.	MFL	Board should monitor executive management; should present a balanced and understandable assessment of company's position; should establish an audit committee; should devote time and effort to attend meetings.
22.	NALCO	To set goals, to set over all policies, to decide strategies for future.
23.	NEPA	To guide senior level management on policy matters; interact with ministries in government and other agencies to further development of the organisation. General image building for the company in different flora.
24.	NHPC	Board should guide the organisation in the short and long term plans. Extend advice and assistance in technical, financial, administrative and organisational matters to ensure best performance. Board should be a vocal mouth piece to project corporation's achievements and aspirations and protect the same from adverse actions and reactions from various quarters.
25.	NPC	BoD should be mainly concerned with formulation of policy and to review the performance of the on-going projects, performance of the operating stations and exercise the powers which are vested in the BoD with regard to sanctions and approvals.
26.	NSC	More concentration on practical operational aspects. Free and frank brain storming discussion. Each and every director should be heard.
27.	NSICL	Board should be available to visualise the future scenario and direct accordingly the future activities. Monitor aspiration of the service user, general economy and employees to give proper policy direction. Adopt techniques of successful managerial practices of private sector boards.
28.	ONGC	Develop a long lasting vision of the company. Provide strategic direction, promote business and ensure long term growth, add value in large investment decisions, encourage creativity, technology up-gradation and value based business.
29.	RCFL	BoD is the pivotal authority created by the company. Role is mainly in laying down policies and ensure strategic and long term plans are carried out. Role is insignificant in the field of development and creation of core competence.
30.	SCIL	See Annexure
31.	SIIL	Assist company through their inputs in strategic planning, provide support in controlling external environment. Provide guidance and bridge in the knowledge gap in areas like technical/marketing. Finance/HR/Operations.
32.	STC	Formulation of corporate plan/policies/ strategies. Fixation of targets and laying down of control/monitoring mechanism.
33.	TCIL	To evolve strategic plan, its implementation monitoring.
34.	VSNL	A combination of formal and informal roles is desirable. The board members may if need be have to formal advance discussions to arrive at formal decisions.
35.	WPCS	The directors in the respective professional field apart from dwelling on board proceedings shall also share the responsibility to develop strategies and plan for business development and to be proactive in resolving key issues in the implementation process. This interaction shall be through a sub-committee which shall function under the CMD and report to the Board from time to time.

Source: Compiled from responses to questionnaire.

The new economic policy has signaled the changes to be brought about in the working systems in public enterprises. Such working systems include recruitment, terms and conditions of service, interface relationship of the government with public enterprises, accountability, budgeting, auditing and market status.

The governing boards in public enterprises have to go a long way to create a favourable impact on the working systems. Table 6 shows that 23 out of 35 enterprises (66 per cent) felt that no changes were effected in the recruitment, 20 enterprises out of 30 (67 per cent) noted that the terms and conditions of service remained unchanged, 25 out of 35 enterprises (71 per cent) indicated that interface relationships with the government did not undergo any change, 23 out of 35 enterprises (66 per cent) noted that accountability norms did not change, 25 out of 35 enterprises (71 per cent) revealed that budgeting systems did not register any change, 27 out of 35 enterprises (77 per cent) disclosed that auditing continued to remain in its traditional mould and finally 22 out of 35 enterprises (63 per cent) showed no change in their market position. 12 out of 35 enterprises (34 per cent) reported a decisive shift in the recruitment system by way of curtailment, need based rationalisation of manpower, campus recruitment, group tests and interviews. 15 out of 35 enterprises (43 per cent) felt that the terms and conditions of service have changed as related to conflict resolution, implementation of pay revision, improvement in general working conditions, recruitment of technicians and engineers on contract

basis, quicker promotions, career plans for executives, better incentive schemes, change from central DA to industrial DA pattern and changes of designation. 10 enterprises (29 per cent) noted a favourable change in interface relationship in the form of multi-point interface, memorandum of understanding parameters and increasing support from the government.

Table 6: Impact of NEP on the Working System

Working Systems	Change	No. of Enterprises	No change	No. of Enterprises
Recruitment	34%	12/35	66%	23/35
Term...	43%	15/35	57%	20/30
Interface relationship with the company	29%	16/35	71%	25/35
Accountability	34%	12/37	6[illegible]%	23/35
Budgeting	29%	10/35	71%	25/35
Auditing	23%	8/35	77%	27/35
Market position	37%	13/35	63%	22/35

Source: Compiled from responses to questionnaire.

12 out of 35 enterprises (34 per cent) effecting changes in the system of accountability pointed out the installation of a system of regular filing of returns by executives, formation of strategic business units, performance review vis-à-vis memorandum of understanding targets and unit heads accounting for all operations of the units and profits of the units. The budgeting changes brought about by 10 of the 35 enterprises ranged from complete revamp of the system, tightening of the expenditure budget, divisional budgeting with emphasis on value addition per employee, replacement of revenue budget by memorandum of association and empowerment of the units to act according to the budget approved. Only 8 of the 35 enterprises (23 per cent) could effect the changes in their internal audit system ranging from amendment of the internal audit manual to meet the strategy requirements and improve procedures, streamlining internal audit, engaging external experts, introduction of the concept of multi-discipline auditors and positioning several audit teams in the fields. Only 13 out of 35 enterprises (37 per cent) effected changes in their marketing policies. These changes include formation of separate groups for international and domestic marketing, market based changes in prices, greater freedom to strategic business units and resorting to marginal pricing under competitive conditions. Though the boards should have ensured a climate for increased delegation and decentralisation, however a number of sample enterprises were reticent about it. Those who improved the climate for decentralisation and delegation gave adequate powers for profit making units, more delegation to GMs of units, delegation of administrative and financial powers to the head of marketing, full financial powers to the unit heads related to production, more and clear delegation to the line managers and senior officers. Only 13 out of 35 enterprises (37 per cent) decentralised powers to units for sourcing of working capital and 16 enterprises (46 per cent) to change diversification procedures.

The CEO is the hub of the corporate wheel. His contribution can make or mar the performance of an enterprise. The CEOs identified their contribution under some common focus areas such as targeting performance, R&D, ethics, JVs, export policies, restructuring, HRD, Business strategy budget estimates, draft MoU, industrial relations, productivity, rationalization of labour, leadership, work ethics, indigenisation, export development, diversification, SWOT, customer focus, radical changes, turnover, fabrication, physical and financial performance, greater freedom for board, induction of non-government officials, revival package, removal of bottlenecks in capacity utilisation, strategic decision making. Table 7 shows that the contribution was more prominent in operational and routine areas. The CEOs could not pride themselves in areas such as corporate culture building, creation of a new regime of values and ethics and transforming public enterprises into self sustained organisations. 9 out of 35 enterprises (26 per cent) viz., ANTRIX, BCPL, BDL, MFL, HPCL, HVOC, MAPL and NSICL and WPCS chose not to respond as to what was the most valuable contribution made by the CEOs during their tenure.

Table 7: Contribution as Board Member

Name of the Enterprise	Most Important Contribution as Board Member
1. ANTRIX	No Response
2. BCPL	No Response
3. BDL	No Response
4. BEL	Targeting performance; R&D; ethics; JVs; export policy
5. BPCL	Restructuring
6. CMC	Restructuring; business strategy; HRD
7. CMPDL	GIS; computerisation of geological modeling; HRD
8. ECL	Budget estimates; draft MoU
9. GRSE	Industrial relations; productivity; rationalisation of labour
10. GSYL	Leadership; work ethics; nation building
11. HAL	Indigenisation; diversification; export development
12. HFCL	No Response

13.	HLL	Diversification; industrial relations; overall performance
14.	HPCL	No Response
15.	HVOC	No Response
16.	ITI	Turnover; sorted pending issues with DOT
17.	MAPL	No Response
18.	MECL	Radical changes; open mgt. & commitment; customer focus; computerisation
19.	MTNL	SWOT of MTNL; Mission 2000; $ 418 million GDR issue.
20.	MDL	Fabrication; installation of 11 well head platforms-ONGC-Neelam Project
21.	MFL	No Response
22.	NALCO	Physical & financial performance
23.	NEPA	Product diversification; skilful fund mgt.; turn around of the sick unit
24.	NHPC	Greater freedom for the Board, induction of non-govt. officials; greater delegation of power with increased responsibility & accountability
25.	NPC	Removal of bottlenecks in capacity utilisation; effecting organisational changes
26.	NSC	Diversification; production of high value crops
27.	NSICL	No Response
28.	ONGC	Policy changes; development of new sources of energy like CBM and gas hydrate
29.	RCFL	Performance improvement & introducing discipline
30.	SCIL	Consolidation of efforts to maintain profitability
31.	SIIL	Felicitating decision making process at Board level; total participatory process; agenda in advance
32.	STC	Responsible for the turnaround of Projects & Equipment Corporation of India Ltd.
33.	TCIL	Formation of revival package for the sick unit TCIL; induction of JV
34.	VSNL	Overall mgt. and strategic direction of VSNL
35.	WPCS	No Response

Source: Compiled from responses to questionnaire.

The management of environment is the key concern of the board. The corporate governance must ensure a healthy interface resulting in a higher growth. 16 out of 35 enterprises (45 per cent) felt that economic reforms did not make any impact on public enterprises. 19 out of 35 (55 per cent) enterprises felt that economic reforms created an impact in terms of parameters such as customer focus, downsizing, leading edge technologies, capacity utilisation, development of competitive edge, commercialisation, diversification, customer orientation, professionalisation, long term planning for growth, exit policy etc. That the corporate governance did not much improve in the sample enterprises is seen from the fact that 18 enterprises out of 35 disclosed there was no change in the management style even after the introduction of economic reforms. However, 9 out of 30 enterprises (30 per cent) revealed that bureaucratic orientation changed significantly, 7 out of 35 enterprises (20 per cent) noted that a significant change had taken place in their commercial orientation, 7 enterprises (20 per cent) felt a significant change in their market orientation and 14 out of 35 enterprises (40 per cent) felt that a significant change had taken place in their administrative orientation.

Conclusion

In the present era of transformational changes of accountability of business enterprises to society ensured by the instrumentality of corporate governance, the governing boards are destined to play a critical role. They should not only engage themselves in the traditional task of boundary management but should also constantly realign the working of the present day corporations with the environmental changes. Public enterprises in India continue to dominate the corporate world. The study of corporate governance function in the 35 responding public enterprises discloses that the corporate governance function is not in a healthy shape. The performance of both the boards and the CEOs does not equal to the norms advocated by the various expert committees and studies.

Public enterprise boards have to improve their style and content of functioning. The systemic change need to be effected to discard their existing procedures. The government will have to rapidly transfer the power of governance to these enterprises to benefit the society in general and ensure benefits accruing to it due to the ownership without the interference in their day to day management.

Abbreviations

1.	ANTRIX	Antrix Corporation Ltd.
2.	BCPL	Bengal Chemicals & Pharmaceuticals Ltd.
3.	BDL	Bharat Dynamics Ltd.
4.	BEL	Bharat Electronics Ltd.
5.	BPCL	Bharat Petroleum Corporation Ltd.
6.	CMC	Computer Maintenance Corporation Ltd.
7.	CMPDL	Central Mine Planning & Design Institute Ltd.
8.	ECL	Educational consultants India Ltd.
9.	GRSE	Garden Reach Shipbuilders and Engineers Ltd.
10.	GSYL	Goa Shipyard Ltd.

11.	HAL	Hindustan Aeronautics Ltd.
12.	HFCL	Hindustan Fertilizer Corporation Ltd.
13.	HLL	Hindustan Latex Ltd.
14.	HPCL	Hindustan Paper Corporation Ltd.
15.	HVOC	No Response
16.	ITI	Indian Telephone Industry
17.	MAPL	Maharashtra Antibiotics and Pharmaceuticals Ltd.
18.	MECL	Mineral Exploration Corporation Ltd.
19.	MTNL	Mahanagar Telephone Nigam Ltd.
20.	MDL	Mazagon Dock Ltd.
21.	MFL	Madras Fertilizers Ltd.
22.	NALCO	National Aluminum Company Ltd.
23.	NEPA	
24.	NHPC	National Hydroelectric Power Corporation Ltd.
25.	NPC	Nuclear Power Corporation Ltd.
26.	NSC	National Seeds Corporation Ltd.
27.	NSICL	National Small Industries Corporation Ltd.
28.	ONGC	Oil and Natural Gas Corporation Ltd.
29.	RCFL	Rashtriya Chemicals & Fertilisers Ltd.
30.	SCIL	Shipping Corporation of India Ltd.
31.	SIIL	Sponge Iron India Ltd.
32.	STC	State Trading Corporation of India Ltd.
33.	TCIL	Tyre Corporation of India Ltd.
34.	VSNL	Videsh Sanchar Nigam Ltd.
35.	WPCS	Water & Power Consultancy Services (I) Ltd.

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R.K. Mishra, Op. Cit., p. 1. □

Feature

Benchmarking: Another Tool in the HRD Toolkit for Organisation Development

Trilok Kumar Jain

The author discusses the concept and application of benchmarking. Benchmarking is similar to, yet different from, many other popular techniques like BPR, TQM etc. Implementation of benchmarking depends on appropriate method, HRD approach and training and development. Benchmarking uses relevant matrices in its analysis. Both quantitative as well as qualitative considerations are important in analysing data. The team undertaking benchmarking should be competent, willing and empowered.

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Benchmarking in simple terms, is comparison of your organisation with competitors/other organisations in order to identify areas of improvement. Comparison may be with internal departments/units also. The comparison is done in some key performance area.

Benchmarking is comparison of your organisation with competitors/other organisations in order to identify areas of improvement.

About the origin of the word benchmarking, Bramham (1998; p. 17) writes: "From its first recorded use as a surveyors's term in 1842, 'benchmarking' came to be the establishment, of a point of reference against which performance could be measured' (OED 1994).

Benchmarking is of following types:

- Internal: Comparison within the organisation
- Competitive: Comparison with competitors
- Generic: Comparison of key indicators with any organisation
- Parallel: Comparison with organisations doing same or similar tasks.

Benchmarking can be undertaken with any company, in any industry, at any location. However, it is not a random exercise. It is done in a planned and systematic manner. Benchmarking process identifies best processes to benchmark and studies the same in detail and prepares benchmark goals to achieve.

What is not Benchmarking

Benchmarking is many times confused with various

similar methods for productivity improvement or technology development. Benchmarking is not just any method of technology upgradation or productivity improvement. Many a time, while adopting benchmarking we may do all such steps, but the foundation of such activities is different in the case of benchmarking. Benchmarking is not just looking at competitors and comparison of your company with them. It goes more detailed in analysing the differences. As G.B.S. Kohli (1996) rightly puts it "Trying to evaluate your standing within your industry is not benchmarking."

BPR, downsizing and TQM are other popular management tools. Hammer (1990) called for questioning outdated rules and fundamental assumptions that underlie our business. The author stated that if we change without changing our outdated rules and assumptions, we are just "rearranging deck chairs on the Titanic". Hammer and Champy (1993) define BPR as "..fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical and contemporary measures of performance, such as cost, quality, services and speed." BPR is a widely discussed method of organisational development. It questions the age old practices in working. It tries to look at the process of working afresh. It has been criticized by many as a tool for downsizing, for reducing manpower. The criticism of BPR is also due to its implementation which has not been effective many times.

Downsizing is a technique of reducing excessive manpower and smartsizing is the technique of retrenching non-profit making activities of an organisation.

In 1954, Armand Feigenbaum first used the term Total Quality Management. Since then, TQM has come a long way. It is today a very popular technique for total organisation development. TQM is a continuous approach to develop quality in all facets of organisation considering total customer satisfaction as the ultimate goal. It encompasses within itself all activities designed to achieve effectiveness and efficiency. The human factor is very important in TQM also. TQM succeeds on the platform of employee empowerment. In comparison to other tools of quality improvement, TQM is more scientific and rigorous, as it revolves around documenting each activity and improving each one of them by introducing standardisation and precision. Manpower training and development is central in any TQM programme.

While TQM is improvement in existing method of working, benchmarking searches for new methods of working based on comparison with best practices else where. The basic approach of TQM relies on empowerment, customer orientation, quality orientation, documentation. These are used in benchmarking also. Both benchmarking and TQM use IT in applications. Many a time, benchmarking is implemented after introduction of TQM.

The Framework of HRD

Human Resource department has a vital role to play in benchmarking. Employee motivation, team building, role clarity, and employee involvement are essential in benchmarking exercise. For achieving these, appropriate climate must be created. The following can help in building the right climate for benchmarking:

- Elucidation to employees about goals and objectives of benchmarking is essential. There may be unwanted fears in the minds of employees that benchmarking is for downsizing, which should be removed.
- Benchmarking uses a lot of data, facts, and information in its process. Right interpretation of data and facts is essential. Benchmarking just doesn't focus on quantitative data, it also unearths qualitative data to aid in decision making. Employees must be trained in benchmarking otherwise they may not find appropriate inferences.

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- Employee motivation and commitment is crucial in benchmarking. Employees working in a particular process must be involved in all stages of benchmarking related to that process.
- Union opposition to benchmarking can be expected in large organisations. Before starting benchmarking, a dialogue with unions should be held in which the objectives of benchmarking are made clear. Union support can help in benchmarking exercise.
- Appropriate values in organisation culture are essential. Ideally, the values of OCTAPACE should be held by employees. The OCTAPACE values are
  - ☐ Openness
  - ☐ Collaboration
  - ☐ Trust

- ☐ Authenticity
- ☐ Proaction
- ☐ Autonomy
- ☐ Creativity
- ☐ Experimentation

Benchmarking to be successful must start with a commitment by employees for improving their work processes. The benchmarking team must be headed by a person who is involved in the existing process. Before starting benchmarking, survey of employee attitude and company perception amongst customers and other stakeholders may be carried out to help in identifying the company's status. SWOT (Strength, Weakness, Opportunity, Threat) analysis may also be carried out beforehand to identify strong and weak areas. Similarly SAP (Strategic Advantage Profile) may be prepared to identify strategically important advantages or disadvantages with functional departments. Resource deployment matrix may be also prepared.

Process of Benchmarking

The process of benchmarking cannot be specified in terms of watertight rules. Any process of benchmarking must have the following steps:

- Identification of areas
- Identification of partners
- Identification and development of teams
- Identification of matrices
- Setting benchmarking goals
- Managing change and monitoring benchmarking progress.

Identification of Areas

Benchmarking is possible in any area of business operation. Whether it be manpower turnover, manpower cost, recruitment cost, wastage, cost per unit, or anything relating to business operation, benchmarking has a role to play. However, it should be stressed at this point that benchmarking focuses on process and not on output. Dhawan (1996) mentions seven imperatives for benchmarking:

- Be willing to change
- Focus on the right partners
- Focus on the right issues
- Create a powerful team
- Gain management commitment
- Set measurable objectives
- Link to corporate mission

Before we start benchmarking, it is important to be willing to change. We must undertake a cost benefit analysis about benchmarking and take top management in confidence. Involvement of top management from the scratch is a must for success in benchmarking. To put it simply, we must be willing to move and know the direction before we start benchmarking. As MRR Nair puts it "We start benchmarking by first deciding the broad direction we would have to move in (Dhawan, 1996).

Identification of Partners

Benchmarking is comparison of best practices and development based on that comparison. Benchmarking is neither invention of a new method of working nor copying a competitor in its totality. It is developing yourself based on study of the best practices. Selection of a good partner is critical in success of benchmarking. The partner can be internal, competitor or even from unrelated areas. Support and cooperation from partner help in benchmarking exercise.

Benchmarking is neither invention of a new method of working nor copying a competitor in its totality. It is developing yourself based on study of the best practices.

Internal Partner: Internal partner can be selected in case of large business houses and can be from the same unit or from some other unit. It is easy to work with an internal partner. It is necessary to develop expertise in benchmarking by first working with an internal partner as it helps in preparing an appropriate human resource climate before the organisation embarks on benchmarking with external organisations.

Competitor: If a competitor can cooperate, there can be advantages for both the firms. Best practices can lead to development of both organisations and ultimately to customer betterment. However, it is not very easy to find a competitor who might be willing for a benchmarking exercise.

Partner from within the Industry but not a Competitor: This can be useful for any company. However,

the circumstances of the two firms are entirely different and hence benchmarking exercise may be difficult to carry out in practice. Many matrices will be useless as the essential 'C' for comparison, i.e. circumstances, are entirely different in both the firms.

Unrelated Partner: This may not be feasible in all cases. However, unrelated firms can be useful for non-production based comparison. For example, Citibank is comparing its culture specific practices with Indian companies which are not in banking and finance industry. RPG group companies, which are in unrelated businesses are compared on many criteria and the comparison generates solutions. This type of comparison can certainly bring about creative ideas in the areas of HR practices, customer relations, office management etc.

Identification & Development of Teams

Benchmarking exercise is carried out by a team consisting of persons from the section which is to be developed. The other members of the team can be from HR department, corporate planning cell, MIS department, quality department (if benchmarking is related with production), and cost department. The team should have clarity about its role and a balance of homogeneity and heterogeneity to generate creative solutions for bridging the gap identified by benchmarking.

Identification of Matrices

Some executives consider matrices as the most important part of benchmarking exercise. Matrices are the measurements which help comparison of one organisation with another organisation. They measure specific details relating to particular area of study (called pilot area). Dhawan (1996) mentions the following matrices: Sales cost/revenue, Service cost/revenue, Distribution cost/revenue, Material overheads, Manpower performance ratio, Cost per unit, Cost per order, Return on assets, Percentage of rejected products, Percentage of rejected parts, Customer satisfaction, Billing error rate, Service response time, Rate of on-time delivery etc.

Bramham (1998; p. 112) mentions four generic types of benchmarking matrices:

- Key Indicator Studies
- Customer Operational Reviews
- Employee Attitudinal Reviews
- Process Benchmarking

What seems to be clear is that there cannot be an exhaustive list of matrices. Here comes the role of the executives, how innovative they can be. Every process can be benchmarked and matrices can possibly be prepared on that. Ratio analysis based on some identifiable and measurable aspect relating to a process gives matrices. However, preparation and analysis of matrices take a lot of time and resources. For example, for a courier company, matrices may be prepared for delivery time as well as the time taken in correspondence, however, the results of these would have different impacts. Therefore a decision has to be taken as to which matrices to prepare. While identifying matrices, the executives need to ponder on following questions:

- Do these matrices measure some process which is related to the key success factor (KSF)?
- Do the matrices give accurate and measurable data, which are reliable as well?
- Do the matrices give figures which can be compared with another company which may not have similar background in that area?
- Can the questions of validity and reliability be applied to the measurements made by matrices?

If the above questions have positive answers, the matrices can be taken up for study, otherwise they should be modified.

Setting Benchmarking Goals

Benchmarking is adopted for a particular area of operation. The work area can be quality of products, cost of products, customer satisfaction, organisation culture. The area can be anything relating to work within the organisation.

Managing Change & Monitoring Progress

Benchmarking is a tool of introducing and managing change. There are various models of change management. The basic theory of change management asserts that people resist change. However, a planned change in which people are also partners in decision making can be successful. Kurt Lewin's model of change considers three stages of change: Unfreezing, Changing, Refreezing. In the unfreezing phase, people are made aware of the need for change, in the changing phase change is introduced and in refreezing phase, the organisation culture and systems are stabilised to ensure that the changed organisation remains in the new equilibrium.

Success of benchmarking depends on the people

implementing it. Empowerment of people, combined with orientation about the theme of benchmarking are central for effective implementation. Benchmarking may not bring about dramatic results, unless it is accompanied with training, development and orientation programmes. Many times, people resist benchmarking processes considering it a step towards downsizing. Taking people into confidence is a must.

Empowerment of people, combined with orientation about the theme of benchmarking are central for effective implementation.

HRD Approach and Planned Change

Just like TQM or BPR, benchmarking also needs HRD approach to be successful in the organisation. Appropriate climate in the organisation is a prerequisite for benchmarking. The organisation must have a clear mission and values to guide it. Benchmarking must be introduced in a planned manner. The employees must be oriented and briefed about the process. Services of trained personnel or consultants may be hired. In implementing benchmarking, high tolerance for uncertainty and ambiguity is required. The executives implementing the benchmarking process must be willing to experiment and innovate.

L&T benchmarked 12 levels of its skills against its global competitors like Bechtel Corp., Fluor Daniel of USA and after identifying gaps, used external recruitments and training to bridge the gap. It used the consultancy of McKinsey & Co. for this exercise.

RPG is using benchmarking within its 35 group companies to spread the best practices. Each of the group companies benchmarks itself with the best in 12 specific areas (which include areas like purchase management, energy savings etc.). It calls this exercise KIP (Knowledge Improvement Process).

Citibank benchmarks its culture specific practices against some Indian companies, which are not its competitors. It undertook this exercise with the help of Eicher Consultancy.

Modi Xerox used benchmarking to compare its customer satisfaction with its rival Rank Xerox Portugal.

Arvind Mills used benchmarking to develop its dividend payout by its product lines and to develop its human resources. It benchmarked its compensation strategy with P&G and HLL.

Epilogue

It is excellent to share knowledge, even with competitors. The traditional concept of competition in the form of cut-throat competition comes in the way of benchmarking. It is essential to open up attitudes and approach towards broader learning. Professionalisation, globalisation etc. will help in the spread of benchmarking. Benchmarking is an exercise which can guarantee improvement if it is implemented properly. The progress of human civilisation is due to benchmarking which nations and peoples do against each other. It is a healthy process to enrich knowledge and change ourselves. Benchmarking to be successful must have good change-implementation. Gap identification should be followed by change management which should comprise HRD components. If change management is not effective the exercise of gap identification may be fruitless.

It is excellent to share knowledge, even with competitors. It is essential to open up attitudes and approach towards broader learning.

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Feature

Issues in Measurement of Input Productivity in India

Ravindra H. Dholakia

A few conceptual issues having direct bearing on deriving the estimates of input productivities at the macro/aggregative level are discussed in the Indian context in the paper. It is argued that the simple assumption of equality between wage rate and marginal productivity of labour which is required for constructing several aggregates is not likely to be fulfilled in the Indian case on various counts. Similarly, input productivity estimates may be more reliable at the macro/aggregative level than at micro/unit level. Productivity studies in countries like India have to be based on different assumptions and measurements of aggregates as compared to the ones in the mature developed countries.

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For the management of input productivity in India, the present practice of generating the estimates of relevant aggregates and deriving the input productivities needs to be reconsidered. The issue of measuring quality of labour input, the problems posed by the time spent on transport to and from work-place in calculating labour productivity, issues arising out of measuring the productivity of infrastructural inputs and those pertaining to the estimation of total factor productivity and technical progress and related problems of measurement of real value addition merit a detailed study.

Quality of Labour Input

Data on labour and work-force in India are perhaps least satisfactory in terms of reliability, intensity, quality, details and frequency. This is because a large proportion of the labour force is in the unorganised sector where it is very costly to collect, collate and publish the required data frequently. As a result, we get only the simple head-count of workers in most of the sectors without any idea of the intensity of their employment and skill levels. Any change in the intensity of employment or the skill level of the work-force in India, therefore, adds to the 'residual' in the growth accounting framework. In other countries where the quality of labour statistics is far more satisfactory, the intensity of employment is measured in terms of person-days and person-hours of work. However, the question of the quality index of the work-force remains to be resolved even in such data-advanced countries because it requires conversion of the qualitatively heterogeneous work-force into qualitatively homogeneous units. Generally, the Ricardian solution of taking the wage-differential to reflect the quality differential and thereby converting different qualities of labour into common or uniform units is widely used. Bakul Dholakia (1974) prepared the first estimates of quality index for the labour force in India following a similar method. However, this solution derived from a simple neo-classical theorem is based on at least four crucial assumptions: All firms in

the economy are interested only in short-run profit maximization; all of them are in equilibrium; there is a perfect labour and capital mobility without any institutional or non-institutional barriers; and there is no segmentation of labour market with free and fair competition prevailing among all. Casual observations from the environment around are sufficient to realize that each of these assumptions is violated in practice. The preparation of quality index of labour is, therefore, a real challenge.

Considerable attention is focussed on the proper management and estimation of capital stock in studies on factor productivity in India. It is also demonstrated that estimates of factor elasticities of output and hence the estimates of TFPG are highly sensitive to the measurement of capital input (See, Dholakia, 1977). However, proper measurement of labour input has hardly received any attention in the Indian studies on productivity. Such a neglect is more surprising because there is a clear recognition of the role played by human capital in determining productivity growth. A fast growing body of literature exists on the theory and strategy of development based on the quality of human resources. Health, sanitation, education and such other aspects are considered important determinants of the quality of labour input. The method of wage differentials to construct a quality of labour index needs to be replaced by a more direct measurement based on measurable aspects of the quality of labour like health, education, experience (or age), skill level, etc. The weights could be derived from cross-sectional in-depth sample studies. In the absence of such detailed cross-sectional studies, even the broad classification of work-force quality by age-sex-area is useful. While the estimates of workers by age, sex and rural-urban residence are available for different sectors over time, very few attempts have been made in India to construct the quality index of labour using this information. Proper adjustments of the quality of labour input can certainly yield more realistic estimates of TFPG (i.e. Total Factor Productivity Growth).

The method of wage differentials to construct a quality of labour index needs to be replaced by a more direct measurement based on measurable aspects of the quality of labour like health, education, experience (or age), skill level.

Time Spent on Travel

The question of treating the travel time to and from the work-place as a part of the time spent for employment has not received sufficient attention. Even the data on the time spent for such travel were not readily available. With the recent Time-Use Survey being carried out on experimental basis in six states, it is possible to get some broad dimensional idea about the proportion of a worker's time spent on work-related travel. In some parts of Gujarat's sample, travel time for males varies between 1 hour to 2 hours per day. It turns out to be almost 15 to 25 per cent of actual working time in several cases of salaried workers, casual labourers and self-employed persons. The work or employment intensity seems to differ substantially for females and younger population. In their case, even the average travel time is also much less in absolute terms as can be seen from some preliminary tabulations of the results of the Time-Use Survey for some regions. The Time-Use Survey is likely to provide useful information on the time spent on various productive/unproductive, paid/unpaid and SNA/non-SNA activities by individuals. Travel time poses some questions in this regard.

For several workers, the travel time is a fully or partly compensated activity since they specifically get travel allowance in cash or kind as a part of their salary package. In most of the cases, however, it meets only the monetary cost of their travel. In several other cases, it becomes a totally uncompensated activity carried out by the individuals on their own. In any case, the time spent on travel is not available to the society for any other alternative productive use. The supply of labour to that extent is effectively reduced. Should the travel time be added to the normal working hours of the workers for calculating their productivity? It needs serious attention. This is particularly because the proportion of time spent on such travel is considerable. Its inclusion or exclusion can significantly affect productivity estimates. It has also some policy implications.

With economic development, the living standards of people are improving and the cost of living also increases. It is often observed that the travel time becomes an important consideration for selecting the location of residence besides the quality of environment, cost of living, etc. Generally, there is a trade-off between the distance from work-place and the cost per unit of quality of living. People make these choices according to their preferences and circumstances. With economic development when traditional labour productivity measures show remarkable increase in an economy, we may find several workers preferring to travel longer distance to be able to afford the same quality of living as before. Thus, a significant part of the increase in labour productivity could actually be illusory in the sense that extra time of the worker is taken away from him if he wants to maintain his real living standard. This is also reinforced by the fact that routine

travel for longer than a threshhold time does result in mental fatigue affecting adversely the quality and concentration of the actual work performed on the job. Any policy which helps reduce the travel time and/or makes the travel more comfortable is likely to be a socially productive intervention. If this aspect has to be quantified and captured formally, there is a need to include the travel time for the calculation of labour productivity. In terms of international comparisons also, such a measure of labour productivity would be more useful and relevant at least in terms of the welfare connotation of productivity growth. Even from the point of view of the employer, such a measure of labour productivity is useful because it has implication on the actual efficiency of the workers on the job.

The theoretical issue here is to reconcile the equilibrium condition of wages being equal to the value of marginal product of labour (MP_L). The latter is derived on the basis of the work performed on the job and the efficiency with which it is done. To an entrepreneur, therefore, the wage reflects the productivity of the time spent on the job. To a worker, it reflects the compensation for the time spent for the job. The preliminary tabulation of the Time-Use Survey data reveals that there is likely to be a substantial gap between the two suggesting the labour market imperfections. Caution needs to be exercised for using the marginal productivity hypothesis as the basis of certain measurements and methodologies to study labour productivities and also for interpreting labour productivity estimates to reflect the welfare of different populations.

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Productivity of Infrastructural Inputs

The way we are measuring factor and non-factor productivities within the legal and social organisation of economic activities in the country, several infrastructure related investments do not become remunerative. The productivity of infrastructural inputs is neither adequately recognised nor properly evaluated. Several of these infrastructural inputs are provided by the public sector and are considered public goods. For example, electricity, water, ports or storage are provided until recently through the public sector in India. The pricing of these facilities is, therefore, likely to be diverging from the basic principles of marginal cost and productivities. Social objectives may also dictate their pricing decisions. Simultaneously, very often their supply is also restricted because of unremunerative prices, unattractive investments in these sectors or different national priorities for resource use. Similar are the cases of those infrastructural facilities which are considered public goods like roads, preventive health-care, drinking water, sewerage, provision of safety and security etc.

All these inputs certainly contribute to the production in the system directly or indirectly, but their productivity or efficiency is hardly ever estimated satisfactorily. Their share in the explicit monetary costs of the production units generally does not reflect the true input elasticity of output. This is because their supply is regulated or controlled and the price is invariably administered or governed by other considerations than profit maximizing. The methodologies used in mature developed countries, where market forces are largely allowed to play a determining role even in such infrastructure related sectors, are not, therefore, expected to capture correctly the contributions of such inputs in the less mature and developing economies like India, where the role of the government is considered very different.

Sectoral studies of factor productivities are likely to mix up fully or, at least, partially, the productivities of the infrastructural inputs with the concept of the residual or the total factor productivity growth (TFPG). It is clearly distinct from technological progress in sectors like manufacturing or agriculture. The quality of factor inputs in the sector and/or the intensity of their use also similarly get mixed up in the estimates of TFPG. The quality of factor inputs and the intensity of their employment may also be influenced by the infrastructural inputs. As a result, sectoral studies of factor productivities in developing countries like India are not likely to be reliable if they are based on methodologies relevant and popular in the mature developed economies. In fact, this problem is likely to become more acute, the more disaggregated level at which the analysis is conducted, keeping the level of aggregation of inputs the same.

Improvements in drinking water availability or preventive health-care facilities, etc. are likely to result in an overall improvement in the intensity of work-force and even the efficiency with which the job is performed ultimately resulting in production or productivity gains. This increase should, therefore, be ascribed to the infrastructural inputs which are not directly employed or

used by the production unit in question. In essence, the logic is the same as the one where the quality of the raw material improves (per unit of its cost) resulting in factor productivity gains. The only possible difference is that raw material inputs are more likely to be weakly separable from the primary factors of production (Sims, 1969) whereas such infrastructural inputs may not be. But conceptually and physically they are distinct inputs. Therefore, there would be serious conceptual problems even in defining the real value added or the net factor products at the disaggregate levels on account of infrastructural inputs in developing countries.

Issues arising out of considering the contribution of infrastructural inputs at the level of production unit—a firm, industry or sector—have been discussed. However, when the factor productivities in these infrastructural sector per se, are considered, the situation is again far from satisfactory. In most of such sectors, say a public hospital, fire-station, drinking water supply or a primary school, the output itself is not clearly defined. The income generated in these sectors is, therefore, largely delinked with the factor productivities. Yet, the factor productivities in these sectors are measured through the factor rewards. Thus, any attempt to use the national accounts statistics to analyse the factor productivities at disaggregated level is only likely to distort the picture. At aggregate level, some of these purely allocative problems are likely to get resolved to give some "average" measurements of the factor productivities when we are using the national accounts statistics. If, however, we have to examine the factor productivities or trends therein at a fairly disaggregate level, the methodology and accounting prices used in social cost-benefit analysis need to be followed. Only then, some consistency and proper allocation are likely to result particularly in less mature developing economies like India. Even with shadow prices of inputs, the problems are likely to be only partially resolved because the shadow prices in practice may capture only some market distortions like tax, subsidies, monopoly, etc. The shadow prices hardly ever capture the genuine cross-effects of the inputs on the marginal productivities of other inputs. The infrastructural inputs are likely to have such cross-effects to a substantial extent. In any case, the use of shadow prices is a major methodological modification for estimating TFPG in India through price route over the traditional approach suggested by Jorgensen and Grilliches (1967).

The infrastructural inputs are likely to have cross-effects to a substantial extent.

Real Value Added & TFPG

Total Factor Productivity (TFP), as of now, is widely accepted as the most comprehensive measure of the overall efficiency of resources available. Operationalization of the concept, as discussed, makes more sense at the aggregate level than at the disaggregate level. The rate at which TFP grows over time has significant importance since it is often loosely equated to the rate of technical progress or the rate of improvement in the system's efficiency of resource-use. Effects and implications of major policy changes are often traced and evaluated in terms of this parameter and its behaviour over time. The correct measurement of various aggregates involved in estimating TFPG, therefore, assumes considerable importance. In the context of the Indian manufacturing sector, there has been some controversy about the behaviour of TFPG before and after 1980, pointing towards the issues in measurement of real value added and related aggregates (Balakrishnan & Pushpangadan, 1994; 1995, 1996 Dholakia and Dholakia, 1994, 1995; etc.).

The debate is essentially arising out of an effort to question the hypothesis of acceleration in TFPG after 1980 in the Indian manufacturing sector by explicitly recognising the role of declining raw material prices. In this context, Balakrishnan & Pushpangadan (1994) have essentially used the theoretical framework provided by Bruno (1984) of the production function with three inputs—labour, capital and material. Although Bruno (1984) has effectively demonstrated and even estimated the substantial bias introduced by the use of the standard double-deflation method for four developed countries, Balakrishnan & Pushpangadan use the standard double-deflated value added with inappropriate input price indices for their study. On several strong assumptions more applicable in the case of mature developed countries, Bruno (1984) has derived the bias of the double-deflated value added. The sign of the bias is determined by the product of growth rate of the relative price of materials ($G\pi$) and the difference between unity and the relative price of material inputs ($1-\pi$). During the period of monotonic change in relative price of material inputs, the bias is always negative or downward. However, if the relative prices of material inputs are moving non-monotonically, as is generally found in practice, the bias could be positive or negative in the case of the double-deflated value added. On the other hand, the bias of the single-deflated value added is always of opposite sign of the change in relative prices of inputs. It is independent of the monotonicity of the input-price behaviour. As a result, it is possible to find years when the biases of the single-deflated and double-deflated value added are in the opposite direction. This will particularly happen when the input prices

are not strictly monotonically behaving as was the case in India during the seventies and the eighties. It will not only affect the absolute estimates of the TFPG but also the behaviour of the TFPG over time with the two alternative measurements of the real value added in the Indian manufacturing sector.

Under the special circumstances of strict monotonic behaviour of relative input prices, however, the bias of double-deflated value added will be a proper fraction of the bias of the single-deflated value added when the elasticity of substitution between materials and value added is less than unity which is empirically more probable. Thus, under most simplifying assumptions and with correct price indices for the intermediate inputs, the double- deflated value added appears to be less problematic than the single-deflated value added. However, the Indian reality of the pre-liberalization phase does not lend to several of the simplified assumptions required to derive these results. Under the regime of administered prices and quantitative controls on several material or intermediate inputs, the basic requirement of equality of input-shares with the respective input elasticities of the output is not fulfilled. As a result, the magnitudes of the biases involved in the estimates of real value added through double deflation and single deflation methods become unknown and largely unpredictable. Moreover, reliable estimates of input price indices for the whole manufacturing sector including the ASI sample sector and unregistered sector are not available due to the problem of finding appropriate weights. This introduces one more source of error in the estimates with double deflation but not in the single deflation method. Moreover, as Sims (1969, p. 471) observes, "double-deflation is invalid in the presence of technical change of most sorts. Because real value added is a residual in the double deflation technique, the technique attributes all increase in output due to technical advance to value added. .....But if technical change has any form other than this purely "value-added-augmenting" form, the double deflation method breaks down". This is one more limitation of the standard double-deflated value added concept for its possible use in estimating the TFPG at sectoral level. Considering all these limitations, a balanced choice of the method for calculating the real value added to derive the estimates of TFPG needs to be made.

On the other hand, national accounts statistics in India are based on a curious mix of the two methods. In the agricultural sector, it follows a double-deflated value added method and in all other commodity producing sectors, it follows the single deflation method (See CSO, 1989). There is hardly any logic for doing this. However, in order to get the estimates of real value added at sectoral level, we also have one more option suggested by David (1962). He reminds that "value added coin has a factor payments side" so that we can think of using expenditure type deflation procedures even at an industry level to ensure consistency at aggregative level. He suggests (p. 154) that "income originating could be deflated directly with an index reflecting the prices which the factors of that industry paid in making their final demand purchases". This method entails a huge statistical task of generating appropriate deflators for every industry. However, in the case of double deflation method also, a similar task is involved in generating firm-wise price indices for intermediate inputs; and if we have to avoid biases, generating these indices with constantly shifting base and continuously varying weights. This is precisely the method of generating the divisia price indices which is not officially followed even in the data-advanced countries.

These are some of the important issues of theoretical and practical significance in measuring the factor productivities properly in a less mature and rapidly developing country like India. These issues have not received adequate attention. They do provide scope for further research and refinements. There is a need to recognise that productivity studies in countries like India have to be based on somewhat different assumptions and measurement of aggregates as compared to the ones in the mature developed countries.

Under the regime of administered prices and quantitative controls on several material or intermediate inputs, the basic requirement of equality of input-shares with the respective input elasticities of the output is not fulfilled. As a result, the magnitudes of the biases involved in the estimates of real value become unknown and largely unpredictable.

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Feature

Towards A Theoretical Rationale Behind Flexible Specialisation

Soumyendra Kishore Datta & Kausik Gupta

An attempt has been made to provide a theoretical rationale behind the concept of flexible specialisation. The role of the small-scale sector in absorbing voluntarily retired workers has been highlighted with special reference to the city of Durgapur. A simple general equilibrium model has been constructed to show that in an economy with flexibility in specialisation, subsidisation of the small-scale manufacturing sector helps to absorb skilled voluntarily retired pool of workers from the large-scale manufacturing sector. Such a policy also raises average labour productivity in all types of manufacturing sector.

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In recent times economies in various parts of the world have been witness to liberalisation and globalisation of trade and commerce. Huge expenditure has been incurred on advertisement and innovation by industrial organisations. This has resulted in shift in consumer preferences, with emergence of newer products and processes and instability in the profitability performance of large enterprises. These enterprises have indeed been extremely vulnerable to the uncertainties arising out of fluctuant demand in a competitive market. Big industries generally use huge and heavy machinery and produce large-scale standardised products. The disposal of these bulk quality requires a big and stable market which is largely missing now-a-days because of the globalised uncertainties. In this context the tremendous potential of medium and small-scale industries to adjust to the vagaries of the market needs a serious reassessment.

Large enterprises have been extremely vulnerable to the uncertainties arising out of fluctuant demand in a competitive market.

Flexible Specialisation

Piore and Sabel (1984) have shown that the strength of small enterprises lies in their application of the concept of 'flexible specialisation'. They trace the root cause of the economic crisis that beset the industrialised west in the 1970s and also in the 1980s in the pursuance of the 'Fordist model' of mass production.[1]

According to them this crisis could have been avoided had there been clustered co-functioning of a number of small firms following the mode of flexible specialisation.[2]

The Fordist model of mass production associated with the operation of large scale enterprises has long been followed in the industrialised west and allied powers. There its development has, it is argued, been more as a sequel to political process than of economic necessities. The alternative mode in the form of 'flexible specialisation' has been deliberately neglected and the limits of the Fordist model is now fully exposed in the sway of vagaries of international market. Sustenance of production along this line presupposes the existence of a large market capable of absorbing the huge batches of production and stable enough to keep the resources involved in their production continuously employed. However, in the wake of globalisation and marketisation and consequent uncertainties, capacity under-utilisation and retrenchment of employment have become a regular phenomenon in the case of large enterprises which suffer from rigidness in the production system. So the need of the hour is flexibility in the system which requires that production process be equipped to shift from one production to another as and when necessary, this in turn requiring multi-purpose machinery and employment of multi-skilled labour force.

Flexibility in operation may be obtained through the clustering of a number of small or medium firms or in a solar system where large firms subcontract work to smaller firms bound to them in a long-run relation of trust. The entrepreneurs in an industrial cluster bound by some organic relationship are required to exercise prudence and co-operation amongst themselves, mutually trust and help each other both informally and through consortia for marketing, design, raw material procurement and maintenance of machine etc., encouraged by local and regional governments. Subcontracting involves smaller firms making ancillary products or even supplying semi-finished intermediate stage products as contracted out to them. This service necessitates employment of skilled technicians having sound engineering knowledge and practical experience. In the city of Bangalore, many instances are found where the owners of small firms turn out to be skilled technicians (often with engineering degree), many of whom having had earlier job link with some large enterprises. They had earned experience while working and then volunteered to opt out of the job to set up their own enterprise.[3] Further, the phenomenon of automation and growing sickness among a large number of Public Sector Units have given rise to the introduction of VRS (Voluntary retirement schemes). Retrenchment of such huge skilled manpower provides enough scope for development of region specific, small scale industries supported by policies of local government and institutions.

The phenomenon of automation and growing sickness among Public Sector Units have given rise to the introduction of VRS. Retrenchment of such huge skilled manpower provides enough scope for development of region specific, small scale industries.

There is a theoretical rationale behind the concept of 'flexible specialisation' with special reference to the role of the small-scale sector. In an economy with flexibility in specialisation, the small and medium-scale sectors play a crucial role. These sectors help absorb the skilled, voluntarily retired, pool of workers from large enterprises.

VRS & Role of Small-Scale Industries

VRS is now-a-days widely adopted by both public and private sector organisations to shed off extra labour considered redundant as well as to fight off their sickness. It entails payment of a bulk amount (which is more than normal terminal benefit) as compensation for foreclosure of job-contract. The industrial belt of Durgapur in West Bengal has in recent years witnessed the adoption of VRS on a massive scale by the PSUs as well as some non-PSUs.[4] The introduction of automation, growing sickness among a number of PSUs and non-PSUs as well as emergence of a large volume of disguised unemployment have left the management with

1. Product price is the prime mover of competitive strategy in mass production and the main stress is reducing production cost. It accommodates voluminous investments in large sized machinery capable of turning out large scale production of highly standardised commodity. Naturally it postulates a large market capable of absorbing this large standardised output, so as to keep the production process uninterrupted. The workers are supposed to be specialised and trained in only one stage of the entire production system and they need not have a total conception of work. There is top down flow of authority and information with management hierarchical and rigid.

2. The notion of flexible specialisation was introduced by Piore and Sabel (1984) to explain why industrial economies (like Britain) dominated by the traditional methods of Fordist mass production were falling behind countries like Japan, Italy and Germany which were adopting more flexible production methods.

3. Holmstrom (1993) argues that in the city of Bangalore, small firms depend on each other as well as on large ones. A high proportion of entrepreneurs are engineers or skilled workers trained in large factories.

4. On the basis of an industrial survey in the city of Durgapur Khasnabis and Banerjea (1996) find that voluntary retirement compensation of workers in the 50-plus age-group had been high. About 60 per cent of the sample of voluntarily retired workers in Durgapur belonged to the 51-55 age group.

no option but to retire a section of working people under the VRS. Generally the people who have been made the target of this scheme fall in the above-50 age group category.[5] Most of these 'rationalised' workers are literate with technical qualification and/or skill acquired on the shop-floor. Hence when VRS is meted out to them, the expertise gained over years on job, is left to wither in the absence of suitable alternatives.

Here comes the role of small and possibly medium-scale industries that can effectively absorb rationalised workers. These people having earned a lump sum through VRS have the potential to invest their money in forming small-scale and medium-size industries where their expertise can be fully applied. Effective inspiration by the local administration, financial support, if needed, by regional institutions and utilisation of a portion of fund meant for employment generation to set up employment assistance centres (EACs) may provide the requisite incentive for a small industrial clustering. In this way, the VR fund may find an avenue for productive utilisation. EACs are centres that organise retraining and reemployment of rationalised workers. With suitable reorientation of their skills through the EACs, these workers can venture to invest their money in small-scale subcontracting enterprises, in making ancillary products required in bigger units or in making locally needed products. Given proper fiscal concessions like tax concession, subsidies etc., the entrepreneurs of these small enterprises may have the incentive to upgrade their productivity and thus flourish over time.

People having earned a lump sum through VRS have the potential to invest their money in forming small-scale and possibly medium-size industries where their expertise can be fully applied.

General Equilibrium Model

A simple general equilibrium model has been developed to show that a section of the above-50 age group workers in big enterprises thrown out of employment through VRS at any point of time can well be absorbed in small and medium enterprises which is consistent with the production structure of the economy. Further it is shown that suitable fiscal support may spur activities in these enterprises and hence government support and motivation is extremely necessary to entice more retrenched skilled people into formation of clusters of small units so very important for a full blossom of flexible specialisation.

As in the context of flexible specialisation, only skilled labour is considered in this theoretical structure and the focus is only on the manufacturing sector of the economy. The agricultural sector obviously exists but it is not explicitly treated in this simplified analysis.[6] A three-sector neo-classical full employment structure with flavours of Heckscher-Ohlin-Samuelson trade model is needed to explain the point.

A small open, developing economy consisting of three sectors—the large-scale manufacturing sector (X), medium-scale manufacturing-sector (Y) and small-scale manufacturing sector (Z) is considered. For the sake of analytical simplicity, labour force is divided into two groups—below-fifty age group as well as fifty and above. The classification on the basis of age is justified in the sense that the above fifty age group is generally considered as ideal for voluntary retirement under golden handshake policy. Both types of workers are skilled and assumed to be fully employed. To begin with, it is assumed that, all the labour is initially employed in manufacturing sector wherefrom a given proportion of above-fifty age group of workers have retired. These workers are skilled, educated and having earned a lump-sum through VRS, can get themselves employed in their ownership enterprises in sectors Y and Z. In other words, between sectors Y and Z, there exists perfect mobility of labour force retrenched from large enterprises. The sectors use different types of capital, for instance, sector X uses lumpy and heavy capital whereas sectors Y and Z employ flexible multi-use capital which is assumed to be mobile between these two sectors only. Production function in each sector exhibits constant returns to scale with diminishing marginal productivity to each variable input. The small open economy assumption implies that the product price in each sector is internationally given, the product of sector X is considered as the numeraire and its price is set equal to unity.

Let the average product of labour be q_i, intensive production function q_i (.), price of the product P_i, unit cost function C_i (.), wage rate W_i, rate of return on capital r_i, capital-labour ratio k_i(.), level of employment L_i and level of capital stock k_i respectively for sector i for

5. The introduction of VRS has widely taken place in P.S.U.s like Machine and Allied Manufacturing Company (MAMC), Hindustan Fertiliser Corporation (HFC), Durgapur Steel Plant (DSP), Alloy Steel Plant (ASP) etc. and some other non-P.S.U.s in Durgapur. See Khasnabis and Banerjea (1996) in this context.

6. This is just a simplifying assumption.

$i = X, Y, Z$. Here $w_Y = w$ and $r_Y = r_Z = r$. r_X is different from r. Let L_0 stand for the initial labour endowment at any point of time that is visible in sector X and 1 be the labour force in above-fifty age group. θ is the given proportion of persons retired out of 1. It depends on the policy decision in sector X. Now, effective employment in sector X is $L_0 - \theta 1$. Persons retired through the VRS can, through proper motivation, be productively employed in sectors Y and Z. Thus, $L_Y + L_Z = \theta 1$.

We assume that $k_Y > k_Z$ i.e. sector Y is more capital-intensive than sector Z. Let 's' be the unit subsidy on the product of sector Z. Finally, we assume $\tilde{P_Z}$ to be the effective price received by the producers in sector Z after adding the subsidy rate. Thus, $\tilde{P_Z} = P_Z + s$. We assume that $P_X = 1$.

The equation structure of the model can be stated as follows:

The intensive production functions for the three sectors are given by the following relations

$$q_X = g_X\ (k_X\ (w_X\ (w)/r_X)) \tag{1}$$

$$q_Y = g_Y\ (k_Y\ (w/r)) \tag{2}$$

$$q_Z = g_Z\ (k_Z\ (w/r)) \tag{3}$$

The competitive equilibrium conditions are stated as follows:

$$1 = C_X\ (w_X\ (w), r_X) \tag{4}$$

$$P_Y = C_Y\ (w, r) \tag{5}$$

$$\tilde{P_Z} = C_Z\ (w, r) \tag{6}$$

Here $w'_X > 0$.[7]

Capital employed in sector X can be written as

$$k_X\ (w_X\ (w)/r_X)\ L_X = \bar{K}_1 \tag{7}$$

Capital employed in sectors Y and Z can be written as

$$k_Y\ (w/r)\ L_Y + k_Z\ (w/r)\ L_Z = \bar{K}_2 \tag{8}$$

L_X is the effective employment in sector X after having introduced VRS and

$$L_X = L_0 - \theta 1 \tag{9}$$

where perfect mobility of labour between sectors Y and Z implies

$$L_Y + L_Z = \theta 1 \tag{10}$$

The model consists of ten equations with ten endogenous variables $q_X, q_Y, q_Z, L_X, L_Y, L_Z, 1, w, r$ and r_X; θ being given exogenously. Given P_Y and $\tilde{P_Z}$ from equations (5) and (6) we can determine w and r. Once w is known, r_X is known from equation (4). Once the factor prices r, r_X, w (and hence w_X) are known, the sectoral capital-labour ratios are known. Thus, when w_X and r_X are known, from equation (7), L_X can be determined as k_X is known. When L_X is known, 1 can be determined from equation (9), given L_0. Hence, 1 is known. Now from equations (8) and (10) we can determine L_Y and L_Z as k_Y and k_Z are already known. Again, since k_X, k_Y and k_Z are known, q_X, q_Y, q_Z can all be determined. Thus, the system of equations is consistent.

An increase in the rate of subsidy on the product of the small-scale manufacturing sector, i.e. sector 'Z', implies an increase in the effective price of the product of that sector i.e. $\tilde{P_Z}$. As $k_Y > k_Z$ following the Stolper-Samuelson Theorem, we find that the rate of return of the intensive factor for sector 'Z' (i.e. w) must increase and the rate return of the 'unintensive factor' for sector 'Z' (i.e. r) must fall. An increase in w implies an increase in w_X and, given $P_X = 1$, it implies a reduction in r_X. Hence, k_X, k_Y and k_Z must increase. Increase in sectoral capital-intensities leads to increase in sectoral average labour productivities (i.e. increase in q_X, q_Y and q_Z) from equations (1), (2) and (3) due to an increase in the subsidy rate.

Again, from equation (7), we find that an increase in k_X implies a reduction in L_X. Hence subsidisation of small-scale sector reduces 'effective employment' in the large-scale sector, i.e. L_X. So more workers can be released from sector X through the VRS scheme (in addition to 1) and can be absorbed in sectors Y and Z.

From the point of view of sectors Y and Z, we find

Subsidisation of small-scale sector reduces 'effective employment' in the large-scale sector. So more workers can be released through the VRS scheme.

7. This assumption is reasonable. It implies that an upward revision of wages in the small-scale and medium-scale sector leads to an increase in wage rate in large-scale sector due to the existence of trade unions.

that, given L_Y and L_Z at their initial equilibrium levels, increase in k_Y and k_Z increases the demand for capital. This is because the LHS of equation (8) implies demand for capital. Hence, given $\bar{K}_2$, an increase in k_Y and k_Z implies excess demand for capital for sectors Y and Z at the initial equilibrium levels of L_Y and L_Z. Again there is an increase in the effective availability of labour force for these two sectors. This is because a reduction in L_X implies an increase in 1 as we find from equations (9) and (10). So shortage of capital matched by increase in effective supply of labour (for sectors Y and Z) implies expansion of labour-intensive sector and contraction of capital-intensive sector. Hence, L_Y falls and L_Z increases as $k_Y > k_Z$. □[8]

We are now in a position to summarise our results in the form of a proposition.

Proposition: Fiscal concession to the small-scale manufacturing sector, in the form of an increase in the subsidy rate of its product, not only raises its average productivity of labour but also leads to increase in the levels of average labour productivity of the large-scale and medium-scale manufacturing sectors. Further, such a policy implies greater absorption of the voluntarily retired workers of the large-scale sector by the small-scale sector.

Concluding Remarks

The main lesson that emerges from this analysis is that in an economy where there exists 'flexible specialisation', policy makers should attach special importance to the issue of expansion of the small-scale manufacturing sector. This is because fiscal concession to this sector helps not only to absorb the voluntarily retired workers of the large-scale sector but also promotes the average labour productivity of both the sectors. In other words, the above model is largely indicative of the fact that the pool of retired workers (through VRS) from large enterprises need not necessarily imply complete wastage of their acquired skill and expertise. Many of them may, however, have financial pre-commitments and may be left with little money to start any industrial enterprise, however small. Again there may be a difficulty in adjusting their acquired skills to the requirement of launching any small undertaking. Besides, many of them may lack the entrepreneurial drive to take any risky venture. In this context, the local government and institutions can play an effective role by taking the initiative for promotion of small scale industrial gatherings, keeping an eye to the absorption of the retired pool of skilled workers. EACs, for instance, have already started functioning, providing retraining and redeployment facilities to the persons who approach them. Again there is needed devolution of decision making power from state planning body to that at the district level which should be in touch with local bodies. These bodies at the local level can come in close contact with people and through mutual interaction identify the problems facing potential industrial entrepreneurs. In specific cases, they can recommend financial support from regional banking institutions or other sources, or may make provision for imparting entrepreneurial training or arrange for providing specific technical training needed for operating small size or even medium enterprises as the case may be. Branches of Small Industrial Development Board of India (SIDBI), National Small Industries Corporation (NSIC) etc. have also roles to play to boost up entrepreneurship from among voluntarily retired pool of persons. So propped up by financial, technical or motivational support by the local government and institutions as and when required, persons retrenched through VRS can find productive absorption in ownership small/medium enterprises and find effective fiscal support to boost up their efforts.

Small Industrial Development Board of India (SIDBI), National Small Industries Corporation etc. have roles to play to boost up entrepreneurship from among voluntarily retired pool of persons.

8. Though it is not the Rybczynski effect in true sense, it is effectively similar to that of the Rybczynski effect. For Rybczynski effect see Jones (1965).

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Feature

Performance Assessment of Indian Textiles Spinning Firms

P.G. Solankar & S.P. Singh

Efficiency measurement is a vital managerial control tool for assessing the degree to which inputs are utilised in the process of obtaining desired outputs. Techniques like corrected least square method (COLS), multiple regression analysis, Cobb-Douglas production function and ratio analysis for inter-firm performance analysis are useful in identifying central tendencies i.e. average behaviour, but are not useful in comparing the relative performance of individual firms. The present paper makes an attempt to apply DEA model for assessing forty private spinning mills.

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Performance measurement is a critical component in the general management process. Reliable measurement systems constitute a sound basis for continuous monitoring and control of organisation performance, enabling managers to pinpoint the bottlenecks and potential factors of improvement and to evaluate the success of previous activities. Viable categorisation of performance measures designed for organisation are efficiency, effectiveness, productivity, profitability, quality, and innovation (Golany, 1995). Each measure indicates the level of performance of different activities. These efficiency measures are vital managerial control tools for assessing the degree to which inputs are utilised in the process of obtaining desired outputs. Researchers have used various techniques like least square method, multiple regression analysis, Cobb-Douglas production function (Mohan K.P.S., 1996) ratio analysis for performance analysis. These methods are useful in identifying central tendencies i.e. average behaviour, but are not useful to identify maximally efficient and less efficient organisation. They are unable to throw light on an individual firm's efficiency, weaknesses and strengths.

Reliable measurement systems constitute a sound basis for continuous monitoring and control of organisation performance, enabling managers to pinpoint the bottlenecks and potential factors of improvement and to evaluate the success of previous activities.

Charness et al. (1998) proposed that the efficiency of a firm can be obtained by using Data Envelopment Analysis (DEA) model. The DEA procedure takes each observation into account in the computation of its relative efficiency score. The sets of weights are implicit internal valuation schemes which are empirically determined by

the model, and may vary from observation to observation for a firm. This paper is an attempt to measure the relative performance of Indian textile spinning firms of private sector by using DEA model.

Methodology

The study assesses and compares the performance of private textile spinning firms vis a cross-sectional comparison of competitiveness measure developed from the data envelopment analysis model. It is based on secondary data collected from "Prowess Database" supplied by CMIE, Bombay for a set of 40 firms for the year 1997-98. All these mills produce cotton and blended yarn, but there is wide heterogeneity in origin, size and abilities of the firms. However, all these firms are in the same line of business and working under similar market conditions.

Income, cash flow from operations, net sales and cost of goods sold have been selected as output measures for determining efficiency. Input variables chosen are total assets, equity capital, plant and equipment, and wages.

The choice of outputs and inputs is critical in any DEA based study (Majumdar, 1994). Two factors are considered in selecting the input and output variables used in the DEA model. One consideration is the production function nature of the DEA model. From a production standpoint, one would want to consider what a firm is attempting to produce in financial terms. Market share, profitability, liquidity and turnover are often considered important outputs of a firm. These factors can be regarded as outputs produced through consuming capital (e.g. plant and equipment) and personnel. The second consideration is financial analysis. Such analysis often involves use of financial ratios such as return on assets, sales per employee, and inventory turnover to measure and compare the performance of firms (Bowlin, 1995). Combining these two concepts, income, cash flow from operations, net sales and cost of goods sold have been selected as output measures for determining efficiency. Input variables chosen are total assets, equity capital, plant and equipment, and wages. The variables used here are somewhat subjective, but they are commonly used for evaluating a firm's performance. The details of variables used in the analysis are as follows:

Net Income (NI): Net income (after tax) is selected as a profitability measure over other possibilities such as income from operations (Bowlin, 1995). The main reason is that net income reflects changes in tax laws, interest expense, extraordinary items which would not be evident in other profitability measures such as income from operations.

Cash Flow from Operation (CFO): It is the portion of total cost of merchandise allocated to items sold during the period. It includes expenses incurred on raw materials, direct labour and manufacturing overheads. Inventory turnover can be expressed in terms of net sales to average inventory. But if consistency is needed, then inventory utilization should be measured in terms of the cost of goods sold.

Total Assets (TA): This variable treated as an input, represents the net book value of assets from all sources devoted to the business as reported in end-of-year balance sheets. It is regarded as an input used to produce income, sales and cash flow. As a result, it also provides the additional element needed for return on assets and return on investment, which is a key measure common in financial analysis. Also, the value of assets is a factor in the market value of a firm's equity.

Equity Capital (E): This variable is the rupee book value of the common stockholders equity as reported in the end-of-year balance sheets. Including it in the analysis provides a type of return on equity (also referred to as return on owner's investment).

Plant and Equipment (P & E): This input variable is the net book value of the plant and equipment as reported in the end-of-year balance sheets. Including it in the model provides an indication of the return on investment and productivity of capital investment (Capital turnover).

Inventory (I): The quantity of goods to be kept in hand is a major business decision. It is considered good management to carry little inventory and turn it over as rapidly as possible. Good management must guard against excessive inventories, the consequences of which is an abnormal drain on working capital leading to financial difficulties. The greater the inventory, the greater is the amount of money tied up, extra space required, extra handling cost, loss through shrinkage, style changes etc.

Analytical Model

In the simplest case where a process has a single input and a single output, efficiency is defined as:

Efficiency = output/input

More typically, processes and organisational firms have multiple incommensurate inputs and outputs and this complexity can be incorporated in an efficiency measure by designing efficiency as:

Efficiency = weighted sum of outputs/weighted sum of inputs

This definition (Boussofianace, et al., 1991) requires a set of weights to be defined and this can be difficult, particularly if a common set of weights is to be applied across the set of firms. Using only observed data of outputs and inputs for firms, the DEA algorithm measures how efficiently each firm is able to convert inputs into outputs (Golany, 1995). There are a total of 'n' firm level observations being evaluated. For the j_o^{th} observation for which efficiency is being estimated, the objective of the empirical exercise is to maximise objective function, which is the ratio of multiple outputs to multiple inputs; this function is expressed as:

$$Max \frac{\sum_{r=1}^{s} u_r Y_{rjo}}{\sum_{i=1}^{m} v_i X_{ijo}} \quad (1)$$

Subject to the constraints:

$$\frac{\sum_{r=1}^{s} u_r Y_{rjo}}{\sum_{i=1}^{m} v_i X_{ijo}} \leq 1$$

Where:

$j = 1,...j_o, ..., n$

$u_r \geq \varepsilon$ $r = 1, ..., s.$

$u_r \geq \varepsilon$ $i = 1, ..., m.$

Y_{rj} is observed amount of rth output for j^{th} firm

X_{ij} is observed amount of ith input for j^{th} firm

u_r is weight attached to each output

v_i is weight attached to each input and

ε is a small positive number.

Since the j_o^{th} firm being evaluated is also a member of the constraint set, it follows that a solution to model (1) always exists with the objective value falling between 0 and 1. Finally, the objective function will equal 1, if and only if the jth firm is efficient relative to the other DMUs that are represented in the constraint set of (1). It is important to stress that the optimal u and v's from (1) may vary for each firm being evaluated; they represent the relative value system that provides the highest possible rating for the particular firm's performance, consistent with the notion that the value system must be feasible for the other n-1 firms. When the maximum objective of model (1) is less than one, it can be concluded that the j_o^{th} firm is strictly inefficient or inferior as compared to a subset of firms in the system which are deemed to be efficient. This subset will be referred to as the j_o^{th} firm's reference system.

See that model (1) is a fractional linear programme which, in its original formulations is both non-linear and non-convex. However, it was suggested and shown by Charnes, Cooper and Rhodes that model (1) can be solved by linear programming formulations.

The formulation constraints the weighted sum of the inputs to be unity and maximizes the outputs that can be obtained. Its formulation is as follows:

$$Max \sum_{r=1}^{s} u_r Y_{rjo} \quad (2)$$

Subject to

$$\sum_{r=1}^{s} u_r Y_{rj} - \sum_{i=1}^{m} v_i X_{ij} \leq 0$$

$$\sum_{i=1}^{m} v_i X_{ijo} = 1$$

$v_i \geq \varepsilon \quad u_r \geq \varepsilon$

Consider next the dual linear programme of (2), which provides a piecewise linear approximation of the optimal joint technology production function by minimizing the quantities of 'm' different inputs required to meet stated levels of 's' different outputs. The formulation, representing the linear programming dual of (2) is

$$Min \left[Z_0 - \varepsilon \left(\sum_{i=1}^{m} s_i^- + \sum_{r=1}^{m} s_r^+ \right) \right] \quad (3)$$

Subject to

$$X_{ijo} Z_o - s_i^- - \sum_{j=1}^{n} X_{ij} \lambda_j = 0$$

$$\sum_{j=1}^{n} Y_{rj}\,\lambda_j - s_r^{+} = Y_{rjo}$$

$\lambda_j \geq 0, s_r^{+} \geq 0, s_i^{-} \geq 0, \forall\, j, r, i$ and Z_0 unconstrained.

Using the Charnes, Cooper, Rhodes ratio form of DEA, we may symbolize our competitiveness measure (CM) as:

$$Max\ CM = \frac{u_{ni}\,NI + u_{cfo}\,CFO + u_{ns}\,NS + u_{cgs}\,CGS}{v_{ta}\,TA + v_e\,E + v_{p\&e}\,P\&E + v_i\,I}$$

where Eqn. (4) represents only the DEA objective function, the u and v variable weights as described in previous section and the other symbols as defined previously. In a sense, we have a model that depicts a company's efficiency in producing financial outputs. One limitation of using rupee values as surrogate measures for inputs and outputs as we do in this study is that DEA requires all inputs and outputs to be positive values. Therefore, when cash flow is a negative value, a small positive value is substituted for the negative value to meet the requirements of the DEA model. As the model implicitly attaches weights/importance to input and output variables, an unbalanced set of weights is a signal that, although technically efficient, the firm may be achieving that efficiency by employing an unusual mix of inputs and may be far from efficient in the allocative sense.

Target Setting

Solution of the input conserving DEA programme also yields details of the maximum amount of inputs any non-optimal firm is to use, if it is to be as efficient as the others in its reference set. The optimal firms, of course, have no input slack. The target input is what the firm in question ought to have consumed, if it was to be rated efficient. The slack is the actual input consumed minus the target input a firm ought to have consumed. Input conserving DEA model also yields details of maximum target output to be produced by a firm to remain efficient. As the targets are computed from the recorded performance of an observable combination of firms, they should be achievable, or at the very least, reasons why they are not achievable are easy to formulate. In practical situations, it is very often desired to set targets for inefficient units to guide them to improved performance. Such targets provide concrete benchmarks by which units can monitor their performance (Boussofianace, 1991). Following input/output levels would render the firm relative efficient:

$$x'_{ijo} = z_0^{th}\, x_{ijo} - s_i^{-*}, \qquad i = 1, \ldots\ldots, m$$

$$y'_{rjo} = y_{rjo} + s_r^{+*}, \qquad r = 1, \ldots\ldots, t$$

A star * superscript to a variable is used to denote its optimal value. This set of targets is input oriented as the main changes are to the input levels.

The target input is what the firm in question ought to have consumed, if it was to be rated efficient

In practical situations, it is very often desired to set targets for inefficient units to guide them to improved performance. Such targets provide concrete benchmarks by which units can monitor their performance.

Results and Discussions

After a cross-sectional analysis of the performance of the 40 firms for the year 1998, the results of the firm level performance analysis are given in Table 1.

Out of 40 firms, there are 23 best performers, which define the frontier with a relative efficiency of 1. They are Abhishek Industries, Arvind Polycot Ltd., Banswara Syntex, Bhilwara Spinners Ltd., CIMMCO Birla Ltd. and so on. Their efficiency score indicates that they were able to use their resources effectively. There are no input/out slacks in utilisation of company resources, and the company is able to produce desired outputs.

Table 2 reveals that inefficient firms like Amarjyothi Spinning, ChitraDurga Spinning Mills, GTN Textiles, SuryaJyoti Spinning Mills etc., were not able to earn sufficient returns on equity capital. Also they failed in utilising total assets in generating revenues. They have invested more in inventories. Too much inventory may mean that resources are being employed unproductively.

Input/Output Slack Analysis

Table 2 documents the details of the input and output slacks. As is evident, the best firms, Abhishek Industries Ltd., Banswara Syntex Ltd., etc., have zero input and output slacks. Kumaran Mills Ltd. and Mahavir Spinning Mills Ltd. are relatively better firms among the non-optimal performers, and their slacks are relatively

Table 1: Inputs, Outputs and Efficiency Scores of Sample Firms for 1997-98 (Rupees in crores)

Firm	Outputs				Inputs				Efficiency Score
	Net Income	Net Sales	Cash Flow from Operations	Cost of Goods Sold	Equity	Total Assets	Plant & Equip.	Inventory	
Abhishek Spinning Mills	75.14	71.87	13.09	61.75	16.85	67.98	44.66	9.91	1.00
Amarjyoti Spinning Mills	38.42	37.37	7.25	31.06	6.75	45.47	74.17	9.30	0.85
Amit Spinning Industries	70.59	69.72	11.40	58.07	17.00	78.03	41.38	9.42	0.94
Arihant Cotsyn Ltd.	52.83	51.17	3.28	49.20	27.59	117.14	82.62	16.37	1.00
Arvind Polycot Ltd.	64.99	54.12	6.51	47.14	24.10	210.94	26.29	15.21	1.00
Banswara Syntex Ltd.	191.45	186.91	17.32	165.68	6.78	117.00	53.24	38.01	1.00
Bhilwara Spinners Ltd.	106.61	90.83	10.01	78.75	6.78	95.92	46.18	17.04	1.00
Chitra Durga Spintex Ltd.	7.13	6.88	0.55	6.34	4.61	7.98	3.42	2.05	0.58
CIMMCO Birla Ltd.	396.94	387.81	27.66	331.88	14.21	372.25	137.96	88.92	1.00
Deewan Rubber Industries	215.90	213.37	17.70	183.12	20.82	283.37	84.59	43.15	1.00
GSL India Ltd.	347.50	314.21	28.87	279.38	9.70	331.30	73.19	81.57	1.00
GTN Textiles Ltd.	156.01	143.96	30.49	11.40	9.14	306.42	177.08	71.96	0.58
Indo Count Inds. Ltd.	96.40	96.17	24.03	73.37	23.54	155.23	100.67	29.55	0.82
Kamadgiri Synthetics Ltd.	39.36	39.25	4.41	35.39	3.00	25.31	19.53	3.47	1.00
Kandagiri Spinning Mills	52.19	51.44	7.52	45.06	3.86	50.85	31.07	14.36	0.82
Kerala Spinning Mills Ltd.	22.04	21.23	0.00	18.72	0.34	10.39	9.09	4.09	1.00
Kumaran Mills Ltd.	27.10	24.52	0.00	21.29	0.40	15.32	7.24	8.13	0.99
Mallur Siddeswara Spg. Ltd.	30.38	30.96	0.00	27.76	0.40	25.35	14.47	7.27	1.00
Mahavir Spinning Mills Ltd.	576.82	572.70	127.06	453.10	25.74	765.94	295.76	166.27	0.99
Malwa Cotton Spg. Mills	352.32	335.96	58.64	283.06	4.90	324.24	141.49	89.19	1.00
Modern Threads (I) Ltd.	213.29	210.15	21.56	196.64	34.76	541.23	236.23	59.69	1.00
Nahar Spg. Mills Ltd.	347.89	312.28	54.49	257.43	13.43	560.93	129.70	113.21	1.00
PBM Polytex Ltd.	105.00	103.36	15.19	86.66	6.10	103.62	72.90	30.59	1.00
Padam Cotton Yarns	12.30	11.94	0.70	11.21	4.72	10.43	6.08	1.60	0.84
Palani Andavar Mills	34.96	32.02	2.92	27.03	0.58	22.45	14.92	8.10	1.00
Patspin India Ltd.	82.31	78.86	24.39	56.87	30.92	150.49	90.16	32.48	1.00
Pranaviditya Spg Mills	42.31	41.48	5.99	35.04	12.00	41.74	26.69	5.94	0.80
Ravi Spinning Mills	4.10	4.31	0.18	4.35	3.70	5.88	3.15	1.74	0.49
Shamkeen Spinners Ltd.	76.95	72.40	19.27	54.80	26.23	119.58	72.94	22.61	0.84
Shree Rajasthan Syntex Ltd.	113.63	120.08	19.80	105.42	17.29	116.91	81.80	22.62	1.00
Shree Jaya Laxmi Autospin Ltd.	7.09	7.17	0.44	6.67	4.48	7.54	3.66	0.93	0.84
Sudhan Spg. Mills Ltd.	68.09	67.02	0.00	52.37	0.60	46.51	12.70	22.73	1.00
Super Spinning Mills Ltd.	173.87	168.41	25.53	144.72	5.50	158.26	114.17	53.77	0.91
Surya Jyoti Spinning Mills	67.11	66.89	6.69	60.57	10.72	61.69	35.49	11.02	0.72
Sybly Spinning Mills Ltd.	20.87	20.22	1.67	17.35	5.02	14.96	7.19	3.66	0.89
Thambbi Modern Spg. Mills	57.10	54.24	5.75	44.81	4.90	53.23	21.36	22.96	0.70
VMT Spinning Co. Ltd.	50.39	51.15	0.00	38.90	17.25	74.43	47.01	15.22	0.43
Vardhman Polytex	190.83	174.83	41.44	140.19	10.64	247.67	105.46	61.74	0.93
Winsome Yarns Ltd.	51.40	48.44	13.92	33.62	27.02	72.68	41.00	16.54	1.00

Source: CMIE's Prowess Database.

Table 2: Slacks and Targets for Inefficient Firms, 1997-98 (Rupees in crores)

Firm		Net Income	Net Sales	Cash Flow from Operations	Cost of Goods Sold	Equity	Total Assets	Plant & Equip.	Inventory
Amarjyoti Spinning Mills	Target	42.03	40.15	7.25	34.14	5.76	38.80	20.53	7.93
	Slack	3.61	2.78	0.00	3.08	0.00	0.00	0.09	0.00
Amit Spinning Industries	Target	72.02	69.72	11.4	60.63	13.27	60.77	39.00	8.88
	Slack	1.43	0.00	0.00	2.56	2.75	12.78	0.00	0.00
Abhishek Spinning Mills	Target	75.14	71.87	13.09	61.75	16.85	67.98	44.66	9.91
	Slack	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chitra Durga Spintex Ltd.	Target	7.21	7.12	0.55	6.34	0.38	4.63	1.98	1.20
	Slack	0.09	0.24	0.00	0.00	2.30	0.00	0.00	0.00
GTN Textiles Ltd.	Target	159.30	155.48	30.49	127.32	5.30	177.94	102.83	12.96
	Slack	3.29	11.52	0.00	15.92	0.00	0.00	0.00	28.82
Indo Count Inds. Ltd.	Target	148.47	142.83	24.03	122.94	19.52	128.95	83.46	17.53
	Slack	52.09	46.66	0.00	49.56	0.00	0.00	0.00	6.97
Kandagiri Spinning Mills	Target	53.04	51.67	7.52	45.06	3.18	41.90	22.61	10.69
	Slack	0.85	0.23	0.00	0.00	0.00	0.00	2.99	1.14
Kumaran Mills Ltd.	Target	27.10	26.31	0.00	21.29	0.39	15.20	5.63	8.07
	Slack	0.00	1.79	0.00	0.00	0.00	0.00	1.56	0.00
Mahavir Spinning Mills Ltd.	Target	576.82	572.70	127.06	453.10	25.74	765.86	295.76	166.27
	Slack	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00
Padam Cotton Yarns	Target	12.60	12.54	1.47	11.21	1.10	8.77	5.11	1.34
	Slack	0.30	0.60	0.77	0.00	2.87	0.00	0.00	0.00
Pranavaditya Spg Mills	Target	42.34	41.48	5.99	36.54	6.07	32.82	21.38	4.76
	Slack	0.04	0.00	0.00	1.50	3.54	0.62	0.00	0.00
Ravi Spinning Mills	Target	5.01	4.90	0.20	4.35	0.19	2.91	1.56	0.86
	Slack	0.91	0.59	0.02	0.00	1.64	0.00	0.00	0.00
Shamken Spinners Ltd.	Target	110.56	105.71	54.97	54.80	22.17	101.07	58.95	19.11
	Slack	33.61	33.31	35.70	0.00	0.00	0.00	2.70	0.00
Shree Jaya Laxmi Autospin Ltd.	Target	7.51	7.20	0.91	6.67	0.69	5.30	3.09	0.78
	Slack	0.42	0.30	0.47	0.00	3.09	1.06	0.00	0.00
Super Spinning Mills Ltd.	Target	173.87	168.41	25.53	144.83	5.02	144.40	92.48	15.48
	Slack	0.66	0.00	0.00	0.12	0.00	0.00	11.68	33.57
Surya Jyoti Spinning Mills	Target	67.79	67.48	6.69	60.57	4.73	44.74	25.76	8.00
	Slack	0.69	0.59	0.00	0.00	3.05	0.00	0.00	0.00
Sybly Spinning Mills Ltd.	Target	20.87	20.60	1.67	18.36	1.12	13.31	6.40	3.26
	Slack	0.00	0.38	0.00	1.01	3.35	0.00	0.00	0.00
Thambbi Modern Spg. Mills	Target	57.21	55.99	5.75	49.45	3.02	37.56	15.07	16.20
	Slack	0.00	1.75	0.00	4.64	0.44	0.00	5.38	0.00
VMT Spinning Co. Ltd.	Target	51.69	51.15	4.20	45.78	3.13	32.30	20.39	6.60
	Slack	1.30	0.00	4.20	6.88	4.35	0.00	0.00	0.00
Vardhman Polytex	Target	260.77	251.23	41.44	214.00	10.64	247.67	105.46	61.74
	Slack	69.94	76.40	0.00	73.81	0.00	0.00	0.00	0.00

least. While Kumaran Mills Ltd. has used little excess plant and equipment capital, net sales fall short by 1.79 crores. In the worst performing firms, Ravi Spinning Mills Ltd., and VMT Spinning Company Ltd. show large quantities of slack in resource utilisation. To be efficient, VMT Spinning Company Ltd. has to reduce equity base to 3.13 crores from 17.25 crores. The company may have employed only 32.2 crore in assets instead of 74.43 cores and should have consumed 20.39 crores on machines and equipment. Inventory consumption has to be brought down to half of the present level. Company's net sales and cash flow from operations should rise by 3.56 crores and 3.05 crores respectively from present levels to become optimal performer.

A bird's eye view analysis of Table 2 shows that among all the non-efficient firms, there is significant slack in how machine capital and inventory is utilised. From a practical viewpoint, the size and balance of the inventory of every business is of great importance. Inventories have been called the "graveyard of business", because they have so frequently been the prime cause of business failures. If both the inventory and the liabilities are heavy, bankruptcy often results. GTN Textiles and Super Spinning Mills have huge inventory burden. They are dealing with white gold i.e. cotton. Cotton is a commodity highly sensitive to price fluctuations. Often such organisations may gain from cotton stocks in escalating market price situations, otherwise they have to bear losses in falling market.

Conclusion

Inter-firm strategic performance assessment has been carried out using DEA and the precise extent to which performance is poor has been assessed. Finally, the use of DEA reveals the specific areas of operations in which firms are able to utilise their resources better.

The DEA Model also yields details of maximum target output to be produced by a firm to remain efficient. Optimal inputs to be consumed by inefficient firms have been computed for respective firms. The result indicates that the spinning mills are poor in day to day transactions management. Their total asset management skills are superior, compared to skills in utilising inventory capital. But mills are falling short in generating sufficient returns on equity capital. Since DEA yields dynamic performance analysis, further research is possible by using several other explanatory variables for objective-wise intra-firm analysis.

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Feature

Compensation Policy in Indian Public Sector: An Evaluation

Suresh Chand Aggarwal

A rational compensation policy has three important goals: to attract, retain and motivate employees in an organisation. The need of such a policy is more crucial in an environment where private sector has started competing with the public sector. This has made recruitment difficult in the public sector and has put pressure on it to improve its efficiency. It is in this context that the compensation policy of the public sector has been evaluated.

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With technological change, the boundaries between countries have shrunk. New technology with new occupation composition of labour force, aided by opening up of the economies, has raised questions on wage and salary rates, job structures, incentive plans, supplementary benefits, profit sharing, and the motivational values of non-financial rewards. Flexi working time and consequently flexible pay system have become the new mantra especially in industrialized countries, in recent years. Flexi time is taking the form of work sharing or hours averaging or just compressing the workweek. In Europe it is done mainly to reduce working hours – Germany reduced annual work hours in manufacturing from 2080 to 1589 i.e. 24 per cent between 1960 and 1990: 40 hours week reduced to 36 in 1993 and 35 in 1995. Denmark, France, UK, Sweden, Switzerland all had lower annual working hours than USA in 1990, only Japan had more working days (2143 in 1989) than USA (1904 in 1990) but it is also cutting down to bring them to USA level. In USA flexi time is being used for new people to enter workforce. Korea, Singapore, Malaysia, and now India also are adopting this principle where flexi pay system is the norm. The pay system besides a basic wage and an annual wage supplement has a variable wage supplement that may be upto 20 per cent in practice. In this situation, the evolution of a rational Compensation policy has become an uphill task in a developing country. It is more difficult and complex in a democratic society like India where the poor, the underprivileged, the backward, the downtrodden and the unemployed are the focus of any meaningful policy, howsoever poorly implemented it may be.

Compensation system of an organisation constitutes all rewards monetary or non-monetary and current or deferred. It includes pay for work and performance i.e. basic pay, cost of living adjustment (DA), overtime payments, shift differentials, travel expenses, etc; pay for time not worked i.e. holidays, vacations, sick leave, earned leave, maternity leave, lunch and rest periods, etc; deferred income as pensions, social securities like P.E;

profit sharing (bonus), stock purchase plans, stock options plan; etc, family income continuation like pension plans, life insurance, group life insurance, social security, etc; other benefits, as medical expense reimbursement, chauffeur driven car, subsidized food, housing, entertainment allowance, etc. The composition of a compensation package may differ from industry to industry and also within an industry. What an employer finally pays an employee is determined by such factors as the policy of the organisation, its capacity to pay, prevailing market rate of similar jobs in the industry and in the region, any government regulation on minimum wages, and the bargaining power of the employees. A sound compensation policy has three goals: to attract, retain and motivate employees. It is generally integrated with the broad objectives of an organisation and of an economy. A rational policy should maintain a balance between an apparent conflict between the need to generate surpluses for economic growth and the creation of job opportunities with the social concern for marked improvement in wages and salaries and working conditions. Such a policy is required for every organisation that employs workers and managers, as the efficiency of work organisations is influenced by their compensation decisions.

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The Indian Experience

Evolving a rational comprehensive compensation policy consistent with our development objectives has remained one of the most important endeavours during the entire planning era. Whereas wages in the public sector are fixed on Pay Commission/Wage Board's recommendations by the Government, private sector wages are generally fixed by the forces of demand and supply. Employment in the two sectors also differs in respect of non-wage benefits such as fringe benefits, working conditions and job security. As a result we find enough evidence indicating the growth of high wage/salary islands, failure to implement minimum wages in the private non-agricultural and agriculture sector, failure to restrain the increase of wages and salaries in the public sector and continuance of intra-sectoral differences in compensation to employees. In 1994-95, the income per person in the organised sector was 6.5 times that of the income per person in the unorganized sector. The compensation to employees is currently 36 per cent of NDP in the aggregate and 61 per cent in the organised sector. In the public sector, the share of employee compensation in net value added is larger—67 per cent in the aggregate. Besides differences in compensation components, we observe other distinctions in the workforce distribution. The share of the informal sector in the workforce has increased from 90.5 per cent in 1972-73 to 91.1 per cent in 1993-94. Within the formal sector, there has been the dominance of the public sector (covering the Central, State and Local bodies besides the departmental and non-departmental commercial undertakings) which accounted for 70.7 per cent of the employment in 1995 as compared to 59 per cent in 1961. Thus discussion of compensation policy has become vital especially in the context of achieving international competitiveness and restructuring of the public sector to improve their efficiency. However the discussion is confined mainly to central Public Sector Undertakings, factory segment of the Industrial Public Sector (as defined by ASI) and employees of the Central Government.

Compensation Policy in the Public Sector

Central PSE's: Public enterprises, with a total investment of over Rs. 1.93 lakhs crores in 1996-1997, were employing 19.78 lakhs people. A majority of the public enterprises set up by the Central government had in the early stages the objective of creating employment opportunities and being a model employer. As a consequence, all human resource policies in public enterprises have focussed not only on wages and salaries of the employees but also on other components, such as housing, bonus, etc. In general the workers in this sector are better placed than their counterparts in other sectors of the economy including Central government employees. Initially, in the case of workers in various enterprises, the practice has been to enter into wage settlements with unions representing the employees.

Prior to 1968, public enterprises were required to obtain Government's approval for any general revision in the terms and conditions of service of their employees. Generally, the level of emoluments in public enterprises used to be fixed by the management on region-cum-industry basis, taking also into account the level of emoluments prevailing for central government servants of comparable categories. In view of the recommendation of the Administrative Reforms Commission (1967), public enterprises were made free to make appointments irrespective of pay, for all posts below the Board level without reference to the government. It was, however, recognized that though uniformity is not possible in the matter of pay and

allowances, wherever possible, rationalization has to be effected. The freedom, depending upon the relative strengths and weaknesses at the bargaining table, led to wide differences between different enterprises inter-se and between the levels obtaining in the central government and the public enterprise. The trend of distortions was arrested towards the end of 1971 when the Third Pay Commission highlighted that the public enterprises were raising their emoluments considerably despite losses suffered by them. The Government then decided that there would be no general revision of wages or increase in fringe benefits in the public enterprises without prior consultations with the central government. Within the government, the then Bureau of Public Enterprises in the Ministry of Finance acted as the central coordinating point for the scrutiny of such proposals. It was felt that there is no uniformity either in the periodicity of review or the extent of neutralization. The lack of uniformity was all-prevalent between the public sector and the Central Government employees and between the central government and state government employees. Even within the same sector, the practice varied from institution to institution leading to wide disparities, even within the public sector, in emoluments between employees of the same status. The Government, through the Bureau, has been trying to rationalize the wage structure and eliminate the distortions in it. The Department of Public Enterprises, Ministry of Industry continues to function as a nodal agency for evolution of policy relating to wage settlements of unionized staff, etc. The subsequent wage settlements were aimed at bringing uniformity in wage structure and included the total package of monetary rewards from employment. Workers in public enterprises had been deriving benefits in addition to wages and perquisites, minimum bonus at the rate of 8.33 per cent of wages. Moreover, they had also been getting other opportunities of supplementing the income by overtime allowances, rapid promotion policies and favourable fringe benefits and scale revision through periodic wage settlements at a greater scale than those available to their courterparts in Central Government. The upward management of emoluments of unionized workers had exercised pressure and led to periodical pay revision of supervisory personnel but the gap between the two had gradually narrowed down. The upward movement of emoluments of workers eroded the capacity to pay in many public enterprises.

All this led to a change in the thinking of the Government, in 1980's, which considered it necessary that increases in wages of the workers be linked to productivity so that on the one hand, the enterprises would have the capacity to pay and, on the other hand, the increase would then appear to be sharing of the fruits of prosperity. However, pending evolution of clear guidelines on the subject, a number of wage settlements were entered into, according to earlier guidelines. But since July 1995, 242 public sector enterprises have been brought under the same DA pattern i.e. IDA, and the earlier distinction between industrial DA and central DA has been abolished. This step will further rationalize the wage structure. The new wage policy announced in November, 93 and January, 1994 while implementing the last pay revision of 1992, emphasized that PSEs should generate their own resources for meeting enhanced liability on account of wage revision and no budgetary support to them the government is to be provided. Also no automatic increase in administered prices of their goods and services is to be made. There should be no increase in labour cost per physical unit of output and same IDA pattern is to continue. The same guildelines were issued while granting the interim relief of minimum Rs 280 to the staff of 247 PSU's with effect from January 1, 1997 to give shape to Justice Mohan committee recommendations for pay revision; which is applicable to 3.5 Lakhs executive and non unionized PSU employees. It was, however, made clear that no interim relief would be granted to employees of sick PSE's referred to BIFR and other loss making enterprises, which have so far not revised their pay scales from January 1, 1992. While chief executives of some major PSU's have rejected the recommendations of the Justice Mohan committee and asked for higher salary than Secretaries in the Central government in the ratio of 1.28:1, the NTPC executive federation wants parity with the oil majors ONGC and IOC. So wages and salaries in public enterprises continue to be determined and revised through "settlements" and "understandings" between the employees and the enterprises.

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Public Sector-Factory Segment: Based on demand for labour, Central Wage Boards were set up for such industries as the government thinks it necessary. The First Wage Board was set up in 1957 in Cotton textiles and many more were set up later for different industries. The wage boards decided on the minimum wage for unskilled work in the industry and a structure of differentials for other employees. However, because of delay in decision-making and implementation, as long as five years in many cases, the system lost faith on the part of

both employees and employers. The boards, therefore, gradually declined in importance and very few were set up in later years.

Central Government Employees: In respect of central government employees, pay fixation/revision has essentially been effected through the mechanism of specially appointed pay commissions. Successive pay commissions (so far five) have been set up for evaluating compensation packages for employees at intervals of 10 to 13 years. A great many changes take place in the structure of emoluments of government employees over a decade. It thus becomes necessary to modify the pay structure. The pay commission examines various issues such as pay and allowances, retirement benefits, condition of service, promotion policies, etc. The Fifth Pay Commission, which was set up in April 1994 and submitted its report in 1997, had among other tasks, the rationalization and simplification of the pay structure with a view to promoting efficiency in administration, reducing redundant paperwork and optimizing the size of the government machinery. The effort was to streamline, restructure and improve the efficiency of the government. The commission stressed the need to improve productivity and suggested different measures including making more time available, through increase in the number of working days, etc. and motivating employees to work more through performance appraisals, linking bonus and other rewards to productivity, output based budgeting, reducing number, etc.

Evaluation of Compensation Policy

Evaluation of the compensation policy in public sector has been attempted in the context of three pillars of a sound compensation policy, namely: to recruit or attract employees; to retain employees; and to motivate employees. All the three guiding motives are interlinked and help an organisation in cutting down costs by reducing high turnover of employees and improving their efficiency.

Attracting employees: After 1947, public sector in India was established with one of the key objectives of providing employment and being a model employer. Prestige attached to Government service and the associated job security were big motivational factors to join any kind of government service till 1990. Private sector till then was not a good paymaster and grew under the shadow of the public sector leading to a rapid increase in employment in the public sector. Whereas employment in organised public sector grew by 170 per cent (column 2, Table 1) from 70.5 lakhs to 192.49 lakhs at an annual compound growth rate of 1.15 per cent, that in the private sector increased by merely 72 per cent with the annual growth being only 0.53 per cent. The increase in employment in the public sector has been criticised by economists, overstaffing being described as the main cause of sickness of many PSE's Since 1990-91, when new economic policies were introduced, the growth in employment of private sector has been faster (0.72 per cent) than the public sector (0.073 per cent). As a result, recruitment in public sector has become increasingly difficult as the private sector is now in the position to provide better remuneration and perquisites as compared to the government sector for comparable positions. This factor also influenced the Vth Pay Commission committee members while recommending pay scales for central government employees so as to maintain external equity in wages and salaries between the private and public sector. Similar growth pattern was observed for central government employees and public enterprises except that during 1990-97, the public enterprises witnessed a decline in employment.

Table 1: Employment Statistics

Year	Employment in organized		No. of central govt. employees	No. of employees in public enterprises	Factory sector-public sector (Lakhs)
	public sector	private sector			
1961	70.5	50.41	16.2	NA	NA
1971	107.31	67.42	26.99	7.01	13.65***
1981	154.84	73.95	34.07	18.39	20.48
1991	190.57	76.76	38.13	22.19	23.23
1995	194.66	80.59	38.73**	20.62	22.04
1996	192.29	85.12	38.45	20.51	NA
1997*	192.49	86.61	NA	19.78	NA
growth rate					
(1961-97)	1.146	0.532	1.03	1.487	0.847
(1990-97)	0.073	0.72	0.135	–0.662	–0.457

*Quick estimates

**Refers to 1994

**Refers to 1973-74

Note: Rate of growth (%) estimated on the basis of semi-long equation.

Source: 1. ASI 2. P.E. survey 3. V Pay Commission Report, Vol. 1

Employee Retention: Employees can be retained by an organisation only if both internal as well as external equity are maintained. It requires not only comparable wages and salaries but also other perquisites. Provision of houses being a factor in bringing about employee loyalty, PSE's incurred heavy expenditure on housing and townships—Rs 6385 Crores were spent till 1997 and more than 9 lakh houses were constructed. Recent

ASI data of factory sectors of industries shows that share of wages and salaries to total labour cost has been consistently higher in public sector enterprises. The share of other perquisites like bonus, PF and other funds and staff welfare funds have been higher for the private sector (Table 3), though the gap has increased after 1990-91. The average amount of bonus paid per 1000 mandays worked increased in the private sector from Rs 4163 in 1985-86 (Rs 4224 in the public sector) to Rs 8666 in 1993-94 (Rs 6477 in the public sector). During the same time, bonus earned per Rs 1000 earned as wages and salaries reduced in the private sector from Rs 95 to Rs 82 and in the public sector from Rs 79 to Rs 46 thereby widening the gap (Table 4). Thus, we find that private sector generally has been paying higher bonus. But the data in table 5 shows that the public sector has been more successful in retaining the employees as the separation percentage, which indicates severance of employment at the instance of workers or employers or both, has been low for the public sector. Whereas the percentage increased from 10 per cent in 1988 to 12.7 per cent in 1993 for the public sector, it reduced to 17.7 per cent from 18.7 per cent in the private sector. It reflects increased loyalty of employees to the private sector in recent years. The private sector, where variable pay package is increasing from just 10-15 per cent a year ago to 40 per cent of total emoluments in 1997-98, is willing to pay and pay steeply to attract and retain trained manpower (Table 2). The growth of private sector and the emphasis on reforms in the public sector partially explain the large number of people who opted for voluntary retirement scheme in the public enterprises (109, 421 till March, 1998) and the reduced employment level in the public sector (Table 1).

Employee Motivation: Employees are not only to be recruited and retained but are to be motivated also so as to give their best to the organisation. Motivation is an inner urge to put in one's best. It is a real catalyst of action. Motivational levels can be increased by external props like salary levels, cash incentives, promotion

Table 2: Emoluments

(Rs)

Year	Average emoluments at current prices		Average annual per capita emoluments in public enterprises
	Public sector	Private sector	
1980-81	10204	7030	15470
1985-86	19153	12325	24328
1990-91	34856	20675	49179
1994-95	54243	32291	82517

Source: ASI, Public Enterprises survey

policy, work environment, etc. The Vth Pay Commission has identified various motives for people to join the public sector: power, authority, status, the majesty of the law, being a part of the governing class, to serve, to don the uniform of the soldier, or a policeman, etc. Such employees can also be motivated by internal props such as non-monetary rewards, recognition, awards, promotions, etc. simultaneously reducing harassment through premature transfers, etc. Motivational factors also serve the goals of attracting and retaining employees. Motivation level of the employees can be gauged from the efficiency with which they have worked. Many economists have dealt the question of relative efficiency of the private sector vs. public sector. Majumdar (1995) calculated the efficiency scores of public and private sector for the years 1973 to 1988 and concluded that public sector in general and central govt. sector in particular is less efficient (with an average score of .658) than the private sector (score of .975, on a scale of 0 to 1), the reason being "...attaining efficiency is not a primary managerial motivation in the government owned sector". Gouri (1996) reached the same conclusion by comparing the return on net worth and profit after tax (PAT/sales) as a ratio of sales – both were low for public sector. However, Rao (1996) has contradicted the result on the basis of total factor productivity growth rate calculated by double-deflation

Table 3: Share of Perquisites

Year	Average labour cost (Rs)		Percentage to Total							
			Wages, salaries, etc.		Bonus		PF and others		Staff welfare fund	
	Public sector	Private sector	Public sector	Private sector	Public sector	Private sector	Public sector	Private sector	Public sector	Private sector
1985-86	66	55.26	79.8	77.2	6	7	5.7	8.9	7.6	7
1988-89	91.73	76.72	81.4	78.3	6.3	6.9	7.3	8.4	5	6.4
1991-92	138.25	114.9	83.2	78.6	4.4	6.5	7.2	8.1	5.2	6.7
1993-94	167.71	130.08	83.6	79.2	3.7	6.2	7.8	8.3	4.9	6.3

Source: ASI

method (TFPDD). The growth rate for public sector was 3.2 per cent and for private sector it was calculated to be 1.4 per cent for the period 1973-74 to 1992-93. Net value added per employee and value added per rupee of emolument were used as the main indices for evaluating efficiency.

Table 4: Bonus Statistics

Year	Average amount of bonus per 1000 mandays worked (Rs)		Bonus per Rs 1000 earned as wages and salary (Rs)	
	Public sector	Private sector	Public sector	Private sector
1985-86	4224	4163	79	95
1988-89	5972	5642	79	91
1991-92	6374	8103	54	86
1993-94	6477	8666	46	82

Source: ASI

Table 5: Annual Rate of Labour Turnover

Year	Separation Percentage	
	Public sector	Private sector
1988	18.7	10
1991	18.6	12.3
1993	17.7	12.7

Source: ASI

Table 6: Labour Productivity

Year	Factory sector net value added per employee (Rs)		Value added/ emoluments	
	Public sector	Private sector	Public sector	Private sector
1980-81	16361	15185	1.72	2.17
1985-86	34973	27981	1.81	2.27
1990-91	72640	57507	2.08	2.78
1994-95	127551	113148	2.35	3.50

Source: ASI

The growth in net value added per employee being higher in public sector along with high emoluments to value added is suggestive of the link between high emoluments and high productivity but the causality is difficult to be inferred at this stage. But it would be difficult to argue that higher net value added is entirely due to increased labour cost. Table 3 shows that average labour cost in public sector has tended to be higher than the private sector and a higher percentage of its payments are in terms of wages. However, when we examine value added per rupee of emolument paid to employees, we find that the efficiency of labour is low in public sector as compared to private sector (2.35: 3.5) (Table 6), though it has increased over the years. We, therefore, find that employees in public sector generally did not get enough motivation, despite higher emoluments, to give higher efficiency.

Concluding Remarks

Compensation policy in India's public sector did succeed, though only partially, in achieving its goals. While the public sector attracted employees and created employment opportunities, it also acted as a model employer by providing not only higher wages and salaries but spending funds for creation of other infrastructure; like housing, townships, etc for its employees. The employees, however, did not reciprocate and remained less efficient than the private sector. The efficiency of public sector employees, i.e. labour productivity is, however, increasing since 1990's. The low efficiency of public sector has been explained by the absence of any output accountability on the part of employees. Managers in such organisations know they are free of both market discipline and sanctions from the ultimate principals, the civil servants or politicians who ultimately defacto own them. There is the reality of the political environment surrounding government owned enterprises and many interest groups use pulls and pressure to further their own interest. With the growth of private sector and increased compensation packages offered by it, the public sector is getting conscious of its past follies and has tried to take some corrective steps like rationalizing the salaries through Pay Commissions and Wage Boards, etc. As a result some external equity has been restored between the private sector and the public sector which was disturbed during the mid-1990's. Thus a rational compensation policy is the need of the future so as to maintain internal and external equity in the National Wage Policy.

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Feature

Mentoring for HRD

Shailendra Singh & Archana Shukla

The present paper addresses various issues on the process of mentoring. The profile of Indian subordinates can be described as one of high dependency, with preference for personalised and hierarchial relationship leading to a scenario where mentoring would be a desirable intervention for enhancing organisational effectiveness. The case of NCL is discussed to describe the Indian experience in mentoring which is encouraging. Potential pitfalls of mentoring are also presented.

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In the current era of stiff competition, both in home land and across the global market, organisations are falling back upon their human resources for competitive advantage. Human resource professionals are experiencing a great challenge in responding to the aspirations of their employees catering not only to their present needs and expectations but fulfilling their future career aspirations also. In this context, practitioners and academics have found the concept of mentoring to be of great potential in creating and sustaining an organisation's competitive edge through development of employee competencies and facilitating employee fulfilment. As Hunt & Michael (1983) opine, mentoring is a tool of career training and development.

What is Mentoring?

The word mentor comes from the name of a person who was a friend of Odysseus and entrusted with the education of Odysseus' son Telmachus (Webster's New Collegiate Dictionary, 1981). Thus in traditional sense mentor means a teacher. But over the years this concept has evolved and become more complex and powerful. The related term mentoring refers to the process that emerges during interaction and relationship between mentor and protege.

Mentoring refers to the process that emerges during interaction and relationship between mentor and protege.

Mentoring has been defined in a variety of ways in literature (Aryee, Chey & Chew, 1996; Hunt & Michael, 1983). Collins (1979) defines mentoring as "one to one relationship between a more experienced person and an inexperienced person, and only until the latter reaches maturity". Bolton (1980) posits that mentoring exists when "an experienced person provides guidance and support in a variety of ways to the developing

novice. In addition to being a role model, the mentor acts as a guide tutor or coach and a confidante". Ragins and Cotton (1991) define mentor as "a high ranking, influential member of the organisation (in which the protege works) who has advanced experience and knowledge and who is committed to providing upward mobility and support, to the protege's career". On the basis of the exploratory study based on in-depth interview of fifteen managers, Kram (1983) identified two mentor functions—career related and psycho-social. Career related functions include providing sponsorship, exposure, visibility, coaching, protection, and challenging assignments/activities which directly involve the protege's career advancement. Psycho-social functions include providing role modelling, acceptance, confirmation, counselling and friendship activities having impact on the protege's self-image and competence.

By definition, mentoring provides both psychosocial and career related help to proteges. Psychosocial functions enhance the proteges' sense of competence, identity and role efficacy. These functions include serving as a role model of appropriate attitude, values and behaviour for proteges, conveying unconditional positive regard, providing opportunity to the protege to talk openly about his/her anxieties and fears and interacting informally with mentors at work. Career functions include those functions of mentoring which prepare the protege for career progression. These functions incorporate nominating the protege for desirable projects, lateral moves and promotions, providing assignments with high visibility to organisational power holders, sharing ideas, providing feedback and suggesting strategies for achieving work goals, reducing unnecessary risks that might damage the protege's reputation and providing challenging assignments and exposure to future opportunities.

Mentoring provides both psychosocial and career related help to proteges.

Stressing on the developmental aspects of mentoring, Levinson (1978) defines it as one of the most complex and developmentally important relationships a man can have in early adulthood. The mentor is ordinarily several years older, a person of great experience and seniority in the world the young man is entering. Different shades of mentoring are captured by terms such as counsellor, guru, teacher and advisor. Mentoring also includes identification, admiration and internalisation. Levinson feels that the author of a book can also be treated as a mentor if the book has had influence on the individual. Picking up the common threads of various definitions of mentoring, Noe (1988) defines that the mentor is usually a senior experienced employee who serves as a role model, provides support, direction, feedback to the younger employee regarding career plans and interpersonal development and increases the visibility of the protege to decision makers in the organisation who may influence career opportunities.

Noe (1988) has provided a comprehensive definition of mentoring with specifying elements/acts that a mentor performs. The issue of mentoring in this paper subscribes to Noe's definition.

What is HRD?

HRD is a philosophy of management. Essentially, it is a humanistic concept which places a premium on the dignity and potential of people. HRD emphasizes that people are assets of companies. Human Resource Development is the process through which people are helped to acquire and sharpen skills required to perform various functions connected with their present and future roles. HRD philosophy in the organisational context stresses that managements owe to themselves to value human beings, irrespective of their performance, productivity, and should provide conditions and opportunities to employees for attaining the fullest of their potentials.

Mentoring—HRD Linkage

Intuitively, mentoring seems to be an instrument of HRD and there is clear linkage between both. Mentoring provides both career related as well as psychological support to employees through which employees feel empowered, and their path for career progression is facilitated.

Benefits of Mentoring

In recent years, mentoring has been studied as a mechanism of employee development. On the intuitive plane, there are obvious benefits of receiving mentoring on skill development, competence building, career advancement etc. Hence an attempt was made to provide some empirical evidence on the benefits of mentoring for people and organisations.

Job Performance: Both mentors and proteges are benefitted in the process of mentoring. Both report more success in their careers, defined in terms of promotion rate, salary and job performance (Dreher & Ash, 1990); Fagenson, 1989; Scandura, 1992).

Job Satisfaction: Mentoring is linked with job satisfaction in two different ways. First, there is a positive

relationship between mentoring and career commitment. Second, a negative relationship exists between mentoring and job dissatisfaction manifested in absenteeism and turnover. Fagenson (1989) examined the level of job satisfaction in mentored and nonmentored individuals. The results showed that mentored individuals experience higher level of satisfaction than their non-mentored counterparts.

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Early Career Socialization: Studies show that newcomers seek out established members to serve as role models (Schein, 1968), sponsors (Burke, 1984) and mentors (Burke, 1984). Employees having mentors are more likely to learn the workplace dynamics faster and adjust themselves more quickly to the demands of organisation than those who do not have mentors. Mentoring also helps in enhancing organisational commitment among proteges (Zey, 1984). The process also humanises the environment for the protege and serves as a mechanism for integrating him into the corporate culture (Zey, 1984). Howe (1995) observed that employees who have strong mentors are less likely to change jobs frequently. Kozlowski and Ostroff (1987) explain the dynamics by observing that mentors provide their proteges with special organisational information about the organisation's norms, procedures and policies to inculcate confidence in them.

Succession Planning: Mentoring continues the traditions of apprenticeship when master craftsmen taught young people the skills necessary to become masters in their own right. Thus mentoring is the process through which a younger person is groomed to take up newer and challenging assignments. Henslor (1994) reported that mentoring is an accelerator for effective succession because through mentoring, many high and reliable performers become available to the organisation.

Preparation of Leaders: Mentoring relationship, if successful, offers a mini-course in leadership. Mentors serve as role models, and proteges identify and internalize the values of mentors. Besides that, a host of managerial issues like role of mentoring in mainstream management development and in achieving organisational change are also handled. Mentoring can be instrumental in succession planning, communication improvement, culture change, key competencies identification and inducing a cross functional approach to management. Through these functions, mentors develop a nursery of leaders (Zalenznik, 1977). Further Jennings (1971) found that most corporate mentors have had mentors who played a critical role in their success.

Empowerment: Junior and middle level managers and employees complain about their powerlessness. Mentoring is believed to have an empowering effect on these employees. In an interesting study, Fatenson (1988) examined the proteges's perception of his influence in organisational policy decisions. Mentored individuals reported having more influence in policy decision, greater access to important people and a higher level of control over valued resources than non-proteges. The results showed that mentored individuals reported having more overall power than individuals who were not mentored. As a protege learns the ropes of the organisation he starts perceiving himself as one of its power holders. Further, since power enables individuals to operate more effectively in organisations, mentored employees' productivity and contribution can be relatively higher (Habler & Lowe, 1985). Since mentor connection enhances accessibility to people who matter in organisations, mentored employees were likely to experience less frustration and more satisfaction than their non-mentored counterparts (Kanter, 1977). Due to mentor connection, proteges also display more resourcefulness.

Antidote to Stress: Mentoring is a potentially valuable resource for learning and coping with major organisational change. Kram and Hall (1989) in their study of 161 male managers found that mentoring relationships serve as an antidote to stress, providing a variety of support to both junior and senior employees. Such developmental relationship is more visible during stressful periods. People who are under stress need encouragement, guidance and coaching from more experienced colleagues. Stressed employees are more interested in seeking relationships with potential mentors than during calmer and stable situations. Rationale for seeking mentor alliance while under stress is congruent with the psychological perspective on the role of affiliation (Schacter, 1959) and interpersonal relationship (Rogers, 1961) in reducing anxiety and stress and in promoting self esteem and positive self image.

Breaking the Glass Ceiling: It is generally reported that female managers and those belonging to minority experience an artificial glass ceiling in their career beyond which it is next to impossible to move. The process of mentoring has a potential for breaking that glass ceiling. Barker, Monk and Finian (1997) found in their study of two chartered accountant firms in Ireland,

that the most important element of mentoring relationship was the career development aspect. 72 per cent of the respondents agreed that having an influential mentor is critical to their promotion as partners and 93 per cent of partners who responded said that they had a partner who acted as their mentor. The study revealed that while mentoring relationship experienced by men got strengthened as the grade increased, the level of mentoring received by women remained relatively unchanged as they progressed up in the firms.

Is Mentoring Desirable for Indian Organisations?

Sinha (1995) identified three salient characteristics of Indian subordinates, namely, Dependency, Preference for hierarchy, and Preference for personalised relationship.

Dependency: Indian employees display an excessive degree of dependency (Chattopadhyaya, 1975; Pareek, 1968). That is, they seek support, guidance, and encouragement in situations where they are apparently competent to make decisions and function without receiving a dose of encouragement. Misra and Kanungo (1994) also observed dependency and helplessness as typical of Indian employees.

Preference for Hierarchy: Kothari (1970) reported that Indians feel more comfortable in superior-subordinate relationship rather than in peer relationship. Significant others play a very important role in the psyche of Indian employees (Sinha, Singh & Shukla, 1986). Success is more a function of blessings (Kripa) of powerful others rather than of one's own effort. Efforts are, therefore, invested to please and appease powerful others. The superior has the obligation to help, protect and guide his/her subordinates. Superiors enjoy patronising and create conditions where dependency is unavoidable or appreciated. People with high dependency are rewarded and people with initiative and independence are frowned upon and distanced.

Preference for personalised relationship: Indian subordinates have distinct preference for personalised relationship over contractual relationship (Misra & Kanugo, 1994). An earlier study of Kumar and Singh (1976) also revealed preference for personal relationship. Kumar and Singh observed that Indian managers have a two dimensional framework to perceive others and to interact with them: Own–others and personal-impersonal. Family members are own and personal while strangers are impersonal and others. Dayal (1976), De (1974), Roland (1988) also confirm the view that Indian employees like to work in personalized relationships.

Hofstede (1980) reported that Indian managers were high on power distance and collectivism. Power distance refers to the fact that power in institutions and organisation is distributed unequally. Collectivism is characterized by a tight social framework in which people distinguish between ingroup and outgroup. They expect their ingroups (relative, clan, organisations) to look after them; in return, they owe an absolute loyalty to it. The implications of the findings are that India is a hierarchical society where there is a wide gap between less powerful and more powerful persons. Similarly Indians describe themselves in terms of groups and collectivities and sacrifice personal needs/preferences for the sake of groups and families.

Given the profile of a typical Indian employee who is excessively dependent, prefers hierarchical and personalised relationship rather than contractual relationship where power is high, and collectivism is preferred over individualism, the process of mentoring is the most suitable mechanism to bring out the best from Indian subordinates.

Given the profile of a typical Indian employee who is excessively dependent, prefers hierarchical and personalised relationship, the process of mentoring is the most suitable mechanism to bring out the best from Indian subordinates.

Now the question arises whether the process of mentoring caters to the salient needs of Indian employees? Stated differently, whether the process of mentoring is congruent with the needs and values of Indian employees. The answer is affirmative. Persons with high dependency, who have preference for personalized relationship in hierarchical set up look for an anchor at work place whom they can fall back upon in moments of confusion, crisis or for seeking assurance and guidance. These people may want to know about their jobs and effective ways of performing the same. Mentor will prove to be a powerful source of information, guidance and support. Hence mentors and the process of mentoring are very much desirable and needed in Indian organisations. Here it may be clarified that mentoring relationship is a developmental relationship, and it terminates when the protege attains the level of maturity to become a mentor in his/her own right.

India has a long tradition of mentor relationship. Relationship between Krishna and Arjuna can be described as one of the best examples of mentor

relationship. Sinha's (1980) Nurturant Task leadership style incorporates mentoring in it. In fact nurturance dimension of nurturant task leadership is what is here referred to as mentoring. To quote Sinha (1995, p. 102).

> "A nurturant leader is one who cares for his subordinates, helps them grow, shows affection, takes interest in their well-being etc. He is the person who allows his subordinates to depend on him, cultivate an emotional and personal relationship and run to him for personal guidance and trust. He has affection for those subordinates who in turn have *shradha* (deference) for him."

However, mentor is not just nurturant, he may at times have to take certain harsh steps, keeping in view the overall growth of the protege just like a doctor prescribes bitter pills to cure a disease or parents discipline their children keeping their overall growth in mind. As Saint Kabir states,

'Guru Kumhar Shiskumbh hai

Garhi, garhi kadhe khot

Bhitar haath sahari de

Bahar mare chot'

The essence of the couplet is that mentor is like a potter who tries to reform and beautify the pitcher—the protege by moulding, cutting and reshaping. While doing so the guru is always concerned with the wellbeing and growth of his protege just like the potter who spanks the pitcher from outside but puts his helping hand inside to protect it from being damaged.

There are, however, many conditions under which mentoring can be effective. Organisations following mentoring as a programme of HRD must have the culture of open communication where people of all status can freely communicate with each other. Further a climate of interpersonal trust is also a pre-requisite for mentoring to succeed. If there is a climate of suspicion, mentoring relationship may not develop to its fullest extent. Moreover, the mentor must be open and willing to be challenged even on his basic assumption.

Mentoring in an Indian Organisation

Neyveli Lignite Corporation Ltd. (NLC) a profit making public sector company has used a formal mentoring programme for HRD. Silvera (1988) has documented the experience of NLC on the process of mentoring.

NLC was started in 1956 and by the end of 80s NLC was envisaging a large scale retirement of first to third line of managers with no adequate succession planning. The top management felt the need for ensuring corporate knowledge accumulated over the years remaining with NLC for future guidance. Mentoring programme was launched as a formal training programme with twin objectives: to preserve and pass on the expertise built into its executives over the period, and to create a climate of nurturance among managers. The objective of starting the mentoring programme was clearly stated by its Chairman and Managing Director that his purpose was to ensure transfer of skill and expertise from the generation of managers on verge of retirement to the new graduation being inducted into the company in large numbers. The retiring seniors were thus charged with nurturing a new generation of managers and securing the future of a company which they had built and sustained through difficult days (Silvera, 1988). Further, mentoring was seen to be instrumental in integrating graduate engineers and retaining them on long term basis.

Training programmes for mentors and proteges were separately and jointly designed with the help of external consultants. Pilot project was started with 22 carefully chosen executives as mentors and 85 graduate engineers as proteges. CMD interacted with groups of mentors as well as proteges to share the objectives of the programme—which were to establish a culture of nurturance and coaching at NLC and to encourage the senior members associated with NLC from the very beginning to share their experience and knowledge to the new generation of graduate engineers.

The goal of the mentoring process was set up. It was to facilitate the process of induction of graduate engineers, develop coping skills in them; provide perspective and clarity in career paths, assess their potential and enhance the mentoring capabilities of senior executives. Separate orientation training was initiated in which mentors were given conceptual input on mentor protege relationship and ways of enhancing proteges' competence and confidence, communication skills, time management, interviewing skills and self exploration. Mentors were also cautioned about the potential risks of mentoring relationship. Proteges were given orientation to clarify their personal and career expectation, articulate their strengths and weaknesses and goals that they want to achieve through the process of mentoring in various phases and development of interpersonal skills.

After three days of theoretical training, mentors and proteges were brought together for half-a-day training, where they were allowed to practice and experience mentoring under supervision, i.e. put into practice

whatever they had learnt from training. The consultant emphasized three phases in mentoring process: *Rapport building* where mentor and protege establish their identity (this is the stage where trust and patient listening is showed by both the parties to the relationship), *Joint exploration*—where both the mentor and protege explore jointly issues of feelings, relationship and hidden agendas, and *Action planning phase*—where the mentor takes up the facilitator's role and the proteges get involved in initiative action and self-discovery.

After training, mentors and proteges were expected to meet as and when the two mutually decide, but at least once a fortnight and atleast for half an hour. Forms were designed to assess the level and quality of interaction separately for both mentors and proteges. After six months of interaction a review meeting was held in which CMD made it a point to be present and provided feedback which was subsequently used for process improvement.

The feedback received both from mentors and proteges revealed that a climate of trust and openness was established in the process of mentoring and unfolded many unattended issues which needed top management attention for improvement of work process and employee satisfaction. Moreover, mentors reported a sense of fulfilment from the act of grooming the juniors and the top management feit that mentoring was a key source for inculcating a culture continuity and change. The essence of NLC's mentoring programme is to develop an organisation wide culture of developing and empowering subordinates through coaching and guidance. More experiments on mentoring process are needed in order to establish the credibility of mentoring programme in Indian organisations. Given the benefits of mentoring abroad and the encouraging feedback of NLC, the experiment is worth trying.

The essence of NLC's mentoring programme is to develop an organisation wide culture of developing and empowering subordinates through coaching and guidance.

Potential Pitfalls

Mentoring should not be treated as a panacea for all the problems of employee motivation and poor performance. Nor should it be treated as a substitute to regular management development programmes. However, mentoring does provide on-the-job training to younger employees, helps them come closer to the organisation and empowers them by enhancing their competence, self-efficacy, and self-esteem. There are also potential pitfalls of the mentoring process in relationship issues. Mentoring may reinforce dependency among proteges. If the mentor is enjoying the process of mentoring and not willing to terminate and redefine the relationship, it may become unproductive. Further, mentoring should not become a crutch for proteges. They must come out of the relationship with the mentor as one of lasting friendship. There may be an experience of loss of self confidence, frustration, blocked opportunity, and a sense of being betrayed if the relationship is not complementary or is prematurely terminated. Mentors may feel disturbed if their proteges are not able to display the desired level of performance, as poor performance of proteges may put mentors in bad light. Mentors may also feel envious and resentful if their own career progression in the organisation is blocked and feel that their proteges may catch up or surpass their own achievement (Kram, 1980). Wrong choice of mentors may cost proteges their valuable career time and may invite negative poor rating (Kram 1980). Mentoring process if not working properly may lead to sycophancy and ingratiation of mentors, and other political behaviour dysfunctional to organisational functioning. Mentoring has also been found to be problematic when sexual issues crop up in cross-gender relationships which may involve sexual attraction, marital disruption and damaging gossip (Burke & Mckeen 1990, Lorinc, 1990). Top managements have to be cautious and plan meticulously to avoid these pitfalls. To summarise, mentoring has emerged as an effective mechanism of HRD. It benefits proteges, mentors and the organisation as a whole.

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Feature

Management of Information Technology in the Indian Army

S.K. Tripathi & R.D. Pathak

Organisational imperatives existing in the Indian Army demand speedy and accurate processing of huge data. Suitable deployment of Information Technology is the key to address this situation. The study analyses the current status and future possibilities of IT in Indian Army.

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Indian Army is the third largest in the world, consisting of more than 40,000 officers and over a million men. It is also the largest force among all defence forces of the country. It holds more than 50,000 crores worth of inventory including 1,50,000 tracked and wheeled vehicles and over half a million other items. To fulfil its role of security of the country from external or internal threats, Indian Army remains deployed along the vast borders ranging from snow clad mountains and hot deserts to open plains and inhospitable jungles. It also remains involved in various states in low intensity conflicts to control insurgency and helping the civil administration during famines, floods, earthquakes, accidents and riots.

At the national level, the Army interacts with the defence ministry, the Navy, the Air Force and various other defence and civil organisations. The Army has a hierarchical operational structure consisting of six layers from the lowest unit called Regiment or Battalion to Brigade, Division, Corps, Command and the Army HQ. Other than these operational organisations, there are static organisations also, like the Area/Sub Area, depots, hospitals, training institutions, recruitment centres, workshops etc., in the functional chain. Planning for major issues like recruitment and HRD of manpower, procurement of weapons, stores and vehicles etc. is carried out at the level of Army HQ and Ministry of Defence. The execution and management of all these tasks is carried out at lower echelons down to the unit level. Efficient flow of information in such an environment is always a critical requirement.

The information resource holds a place of high importance in every field of Army activity. Speedy collection, collation and processing of information is vital for drawing desired inferences at all levels. Decision making process in the Army involves collection of raw data, its processing to produce information, and finally generation of outputs. Organisational imperatives, like the fluidity of situations prevailing in Army activities, mostly

demand that a vast amount of data should be processed in a very short time frame. Manual staff procedures fail to bring results and cause under utilization and loss of information. The large size and wide dispersion of Army resources and activities also add to the challenges in the process of information management.

Organisational imperatives, like the fluidity of situations prevailing in Army activities, demand that a vast amount of data should be processed in a very short time frame. The large size and wide dispersion of Army resources and activities also add to the challenges in the process of information management.

IT in Indian Army

Information Technology (IT) was introduced in Indian Army in late sixties for management of information. With a view of oncoming confluence and synergism of computers and communication, proliferation of IT in the Army began in 1965 with a report recommending automation in the areas of personnel management, operational information, inventory control etc. In 1969, Indian Army became a pioneer in the field of computers in the country by acquiring a mainframe computer system. Initial IT implementation plan was built on a hypothetical model, comprising distinct modules such as single-user systems, multi-user systems and record office management systems. In the seventies, an automated information processing system was introduced for decision making at Army HQ in the field of personnel management, logistics management and inventory control functions. Automation was made to limited extent in the areas of officer management system, vehicle data and logistic systems. Procurement of hardware remained a slow process due to user requirement not being very clear and lack of interest among senior staff. In the eighties, new organisations were created and more computer systems were installed at the Army HQ. Some efforts were made to install local area networks also. During this time, various procedural delays resulted in technical overrun of the hardware and non-availability of organisation specific software. With the rapid advancements of technology in early eighties, microcomputer based processors were adopted worldwide thereby shifting the concept from central processing towards distributed processing based on data networks. Army continued to lag behind technologically and remained dependent on highly centralized data processing. The frequent organisational changes, delays in decision-making, and lack of manpower resources hindered technology progress in the Army as compared to global developments.

Frequent organisational changes, delays in decision-making, and lack of manpower resources hinder technology progress in the Army as compared to global developments.

In the nineties, the Army recognized the need for PCs, LANs and WANs, and need of data communication channels for communication between Army HQ and lower formation headquarters. Under the five year computerization plan 1992-1997, PCs were procured and a few LANs established. During its eighth plan for automation, the Army outlined the salient features as: provision of PCs for units, Telex, FAX and data transmission facilities at HQs, implementation of automation and MIS, development of wargames and simulators for training, connecting the entire army on LAN/WAN, selective video conferencing and in-house software development. Recently, the thrust for IT proliferation in the Army has been further intensified under the ongoing National IT Action Plan of July 1998.

The review of literature, regarding evolution of IT in Indian Army, reveals that IT developments in Indian Army have not evolved according to the needs of the organisation but a piecemeal conversion of manual to partially automated system has been undertaken. Penetration of IT tools such as computers, FAX, modems etc. has remained restricted down to only limited HQ level and efforts to establish computer networks limited to the level of Army HQ and a few other HQ. Army units have largely remained untouched by new technology. The level of computer literacy is very poor among Army officers, especially among the junior and senior managerial levels.

Policies on IT implementation and training were framed and re-framed many times on recommendation of various study groups but their implementation in the complete organisation was not undertaken whole-heartedly. The literature review makes it clear that IT has not evolved to a level where it can effectively influence organisational structures and practices towards assuming its well-anticipated role of a force multiplier in Indian Army.

Studies regarding status of IT in other defence forces, reveal that a Revolution of Military Affairs (RMA) is in the process of spreading among defence forces around the world. The world is experiencing a third

wave warfare (information) due to the impact of IT revolution and, during its evolution, RMA is going to be dependent upon the IT and telecommunication capabilities of various countries and their application and absorption in the defence forces. RMA is considered to be influencing military strategies, doctrine and force structures in significant ways towards evolving leaner structures and organisations that will be technologically proficient and operationally based around information. IT is considered as the enabling force behind major inputs for the induction of RMA. Therefore, IT capabilities of the defence forces are influencing all other defence related aspects around the world.

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IT is in various stages of use and development, especially for Command Control Communications and Information (C3I systems, now known as C4I2EWS, i.e., command control coordination communication information intelligence and electronic warfare systems also) systems, among other defence forces. IT based long range weapon guidance systems are influencing the concepts of conventional military operations. IT based sensors and surveillance systems are being developed to create total digitization of the future battlefield. Cyberwar and Information-war capabilities are being evolved to play a dominant role in warfare where IT will be used as a weapon to neutralize enemy forces.

Further, IT applications are influencing various aspects concerning the defence forces. IT is being used to reshape training and education by way of implementing computer based training and distance education, virtual reality tools and simulators. Increasing use of computer based modeling and simulation is being taken up as a popular thrust area for future developments. IT applications are influencing various management practices as well; like decision making and information handling at various levels of hierarchy through automation, MIS and decision support systems. For information flow in static conditions, as well as operations, defence forces are evolving their internal IT networks. At the same time, they are using the Internet for various types of information services. Logistics Support during static conditions and operations is being planned through logistics MIS and networks. To build up their IT infrastructure, defence forces are mostly relying on 'off the shelf' procurement from the industry since better developed industrial technology is available for defence applications. Organisational structures are being evolved to align around the information systems and IT based tools to prepare for the information era.

The present study, therefore, has been conducted with the following objectives:

- The study the evolution of IT in Indian Army.
- To examine the role of IT applications in training and education
- To analyze the present status of IT management and to suggest a futuristic perspective on IT management
- To analyze gainful implementation and employment of IT networks and
- To study IT induced organisational changes and emerging management practices.

Based on literature review, discussions carried out with senior army officers and own observations and experiences, following hypotheses were formulated for the study:

- State of IT management in the Indian Army is perceived as poor.
- IT is perceived to be a useful tool for distance education programmes, targeted to provide equal opportunity of education for all personnel of the organisation.
- IT networks are perceived to improve information handling in the Army.
- Creating a new organisation of specialist personnel is perceived to lead to better IT management in the Army.

Methodology

A sample of 180 officers was selected, for this study, from amongst army officers present as faculty members and students attending courses, at three premier training institutes of the Army located at Mhow, M.P. The officers present at Mhow, either as instructors or as students, represent all branches of the Army with a wide spectrum of service experience. The selection of sample can be considered purposive since the subjects were representative. These officers were divided into three groups during sampling:

- Junior level management group having recently commissioned officers to officers having maximum 13 years of service.

- Middle level management group having 14 to 21 years of service.
- Senior level management group having 22 years of service and above.

Primary data collection was through the use of a questionnaire which was supplemented by interviews of senior army officers. Secondary data collection was carried out from following sources.

- Published reports on studies and research work regarding studies carried out on IT management and Management of Information Systems (MIS).
- Reports and Technical brochure published in the IT seminar conducted by the Army Headquarters at Delhi in 1996.
- Internet sites of defence forces on the world wide web.

Data obtained from the questionnaires was analyzed using suitable statistical techniques. The computer package of 'Microsoft Office' was used to assist in the analysis of data obtained from the questionnaires. The software provided the facilities of tabulating the data and presenting it in a variety of graphical forms for comprehensive understanding of the response pattern.

Unstructured interviews of senior Army officers were conducted. In addition, the views of officers involved in proliferation of IT in the Army were obtained and incorporated in the analysis of results. The scope of this study was to build a perspective for IT management in Indian Army at the national level.

Limitation in the review of literature remained due to the fact that very limited information was available on the impact of IT applications in the defence forces of other countries because these areas are still under evolution. Hence a model of emerging trends on likely IT induced changes has been utilized to consider efficacy of its implementation in Indian Army. Data collection about developments in the field of command and control systems and the current IT Action Plan of the Indian Army was a difficult proposition because most of the reference material is classified. Hence, only published information was used for the purpose of the study. Above all, one major limitation is that this study is confined to only Indian Army. Had the time and resources permitted to extend the scope of this study to the Air Force and the Navy, then there could have been a comprehensive picture about management of IT for Indian defence forces.

Results & Analysis

The main findings of the study, regarding current status of IT management, are as follows:

Availability of Computers

The availability of computers has increased from 39.42 per cent in 1995, as reported in a survey by Kar (1997), to 98.50 per cent in 1998 showing an overall improvement of 59.08 per cent. The data collected on source of computer procurement indicates that the percentage of procurement through regimental funds and grants of the army units is quite high compared to those supplied by the central controlling and coordinating agency. The number of computers provided by the Army HQ has been considered grossly inadequate by respondents.

Though there has been an improvement in computer availability since 1995, the opinion of respondents on adequacy of computer availability reflects a poor situation as 78 per cent of respondents found it inadequate, and 17 per cent found it most inadequate. In comparison to this status, other defence forces in USA, UK, Germany etc. have already acquired IT infrastructure for their units and HQs (Christopher, 1998). IT Action Plan of India, issued in July 1998 emphasizes the urgent requirement of IT penetration in all government offices and work areas. A minimum availability scale of one computer per sub-unit (company/squadron), and one each in other important sections, has been recommended by all respondents.

Computer Literacy

There is a large section of non computer-literate officers (49.50%) who are not able to operate the computer, with even one software, independently. In comparison to the survey conducted in 1995, as reported by Kar (1997), computer literacy has improved by 20.22 per cent in the last three years.

The improvement in computer literacy, compared to the survey of 1995, is attributed to constant training efforts and wider availability of computers in the organisation in the last three years and increasing interest among the officers towards acquiring computer knowledge. Another reason of rising popularity of computers is attributed to developments in computer operating system from older DOS (Disk Operating System) to the user friendly Windows operating system. Wide exposure to multimedia and Internet has also generated great amount of interest.

It is observed from both the surveys that middle level officers have higher levels of computer literacy

compared to the other two groups. These results indicate that available learning opportunities for junior officers are not adequate and senior officers have not acquired computer literacy due to non-existence of organisational computer culture and their own non-interest. Only middle level officers have better learning opportunities and motivation than the other two groups.

The response indicates an overall absence of organisational motivation to encourage officers in acquiring computer literacy. Lack of opportunities in the organisation to acquire computer literacy is attributed to inadequate computer availability in the offices and inadequate training courses. Aptitude test conducted for entrance to computer courses till late eighties, is also found partially responsible for poor computer literacy as it denied opportunity to attend computer courses to a small number (mostly senior officers) among the respondents, and also created a mindset thereafter deterring them from learning by own efforts.

Utilization Pattern of Available Computers

The results show that maximum use of available computers takes place in word processing tasks (72.5%), followed by office automation activities (65%), and database management (50.5%). Networking takes the last place with only 7% utilization, that also mostly in training institutions or technical units. There are other popular activities (12.5%) as well for which the computers are employed as a tool, i.e. making slides for presentations and conferences. ERP solutions have not figured anywhere in the existing utilization pattern mostly due to absence of network in contravention to defence forces of other countries (Gill, 1999).

A very limited use of computers is taking place for training of men and that also only in the field of wargames restricted to training institutions. This indicates that IT based training and education has not been developed and utilized adequately. The pattern also suggests that the development and proliferation of organisation specific software packages is grossly inadequate since most of the units are using their own packages for office data management at a very small level. At the same time, maximum use of computers in word processing activities confirms its present employment mostly being that of an automatic typewriter.

IT based training and education has not been developed and utilized adequately. The development and proliferation of organisation specific software packages is grossly inadequate.

Availability of IT Trained Manpower

On checking the availability of IT trained manpower to efficiently handle computer hardware and software in the Army, the trend shows level of inadequacy to be at 96.50%. This trend is substantiated by low computer literacy level of 50.50% among the officers and the situation is likely to be worse among subordinate staff (non-officers) as lesser opportunities of acquiring computer literacy exist for them. This is an alarming situation considering the fact that the soldiers are required to prepare for the wars of the twenty first century which will be fought as information wars where IT will be integrated fully in military operations. The Army will require 100% computer literacy and IT proficiency, in the era of information warfare, so as to handle modern technology systems and effectively gain information superiority in battle.

Duties Performed by IT Trained Personnel

The standard of duties performed by IT trained personnel in the Army shows an inadequacy level of 79 per cent. The pattern of inadequacy shows that a streamlined and standard system to handle IT does not exist in the Army, but an ad-hoc system has been evolved at various levels of computer utilization. Non-availability of trained manpower to handle computers has resulted in employing scarcely available computer literate personnel on ad-hoc basis, without properly defining their role, duties and responsibilities. This practice further results in poor exploitation of IT resources as is evident from the computer utilization pattern where only word processing activities are prominent.

To improve the situation, a number of measures have been suggested by the respondents, from having specialists in the field of IT to ensuring compulsory computer training of all officers and subordinate staff (clerks, store-holders, operators etc.) during various stages of their service in the Army. The requirement of manpower to use IT in the Army has been divided into two groups: an expert group of specialist personnel to manage IT resources, and a user group with good computer literacy to effectively handle and exploit IT tools.

IT Related Security Aspects

While responding to the implementation of security aspects related to IT environment, the opinion of respondents is divided. Middle level and senior officers have found security to be largely inadequate. Junior officers are not so assertive in their opinion, with over half

of them falling in the category of security being adequate/not sure and the rest finding the security inadequate. This type of mixed response is attributed to overall poor exposure to IT, and therefore, its security needs which are different from conventional security aspects. Moreover, the Army being a traditionally security conscious organisation, it is apparent that reasonable efforts have been made at individual unit level to adopt suitable security measures concerning information management on the available computers. At the same time, considering the current and future thrust of the oncoming computer-networking environment, adoption of additional security measures will be required especially while transferring information on networks.

Another aspect of IT related security has been observed by the respondents that an organisational over emphasis on security results in creating a mental block among users and acts as a deterrent against using computers freely, thereby affecting the attitude towards adoption of computers and networks. A need, therefore, arises to carefully plan security related issues alongwith the organisational thrust for proliferation of IT tools and networks, so as to build up the required level of confidence among users and also ensure security of information.

Availability of IT Support Services

Availability of support services for computers and peripherals, in terms of repairs, maintenance, upgradation etc., has been found to be inadequate (81.50%). To ease the tremendous amount of additional load on the Army's repair and maintenance organisations likely to be created by IT infrastructure, involvement of countrywide civil infrastructure is recommended. These factors automatically support larger participation of civil industry in providing infrastructure and support services for IT in the Army.

As indicated by the worldwide trends of defence forces procuring off the shelf cost effective technology rather than custom built systems by own research and development efforts (Harris, 1997), Indian Army also will have to purchase computers and peripherals mostly from the civil sources called Original Equipment Manufacturers (OEM). OEMs can be persuaded to set up support facilities on command or zonal basis, or to provide authorized maintenance agencies. Army workshops may act only as liaison agency between the civilian workshop and the users. This approach will help the Army in reducing its requirement of technical manpower, storage space, and other inventory carrying costs like transportation and maintenance of spares. Many such civil workshops for various equipment used by the Army may be co-located at suitable locations, to act as support nodes, towards evolving a cost-effective support system.

State of Automation

While responding to the state of automation, of data and various processes in the Army by use of computers, the response has been divided and uncertain. Though majority found the state of automation to be inadequate (53%), a large percentage of respondents (mostly senior officers) are not sure (26%) about the state of automation in the organisation. Such a response can be attributed to prevailing poor computer literacy leading to non-awareness regarding the extent of automation possible by use of computers. The response indicates that centrally coordinated efforts, towards automation of MIS data, have not become effective as shown by high inadequacy level. This observation is also substantiated by utilization pattern of computers as discussed earlier.

Information Handling by using Computers

The response regarding the contribution made by the proliferation of computers, in information handling, has been similar to that of automation. Poor contribution is confirmed by the earlier finding that only 7 per cent of available computers are being used for networks. Automation Plan for the Army and ongoing IT Action Plan of the country emphasize the need for networking all places of work in government offices. The Army will need to consider networking on priority.

Computers in Organisational Training and Education

Utilization of computers for organisational training and education has been found inadequate by maximum (92.50%) respondents. Other than adding value to the training system, computer based training tools can contribute in improving overall computer literacy level as well. Computer based training, simulators and virtual reality tools have already become popular in most of the other defence forces to reduce cost of training and to bring more realism in the training process.

The results and findings, indicate the present state of all major aspects of IT Management in the Army. These factors represent the desired areas of IT proliferation and utilization in the Army as defined during the Army's IT seminar in 1996 and Army IT Vision of 1999. Considering the above reported findings, it can be said that 'the State of IT management in the Indian Army is perceived as poors as stated in the first hypothesis of this study.

Poor state of IT management in the Army has many serious implications. The overall inadequacy of com-

puters, coupled with under utilization of available resources, forces the organisation to remain dependent on manual processes even at the threshold of entering the information era in the twenty first century. The potential of IT has not been realized by the users and, therefore, decisions continue to be taken based on manual processes and incomplete or obsolete information. The quality of such decisions will always remain questionable. Due to widespread neglect and underuse, computers have not made any significant contribution to the organisation and have failed to add value to the processes. They have largely remained either an item of ornamental value or have replaced typewriters in the offices. At times, rather than reducing the infrastructure, computers have actually caused an additional burden by creating the need for trained operators, and by generating the additional demand of stationery, peripherals and maintenance support. Poor IT awareness has created two separate classes among the officers, the computer literates and the illiterates, with both classes having different perspective about the proliferation of IT in the Army. This further retards the growth of IT culture in the Army. The situation is quite alarming; considering the importance of the fact that future soldiers will be required handle digitized battlefields and also face information warfare.

IT related Training and Education in the Army

Measures to Improve IT Awareness

While responding to the suggestion that computer literacy be made mandatory for entrance to officer training institutions of the Army, the majority of respondents have disagreed (56%). The response is attributed to the fact that present situation of low IT awareness in the country does not allow this measure to be implemented because adoption of this measure may cause rejection of otherwise suitable candidates for enrolment. Training after enrolment can bring about the desired level of computer literacy in the officer cadre. In view of the major thrust being undertaken to improve IT awareness in the country, under 'Operation Knowledge' of National IT Action Plan, it can be predicted that overall situation of IT literacy in the country is likely to improve soon. It may be possible to make IT literacy mandatory for enrolment of officers in the near future.

In view of the major thrust being undertaken to improve IT awareness in the country, under 'Operation Knowledge' of National IT Action Plan, it can be predicted that overall situation of IT literacy in the country is likely to improve soon.

A similar overall opinion pattern is observed about the proposal that computer literacy should be linked with career of the officer cadre, by making it part of promotion examinations. The majority of respondents have disagreed with the proposal (53.5%). The overall response pattern indicates that the organisation is not yet ready for such a measure considering the poor state of computer literacy and inadequacy of learning opportunities. This response confirms the finding that adequate learning opportunities do not exist in the organisation and that there is an absence of motivation and support for the growth of IT related work. The situation therefore dictates the need for providing better opportunities of learning, particularly for IT literacy, for all personnel and also career growth for those involved in the IT development work.

Regarding the need for an organisational thrust towards acquiring 100 per cent computer literacy, there is widespread agreement among the respondents. The organisation needs to consider this aspect as a high priority area.

The recommendations regarding the design of software syllabus for training, when compared with the utilization trend of available computers, indicate the typical requirement of tasks to be carried out by IT trained manpower in the Army which is different for IT users and IT experts. The response shows a clear mandate in favour of word processing software (87.50%), organisation specific software packages (87.50%) for office automation activities and database management software (69.50%). The response is supported by the utilization pattern of available computers where maximum use of computers was found to be in the area of word processing followed by office automation activities and database management. This trend reflects the syllabus requirement of training software typically for the IT user group in the Army. Other software useful for the user group, like the slide making software for presentations etc., have the minimum recommendation (2%) whereas its utilization is quite prevalent (12.5%). It indicates self-learning trends among the user group without the requirement of formal training in this type of software. Approximately half (49.50%) of the respondents have expressed the need for introducing networking software even when networking is at a very low level of utilization (7%) in the Army. Such a need is driven by the realization that networks will soon become the standard media for operations at every level in the form of organisational internal network. In the networked environment, the importance of utilizing popular ERP solutions, like SAP, Oracle etc., will also emerge for integration of various

distributed applications, as also recommended by Bindra (1998). Few respondents (18.50%) have felt the need to train army personnel in programming languages as well, who will be required to either develop software packages themselves or by interacting with software development agencies. The expert group (IT managers) will need to learn implementation of networks, hardware and software applications and, thereafter, train the user group through awareness improvement classes.

Networks will soon become the standard media for operations at every level in the form of organisational internal network.

Role of IT in Training and Distance Education

Training and education in the organisation should be designed in such a way that it provides equal opportunity of education and self development for all personnel. The majority of respondents feel that this aim is not being fulfilled adequately (96.50%) because of the Army's wide dispersion, frequent movement and deployment of units and formations at far flung areas and their never ending commitments in peace as well as field stations. These service constraints occasionally do not allow officers and men to attend training courses, and often do not permit them to have enough time to prepare for competitive examinations that are essential for the growth of their career.

The response pattern to judging the usefulness of cost effective and time saving IT applications in the Army's distance education programme shows that the majority of respondents are in agreement (71%) with the usefulness of IT applications. There is a large group of respondents who are not sure (24%) of their opinion, which is attributable to widespread poor computer literacy and non exposure to IT benefits. Maximum respondents have opined that IT tools will play an effective role in distance education. Improved opportunities in distance education will raise hopes and aspirations of the personnel located at difficult and inhospitable remote areas. In addition to this, IT supported distributed delivery of education and training will reduce the cost of bringing a large number of trainees together in a classroom and overall requirement of instructors in the Army, as also recommended by Pathak & Tripathi (1998). Similar trends exist in other defence forces as well, e.g., in USA and other NATO countries, who are implementing 'Total Army School System' by using IT applications and networks in distance learning (Myers, 1998).

The response pattern confirms the second hypothesis that 'IT is perceived to be a useful tool for distance education programmes, targeted to provide equal opportunity of education for all personnel of the organisation'.

IT tools can effectively support distance education and also reduce the cost of bringing a large number of trainees to one place. Indian Army can learn from the worldwide trends, which indicate that computer based training, computer aided instructions, simulators and virtual reality tools are becoming inexpensive with advancement in technology and, therefore, can be increasingly employed. Computer based wargames can be used extensively in training, considering the economy factor, to enhance decision making skills of officers and men and to also try out new doctrines and concepts that continually emerge as a consequence of launching new technologies. Use of virtual reality in training has tremendous scope.

IT tools can effectively support distance education and also reduce the cost of bringing a large number of trainees to one place.

IT applications will influence training and education in Indian Army in a significant manner. To exploit technology and train its manpower for IT environment, the following measures emerge suitable:

- Impart IT oriented training to all personnel, especially officers.
- Exploit IT solutions to strengthen the training system, by employing IT as an education delivery tool, and for simulation, automation and networking of libraries.
- Support distance education programmes by IT applications to provide equal opportunities of education to all members of the organisation.

IT Networks

Role of IT Networks in Information Handling

The results of the survey, to ascertain the status of the respondents having an exposure to networks, show that a large percentage (42%) of the respondents have the experience of transferring information on computer networks. This result has special significance in view of the background that the organisation has only a negli-

gible percentage (7%) of available computers employed for networks. The experience has been gained by the respondents due to their own interest by working on the Internet, now widely available in India.

In recognizing the role of computer networks to improve information handling in the Army, the response has been absolutely in agreement (98%). The response indicates a high level of need to improve the present system of information management even with prevalent low computer literacy. The respondents have realized that the capabilities of IT systems can be completely exploited only when confluence of computers and communication systems is realized in terms of computer networks. Most of other defence forces in countries, such as US, UK, Germany, Russia, China, Japan etc., have taken up development and use of IT networks to support the organisational MIS, operations, logistics and training.

Networks in the Army will provide easy access to distant data, improve communications and enable speedy flow of large amount of information. The quality of decision making will improve tremendously due to enhanced availability of updated information. Networks need to be introduced in the army at all levels of operations rather than depending on slow and phased induction limited to a top down approach. To begin with, an initial thrust in this direction can be undertaken by networking all available computers of all units and headquarters at their present location. This will allow the users to gain experience in sharing data and transferring information in a small way. Slowly these networks should be enlarged and integrated into wider networks.

Utilization of Internet

The need to introduce Internet is felt by the respondents mostly in units (62%), headquarters (72.50%), training institutes (72%), and static establishments (55.55%). The highest individual response has been shown by senior officers in favour of inducing Internet at the training institutes (90%). This response shows an immediate need of network among the army training institutes and also of providing an open access for all trainees to the plethora of information available on the worldwide web of Internet. Such a need is supported by 42% network experience gained by the respondents by their own efforts on the commercially available Internet. Many defence forces around the world, such as USA, UK, China, Pakistan etc., have established websites on Internet to disseminate information concerning their organisations, achievements, public relations, technology and many similar issues. India has also recently set up web sites on a few defence related matters.

Induction of Intranets

There is an overall agreement to induction of computer networks within the Army on Intranet model, which are intra-organisational computer networks based on core Internet technology. While Intranets are considered most suitable under static conditions by maximum respondents (83.50%) their induction in the field environment has been considered less useful (62.50%). This response pattern is attributed to the overloaded and stretched communication lines in the field conditions, as experienced by the respondents and, thereby, their lack of faith in success of computer networks under such constraints.

As the present communication infrastructure is already over-streched to meet the communication demands of the Army, an additional backbone telecommunication network is considered essential before introducing Intranets, as recommended by Tewari (1996). The network will have to be established and managed by IT managers with special training in networking technology.

The response pattern confirms the third typothesis that 'IT networks are perceived to improve information handling in the Army'.

Indian Army requires networks to improve flow of information in various areas of activity. There is a need to support flow of information and decision making in static and field environment. At the same time there is a need to evolve training networks to support training and distance education.

Considering the evolving trends worldwide and information flow needs of Indian Army, there is a need to establish various types of Intranets for different functions. MIS Networks will need to be extended down to division, brigades and units. Logistics networks will have to be established in each command by interconnecting static logistic establishments. Training Network should be established to interconnect all major institutions of military training across the country to coordinate training effort and distance education. Field Network systems should be procured to support information flow in the future operational environment.

IT Induced Organisational Changes

The main issues are as follows:

Role of IT in Downsizing and Restructuring

The response pattern to acknowledging the role of IT, as an enabler to downsizing and restructuring in the Army, shows an agreement to implementation of IT for

leading to smaller organisations in the case of headquarters (75.50%), training institutes (85.50%) and static establishments (83.50%). Various headquarters (command, area, sub area HQ etc.) and static establishments (depots, workshops etc.) function with a heavy element of personnel in their staff where IT can play a major role to reduce the manpower requirement by automating of processes and handling of information, as also recommended by Reddy (1996). Similar efforts are being undertaken in the defence forces of many other countries, to downsize with the help of technology, considering the synergy possible after employment of IT (Banerjee, 1997).

IT can play a major role to reduce the manpower requirement by automating of processes and handling of information.

The poor response to IT being an enabler to downsizing of individual army units (35%) is due to the fact that the organisational structure of army units is based on their operational role in the field. IT is considered to play a supportive role here, towards improving information handling, decision making and digitizing the battlefield in operations, and therefore, will cause restructuring of filed along the flow of information on modern IT systems.

Role of IT Applications in TQM

An overall positive response (89.50%) about the role of IT applications in supporting TQM implementation efforts confirms that IT will play a major role for TQM in the Army. Defence forces of the developed countries are similarly studying the areas of emphasis for TQM implementation and the role of IT (Internet web-site of US Army at www/forscom.army.mil.com.).

Organisation for IT Management

While responding to the suggestion that there is a need to evolve a new organisation (called the IT Corps) comprising specialist personnel for IT management in the Army, only 45 per cent of respondents have agreed. The majority (55%) are in disagreement/not sure category regarding the need to create a separate organisation for IT management. Poor availability of trained manpower and inadequacy in the duties performed by them have already been recognized by the respondents. This response pattern indicates that while the respondents have realized the need of improving the organisation responsible for IT management, evolving it separately with a different identity has not been considered appropriate by all.

In the IT intensive military operations of the future, there will be a requirement of having teams of IT experts in each part of the organisation and at various level of operations. Similar actions have been taken up in other defence forces as well, e.g., US Army has provided integrated automation support to its field forces, by attaching IT expert personnel at all HQs down to the brigade level (Christopher, 1998). These teams can integrate IT in the organisational functions at every level and thus should not be segregated as a different organisation with a separate identity.

Considering the response pattern, the fourth hypothesis, stating that 'creating a new organisation of specialist personnel is perceived to lead to better IT management in the Army', stands disproved.

The existing organisations for IT management are required to be improved considering the poor state of IT management in the Army, and ongoing IT thrust under the 'National IT Action Plan'. To plan IT management for the twenty first century, there is a need to restructure the organisations by enhancing their reach through establishment of IT cells, comprising IT expert group personnel, at every level down the chain of command in the Army. These experts will supervise and ensure installation of IT systems and, thereafter, realignment of processes and structures around the flow of information.

Conclusions

The major conclusions of the study are as follows:

- The overall computer literacy level of the Army officers is poor. Limited efforts have been made to develop IT literacy and awareness among the officer class and almost negligible emphasis has been laid on IT training of other ranks. Non availability of learning opportunities, alongwith absence of incentives and motivation, at an early stage of service has resulted in poor IT literacy among junior officers and lack of interest has been the main cause behind poor awareness among senior officers.
- Poor computer literacy has resulted in further deterrence to IT adoption and use in the Army. The availability of IT trained manpower is inadequate and the standard of duties being performed by IT trained manpower is poor. This trend has resulted in dependence on a few specialized personnel, thus creating a need for extra manpower in the offices rather than

reducing manpower requirement to achieve IT enabled efficiency.

- Inadequate learning opportunities, lack of organisational support and absence of motivation have been the major causes of poor IT literacy. The organisation needs to motivate its manpower to achieve better IT literacy under their own efforts as well as through organisational thrust for improving IT literacy.
- Syllabus for IT training can be defined by considering modern technological trends and the existing utilization pattern of available computers in the Army.
- The hardware provisioning is very inadequate. Provision of office automation tools in terms of computers, FAX, scanners etc. have remained restricted down to brigade HQ level and computer networks have been established only at a few HQs and training establishments. The units have resorted to procurement of computers from their funds and grants but the overall availability of IT infrastructure has remained grossly inadequate. The Army has been constantly feeling shortage of finances for procurement and development of IT infrastructure.
- Delay in procurement and supply of hardware and software has resulted in frequent hardware mismatches and technology overrun, after procurement.
- Available computers in the Army have not been adequately utilized for handling of information in an efficient manner. Similarly, computer based training tools have not been adequately developed and utilized to reduce costs and to improve the conduct and delivery of training.

Available computers in the Army have not been adequately utilized for handling of information in an efficient manner.

- Support services for available IT infrastructure are found to be insufficient and, with the ongoing thrust of national IT Action plan in India, dependence on civil support services has emerged to be the only appropriate solution.
- The Army has made very limited progress in the area of software development. Organisational software have not been widely proliferated and are yet to prove their effectiveness. Therefore, use of hardware provided in the offices has largely been limited to word processing and record keeping. There is large dependence only on commercially available software in the offices. The potential of organisational manpower, capable of undertaking software development, has not been exploited.
- There has been an overall lack of motivation and organisational support for progress in IT development and IT awareness. Tenure based postings and employment has been found to be the major factors causing poor IT proliferation and development in the Army.
- There is an absence of long term IT Management perspective and vision in the Army to realize IT integration with the organisation through IT infrastructure, networks, training, and reshaping of the organisation through reengineering and restructuring.
- Integration of IT with the organisation has the potential to influence following areas:
  - Computer networks can improve the process of information handling by providing easy access to distant data, improving communications and by enabling speedy flow of information and sharing of knowledge and resources. The Army needs to utilize Internet and establish Intranets at various levels.
  - IT applications in the Army can enable downsizing and restructuring. The field forces can become smaller, more technologically proficient and capable of greater flexibility. IT can play the key role of integrating the field forces and help in progress towards achieving a Revolution in Military affairs (RMA).
  - IT applications can meet the challenges of TQM implementation by quality improvement in training, work efficiency, decision making and various other areas. IT applications will extend communication beyond hierarchies and provide linkages between widespread formations/units of the organisation.

Recommendations

Indian Army needs to evolve its own 'IT Management Plan', which should encompass strategies for IT proliferation, IT related training and education and also

consider influences of IT applications to reshape the organisation for maximum benefits. The major recommendations are as follows:

IT Proliferation

The following are the main recommendations concerning IT proliferation:

- Availability of well trained manpower is a pre-requisite for IT proliferation. Improved learning opportunities and motivation should be ensured to enhance computer literacy and bring in a computer culture (or IT culture) in the organisation. This will generate a group of well trained IT workforce to utilize IT tools.
- IT management requires specialized manpower and organisations, integrated at all levels of operation, in all arms and services of the Army. IT manpower should be evolved as two different groups: a user group, comprising all officers, clerks, storekeepers etc. with a few other selected personnel, and an expert group comprising only IT managers. Training of these two groups needs to be evolved separately at different levels. There is a requirement to evolve policies on selection, training, motivation, growth and employment of IT expert group personnel. IT cells, comprising these experts have to be established down to the lowest HQ level.
- IT proliferation in the Army has numerous areas of applications. IT should be absorbed in training and education, automation of manual processes through software, management of information systems, developing geographic information systems, evolving command and control systems and establishment of networks.
- The Army needs to build up its IT infrastructure on a priority basis, mostly through 'Off the Shelf' procurement from the civil sector. Infrastructure, in terms of IT tools for office automation and IT networks, has to be provided down to the lowest sub-unit level. At the same time, maintenance and support facilities are required to be built up by the organisational repair agencies supported by the civil maintenance agencies. An improved state of IT infrastructure is a pre-requisite for better learning opportunities and IT proliferation in the organisation.
- Software development in the Army should be taken up by using various sources, i.e., by the organisation agencies to develop software in a time bound programme, with the help of Defence R&D Organisation (DRDO) and by outsourcing software development to civil IT agencies. Industrial ERP solutions should also be applied on the networks for integrating distributed logistics applications. The potential of Indian IT industry should be harnessed for system integration capabilities.
- Transition from manual to automated systems will have to be managed carefully. During the transition, the manual and automatic systems will have to be run concurrently which may require additional manpower. Gradually, the automatic systems will take over. The transition will have to be supervised by IT cells comprising IT managers.
- An automated and networked environment will be vulnerable to security of classified information. Adoption of security measures with proper user training will have to be ensured. Constant user awareness in security matters will be one of the major responsibilities of the IT cells.

An improved state of IT infrastructure is a pre-requisite for better learning opportunities and IT proliferation in the organisation.

IT Networks

Networks in the Army should be evolved at two levels. The first level is to use the commercial Internet for dissemination of administrative information, improving public relations, as a training aid, as a propaganda medium, and in many other similar areas of information transfer. The second level is to develop internal networks on Intranet model for static and operational environments. The organisation requires internal networks for MIS, logistics, training and field operations. To support data flow on these networks, there is a need to immediately establish a countrywide telecommunication superhighway based on a variety of media.

Organisations for IT Management

During restructuring of IT Management Organisations, the overall control of IT proliferation should remain with the central agency at the Army HQ. The management at lower levels requires establishment of IT cells at each static and field headquarters. These cells should be staffed with personnel from IT expert group. Network management will become an additional responsibility of the telecommunication branch. For

development of command and control project, there is a need to create a separate organisation at the Army HQ. For overall coordination and development of IT at the national level, a Chief Information Officer (CIO) should be appointed at the Army HQ.

IT Related Training and Education

The aim of evolving IT related training and education should be to prepare the Army for the technology intensive battlefield environment of the twenty first century. The aim should be fulfilled by ensuring the following:

- IT training for all personnel at civil institutes, Army training institutes and at IT labs (IT cells at each HQ).
- Adopting various IT tools as training aid, developing computer based training, simulating weapon systems/equipment and battlefield environment (wargames) and using virtual reality.
- Networking of all training institutions, and using Internet as a medium to acquire/disseminate information.
- Library digitization.
- Evolving IT supported distance education based on multimedia and networks.

Absorbing Influences of IT Systems

IT systems will play a major role in supporting induction of RMA (Revolution in Military Affairs) and will influence the organisation in many ways. The relevant issues are:

- Utilization of IT in the operations should aim to make an impact on many areas: evolution of command and control systems, elimination of uncertainty through battlefield digitization, enabling pin-point accuracy in weapon guidance, creation of force multiplier effect with information dominance etc. On the other hand, complete exploitation of IT benefits will demand a high level of IT proficiency among the officers and men, evolution of IT based military doctrines, tactics and force structures.
- Management of logistics through IT networks should be planned to provide many benefits: centralized control of stocks and reserves, provision of 'in-situ and just-in-time' logistics services, reduction in costs and requirement of manpower, and enabling the establishment of integrated logistics nodes for the three defence services.
- The organisation should chalk out strategies to derive benefits from the well known and established influences of IT systems on various organisational aspects such as: enabling of downsizing, creating a need for restructuring, reengineering of processes, improving training and education, supporting TQM implementation efforts etc. The processes and structures should be realigned around the flow of information on modern IT systems.

IT induced Vulnerabilities

Widespread dependence on IT will create many areas of vulnerabilities. A networked environment will be susceptible to loss, pilferage and theft of information and thus demands additional security measures. The vulnerabilities of IT systems to electronic warfare and information warfare measures by the enemy will become an area of great concern in times of peace as well as war. There will be a need to evolve a national policy on information security. The Army will need to undertake development of decision support tools to manage information overload of decision makers during operations. Induction of 'off the shelf' technologies will create a great amount of dependence on the civil industry for supply of spares and support services, which should be overcome by selecting suitable suppliers with reliable credentials and countrywide services.

Epilogue

Revolution in Military Affairs (RMA) in India requires development of many capabilities at the national level and, thereafter, their application and absorption in defence forces. This demands conception of defence oriented IT policies at the national level. IT systems in the Army will play a major role in supporting induction of RMA, by influencing the organisation in significant ways, through evolving information based doctrines and force structures.

To reap the benefits of IT revolution, and to step into the information age in the twenty first century, there emerges a need to create an 'Army IT Vision'. This vision should emerge from the parameters of 'Defence IT Vision' which in turn should evolve along the major guidelines of the 'National IT Vision'. IT management plan should be chalked out to fulfil the Army IT vision and to transform the organisation in the information age. On consideration of various factors influencing IT management in Indian Army, a framework emerges about IT proliferation, training and education, utilization and influences in the Army. This framework should be used to evolve policies and perspective for the future.

IT management plan for the Army should be implemented in a time bound programme till the year 2008 to coincide with the National IT Action Plan. There is a need to set various goals in the form of a 'Roadmap for IT Management Plan' upto the year 2008. Effort should be made to achieve IT proliferation and total IT literacy by the year 2005. Thereafter, the process of realignment of procedures for decision making and their execution should begin alongwith downsizing and restructuring efforts, towards a technologically proficient 'leaner and meaner' Indian Army in the information era.

Indian Army will need to absorb IT revolution in many areas and develop joint force doctrines for combined operations with the Navy and Air Force in the future. IT should be used as the integrating medium for joint operations in the 21st century. Within the organisation the main RMA components to be evolved are intelligence collection, surveillance and reconnaissance capabilities, command and control systems, integration of complex information systems in real time and development of doctrines, strategies and military organisations that can take advantage of the new technology. To support the operations, an approach to develop integrated logistics support based on the modern information systems and networks should be acquired. The organisation will need to imbibe and enforce a new culture of faster decision making, flatter hierarchies and leaner organisational structures. The Army needs to undertake dedicated studies on the process of organisational transformation to the information era.

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At the national level, there is a need to realize the importance of RMA. India has to absorb the full potential of IT infrastructure and capabilities available in the country by involving the civil sector in the system integration capabilities of the defence. IT capabilities of the country will have a major role to play in this endeavor.

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Feature

Planning & Designing a Data warehouse for Government Accounts Sector

V.S.R. Krishnaiah & M. Prabhavathi

Globalisation of Indian economy depends on efficient management of the nation's financial resources which calls for efficient management of financial data, both for monitoring and decision making purposes. Though large volumes of accounts data are collected and consolidated every month through existing information systems, the data is not being utilized presently for the purpose of financial analysis. The paper presents the planning and designing of a Data warehouse for accounts sector with a view to transforming the data available in different transaction systems into a large data repository using tools of data warehousing technology. The paper also explains in detail the objectives, approach, strategy, resources, responsibilities and architecture of the accounts data warehouse.

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The globalization of Indian economy depends on efficient management of the nation's financial resources. The planning process and monitoring of the targeted GDP growth also call for management of financial data, both for monitoring and decision making purposes. Computerisation of various financial accounting and management systems over the years has resulted in large number of transaction processing systems operational on different computer hardware platforms. The existing information systems IMPROVE, CONTACT, GAINS, FINEACT help financial/accounts managers in the Government of India to consolidate accounts in the required time with increased accuracy. These systems have been designed to record financial transactions and to store financial data required for generation of various managerial and routine reports for day to day decision making.

The planning process and monitoring of the targeted GDP growth call for management of financial data, both for monitoring and decision making purposes.

The size of the data being very large, flexible query based retrieval is not possible using these transaction processing systems. Also the ability to manipulate data is limited both due to the organisation of data in transaction processing systems, and limited capabilities of reporting facilities available in the earlier versions of database management systems. Even the physical architecture of financial informatics infrastructure is not conducive to derive larger benefits of data stored or entangled in these systems. Since the capacity of secondary storage facilities, and the processing speed of the hardware used for computerization of finance and accounts sector do not allow the comprehensive design

of large financial systems, the applications are limited to the immediate needs of accounting units.

Though computers have made large inroads into various sectors of our economy since 1980's, the real computerisation of Indian finance sector particularly accounts, banking, insurance sectors has been a recent phenomena. Now, there is increasing awareness of the issues related to data management, particularly storage of time related archival data, acquiring additional use from the data captured and stored in large databases, heterogeneous DBMS support, transaction integrity etc.

Data Needs in Government Accounting Sector

Government Accounts deal with the collection, measurement (classification and valuance), processing, communication, control and stewardship of receipts, expenditure and related activities in the Government sector. The types of data handled by the government accounting units can be grouped broadly into three categories – i.e. Current detail data, Old detail data, Summarized data.

Accounting and reporting are very important activities as most Government decisions are based on these statements. The main objectives of Government accounting and reporting are:

- To provide a comprehensive picture of Government's management of public resources
- To provide information on financial consequences and long term implication of Government policy
- To enable the Government to manage its liabilities with full knowledge of its asset base
- To motivate decision makers and financial managers in the government to focus attention on the economic use of public resources.

These objectives can be fulfilled only with the availability of a strong and large repository of finance and accounts data, which is an essential input for better management.

In the accounts sector, a large amount of operational/transactional data is available with problems such as high volume, fragmentation, and inconsistency, rendering little help for decision making. A set of significant new concepts evolved recently in the field of databases make it possible to attack and overcome these problems. The term that has come to characterize this new technology is "data warehousing". Data Warehousing has grown out of repeated attempts on the part of various researchers and organisations to provide their organisations with flexible, effective and efficient means of getting at the sets of data which represent the organisations' most critical and valuable assets.

Why a Data warehouse for Accounts Sector?

Recognizing the need of a larger repository of data for the government accounts sector, the Accounts Informatics Division of NIC has initiated an exercise and identified the following advantages of a data warehouse in the accounts sector:

- Synchronization of large volumes of accounts data
- Information access to large accounts data volumes-availability
- Making Government accounting more transparent
- Data visualization for better planning and forecasting
- Heterogeneous DBMS Support
- Accounts Transactions integrity
- Data dissemination and distribution to a wide set of users
- Mining the large accounts data to enable accounting units and Ministry of Finance to answer non-standard questions, to discover meaningful correlations, patterns, trends.

In this information age, information is required not to just exist, but to survive. There is a need for acquiring and using large amounts of data, to improve the information content of the data and empower the knowledge workers and decision makers in the government with useful/valuable information by "filtering" unnecessary data by deploying the latest technologies such as data warehousing, metadata repositories, Online Analytical

There is a need for acquiring and using large amounts of data, to improve the information content of the data and empower the knowledge workers and decision makers by deploying the latest technologies such as data warehousing, metadata repositories, Online Analytical Processing (OLAP) and data mining.

Processing (OLAP) and data mining. These technologies are a manifestation of the maturity of the client/server computing model and its applicability to a wide variety of financial/accounting business problems.

Tools like Data mining recognise patterns in the data to help in describing the existing data and predict future behavior based on current characteristics. For example, the pattern of the present expenditure as well as revenue collection and other parameters are required, for formulating the budget for the coming year.

Planning the Data warehouse

Proper planning and designing of the data warehouse is important for its successful implementation in the Accounts sector. As building a physical structure requires a good planning and architectural design, so does the building of a data warehouse which is a seamless connection of several data stores into a single logical structure. This planning and design process should detail the objectives, approach, strategy ownership, resources and responsibilities.

Objectives

Various levels of accounting units of the government have introduced computerisation during the last two decades with the active assistance of NIC, the nodal agency for government informatics. The lower rung of the accounting units namely PAOs are automated to some extent with the introduction of voucher level computerisation software IMPROVE. The next levels at the Pr. A.O./CCA are supported in the electronic data processing through CONTACT, mainly for generating the consolidated monthly accounts at ministry/department. The final consolidation of accounts at the office of the CGA is done through a software package GAINS. These three transaction-processing systems and other related software packages such as SCT, FINEACT provide support for the accounting and reporting needs of the government accounts sector. NIC has initiated a plan of action to build a large data repository using the new tools of data warehousing technology. The data stored in these different transaction systems at multiple places are to be integrated into a large data repository. The aim is to provide information access to end users and decision makers on the massive accounts data that is accumulated over many financial years originating from different sources and lying in heterogenecus platforms/operational systems.

Strategy

Developing a data warehouse strategy provides the opportunity to align Data Warehouse efforts to the organisation's business strategy and goals. This will improve productivity through improved access to information and thereby improve the quality of decision making so that the organisation becomes more competitive.

Approach

The information scope of data warehouse varies with the business requirements, business priorities, and even magnitude of the problem. In case of Accounts Sector a "Bottom-up Approach" is followed to create a data warehouse in which the scope is to solve and answer all financial problems/queries related to accounts. In this approach the bottom level i.e. at PAO, CCA, department wise data marts is created to integrate them at the CGA office to form an enterprise wide data warehouse.

The requirements study for the data warehouse has to be done thoroughly and should cover five categories such as:

- Functions of the various accounting units
- Data sources and uses
- Applications that are required by the decision makers
- Technology issues and
- Organization of information.

Given the relative newness of data warehousing technology, it is understandable that users do not clearly identify their data requirements as OLTP users. Therefore it is critical to form a team where both technical and end use personnel can work together to develop a mutually acceptable and technologically achievable set of specifications and requirements. This should result in continuous collaboration throughout the project as warehouse projects can be viewed as a discovery process where the business prospective must be weighed alongside technical issues.

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Resources

The project plan should take care of all organisa-

tional or resource issues and project them in a detailed way to the project sponsor, in this case the Ministry of Finance, Government of India. These resources include:

- Manpower Resources (technical expertise, operational expertise and business area knowledge etc.)
- Communication and Infrastructure Resources for supporting the data warehouse
- Hardware and Software Resources for building the data warehouse
- End User Training Resources
- Financial Resources

Responsibilities

The requirements and environment associated with informational applications of a data warehouse are different from developing operational systems. Hence the organisation involved in the design and development of a data warehouse for Accounts sector has to employ different development practices than the ones it uses for operational systems. Large organisations like National Informatics Centre are equipped for taking up such projects. The responsibility of the organisation involved in the design of the data warehouse is to bring together data from all the operational systems at various levels of the accounting units (IMPROVE, CONTACT, GAINS etc.) and also from external sources like banks, MOF etc. Of course user (CGA/MOF) involvement is crucial during the planning and designing stage to identify the business requirements, objectives and goals of the data warehouse. During the implementation stage, user responsibility is high but the software development agency/IS organisation will have to continue to shoulder the responsibilities of the upkeep of the data warehouse by providing maintenance, security related, and training services.

Ownership

Data ownership lies with the individual accounting units. However once the data is transferred and integrated with the data warehouse, the ownership of the data warehouse lies with the CGA/MOF, and therefore they will be responsible for timely updation and dissemination to the required end users.

Data Warehouse Architecture

Data Warehousing can be best represented as an enterprise-wide framework for managing informational data within the organisation. The data warehouse is based on a comprehensive and consistent data framework, exemplified by a data model, data definitions, and physical database structures. Enterprise data architecture ensures the ability to perform comparisons across application systems. Common data description defines the data elements in operational systems, data warehouse, and user directory. For the data warehouse, the normalized design is modified to include elements of time, summaries, and derivations; structures are added for ease of understanding and performance, and external data is included.

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Data warehouse Architecture (DWA) is a way of representing the overall structure of data, communication, processing and presentation that exists for end user computing within the enterprise.

The architecture is made up of a number of interconnected parts such as:

- Operational Data Base/External Data Base Layer
- Information Access layer
- Data Access layer
- Data Directory (Metadata) layer
- Process Management layer
- Application Messaging layer
- Data Warehouse layer
- Data Staging layer

There are a number of different architectural options that may be considered in moving to data warehousing. For the purpose of the accounts warehouse, a three-tier enterprise information architecture can be built. This will support a broad range of integrated services, in which the user interface, business processing functions, and database management functions are partitioned into separate processes. In this architecture–

- The source data or operational data on host computers resides at tier 3.
- Data and business rules that are shared across the organisation, such as target databases for

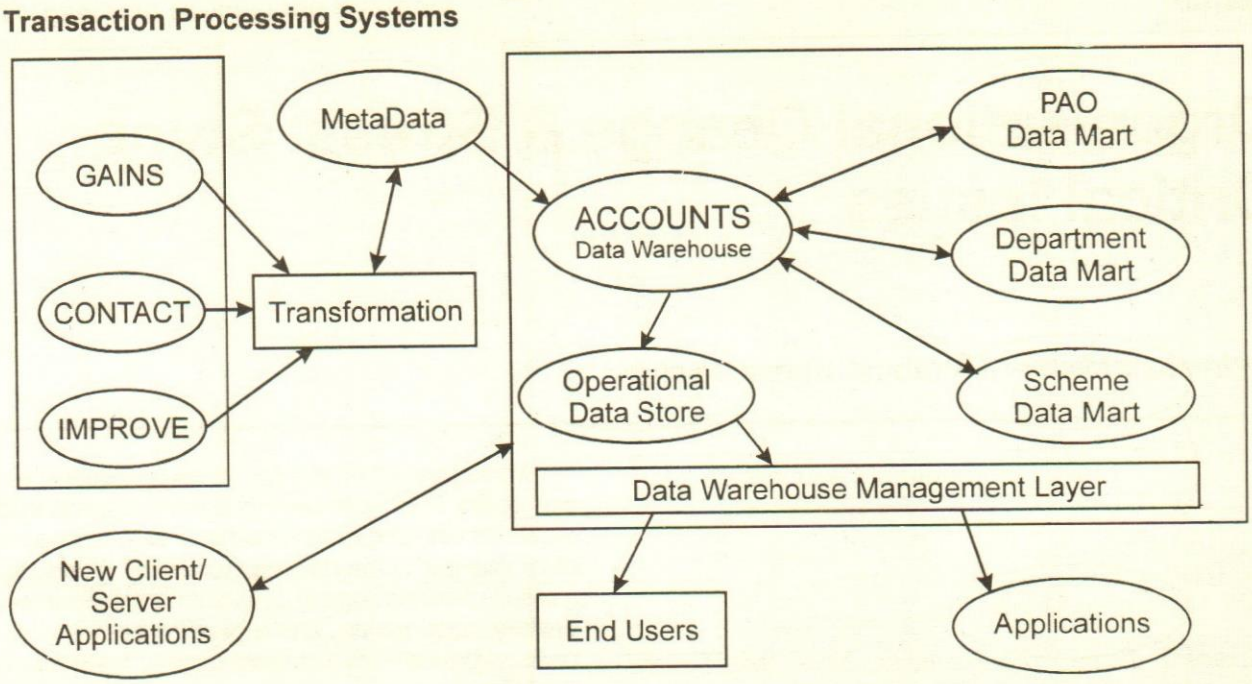

Fig. 1. Conceptual Model of Accounts Data Warehouse

data warehouse are stored on high-speed database servers at tier 2.

- Graphically oriented end-user interfaces run on LAN-based PCs or workstations at tier 1.

This architecture provides great performance and scalability. In this format, data from operational systems is cleaned-up, transformed and stored in high-speed database servers, which are used as the target database for front-end data access. The architecture also includes data marts for individual PAO or department which utilize LAN based architecture.

Based on the architectural issues and the type of databases available in the accounts sector at present, a blue print of data warehouse has been prepared (Fig. 1).

The various components of the warehouse architecture will be:

- Source data bases such as GAINS, CONTACT, IMPROVE and any external data from BANKS, MOF etc.
- Data extraction and transformation tools, used to extract data from source files, cleanup up the data and organize the data so that it is consistent and understandable by business users
- Data Modeling tools used to prepare an information model of both source and target databases for the warehouse
- Central repository used to store data models and metadata
- Target database
- Front-end tools to support high-speed access.

Conclusion

Data warehousing is a new technology which aims at providing solutions to managers at all levels of finance sector. Handling large data in the accounts sector for deriving much larger benefits from the same data currently and in future demands data warehouse solutions. Though popular, data ware technology is still in the initial stages in our country. Hence it requires good planning based on careful study of cases in the finance sector implemented elsewhere. □

important to managers, as it so strongly impacts their workloads and stress levels (Huber et al., 1995).

Organisational change, depending on how it is perceived, is one of the primary causes of stress.

Concept of Stress

Now-a-days everyone talks of stress. The term is discussed not only in daily life conversations but is also extensively debated through the media of magazines, TV, radio broadcasts etc. Different people have different views about stress as stress is experienced from a variety of sources. For example, the businessperson views stress as frustration or emotional tension; the air traffic controller sees it as a problem of alertness and concentration, and an athelete thinks of it as a muscular tension.

Though much has been written about stress from many different points of view, there is still a lot of confusion in understanding its real nature under different circumstances. There is no single agreed definition in existence. It is a concept which is familiar to both the layman and the professional; it is understood by all when used in a general context, but by very few when a more precise account is required.

Stress is the result of an individual's perception that he does not have the resources to cope with a perceived situation from the past, present or future. It is caused by fear, and reaction to fear is the instinctive and automatic preparation for "fight" or "flight". In basic terms, stress is an aspect of living that can be beneficial when it motivates, encourages change or inspires, but can be opposite when it does not.

The concept of stress was first introduced in life sciences by Hans Selye in 1936. It is a concept borrowed from natural sciences. Selye's (1946) "General Adaptation Syndrome (GAS)" analysis stimulated a vast array of research on the topic, mainly focusing on stress and disease, i.e., noxiousness and adaptation responses to tissue systems. The popularity of this concept in the physiological field, where it was first introduced has dwindled, but the use of stress terminology continues to flourish in the psychological and social sciences. In the last two decades, the term "stress" has come to be widely used in relation to work organisations (Agarwala et al., 1979).

Psychologists of different persuasions have given stimulus- oriented, response-oriented, and interactional definitions of the term "stress".

Stimulus-Oriented Approach: Stress is regarded as an external force which is perceived as threatening. Some view threat itself as stress.

Response-Oriented Approach: According to this approach, stress can be understood best in terms of the way people perceive and ascribe meaning to stress producing situations, the values they attribute to actions and the way they interact with events.

Interactional Approach: This approach, expresses the view that stress arises through the existence of a particular relationship between the person and his/her environment, Cox and Mackay (1981) suggested that stress arises when there is an imbalance between the perceived demand and the person's perception of his/her capability to meet that demand. Similarly, Ivancevich and Matteson (1984) defined stress in terms of a person-environment relationship wherein environmental demands are supposed to result in stress.

Thus, it is evident that stress is essentially an individual phenomenon and must be understood with reference to the characteristics of both the focal individual and his/her environment. As an individual phenomenon, stress is a personal response to a certain variation in the environment. According to Pestonjee (1987), there are wide individual differences in response to the same set of stressors, depending upon:

- the nature and magnitude of the strategy
- the importance of the stressor to the individual
- the perception of threat element as a component of stressor
- the personal and social support system available to the individual and
- the involvement and willingness on the part of the individual to do something about the state of stress.

Organisational Stress

In the past two decades, empirical researches on the theme of stress have increased manifold (Pestonjee, 1999). Researchers have focused their attention on causal factors of stress, stress manifestations, moderators of the stress-strain relationship, types of stresses experienced by diverse work populations, and various coping strategies adopted by organisational entities to cope with stress.

The working population constitutes a major section of the community. Industrialization and automation of industrial processes have resulted in rapid changes in the psycho-social environment at workplace and in the reactions of the employees to this environment. Exposure to these factors depends on various external factors, for example, fast changing technology, pressure to improve performance, competitive environment etc. and internal factors like organisational climate, various management processes, physical and psychological conditions at work and so on.

Stress in an organisation has been defined in terms of a misfit between a person's skills and abilities and the demands of his/her job, and as a misfit in terms of a person's needs not being fulfilled by his/her job environment (French et al., 1974). Caplan et al. (1975) defined organisational stress as any characteristic of the job environment which poses a threat to the individual.

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Organisational Change & Stress

Change involves becoming something different than what one is today, that is, moving from something familiar to something unfamiliar. Since it is a process of migration from a current state to a desired future state anxieties, insecurities and fears are expected to be part of the change process. Since uncertainty is associated with major organisational change, it makes people anxious making them react to change with withdrawal or active resistance (Nadler 1987). Therefore, it is in the organisation's best interest to intervene and minimize the negative effects of stress from organisational change.

The impact of organisational change on employee stress levels has received little attention from researchers. A pioneering work done by Mack et al. (1998) depicts how stress at individual employee level is related to change at the organisational level. They propose a dynamic process model which takes into account complex interrelationships among perceptions, stress response, and behaviour. In their model, perception is the central part of the stress process. The model begins with the demand or stressor, which in this case is organisational change. Each individual evaluates the change by filtering it through his/her own unique perceptual process. Then, a determination is made of the potential impact of the change and whether it is a threat or a challenge.

If the change is determined to have a negative impact, it is classified as a threat. On the other hand, an anticipated positive impact would be classified as a challenge. This determination is based on the individual's general attitude towards change (Lau & Woodman, 1995). Threats tend to result in a negative stress response and challenge in a more positive response. Then, the employee's behaviour is directed towards addressing the effects of the stress response. A diagrammatic view of the dynamic process model is shown in Fig. 1.

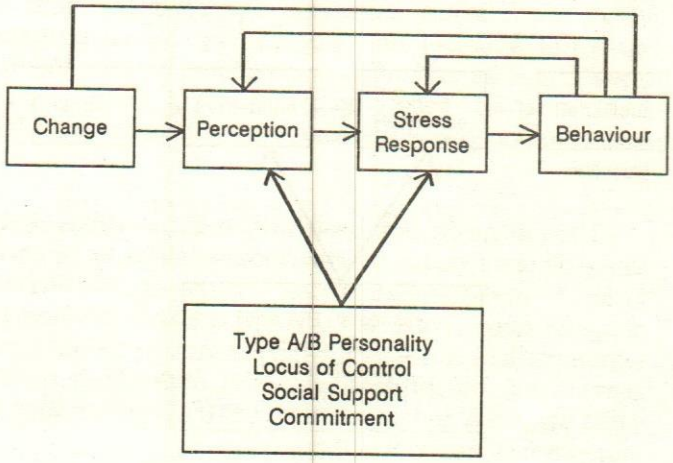

Fig. 1. A Dynamic Process Stress Model

The model also includes a number of moderators that impact perception and/or the stress response. There is abundant literature on these moderators (Sullivan & Bhagat, 1992; Pestonjee, 1999). Paterson and Neufeld (1989) argued that the existence of these moderators lends support to the idea that stress impacts each individual in a different manner. The evidence also indicates that these moderators affect both the individual's ability to cope with the effects of stress as well as the individual's perception of the stressful event.

The model also depicts that there are three distinct behaviours that are possible: those that address the stressor itself, those that address the perception, and those that address the stress response. Figure 1 also shows the feedback loops that cycle back from the behaviour to the change, to the perception process as well as to the stress response. Edwards (1992) refers to this as the negative feedback loop. A single behavioural act is not likely to successfully relieve any particular stress response. Instead, it is the ongoing, cyclical nature of

the dynamic process that ultimately brings about a resolution.

A single behavioural act is not likely to successfully relieve any particular stress response. Instead, it is the ongoing, cyclical nature of the dynamic process that ultimately brings about a resolution.

Coping with Stress

The true test of managers occurs when they must manage change. Top managers are involved in two change-related processes—one is creating change and the other is coping with change. Both processes increase workloads and stress levels.

The organisation and its managers can better cope with stress imposed by change if they are prepared, and they can be better prepared if they can predict organisational changes. Increased stress levels as a result of organisational change can be smoothed and their dysfunctional effects attenuated with some preparation (Huber et al. 1995). These preparations include: clearing the decks, that is, delegating, postponing, or completing work at hand; alerting people to the fact that increased workloads are forthcoming but that the organisation is readying itself, and thus partially immunizing them against the threat of change; and creating change-tackling units, such as task forces or collateral organisations.

Cognitive restructuring may be an effective means of helping individuals see the positive side of change and allow them to dispute cognitive distortions (Murphy, 1984). Another intervention can be feedback communication of the rationale for the change and employee participation in the change process.

Provision of social support is another way to increase self-efficacy (Bandura 1986). Encouragement from others is a major source of self-efficacy information. Quick et al. (1997) argued that control of the stress response can be encouraged in several ways. One of these ways is to encourage physical fitness, relaxation and emotional outlets as secondary prevention activities.

Pestonjee (1999) has also suggested a number of proactive interventions which an organisation can adopt to deal with stress imposed by change. One of these interventions is called "Stress Audit". When an organisation decides to have a scientific look at the mental-cum-physical health status of its backbone group (managers), the exercise is called a stress audit. It involves an attempt on the part of the organisation to study, explore and control various types of stresses which managers experience by virtue of their organisational membership. The major objectives of stress audit are: ascertaining dominant stresses at various levels of the organisation; identifying dominant personality profiles in terms of anxiety, anger, depression, Type-A behaviour pattern, motivations etc.; and determining remedial measures like training efforts, counselling, and readjustment to enhance the effectiveness of the organisation.

However, interventions that treat all employees in the same manner are unlikely to be successful. The interventions must take into consideration the importance of the individual's perception and response to a stressor. As Selye (1979) has rightly pointed out, "It is much more important to know what sort of patient has a disease than what sort of disease a patient has."

Interventions that treat all employees in the same manner are unlikely to be successful. The interventions must take into consideration the importance of the individual's perception and response to a stressor.

Conclusion

It is clear that implementing organisational change is not possible with a single individual's efforts. It requires the efforts and commitment of many individuals. Major change in an organisation may be extremely difficult if the head of the organisation is not an active supporter of it. Successful transformations in small as well as large organisations generally result when not just the chief executive or chairman or president but also a group of key members come together and share a common vision.

Modern organisations, with their constant changes, must be flexible and proactive in order to survive. This will require employees who are adaptable and who can be proactive in stressful situations. Any change in the organisation affects employees. Even if everyone in the organisation does not get affected by a change, some of them do get affected. Those employees who respond to change with rigidity or a passive, reactive posture will most likely not survive. Organisations can help employees through training, education, and increased communication aimed at enabling employees to understand and cope with stress.

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Feature

Role Stress & Involvement of Middle Level Managers: A Study

Amod Kumar Singh & Gopa Bhardwaj

There is an undeniable link between the role stresses experienced by members of organisations and the level of their involvement in the job. This study investigates the above relationship in three public sector organisations.

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In the modern world, man is continuously facing hazards. This is especially true in the organisation context where everyday something new occurs, old experiences become obsolete and organisational members struggle to live with everchanging conditions and stressful situations. Human behavior in an organisation is influenced or directed by several physical, social and psychological factors. One of the key concepts in understanding the integration of an individual with an organisation is the role assigned to him within the overall structure of the organisation. It is through this role that the individual interacts and gets integrated with the system. Role may be defined as any position a person holds in a system (organisation) as defined by the expectations of various significant persons, including himself/herself from that position. The definition of role indicates that there are inherent problems in the performance of a role and, therefore, stress is inevitable. The concept of role, and the related concepts of 'role space' and 'role set' have a built-in potential for conflict and stress (Pareek, 1993).

Role may be defined as any position a person holds in a system as defined by the expectations of various significant persons, including himself from that position.

Stress vis-á-vis Job Involvement

There is no universally acceptable definition of stress among behavioral scientists. Caplan (1964) defined stress as the result of a misfit between a person's skills and abilities and demands of the job and a misfit in terms of a person's needs supplied by the job environment. In the opinion of Lazarus (1971), environmental stimulus and the reacting individual are vital and

reaction depends on how the person interprets or appraises (consciously or unconsciously) the significance of a harmful, threatening or challenging event. Pestonjee (1983) stated "stress is something resulting from a combination of various individual (such as age, achievement need, type A of personality etc.) and organisational stressors (role conflict, role ambiguity)". Stress can also be defined in terms of a dynamic mismatch between the individual and his physical, social and psychological environment.

Another important variable is job involvement. The concept of job involvement is closely tied up in work ethic, the moral character of work and the sense of personal responsibility. Lawler & Hall (1970) defined it as the degree to which a person is identified psychologically with his work or the importance of work in his total self-image. Job involvement is the internalisation of value about the goodness of work or the importance of work in the worth of the person. Lodhal (1964) defined job involvement as "the degree to which a person's work performance affects his self- esteem". Its main determinant is a value-orientation toward work that is learned early in the socialisation process. Kanungo (1979) took a fresh look at the notion of involvement and defined it as a cognitive state of psychological identification with work to the extent that work is perceived as instrumental in satisfying one's salient needs and expectations.

There is a large number of studies on role stresses experienced by members of various organisations and their involvement in the job. Singh & Mishra (1983) found a positive but insignificant relationship between job involvement and organisational stresses; negative relationship between job involvement and ego strength and negative relationship again between organisational stress and ego strength for first-line supervisors. Ahmad & Khanna (1992) studied job stress in relation to job satisfaction and job involvement among 50 middle-level hotel managers (aged 23-36 yrs). A significant but negative relationship was found between job stress and job satisfaction, irrespective of the subjects' gender, marital status, education and experience. However, occupational stress was negatively correlated with job involvement and the high job involvement group was more satisfied with their job than the low job involvement group. In another study, Sehgal (1997) attempted to assess the effect of role stress on the level of involvement the person has in the job. The finding revealed that job involvement was correlated negatively and significantly with role stress. Inter role distance, role erosion, self role distance and total organisational role stress were associated negatively and significantly with job involvement. Alam (1997) conducted a study to determine the strength of job satisfaction, job involvement and organisational stress among private and public sector executives. It was found that executives differed significantly on the variable of job involvement, private sector executives being more involved with their jobs as compared to public sector executives. It was also observed that private sector executives experienced more role stress as compared to their public sector counterparts.

Occupational stress was negatively correlated with job involvement and the high job involvement group was more satisfied with their job than the low job involvement group.

A study was attempted to assess the nature and extent of organisational role stress and job involvement among middle level managers of three large public sector organisations and to investigate the relationship between organisational role stress and job involvement.

Methodology

The sample of the study comprised 120 middle level managers working in three large public sector organisations (40 from each organisation). These organisations included:

PSU-I : engaged in oil exploration and acting as a mediator between India and other countries.

PSU-II : marketing oil and gas.

PSU-III: involved in production and distribution of steel all over the world.

Organisational Role Stress Scale and Job involvement scale were the two tests used in the study.

Organisational Role Stress (ORS) Scale—This scale developed by Udai Pareek (1983), measures ten role stress dimensions relevant to organisational life. The dimensions are inter-role distance (IRD), role stagnation (RS), role expectation conflict (REC), role erosion (RE), role overload (RO), role isolation (RI), personal inadequacy (PI), self role distance (SRD), role ambiguity (RA) and resource inadequacy (RIn). The scale has 50 items with assigned scores of 0-4 for each item. The total organisational role stress may range from 0 to 200.

Job Involvement (JI) Scale—This scale was developed by Lodhal & Kejner (1965) to measure the degree of involvement of subjects in their job. It is a Likert-type (5-point) attitude scale. The items were

Table 1: Mean Scores, S.C. and 't' Values

Variables	PSU-I		PSU-II		PSU-III		t-value (I II)	t-value (I III)	t-value (II III)
	Mean	S.D.	Mean	S.D.	Mean	S.D.			
IRD	5.55	3.62	4.60	3.20	4.83	3.22	1.13	0.93	0.18
RS	4.88	3.27	5.40	3.16	3.75	2.94	0.83	1.60	2.54**
REC	3.65	3.30	2.65	2.07	4.15	2.65	1.40	0.74	2.54**
RE	8.23	3.95	5.60	2.75	6.20	3.60	3.29**	2.37**	0.66
RO	4.68	3.11	3.18	2.71	2.70	2.65	2.05*	3.02**	1.07
RI	4.80	3.17	4.05	3.08	5.05	3.37	0.89	0.34	1.21
PI	4.13	2.92	2.30	1.87	4.38	3.52	3.18**	0.34	3.13**
SRD	5.33	3.59	3.90	3.09	4.30	3.02	1.80*	1.36	0.70
RA	3.85	3.32	2.40	2.15	4.13	3.27	2.17*	0.37	2.90**
Rln	3.68	2.79	4.00	3.44	5.28	3.65	0.64	2.16*	1.44
ORS	48.30	25.08	37.90	18.68	44.45	24.13	1.90*	O.69	1.14
JI	45.28	4.51	44.45	7.88	45.33	3.05	0.60	0.06	0.55

** Significant at 0.01 level

* Significant at 0.05 level

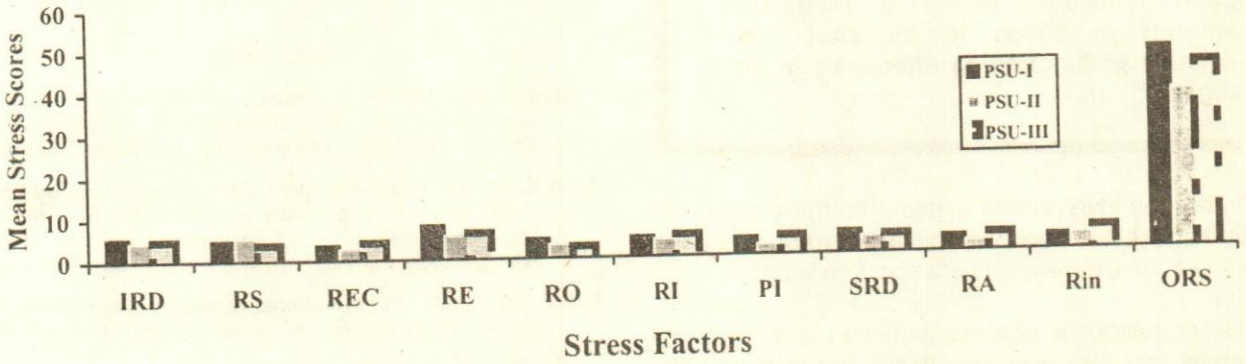

Fig. 1. Stress Profile of Three Public Sector Organisations

scored 1 to 4 from high to low involvement. The minimum score was 20 and maximum 80.

Both the tests were administered on the total sample of 120 middle level managers from all the three PSUs, honouring the confidentiality of their identity. Responses obtained were statistically analysed.

Discussion

The result (Table 1, Fig. 1) showed that managers of all three organisations faced some degree of role-related stress. A comparative analysis of the data revealed that the managerial personnel of PSU-I tended to experience significantly higher stress than their counterparts of the other two organisations with regard to role erosion and role overload probably due to the fact that PSU-I is a very large organisation and the nature of its work is complicated and diversified. People working in this complex setup are not finding their little niche. The organisational members feel that there are two many expectations – quantitative and qualitative – from the significant roles in their role set and are confused about their own significance and contribution to the organisational existence. Managers of PSU-III experienced slightly higher stress rating on personal inadequacy and role ambiguity than those of PSU-I but rest of the differences was significant. This might be due to the perceived experience of the employees' inability to cope with the rapid changes and demands both within and outside the organisation. There is lack of clarity about the expectations regarding their roles which may arise out of lack of information or understanding. They have to face competition from private sector in terms of

production and quality and also have to maintain the profit level. Again, on overall role stress, a significant difference was found between PSU-I and PSU-II while rest of differences was non-significant. A look at the mean score showed that the two relatively big organisations PSU-I and PSU-III scored quite high on stress levels as compared to PSU-II. These organisations play a significant role in the economic development of the nation. The employees working in these organisational settings have to fulfil lots of expectations within and outside the organisation and they are required to keep themselves abreast with today's fast-paced world.

However, stress cannot always be taken in a negative manner, neither can it be treated as a unidimensional concept. As Kets de Vries (1979) had noted, each individual needs a moderate amount of stress to be alert and capable of functioning effectively in an organisation. Stress may prove to be an asset so long as it is tolerable and helps in creating healthy competition. Organisational excellence and individual success are achieved through well managed stress.

Each individual needs a moderate amount of stress to be alert and capable of functioning effectively in an organisation.

On the job involvement aspect, the three groups of managers have not displayed the same amount of involvement but the differences were not significant.

The correlational analysis between organisational role stress and job involvement (for the total sample) indicated that a non-significant inverse relationship emerged between the two (coeff. of correlation = –0.14). The highly involved employees were less stressed by undesirable situations or demands of their jobs, while the less involved or uninvolved employees perceived their job situations to be highly stressful. Thus, involvement in work decreases with increasing organisational role stress. Supporting this finding, Hammer and Tosi (1974) also found an inverse relationship between role stress and job involvement.

Conclusions & Implications

On the basis of the above findings, it may be concluded that:

- Managers of all three public sector organisations experienced some amount of job related stress, but the degree of stress varies across the organisation. This is an important indicator of the fact that we cannot use the label of public sector undertaking and take it as a symbol representing homogeneity of experiences. The nature of objectives, product, size, functions etc. create the differences even among PSUs (though all the three PSUs under study are Navratnas). One needs to be careful in categorizing and treating these organisations especially from HRM perspective.
- Job involvement of all the managers was relatively high and more or less homogeneous.
- An inverse relationship has been found between organisational role stress and job involvement.

The organisations should develop a modest action plan to lessen the magnitude of stress faced by their executives in the work setting. It is important to know how much stress they are currently experiencing and where it is coming from. How stress management integrates into one's work life should be taken into account. Since job involvement was almost similar for all the three, one has to focus more on the stress experience.

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Feature

Dimensions of Quality Training in Industrial Training Institutes

R.R. Asawa & D.R. Baheti

This paper discusses the problems of using trainee evaluations as a major criterion for measuring training effectiveness. It argues that the present focus on such measures belies total quality management. The potential impacts on the quality of instruction when such measures are used for assessing performance are identified. Potential remedies to improve the quality of instruction in training institutes are offered. This study is based on an evaluation of mission statements of training institutes and informal discussions with faculty members in such an institute.

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Quality is on everyone's mind. Over the years, it has become apparent that the only way for corporations to survive is by being competitive. Manufacturing as well as service oriented, industries compete with other corporations both at local and global levels. However many organisations have suffered severely because of their lack of competitiveness. Products and services that do not meet the needs and specifications of consumers are increasingly being produced or provided and being rejected by the consumers who have a wide range of options to select from. These products or services are not fit for use as they do not conform to standards.

Recent articles have also focused on quality dimensions for the service industry. This makes sense especially since more than 70% of the Indian labour force is employed in the service sector. Measuring the quality of service is elusive as there are a lot of intangible factors that may be easily excluded. In fact here quality is in the eye of the beholder.

Measuring the quality of service is elusive as there are a lot of intangible factors that may be easily excluded.

In discussing quality issues in the service sector we can not have a general prescription for all service industries. Each service industry should be treated individually with a potential measurement and means to develop quality. This study examines the quality dimensions for instruction effectiveness in training institutes.

Problems in Training Institutes

Education, training and effective utilization of human resources have always been the major tenets of

building quality in the workplace. The workforce has to be sufficiently educated and trained to understand the impacts of quality on the corporation, and how that affects the survival of the firm and their own survival. With sufficient education in relevant areas, the worker can be easily be retrained, especially with the rapid proliferation of new technologies. Training is easier when workers have some basic education.

Industrial training institutes are major centers for providing basic training needed for the modern workforce. In order to be competitive in the future, we ought to be concerned about the quality of training that is being provided at the institute level.

Quality in the context of training institutes should be treated differently from that of corporate or service areas. For example the general paradigm in the case of manufacturing and service industries is that the consumer knows what he/she wants. The definition of consumers is quite broad in a training institute situation. While the training institute may tend to view the trainees as the primary consumers, it should also consider as consumers, parents who pay for their children's training, corporations that hire trainees from the institutes, faculty members who continue to train trainees who have met the minimum requirement for their courses, and the general society that suffers or benefits form the actions of these trainees. Administrative and structural barriers have severely limited the extent to which academics can do justice to their job.

A training institute may define its mission as that of "Providing quality training". Obviously, the institution must have the means of achieving this goal, which is actually part of the dimension of quality instruction in training institutes.

Quality instruction calls for profound change in the instructional model. This change begins with leadership. Leaders must know current trends such as globalization, total quality management, environment issues, integrity and social responsibility and should act swiftly to exploit opportunities. Leaders should define reality, make commitments, lead themselves and others in the right direction. Without this type of vision, the organisation is bound to fail.

However, informal survey and discussion with faculty, reveal that in many institutes that have such a mission statement, this goal has just become a selling point to both trainees and accrediting bodies, and is rarely implemented. How can this goal be achieved? After reviewing several standards adopted by some of institutes, the following lacunae were observed.

One of the common measurements of training effectiveness is the use of trainee instruction evaluations. Evaluation methods include the use of performance indicators, observation of training and the use of trainee feedback. Trainees are given prepared questionnaires with a Likert type scale, mostly 1 to 5 to rank their instructors on specific dimensions of instruction that are identified. Trainee evaluations are in fact valuable if they are properly used. For example they should be used to provide feedback to the instructor on what the trainees feel about the course presentations. Every serious-minded professor would like to improve the quality of his instruction and can isolate the controllable factors from the uncontrollables going through these evaluations. He can act to control those within his power and may make recommendations to the administrators on things to do in the future to improve the quality of instruction. However, there are obvious problems in focussing primarily on trainee evaluation as a means of judging instructors.

Trainee evaluations are valuable if properly used. They should be used to provide feedback to the instructor on what the trainees feel about the course presentations.

- One major assumption is that the trainees are not biased in their judgment. This is an assumption that is questionable.
- It is also assumed that the trainees are generally aware of what to expect from the course. Often there are no measures of the content of the course actually delivered to the trainees other than prepared class outlines by the instructor. There are no standardized tests to evaluate the quality of trainees from each class. These evaluations have more or less become a familiarity contest.
- Further, there are inconsistencies in trainee responses that are only obvious when each response is treated on an individual basis—for example, a trainee may rank an instructor very high on knowledgeability and organisation but at the same time would not recommend the instructor or gives him/her a very low overall rating. This type of inconsistency may suggest other factors outside the questionnaire such as personal biases about the instructor (based on dressing, grade expectations, race) etc.
- In trainee evaluations statistical data obtained are often misused.

- The evaluation process does not pinpoint any particular weakness that has to be addressed. There is no follow-up by the evaluator to see how improvements are being made. Feedback and communication between these two parties are limited.
- The measures used tend to blame the instructor as the source of the problem, not the lack of institutional infrastructure or the admission of ill prepared trainees. Infrastructure such as photocopies are not easily available to prepare class materials, and projectors and video/TV sets are often unobtainable. If the institute is not willing to spend money to buy teaching aids such as video tapes, wouldn't these factors influence the presentation of materials?
- Too much bureaucracy is a problem that many of these institutions face. There are too many administrators with varying powers and, at times, ill defined positions. The reporting system is not clear.
- Misperception and misinformation set in whenever information is transferred without clear objectives.

The present focus and measures for effective teaching defy most of Deming's (1982) quality philosophy. For example there is no commitment to continuous improvement and emphasis is placed on short-term concerns rather than the future. Resources are not adequately committed to the achievement of continuous quality improvement. There is a lot of focus on numerical targets as exhibited by too much emphasis on scores from trainee evaluations and the use of quotas in the grading system. Acceptable work standards are not well defined and the environment, by its narrow focus, affects the morale of instructors. Deming's warning that management is responsible for 85 per cent of all the quality problems can be attributed to an insurmountable administrative barrier that limits the flow of information and communication between administrators and instructors.

Management is responsible for 85 per cent of quality problems.

Model to Measure Training Effectiveness

The following are some guidelines for improving training effectiveness:

- Training effectiveness can be significantly enhanced if instructors develop training manuals with unique skills that can be shared with colleagues. Instructor skills can be subject to peer evaluation with feedback received on how to improve the quality of training. Institutions can also organize in-house seminars where instructors with something new to share such as how to apply an existing technique can hold demonstrations.
- Training is not just a function of communication or simply of animation. The communication should be rich is knowledge base and also skills. The elements of good training are the content, technique, and class room chemistry. Effectiveness of training session is proportional to the physical conditions plus a product of training content, training technique, class room chemistry, trainee's motivation, peer trainee behavior, and the timing of session. Instructors must be encouraged to enhance their skill with constant updation on latest developments in their trade.
- Adequate infrastructure must be present to improve the quality of training. Necessary training materials, professional journals and major books should be available in the library. Teaching aids must also be available and in operational conditions. Instructors should be able to get the information they need on a timely basis.
- Trainee evaluation should be used as a means of providing feedback to the instructors and not in a punitive manner since this has the potential of affecting the quality of training. There should always be feedback between the administrators and instructors on how training can be improved, and there must exist guidelines to ensure that this is done. Frequent consultation with the other consumers such as industries, parents and faculty members may also be necessary to ensure not only that the material is well communicated but that it is timely, appropriate and effectively communicated to the trainees. In essence, trainee evaluation must be used developmentally, not punitively.
- How appropriate is the subject matter discussed in the classroom. One can be an effective communicator without actually delivering quality teaching. The content of the subject matter has to be enriching with the instructor discussing on-going topics in a challenging manner. Also, instructors should not just be reportorial in their presentation of topics. They should take a stand on issues and contribute original thinking in a significant manner. This is

seldom achieved when the teaching is separated from recent developments in the concerned trade.

- Instructor skill can be tested by observing his performance. This can bring weakness into notice.
- The use of exit polls could be effective in measuring training effectiveness.
- Innovativeness is necessary in order to be effective instructors. Instructors should understand the make up of the class, be able to test different training skills, and identify the skill that communicates most effectively to the trainees. Obviously, this is an experimental procedure that may not amount to anything. It is possible that the right approach for a particular class may not be identified during the short duration. Being innovative can also be risky and counterproductive to the instructor if the focus on short-term evaluations continues without really taking into account the attempts made by the instructor to communicate effectively. The instructor who understands his trainees may be able to identify the appropriate skills to communicate effectively.

Contrast between TQA and TQM is presented in table 1 to show that present instruction is modelled on TQA, which is increasingly responsible for failures. The principle of TQM can be used for imparting more enriching training by revising the trainee evaluation practice.

Definition of Quality

In TQA, quality is product driven while, in TQM quality is customer driven. The major consumers of the services offered by training institutions are the trainees. They come into a class with varied backgrounds. Topical coverage should be cognizant of those different backgrounds and should, include enriching topics that will relate to the trainees real-life experience. Course content should also consider environmental trends and interests of the trainee population.

Once training needs are identified and means developed to achieve such needs, an evaluation programme should be commenced. The evaluation is to identify problems while the course offering is in process and to apply corrective measures at once. The trainees provide on-going feedback as well as suggestions, and the instructor reacts to improve on identified problem areas. By making this evaluation informal, the instructor is not threatened that the outcomes may be used against him/her. Also, due to the frequency of this review process, the instructor has more opportunity to improve on those dimensions. When need be, the instructor may seek institutional support to help improve on those areas that are outside his/her control.

Table 1: TQM and TQA Contrasted

Principles of quality	TQA	TQM
Definition	Product driven	Customer driven
Priorities	Emphasis is on cost and output	Emphasis is on outcome and quality is the means
Decision	Short-term goals are emphasized	Short-term and long term goals are emphasized
Objective	Detecting errors	Preventing errors
Costs	Quality increases costs	Quality reduces costs & improves productivity
Errors are due to:	Special causes which result from worker's mistakes and inefficiency	Common causes which result from the failure of top management to manage effectively
Responsibility for quality	Inspection centers and quality control departments	Involves every member of the organisation
Organisation culture	Numerical targets are used and employees can be singled out for their mistakes	Continuous improvement is emphasized and teamwork is the approach
Organisational structure	Top-down and bottom-up approach bureaucratic and restricts information flow, rigid	Horizontal approach, provides real time information, flexible
Decision-making	Top-down approach	Team approach is used with team members comprising employees

Priorities

The present approach of student evaluation focuses on output rather than outcome. Output is measured by the rating a particular instructor gets. Lower rating in evaluation means that instructor was inept or inefficient. Also, it means that a batch of dissatisfied trainees has been produced. The poor quality of training delivered to this batch costs the society in terms of productivity losses. Eventually, this batch will be called to apply its knowledge and skill in the society-at-large and may be found lacking.

The present approach of student evaluation focuses on output rather than outcome.

The TQA approach, while minimizing cost in the short run by not spending the necessary time to improve or by penalizing those with poor ratings, is actually increasing the cost to society in the long term by producing inferior trainees. In the long term, the training institute develops a poor image as its poor quality becomes apparent by the mass production of inferior trainees. TQM, on the other hand, emphasises the outcome and transforms the trainees into well equipped members of the society.

Decisions

Allowing the instructor to manage his quality leads to long-term goals. Quality management becomes a continuous process with embedded feedback that can be applied while the trainees are undergoing transformation. Both the trainees and their instructor become committed to the goal of quality training. Corrective actions are taken early enough to bring the trainee batch on the desirable track. The instructor benefits by expanding his experience base for problem-solving and interaction with trainees. Such experience will help in the long term to minimize the number of workshops and preparation errors, by minimising the time it takes to identify problem areas. There are, therefore, short and long term benefits associated with the application of TQM.

Objective

The objective of workshops should not be to detect errors. The present TQA applied in workshops tends to blame the instructors for any detected errors (i.e. special causes which result from instructors' mistakes and inefficiency). We have to go beyond this finger pointing. Many of the problems are indeed due to common causes which result from top management inability to manage effectively. Instructors should be given more flexibility in improving and maintaining quality. They should know the make-up and qualifications of their batches and what the batches expect to obtain. Also, if the course requirements and quality are not standardized, there is bound to be a lot of common causes that influence quality, and the instructor may not be able to deal with them. In addition, when special causes are observed, top management must provide the necessary infrastructure and resources to deal with such problems. There is a need to develop a systematic view of shop floor training.

There is a need to develop a systematic view of shop floor training.

Responsibility for quality

Responsibility for quality training lies not only with the instructor but also with the institution administrators and all pertinent interest groups. A systematic review of the class should be adopted to see how institute policies and actions influence quality training. Quality is to be seen as an institute wide commitment where everyone involved plays a role in achieving. Every member of the institute has a commitment toward quality training. In a TQM environment, it is very hard to tell who is the boss. Trainees who are willing to learn could help the instructor design a good training system. An atmosphere that is cordial will make it possible for trainees, instructors and administrators to work toward a common goal.

Organisational Culture

Emphasis on numerical targets should give way to emphasis on continuous improvement and team work. Evaluation of instructor on Likert scale becomes even more detrimental when the instruments being used to classify these instructors are of questionable validity, unreliable and often misused. The process presented here calls for active participation of trainees, instructors and administrators in improving the quality of shop floor instruction delivery. The instructors have to feel comfortable knowing that they have room to improve. When numerical targets are overemphasized, as is being presently done, instructors tend to resort to unproductive methods to maximize their scores in trainee evaluations. Timely information is needed to improve the quality of instruction. A horizontal structure should be adopted to hasten the flow of such information.

Conclusion

Finally, institutions can be great if they do what they claim as their missions and their productivity can be assessed. Such institutions have a high proportion of their faculty involved in training-manual writing, preparation of lesson and demonstration plans and development of audio visual aids of effective training. For institutes that hope to compete in the future, the guidelines laid down here are worth considering.

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Feature

Minimisation of Time & Cost Overrun for Turnkey Projects

B. Kumar & S. Dey

The turnkey project contractor has to deal with a large number of vendors and sub-contractors, as well as the consultant and owner of the project. Consequences of delay on their part and accidents are often borne by the turnkey contractor who has also to contend with a penalty clause and no bonus system in India. This paper discusses some steps and a software to minimise the delay and cost overrun while executing a turnkey project contract.

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Turnkey contract overrun is very common in India. Project contracts are often late and over budgeted and do not perform the way they are expected to. Many project contracts overrun because of lack of integration in planning and implementation effort, absence of commitment, lack of leadership, lack of dedicated personnel in the team, non-involvement by the top management, wrong decisions by the project manager, wrong direction by the management, price escalation, strikes, improper fund flow, act of God and resource constraint etc.

Optimum Planning

Proper planning with available resources, periodic review of the job and an integrated approach can minimize delays. The PERT network made initially before the execution of a project contract is a tentative plan of action. In actual execution, there may be slippages and unexpected events which delay job progress and also overshoot cost estimates. Therefore, a periodic review of the progress status with the help of the CPM/PERT network is essential for execution of turnkey projects. Previous plans require to be updated and modified after periodic review, as per conventional Project Management techniques.

The critical path is the longest duration which determines the project completion date. Any delay in the critical path of the project will delay project completion. Critical path can only be maintained by timely availability of equipment, materials and labor. For a turnkey contract, the duration of individual activities has to be back calculated as per the target date of completion of the project, which is fixed by the owner. Then by estimating the probable time of completion of each activity and comparing with time availability which has been calculated based on target date of completion of contract, one can assess whether an activity is normal or a crash activity. And

accordingly action can be taken or strategy can be formed.

As soon as a turnkey project contract is awarded to an organisation, the project planning and monitoring cell (PPMC) makes the full plan of the contract in the form of a Bar Chart. But in case of multiple projects, desired quantity and quality of manpower, resources and materials may not be available. The interference of other contracts may delay the start of the job or may defer current jobs, also the existing resources may have to be shared. Resource constraints delay contract completion. The schedule is designed so as to start all the activities at their earliest, then large quantities of resources are required in the early period and relatively lower levels in the later stages. To optimise the resources and labor forces, allocating the resources in fixed quantity without fluctuation is vital. Such levelling has the advantage of reducing idle labor and resource costs. Contract activities may be affected due to the following:

- Wrong assessment of geological soil structure—so while excavating for foundations or tunnels or digging bore wells, time schedule of activity may be upset
- Acts of God like cyclones or other calamities and untimely monsoon affect job progress
- Financial constraint
- Late supply of equipment
- Non-availability of materials such as cement, steel, explosive, electrical equipment and cable etc. in agreed time
- Delayed availability of land or working front from project owner, as it is not ready at their end
- Delayed clearance of drawings, from consultant
- Mis-matching of drawing on mechanical, structural, civil, and electrical aspects
- Discrepancies or mistakes in drawings
- Wrong assumption made while planning the schedules
- Omission of activities i.e. slippage
- Breakdown of machinery or equipment for excavation or erection purposes

Due to the above factors the whole job may get delayed and considerable liquidity damage has to be paid by the turnkey contractor to the project owner, as per the penalty clause.

Methodology

To prevent delays, job progress should be monitored at each stage. After each periodic review, as per the status the PERT network diagram must be revised. Current data must be fed into the computer programme made for CPM/PERT Network, written in Visual Basic language and linked with Autocad for diagram. The output data is also available through Microsoft Excel which is linked with the main programme for getting precedence matrix, activity list with duration and event list. This programme will give an output in the form of a new network diagram all the time, with the activity list displaying the time allotted for each activity. Here due to the change of duration of activities, the critical path might change. Now this new network diagram has to be distributed to all the departments for strictly adhering to the time schedule for completion of their work, so that the contract can be finished within the revised estimate of time and cost. The network will give a guideline for implementation of the project with the available manpower and resources. While executing a turnkey project contract, free float and total float can be utilised by engaging the resources properly. Under Indian conditions, shortage of cement, steel or materials and capital is very common. So rescheduling the start and finish of various activities taking advantage of the floats for the activities and by best reallocation of resources, the pressure may be relieved. "Resource Analysis" is very important in order to minimise delays.

There may be two types of resources constraint: There may be shortage of resources in a particular time due to simultaneous execution of more than one project. Resource being limited in capacity, cannot be increased. So, by the help of Resource Smoothing one can get maximum utilization of equipment/manpower. By resource sharing, capital investment on the resources will be optimised. Heavy equipment and operators must be utilised all the time by sharing among all work sites.

In the present labor situation, drastic fluctuation in labor requirement is practically difficult to cope with. It is difficult to arrange 200 laborers for one day and 100 laborers for another day and so on. Once a strength of labor is engaged it can not be disengaged easily, also it is difficult to arrange different quantity of manpower at different points of time. So, the technique of Resource Levelling can be utilized to make uniform requirement of labor over a long period of time.

By using the floats available on activities, manpower and equipment needed can be arranged in such a way, that by shifting activities i.e. by rescheduling, the

resource may be utilised in a uniform manner optimally. Sub-contractors are responsible for the success or timely completion of the project contract, so they should get a proper schedule for performing different activities at different points of time with respect to the target date of completion and they have to be closely monitored. The supervising executive and the sub-contractor should be held responsible for their part of the job.

The time estimates may be wrong in actual execution due to many reasons. The planning should be modified and corrections incorporated after review in a number of sittings.

Success is never an accident and is the result of right decisions at the right time. For taking the right decision at the right time implementation of management technique for planning and monitoring is vital. If planning is based on the current status of jobs, one can take the right decision for solving a problem and strategies can be formed for completing the job with the available resources and within the stipulated time limit.

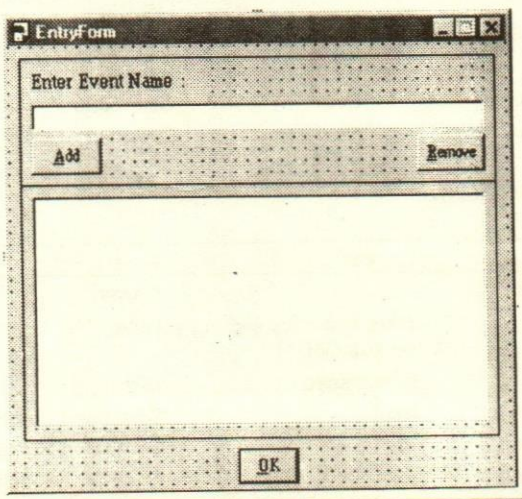
For preparing the activity list, precedence matrix and network diagram with Critical Path, in PERT Program, the steps to be followed are as follows:

PERT

This software has been developed for the generation of PERT network diagram and for finding the Critical path of the generated network diagram. The software consists of 5 Main forms

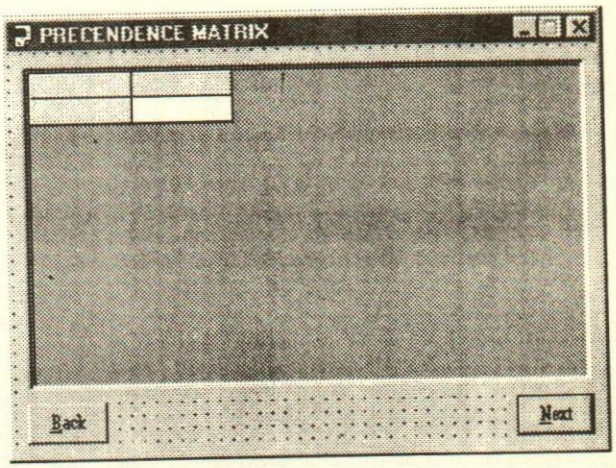
- Entry Form
- Precedence Form
- Sub-Activity Form
- Path Form
- Activity Form

Entry Form – Is the first form through which the user enters the event to generate the Pert network diagram.



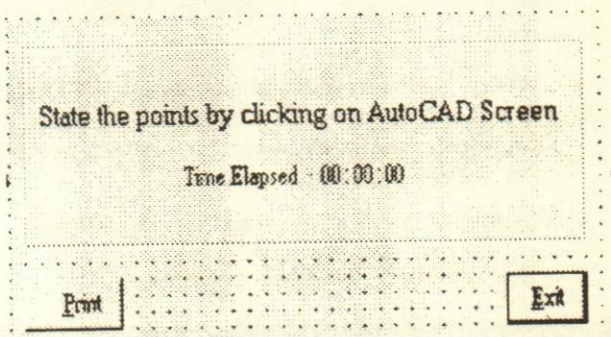
Precendence Form – This form appears with the rows and columns set according to the entries given in the entry form.

- To indicate the precedence of events click in the appropriate box and "1" appears & double clicking empties the box.
- As for the same event loop is not possible so, automatically 'X' will appear in the box, e.g. 3 to 3 looping is not possible so in that cell 'X' will



appear. And when one cell is clicked, say cell for row no. 2 & column no. 3, then in that cell "I" will appear and by default in row no. 3 and column no. 2 a "X" will appear, as this loop is absurd. Precedence should be such that dangling is avoided.

- 'Back' button shows the entry form. 'Next' button opens AutoCAD.

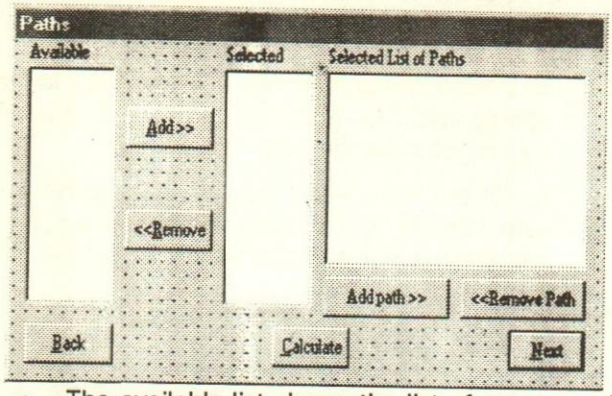


- Indicate the points for each event of the Pert network by clicking on the AutoCAD screen. At the end the Path form appears automatically.

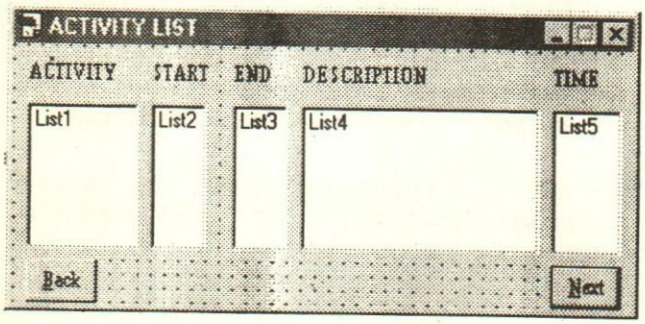
Printing – Click on the print button on the last form and all relevant data is exported to an excel worksheet from where user can get a print out.

Path Form – This form is for the user to indicate the

paths that are to be considered for finding the Critical path.

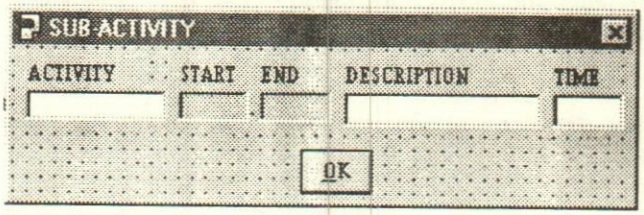


- The available list shows the list of events available for generating the critical path. For stating the paths to consider, refer to the network diagram in AutoCAD.
- To create a path, select events from the available list, in the order as they occur in the Pert network, then click on the 'Add' button. The event gets added to the list of **selected**.
- When the path has been traced, into the selected list, Click on the 'Add Path'. The path gets added to the Selected list of paths and the selected list gets emptied so that next path can be traced. To remove a traced path from the Selected list of paths, select an item from the list and click on the 'Remove Path' button. The path is removed from the list.
- When all the paths have been traced, click on the 'Calculate' button, the critical path is displayed. One can add/remove paths at will and click on 'Calculate' to look for feasible critical path.
- When finished with critical path generation, 'Next' button is to be clicked. Then show the place on the AutoCAD screen where one wants the Critical path to be shown.
- Click on 'Exit' button on the issuing screen.
- 'Back' button shows the previous screen.

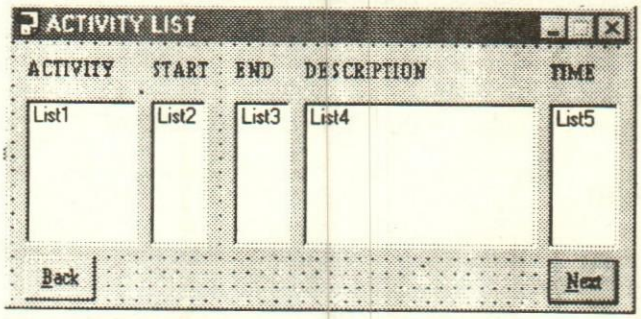


Activity Form – Activity form contains the list of activities with their starting and ending events. While drawing the Pert network the software asks for the activity name by showing start event and end event with description which is a user input. 'Next' button shows the path form, while 'Back' shows the previous form.

Subactivity Form – In this form enter the activity name together with its description. The start and end of the events are shown by the software.



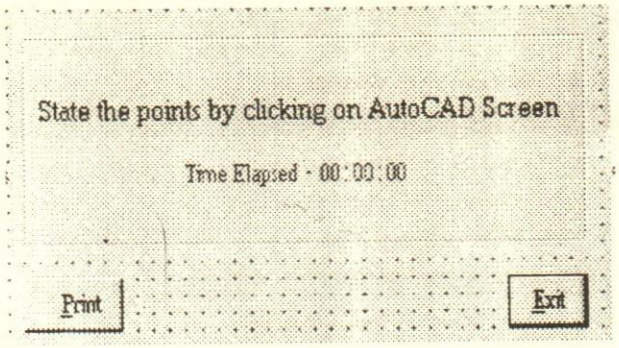
Activity Form



Object	Caption	Type
Label 1	Activity	Label
Label 2	Start	Label
Label 3	End	Label
Label 4	Description	Label
List 1		List Box
List 2		List Box
List 3		List Box
List 4		List Box
List 5		List Box
Command 1	Back	Command Button
Command 2	Next	Command Button

Caption Form

Object	Caption	Type
Frame 1		Frame
Label 1	State Points by clicking on AutoCAD	Label
Label 2	time elapsed	Label
Command 1	Back	Command Button
Command 2	Print	Command Button
Command 3	Exit	Command Button



For example, a turnkey project of a coal handling plant has to be executed, the layout of which is shown in Fig. 1. Now the work for the above is as mentioned:

- Conducting site survey for gradient and levels of the land, at the place where plant will have to be installed
- Manufacturing processing machines like screens, crushers, vibrating feeders etc.
- Lay out of the plant and transfer houses to be finalised with conveyors
- Finalising electrical cable routine and procuring controlling equipment, transformer, safety switches, cables etc.
- Preparing drawings for mechanical, structural, civil, electrical and other utilities
- Approval of all the drawings to be taken from the project owner's Consultant
- Preparation of detailed drawings for all categories
- Construction of civil foundations and tunnels along with other civil work, if any
- Fabrication of structural and mechanical items
- Erection of structures and of mechanical items
- Installation of machines and equipment
- Electrical cable laying and giving connection
- Conducting trial run of the plant with and without load till the system is stabilised
- Plant to be handed over to the project owner.

Now for drawing the PERT Network, the logic is given like this. The survey work of the area and machine drawings can be started simultaneously. Then submitting the machine drawings, approval has to be received from the consultant. After survey work, layout of conveyor and transfer houses along with general arrangement drawings can be started and after submission, approval has to be received from consultant. After approval of mechanical, general arrangement drawings, structural and electrical drawings of houses and conveyors can be started and after submission, approval can be achieved. Civil drawings can be prepared only after approval of Structural drawings. After approval of mech., structural and civil drawings, detailed drawings can be started and then foundation and other civil work, structural and mechanical items' fabrication is possible. Electrical equipment and components can be procured only after approval of these drawings. After foundations

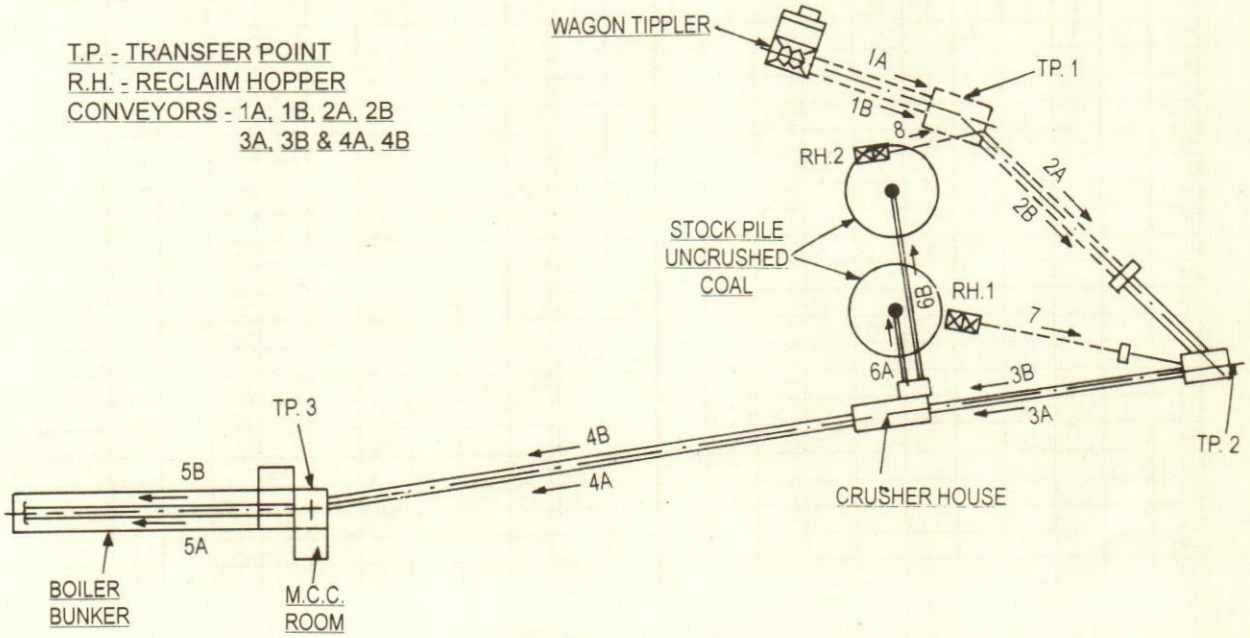


Fig. 1. Coal Handling Plant

Activity	Start Event	End Event	Description	Time in weeks
A1	1	2	Survey Work	1.5
A2	1	3	Preparation of Machine Drgs.	1.5
A3	2	4	Preparation of Layout Drgs.	3
A4	3	5	Approval of Machine Drgs.	1
A5	4	6	Approval of Layout Drgs.	1.5
A6	5	9	Manufacturing of Machine	7.5
A7	6	12	Preparation of Detailed Mech. Engg. Drgs.	4.5
A8	6	10	Preparation of Structural Drgs.	3.5
A9	6	7	Preparation of Electrical Drgs.	2
A10	7	8	Approval of Electrical Drgs.	2
A11	8	9	Procurement of Electrical items	8
A12	10	11	Approval of Structural Drgs.	1.5
A13	11	12	Preparation of Detailed Stru. Engg. Drgs.	4
A14	12	17	Fabrication of Mech. & Stru. Items	5
A15	11	13	Preparation of Civil Engg. Drgs.	3
A16	13	14	Approval of Civil Engg. Drgs.	1.5
A17	14	15	Preparation of Detailed Civil Engg. Drgs.	4
A18	15	16	Excavation for Tunnel & Foundation	3
A19	16	17	Civil Construction Work	10
A20	17	18	Erection of Strct. & Mech. Structure	7
A21	9	18	Supply Bought out Items to Site	1
A22	18	19	Installation of M/CS. & Ele. Equipment	3
A23	19	20	Electrical Cable Laying & Conn	5
A24	20	21	Commissioning	2.5

Fig. 2 Activity List

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	
1	X	1	1																			
2	X	X		1																		
3	X		X		1																	
4		X		X																		
5			X		X				1													
6				X		X	1			1		1										
7						X	X	1														
8							X	X	1													
9					X			X	X									1				
10						X				X	1											
11										X	X											
12						X					X						1					
13											X		X	1								
14													X	X	1							
15														X	X	1						
16															X	X	1					
17												X				X	X	1				
18									X								X	X	1			
19																		X	X	1		
20																			X	X	1	
21																				X	X	

Fig. 3. Precedence Matrix

are ready, mechanical and structural items can be erected. In the mean time all the machines and equipment are to be sent to site. After erection of structures, the machines and electrical equipment can be installed. After completing cable laying, connection can be given on machines and motors of conveyors. Then the plant can be trail run and after stabilising the operations, it can be handed over to the project owner

time can be known. In this programme the diagram for 100 events can be made.

After the network diagram, the print button has to be clicked and automatically Microsoft Excel gets loaded and an Event List, Precedence Matrix (Fig. 3) and Activity List (Fig. 2) with duration and Critical Path (Fig. 4) come on its output. The network diagram can be edited in Autocad as per requirement. The output of the

Event List

1
2
3
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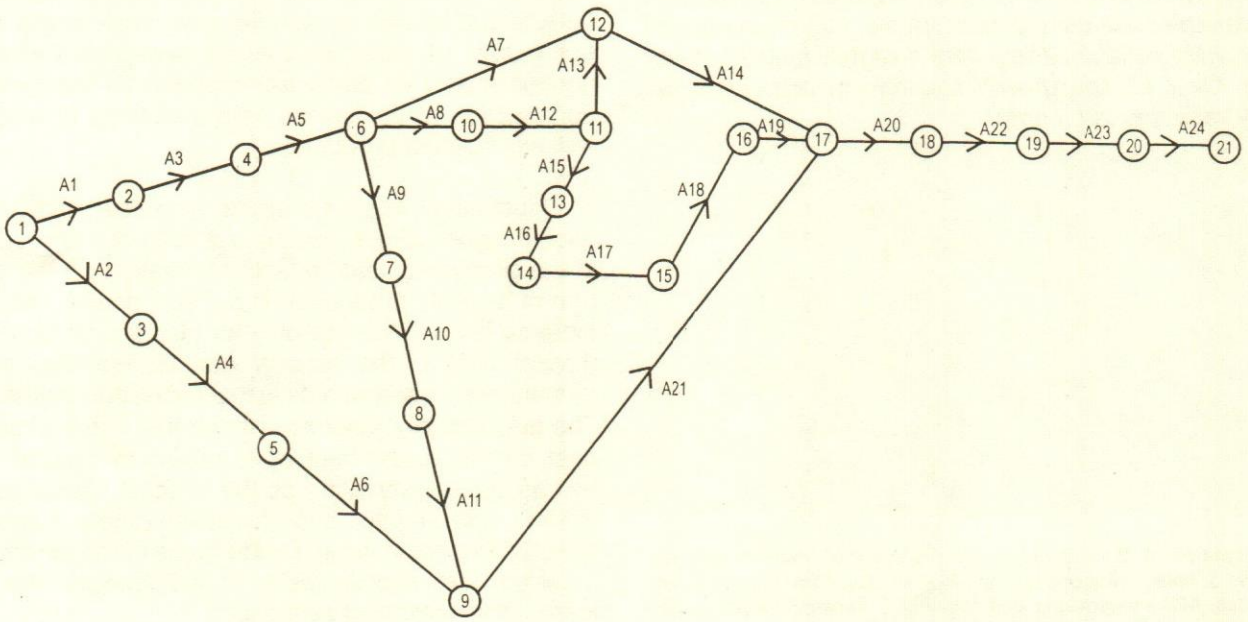

Fig. 4. Critical Path – 1-2-4-6-10-11-13-14-15-16-17-18-19-20-21Time – 50 Weeks

The input data for the above is fed on to the Event Entry form as instructed. After filling up, Precedence form will appear and has to be filled up carefully, because the network diagram will be drawn with this. After filling up the precedence form, the Autocad will appear with a question about where one wants to start the diagram. When the start point is clicked, a Sub-Activity form will appear which needs to be filled up. So, in a short period a big network diagram can be made. Then by filling up the Path form, the critical path and critical

coal handling plant has been attached. So, after review, the project status can be updated and new computerised diagram can be made without lapses.

Conclusion

This computer programme can be used in handling projects, turnkey contracts, maintenance of breakdown, development programs and similar types of work.

□

Feature

Forecast Models for Yield of Raw Jute

Satyabrata Pal, S.N. Pal & Suva Banerjee

The article presents the dynamics of growth in respect of the variables, total supply and industrial consumption of jute fibres over a span of 32 years (1965 to 1996). The study reveals that the growth-trends in respect of two variables are quite imperceptible, though in respect of the yield variable, it registers a slightly upward movement. Over all, the growth scenario in respect of the study variables is gloomy.

Satyabrata Pal & Suva Banerjee are Professor of Statistics and Research Scholar, respectively at Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia and S.N. Pal is Senior Scientist, Indian Jute Industries' Research Association (IJIRA), Calcutta.

Jute, the golden fibre, is the cheapest of all fibres available globally and is produced in the Far East region of the world. India accounts for half of raw jute production of the world. Jute's eco-friendliness and versatility have ushered in a sustainable and promising future in respect of its use in diverse areas of industrial and textile applications. It can be recycled and being a natural product, ultimately degrades. Its industrial use encompasses varied areas of applications like packaging materials, geotextiles, fine yarns for textile application (all jute and as well as blended with other fibres), superior grades of paper as well as newsprint and in the nontextile area as composite material for furniture and construction of appliances as a substitute of wood as well as moulded products.

Fluctuation in prices of jute in a year under reference depends directly on the quantum of its production in the preceding year. In fact, information on the quantum of its likely production in the succeeding year is of extreme importance not only for planning of economic development in the national context but also to the farmers associated with its actual cultivation on the field. The quantum of production of raw jute has a direct impact on the assessment of its minimum support price and as such, information on the forecast figures related to yield, consumption and production of jute in advance benefits farmers at large. On the basis of the information received, they can decide to include/exclude the crop in/from their cropping sequence.

The quantum of production of raw jute has a direct impact on the assessment of its minimum support price and as such, information on the forecast figures related to yield, consumption and production of jute in advance benefits farmers at large.

A suitably developed model ensures short term

forecasts of yield or any other character of interest with respect to jute at required level of precision. Development of such models has adequate importance not only to planners but also to workers at grassroots level. This study presents models on historical information on three characters, mainly, yield, mill consumption and total supply of raw jute over a span of 32 years commencing from 1964-1965 and ending with 1995-1996. Since works on modelling on jute yield, consumption and supply, based on recent data in the national context are not generally available in literature, or, if available (Tata Economic Consultancy Services, 1997), the findings are not supported by application of adequate quantitative techniques, this work may be regarded as an updated account of the various characteristics of the data profile of jute as well as a deep statistical analysis of the dynamic behaviour of these characteristics over time.

Materials & Methods

Annual data on total supply (lakh bales), mill consumption (lakh bales) and yield (bales per hectre) of raw jute in India over a span of 32 years, i.e., 1964-65 to 1995-96 form the data base of the study. The complete data set is given in Table 1. Here one bale is considered as 180 kg. of jute. Total supply is based on trade estimates of crop, opening stock at mill godowns and at Jute Corporation of India, imports and others (including undelivered balance of mill purchases and jute held up in country and transit). It is important to note that jute usually means both jute and mesta and the jute season is from July to June. The source of data is the bulletins issued by the Statistics Department of Indian Jute Mills Association (Annual Summary of Jute & Gunny Statistics (1987-88), Monthly Summary of Jute & Gunny Statistics (July 1988-1996)).

Forecast methodology may be broadly classified into qualitative and quantitative techniques. Qualitative or subjective forecast methods are intuitive, largely educated guesses that may or may not depend on past data. Forecasts that are based on mathematical or statistical models are called quantitative forecast. Quantitative methods or models can be further classified as deterministic and probabilistic (stochastic or statistical).

In deterministic models, the relationship between the variable of interest Y (here yield/total supply/mill consumption) and the explanatory or predictor variable, t (here time) is exactly determined by

$$Y = f(t; \beta_0, \beta_1, \ldots\ldots, \beta_m)$$

Table 1: Yield, Supply and Mill Consumption of Raw Jute

Year	Yield (bales/acre)	Total supply (Lakh bales)	Mill consumption (Lakh bales)
1965	7.18	104.62	81.44
1966	5.93	91.32	76.61
1967	6.72	94.75	72.00
1968	7.18	95.26	71.26
1969	5.56	69.00	58.50
1970	7.36	80.00	62.00
1971	6.54	83.00	63.50
1972	6.97	96.50	74.50
1973	7.11	84.00	69.00
1974	7.85	102.50	62.50
1975	6.73	95.00	63.00
1976	7.59	88.00	75.00
1977	7.26	78.00	68.00
1978	6.73	76.00	68.00
1979	7.32	90.00	62.30
1980	7.26	114.50	79.25
1981	6.92	115.72	79.72
1982	8.22	105.50	72.85
1983	8.08	88.39	75.39
1984	8.40	78.00	63.95
1985	7.84	85.05	74.22
1986	9.50	131.83	82.68
1987	9.12	125.15	77.63
1988	8.08	107.50	69.62
1989	8.87	100.90	77.71
1990	8.45	91.70	77.46
1991	9.82	102.24	83.36
1992	10.23	107.04	74.50
1993	10.47	103.50	79.40
1994	9.48	86.60	81.53
1995	10.23	94.80	79.83
1996	10.28	91.75	81.15

The function 'f' and the coefficients '$\beta_0, \beta_1, \ldots\ldots, \beta_m$' are known with certainty. The traditional "laws" in physical science are examples of such deterninistic relationships. In social science, however, the relationships are usually stochastic i.e., probabilistic in nature. Measurement errors and variability from other uncontrolled variables introduce random components. This leads to probabilistic or stochastic models of the form,

$y_t = f(t; \beta_0, \beta_1, \ldots\ldots, \beta_m) +$ noise (e_t), where the noise or error component is a realisation from a certain probability distribution. Here e_t's are identically, independently distributed as normal with '0' mean and

Table 2: Observed and Estimated Values on Yield, Total Supply and Industrial Consumption of Raw Jute

Year	t	Values on Yield						Values on Total Supply						Mill Consumption Values					
		Estimated through five different models						Estimated through five different models						Estimated through five different models					
		Observed yield	Linear Model	Quadratic	Cubic	Exponential	Power Model	Observed values	Linear Model	Quadratic	Cubic	Exponential	Power Model	Observed values	Linear Model	Quadratic	Cubic	Exponential	Power
1964-65	1	7.18	6.03	6.63	6.26	6.19	5.47	104.62	88.74	86.48	98.69	87.99	86.16	81.44	66.98	71.59	76.61	66.80	66.85
1965-66	2	5.93	6.15	6.64	6.24	6.28	6.04	91.32	89.18	87.36	94.84	88.39	88.37	76.61	67.37	71.09	74.13	67.17	68.39
1966-67	3	6.72	6.28	6.66	6.23	6.38	6.40	94.75	89.62	88.21	91.75	88.80	89.69	72.00	67.77	70.65	71.97	67.54	69.31
1967-68	4	7.18	6.41	6.68	6.24	6.48	6.67	95.26	90.06	89.02	89.37	89.21	90.64	71.26	68.16	70.27	70.07	67.91	69.97
1968-69	5	5.56	6.53	6.71	6.26	6.58	6.88	69.00	90.50	89.81	87.63	89.62	91.39	58.50	68.55	69.95	68.39	68.28	70.49
1969-70	6	7.36	6.66	6.75	6.29	6.69	7.06	80.00	90.94	90.57	86.50	90.03	92.00	62.00	68.94	69.69	66.86	68.66	70.91
1970-71	7	6.54	6.78	6.80	6.33	6.79	7.22	83.00	91.38	91.31	85.90	90.45	92.52	63.50	69.33	69.48	65.44	69.04	71.27
1971-72	8	6.97	6.91	6.86	6.38	6.90	7.36	96.50	91.82	92.01	85.80	90.86	92.97	74.50	69.72	69.34	64.07	69.42	71.59
1972-73	9	7.11	7.03	6.92	6.44	7.01	7.49	84.00	92.26	92.68	86.13	91.28	93.37	69.00	70.12	69.26	62.70	69.80	71.86
1973-74	10	7.85	7.16	7.00	6.51	7.12	7.60	102.50	92.70	93.33	86.84	91.70	93.74	62.50	70.51	69.23	61.27	70.18	72.11
1974-75	11	6.73	7.29	7.08	6.59	7.23	7.70	95.00	93.14	93.94	87.88	92.12	94.06	63.00	70.90	69.27	59.73	70.57	72.34
1975-76	12	7.59	7.41	7.16	6.68	7.34	7.80	88.00	93.59	94.53	89.19	92.54	94.36	75.00	71.29	69.36	58.02	70.96	72.55
1976-77	13	7.26	7.54	7.26	6.78	7.46	7.89	78.00	94.03	95.09	90.72	92.97	94.64	68.00	71.68	69.52	56.09	71.35	72.74
1977-78	14	6.73	7.66	7.36	6.89	7.57	7.97	76.00	94.47	95.61	92.42	93.40	94.90	68.00	72.08	69.73	53.89	71.74	72.92
1978-79	15	7.32	7.79	7.47	7.00	7.69	8.05	90.00	94.91	96.11	94.22	93.83	95.14	62.30	72.47	70.01	51.36	72.13	73.08
1979-80	16	7.26	7.91	7.59	7.13	7.81	8.13	114.50	95.35	96.58	96.09	94.26	95.36	79.25	72.86	70.34	48.45	72.53	73.24
1980-81	17	6.92	8.04	7.72	7.26	7.94	8.20	115.72	95.79	97.03	97.95	94.69	95.57	79.72	73.25	70.73	45.10	72.93	73.38
1981-82	18	8.22	8.17	7.86	7.40	8.06	8.27	105.50	96.23	97.44	99.77	95.13	95.77	72.85	73.64	71.18	41.27	73.33	73.52
1982-83	19	8.08	8.29	8.00	7.54	8.19	8.33	88.39	96.87	97.82	101.48	95.57	95.96	75.39	74.03	71.69	36.89	73.73	73.65
1983-84	20	8.40	8.42	8.15	7.70	8.32	8.39	78.00	97.11	98.18	103.03	96.01	96.14	63.95	74.43	72.26	31.91	74.14	73.78
1984-85	21	7.84	8.54	8.31	7.86	8.45	8.45	85.05	97.55	98.50	104.37	96.45	96.32	74.22	74.82	72.89	26.28	74.55	73.89
1985-86	22	9.50	8.67	8.47	8.02	8.58	8.51	131.83	97.99	98.80	105.44	96.89	96.48	82.68	75.21	73.58	19.95	74.96	74.01
1986-87	23	9.12	8.79	8.65	8.20	8.71	8.56	125.15	98.43	99.07	106.19	97.34	96.64	77.63	75.60	74.33	12.85	75.37	74.12
1987-88	24	0.08	8.92	8.83	8.38	8.85	8.61	107.50	98.88	99.30	106.57	97.78	96.79	69.62	75.99	75.14	4.95	75.78	74.22
1988-89	25	8.87	9.05	9.02	8.56	8.99	8.66	100.90	99.32	99.51	106.51	98.23	96.93	77.71	76.39	76.00	−3.83	76.20	74.32
1989-90	26	8.45	9.17	9.21	8.75	9.13	8.71	91.70	99.76	99.69	105.98	98.69	97.07	77.46	76.78	76.93	−13.52	76.62	74.42
1990-91	27	9.82	9.30	9.42	8.94	9.27	8.76	102.24	100.20	99.85	104.90	99.14	97.21	83.36	77.17	77.91	−24.20	77.04	74.51
1991-92	28	10.23	9.42	9.63	9.14	9.42	8.81	107.04	100.64	99.97	103.24	99.60	97.34	74.50	77.56	78.96	−35.90	77.47	74.60
1992-93	29	10.47	9.55	9.85	9.34	9.57	8.85	103.50	101.08	100.06	100.93	100.05	97.46	79.40	77.95	80.06	−48.68	77.89	74.68
1993-94	30	9.48	9.67	10.08	9.54	9.72	8.89	86.60	101.52	100.13	97.92	100.51	97.58	81.53	78.34	81.23	−62.61	78.32	74.77
1994-95	31	10.23	9.80	10.31	9.75	9.87	8.93	94.80	101.96	100.16	94.16	100.98	97.70	79.83	78.74	82.45	−77.72	78.75	74.85
1995-96	32	10.28	9.93	10.56	9.96	10.02	8.98	91.75	102.40	100.17	89.59	101.44	97.81	81.15	79.13	83.73	−94.08	79.18	74.93
	MSE =	0.4020	0.3202	0.3300	0.0063	0.0128		189.4684	194.6527	166.1800	0.0200	0.0210		38.8700	34.5700	29.8000	0.0077	0.0096	

constant variance σ^2. Frequently, the functional form of 'f' and the coefficients are not known and are to be determined from the past data. As the data here occur in time-ordered sequence, they are referred to as time-series data. In time series modelling we seek the best representative of the behaviour of the observations over time by a suitable mathematical function accompanying random error.

The tentatively entertained model usually contains parameters (unknown constants). An estimation approach, such as least squares, can be used to determine these constants. In this study, we have developed stochastic time series models on the variables, yield, mill consumption and total supply. The following types of models are examined, where specifically the functional forms of $(t; \beta_0, \beta_1, \ldots\ldots, \beta_m)$ are as follows:

Linear trend model: $\beta_0 + \beta_1 t$ estimate of $Y_t = b_0 + b_1 t$,

Quadratic trend model: $\beta_0 + \beta_1 t + \beta_2 t^2$, estimate of $Y_t = b_0 + b_1 t + b_2 t^2$,

Cubic trend model: $\beta_0 + \beta_1 t + \beta_2 t^2 + \beta_3 t^3$, estimate of $Y_T = b_0 + b_1 t + b_2 t^2 + b_3 t^3$,

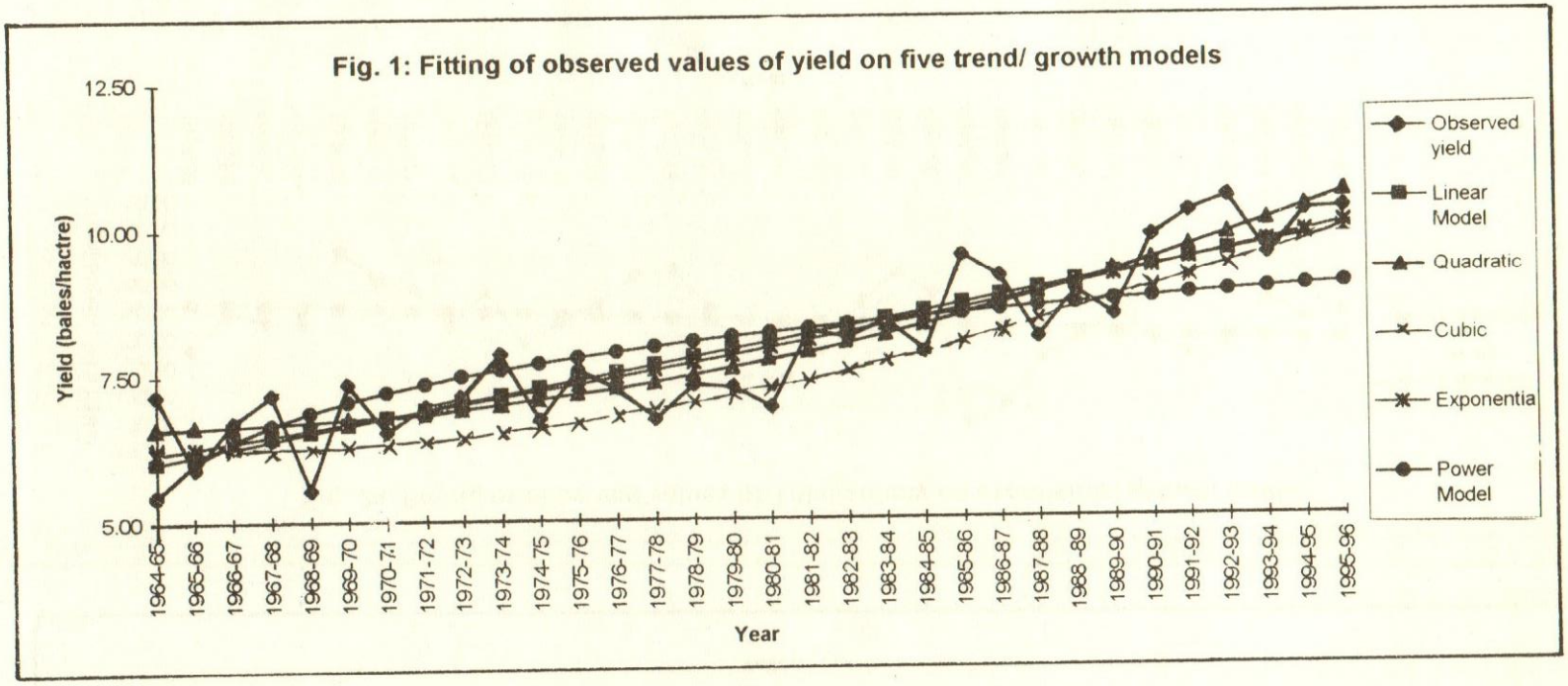
Fig. 1: Fitting of observed values of yield on five trend/ growth models
Yield (bales/hactre)
12.50
10.00
7.50
5.00
1964-65
1965-66
1966-67
1967-68
1968-69
1969-70
1970-71
1971-72
1972-73
1973-74
1974-75
1975-76
1976-77
1977-78
1978-79
1979-80
1980-81
1981-82
1982-83
1983-84
1984-85
1985-86
1986-87
1987-88
1988 -89
1989-90
1990-91
1991-92
1992-93
1993-94
1994-95
1995-96
Year
Observed yield
Linear Model
Quadratic
Cubic
Exponentia
Power Model

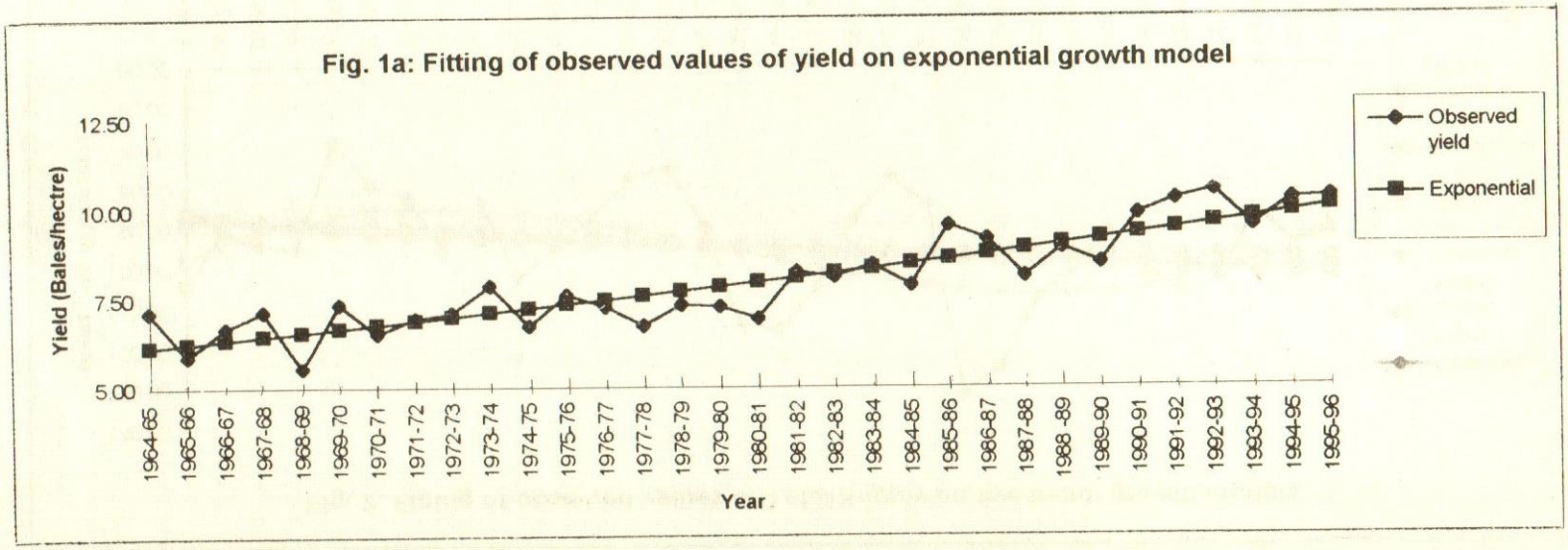
Fig. 1a: Fitting of observed values of yield on exponential growth model
Yield (Bales/hectre)
12.50
10.00
7.50
5.00
1964-65
1965-66
1966-67
1967-68
1968-69
1969-70
1970-71
1971-72
1972-73
1973-74
1974-75
1975-76
1976-77
1977-78
1978-79
1979-80
1980-81
1981-82
1982-83
1983-84
1984-85
1985-86
1986-87
1987-88
1988 -89
1989-90
1990-91
1991-92
1992-93
1993-94
1994-95
1995-96
Year
Observed yield
Exponential

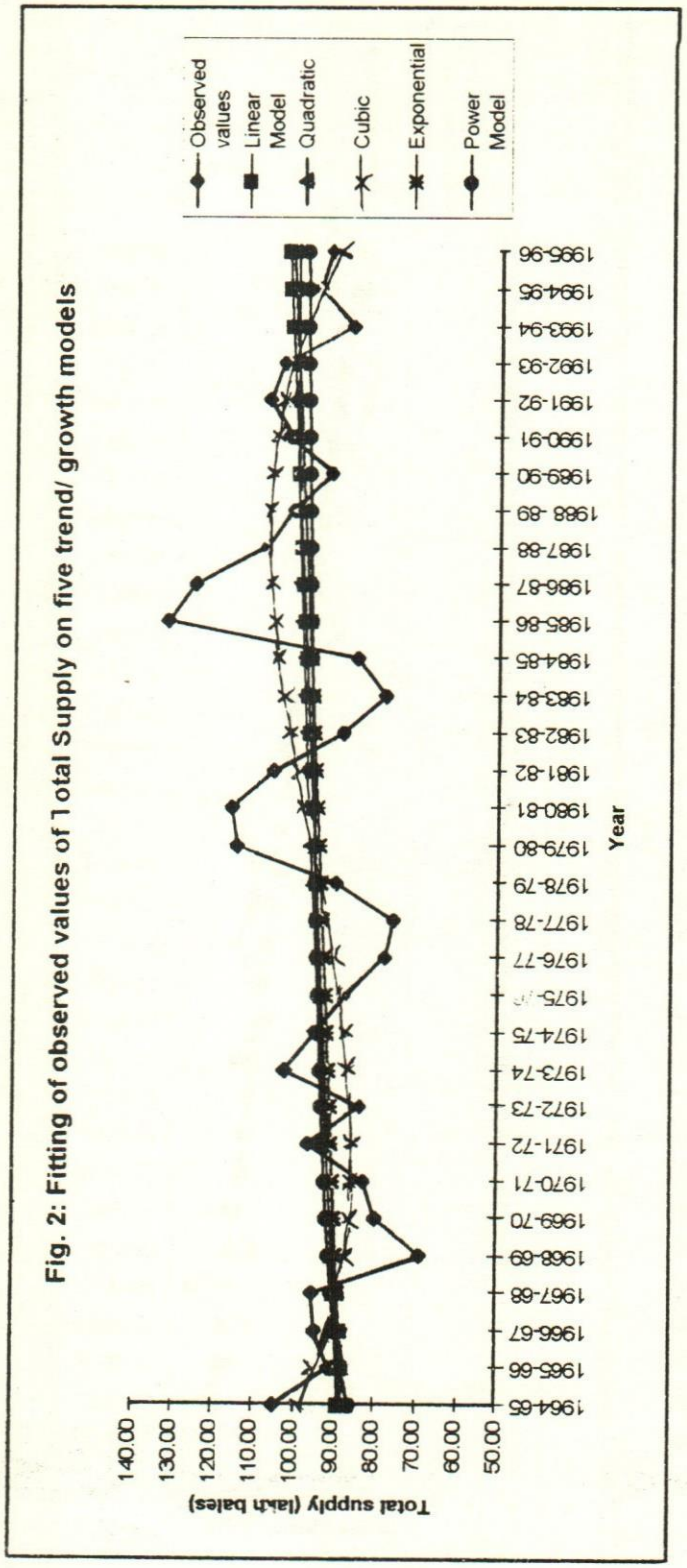

Fig. 2: Fitting of observed values of Total Supply on five trend/ growth models

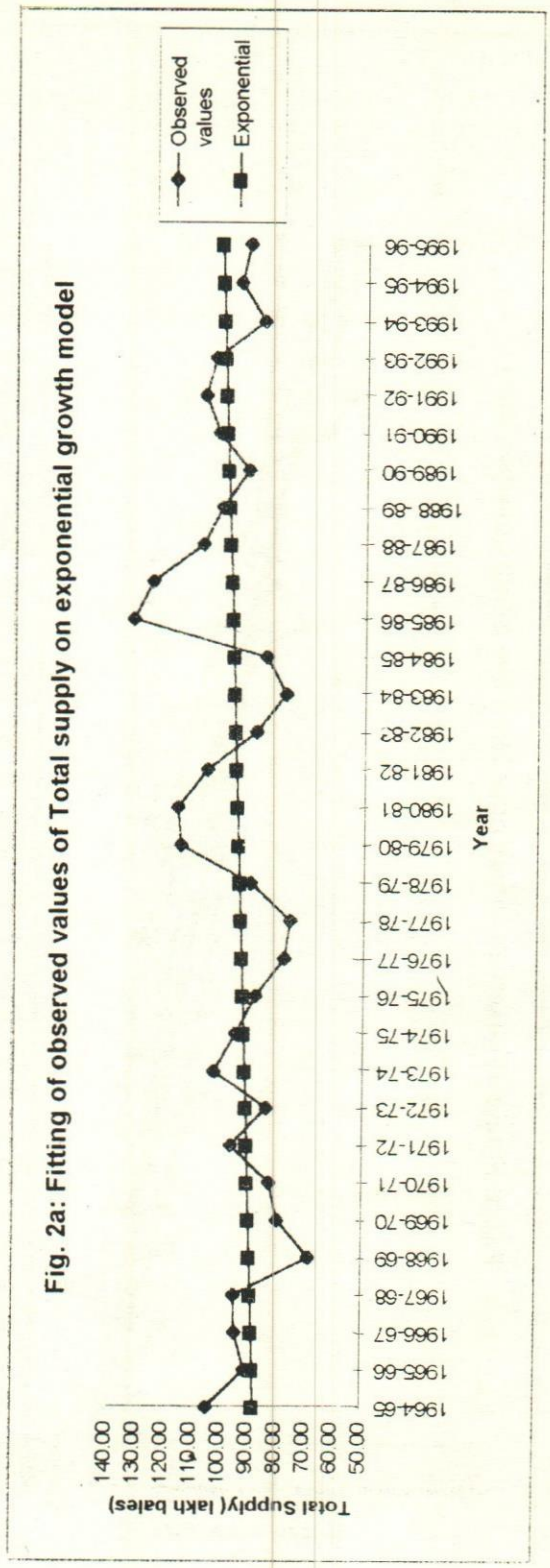

Fig. 2a: Fitting of observed values of Total supply on exponential growth model

Fig. 3: Fitting of observed values of Mill consumption on four trend/ growth models

Fig. 3a: Fitting of observed values of Mill consumption on exponential growth model

Exponential Model: $\beta_0 + \beta_1 t$ estimate of $Y_t = b_0 + b_1 t$, and

Power function model or geometric model: $\beta_0 t^{\beta 1}$ estimate of $Y_t = b_0 t^{b1}$

The parameters β's in these models are estimated by the ordinary least squares method and b_0, b_1,b_2 and b_3 are the corresponding estimates from the observed data. Among the above mentioned competitive models, the best fitting model will have the least residual mean sum of squares, i.e., error mean sum of squares (MSE). In fact, MSE measures the closeness of fit.

Results & Discussion

With the help of SPSS package release 6.0, we have fitted five regression models on the basis of observed data and the estimated equations are as follows:

Linear trend model:

Yield = 5.9026 + 0.1257 t
Total Supply = 88.2958 + 0.4416 t
Mill consumption = 66.59 +0.3918 t

Quadratic trend model:

Yield = 6.6258 – 0.0019 t + 0.0039 t^2
Total Supply = 85.5769 – 0.0019 t + 0.0039 t^2
Mill consumption = 72.147 – 0.5883 t + 0.0297 t^2

Cubic trend model:

Yield = 6.286 – 0.0366 t + 0.0064 t^2 – 0.000052 t^3
Total Supply = 10.3.3512 – 5.086 t +0.4335 t^2 – 0.009 t^3
Mill consumption = 79.4668 – 3.0618 t + 0.2142 t^2 – 0.003 t^3

Exponential Model:

Yield = 6.0894 $(1.0157)^t$
Total Supply = 87.579 $(1.0046)^t$
Mill consumption = 66.3743 $(1.0055)^t$

Power function model or, geometric model:

Yield = 5.4659 $t^{0.1431}$
Total Supply = 86.1588 $t^{0.0366}$
Mill consumption = 66.8513 $t^{0.0329}$

The observed and expected values (estimated through the models) along with their error mean sum of squares (MSE) are given in Table 2. From Table 2 we observe that among the five regression models, exponential model is the best fitted for each of the three responses, Yield, Total supply and Mill consumption with minimum residual mean sum of squares (MSE) as 0.0033, 0.0l2 and 0.0077 respectively. It can also be noted that MSE's of power function in each of the cases are slightly higher than that of the exponential model.

Figure 1 exposes more fluctuations in observed values on yield in the initial 5 years, least fluctuations during the middle 15 years and again larger fluctuation in the last 12 years. The quadratic model and the power model display reverse directions in trend at the end of the time span. The cubic model, however reveals an increasing trend towards the end of the time span but is bound to take a downward trend in future, and hence it does not portray the characteristics of the yield figures over time rightly. Though linear and exponential models give rise to overlapping values, the linear model seems to be more unrealistic in presence of moderate fluctuations prevailing in the observed time-series data on yield. Thus, the exponential model comes out as the ideal representation of the same (see also Figure 1a). Figures 2 & 3 also reveal the superiority of the exponential model over other competing models in representing the features of the observed time-series data on the variables—total supply and industrial consumption of raw jute (see also Figures 2a & 3a).

Conclusions

The study undertaken has exposed a gloomy scenario in the growth aspect with respect to two most important variables, total supply and industrial consumption, as the curvatures of the best fitted exponential models are almost flat over the entire time span of 32 years (1965-1996). However, there appears to exist an indication of growth trend in the near future. Considering the yield variables there are reasons for slight satisfaction in respect of growth not only within the time span studied but also beyond.

Acknowledgment

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Cropping Pattern Changes – Evidences from Union Territory of Pondicherry

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The article analyses cropping patterns and area allocation decisions in the agricultural scenario of the Union Territory of Pondicherry. The impact of several variables, especially price, is studied to assess policy implications.

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Technological innovation and public policies have brought about many changes in the cropping pattern of India. However, the changes are not uniform in different regions of the country (Mander & Sharma, 1995, Singh & Srivastava, 1995, Singh et al., 1996) due to social and economic factors, Pope & Prescott, 1980). The area under few crops has shown consistent increase through expansion and/or substitution, while others have not (Goswami et al., 1995, Singh & Grewal, 1996). These structural transformations have different growth phases (Singh & Grewal, 1996, Kumar & Devi, 1995, Thakur & Sinha, 1995, Behura & Naik, 1994) with zonal variations (Sharma et al., 1995, Ali & Singh, 1995, Singh & Singh, 1996, Singh et al., 1996, Palanisamy, 1995).

Effective price support (GOI, 1992a; 1993b; Singh et al., 1995), economics of replaced crop (Gupta & Tiwari, 1985), yield stability and market infrastructure with easy access to suit new technological inputs (Dhinda & Sharma, 1995) are the factors which favoured shift in cultivation especially to commercial crops, (Vyas, 1996, Satyasai & Viswanathan, 1996). Farmers response to price is found to be one of the major factors in allocating resources among different crops, particularly land. Review of past supply response studies (Ninan, 1987, Sangwan, 1991, Nerlove, 1958; Tripathy & Gowda, 1993) results in various estimates for a particular crop. However, in general, the hypothesis of positive supply elasticity of crops is sustained. Hence, an attempt has been made to assess the change in cropping pattern in Union Territory of Pondicherry and the factors responsible for the shift price.

Methodology

Statistical information pertaining to the period under study was gathered from various issues of 'Statistical Hand Book' of Union Territory of Pondicherry, published by Directorate of Economics and Statistics, Government of Pondicherry. The study covered a period of 39 years

between 1956-57 and 1994-75. The period was divided into sub-periods, such as overall period (1956-57 to 1994-95), pre-green revolution period (1956-57 to 1967-68) and post-green revolution period (1968-69 to 1994-95). The post-green revolution period was further divided into two periods viz., early post-green revolution period (1968-69 to 1979-80) and late post-green revolution period (1980-81 to 1994-95).

The study confines to major crops of the Union territory of Pondicherry taking into consideration their share in the gross cropped area in order to examine the performance in terms of their growth and the nature of expansion and substitution. The gross cropped area in 1994-95 was 46420 ha. of which cereals accounted for 58.96 per cent and pulses 12.91 per cent. Among cereals, rice constituted 58.19 per cent (27010 ha.) of total cropped area. Blackgram and greengram were two important pulses, which formed 5.86 per cent (2719 ha.) and 6.78 per cent (3149 ha.) of the gross cropped area, respectively. In the case of commercial crops, sugarcane was found to be a major crop accounting for 7.11 per cent with an area of 3300 ha. Among the non food crops, groundnut and coconut were the major crops constituting 4.59 per cent (2130 ha.) and 4.52 per cent (2098 ha.), respectively. Analytical methods were employed to both produce groups and major crops for better exposition.

Performance of Crops

Performance of crops in terms of area, production and productivity was examined by employing exponential growth curve of the following form (Gujarati, 1995):

$$A_t/P_t/Y_t = \beta_0\ \beta_{1t}\ e^{ut} \qquad (1)$$

where A_t, P_t and Y_t denote area, production and productivity of crops respectively at time period t, β_0 is intercept, β_1 is slope coefficient, t is time variable and ut is the error term, which is assumed to be normally distributed with zero mean and constant variance. Equation (1) was estimated using Ordinary Least Square (OLS) method. Compound Growth Rate (CGR) was derived from the following equation.

$$\text{CGR (r)} = \text{Antilog of } \beta_1 - 1 \times 100 \qquad (2)$$

The test of significance was applied to the estimated growth rates using equations (3) and (4).

$$SE(R) = \frac{100.\beta_1}{\log^e} SE\ (\log \beta_1) \qquad (3)$$

Based on the log base rule, $\log^e$ is converted into 0.4343. The 't' test is given as

$$t = \frac{r}{SE\ (r)} \qquad (4)$$

Substitution and Expansion Effect

The rates of growth in the area of individual crops which differ from the rates of growth in gross of cropped area provide evidences of change in cropping pattern (Venkataramanan & Prahaladachar, 1980). Area – gross cropped area elasticity[1] (Venkataramanan & Prahaladachar, 1980, Dhindsa & Sharma, 1995) measures aggregate changes in cropping pattern in terms of substitution and expansion effects. At positive growth rate of gross cropped area, various crops are categorised into three groups on the basis of area-gross cropped area elasticities. If the elasticities are greater than or equal to one, i.e. the growth rates of crops equal or exceed the growth rate of gross cropped area, the crops are classified under group I. The crops are classified under group II when the elasticity is less than or equal to one i.e. the growth rates of crops are less than that of growth rate of gross cropped area but positive. Crops belong to III group, when growth rates of area are negative i.e. their elasticities are less than zero. Illustratively, they are given as follows:

Group I - $GR_C \geq GR_{TCA}$ i.e. $E_{A-TCA} \geq 1$ or

Group Ii- $GR_C \leq GR_{TCA}$ but positive, i.e. $E_{A-TCA} \leq 1$

Group III- GR_C is negative when compared with G_{TCA} i.e. $E_{A-TCA} < 0$

where, GR_C is growth rate of area under i^{th} crop, GR_{TCA} the growth rate of gross cropped area and E_{A-TCA} the area-gross cropped area elasticity. The total change in cropping pattern is measured from the decline in area under some crops and corresponding equivalent increase in area under other substitutable crops for a given gross cropped area and the expansion effect (effect of increase in gross cropped area). The crops under groups I and II gain area at the cost of area of crops falling under III group, which is the sum total of substitution and expansion effect. The substitution effect of crops is measured from decline in acreage under group III.

Similarly, at negative growth of gross cropped area, the aggregate change in cropping pattern in terms of

1. Area-gross cropped area elasticity is defined either as the ratio of the rate of growth of area under a crop to the rate of growth in the gross cropped area, or as the ratio of the area under the crop to the gross cropped area after and before the change can be used to measure the shift in the cropping pattern.

substitution and expansion effect is measured by classifying the various crops into two groups. In group I, the growth rates of crops were positive and greater than growth rate of total cropped area. The crops with negative growth rates come under group II. Illustratively.

Group I - $GR_C \geq GR_{TCA}$

Group II- $GR_C \geq$ or $\leq GR_{TCA}$, but negative.

where, GR_C refers to compound growth rate of i^{th} cropped area and GR_{TCA} the compound growth rate of total cropped area. The crops falling under group I gain area at the expense of area from group II crops. Thus increase in area under group I crops is the sum of substitution and expansion effects. The decline in acreage under group II crops measures the substitution effect.

Effect of Changes in Cropping Pattern on Output

The effect of changes in cropping pattern on output was analysed (Dhindsa & Sharma, 1996) taking into account changes in total cropped area (T), changes in cropping pattern (C), changes in yield rate (Y) and changes in the price of the crop (P). The total changes in the value of output due to changes in cropping pattern were examined employing the following equations. The total changes in the value of output between two periods of time are given as

$$O_{(T+C+Y+P)} = \sum_{i=1}^{k} A_{1i} Y_{1i} P_{1i} - \sum_{i=1}^{k} A_{0i} Y_{0i} P_{0i} \qquad (5)$$

where, A_{0i}, Y_{0i} and P_{0i} denote area, yield and price respectively of i^{th} crop of base period and A_{1i}, Y_{1i} and P_{1i} are area, yield and price respectively of i^{th} crop of final period. From equation (5), the effect of changes in yield rates and prices can be eliminated by multiplying the areas in the final period with the respective yield rates and prices as in the base period and then subtracting from it the total production (value) at the base period

$$O_{(T+C)} = \sum_{i=1}^{k} A_{1i} Y_{0i} P_{0i} - \sum_{i=1}^{k} A_{0i} Y_{0i} P_{0i} \qquad (6)$$

The effect of changes in total cropped area can be further eliminated by assuming that the increase or decrease in area under the crops has changed in same proportion as that of total cropped area. Hence, the effect of changes in cropping pattern alone is estimated using the following equation.

$$O_{(T+C)} - O_{(T)} = O_c$$

$$O_c = \sum_{i=1}^{k} A_{1i} Y_{0i} P_{0i} - \sum_{i=1}^{k} (A_{0i} Y_{0i} P_{0i}) TCA_1/TCA_0 \qquad (7)$$

The analysis was carried out for major crops[2] using triennium average. Constant prices[3] were used in estimating the effect of changes in cropping pattern on output.

Effect of Price on Area Allocation Decisions

Economic studies on the supply responses of primary producers vary considerably in their level of statistical sophistication and in their choice of supply response models. The underlying aim of all supply responses is to find out how the farmer intends to react to movements in the price of the crop that he produces. When more than one crop is being cultivated, the aim is to find out how the farmer intends to reallocate his resources between the various crops in response to changes in the relative price levels. In the present study,

The underlying aim of all supply responses is to find out how the farmer intends to react to movements in the price of the crop that he produces.

Nerlovian adjustment model is employed to examine factors responsible for change in cropping pattern, particularly price. The model is given by

$$A_{it} = a\beta + b\beta P_{it-1} + (1-\beta) A_{it-1} + \beta_{ut} \qquad (8)$$

$$A_{it} = a_0 + b_0 P_{it-1} + c_0 A_{it-1} + V_t \qquad (9)$$

where

$$a_0 = a\beta,\ b_0 = b\beta,\ c_0 = 1-\beta,\ v_t = \beta_{ut}$$

A_{it} refers to area under ith crop at time period 't', A_{it-1} indicates area under i^{th} crop at time period 't' with one year lag and p_{it-1} is price of i^{th} crop at period t with one year lag. 'β' is the adjustment coefficient and given as

$$c_0 = 1-\beta,\ \beta = 1-c_0$$

The short-run elasticity is estimated using the formula:

2. The major crops considered are rice, blackgram, greengram, sugarcane, groundnut and coconut.

3. Constant prices were worked out using inflation rate keeping 1970-71 as base year.

$$E_{SR} = \frac{P_{t-1}}{b_0 A_t}$$

where, b_0 is the estimated coefficient, P_{t-1} refers to average price at 't' with one year lag and A_t the mean area at time period 't'.

The long-run elasticity is estimated by

$$E_{LR} = \frac{b_0 \frac{P_{t-1}}{A_t}}{\beta}$$

$$= \frac{E_{SR}}{\beta}$$

where, E_{SR} is short-run elasticity and β is adjustment coefficient.

Findings

Performance of Various Crops

The growth analysis showed that area under non-food crops registered a marginal increase with 0.48 per cent (Table 1). Though the productivity of non-food crops exhibited negative growth rate (0.03 per cent), production increased at the rate of 0.44 per cent per annum due to area expansion. On the other hand, area under food crops decreased by 0.23 per cent and productivity increased by 3.41 per cent. The decline in area under food crops was more than compensated by productivity enhancement, consequently production exhibited positive growth rate with 3.18 per cent.

Rice, which occupied nearly 60 per cent of the gross cropped area in the Union territory exhibited a negative growth rate in terms of area and the rate of decline was less than one (0.47l per cent), however it was a significant fall. The loss in area was more than compensated by increase in productivity, as a result, production of rice increased at the rate of 1.48 per cent. The yield contributing more than area, towards increase in production of rice was also observed by Singh and Grewal (1996).

Pulse production in the Union territory of Pondicherry increased at an annual rate of 3.58 per cent per annum to which area and yield contributed 6.40 per cent and 1.06 per cent, respectively. Among the pulses, greengram showed highest positive growth rate in production with 8.84 per cent per annum. Blackgram also registered positive growth rate in output mainly due to corresponding increase in area and productivity. Mostly, growth in area contributing to increase in production among the pulse crops was also observed. (Goswami, et al., 1995). Sugarcane recorded a growth rate of 5.08 per cent per annum in terms of area and production and the growth of productivity was found stable. In the case of groundnut, production declined at the rate of 0.27 per cent due to decline in area by 1.45 per cent, though productivity registered positive growth rate with 1.19 per cent. Area under coconut registered positive growth rate with 1.39 per cent.

Table 1: Growth of Major Crops in Pondicherry – Estimated Compound Growth Rates

(per cent)

Crops	Area	Production	Productivity
Rice	–0.47* (–2.02)	1.48* (2.39)	1.96** (3.84)
Total Cereals	–0.85*** (–3.54)	1.24* (1.88)	2.10*** (4.12)
Blackgram	6.37** (2.22)	8.57** (2.78)	2.06*** (2.78)
Greengram	7.52*** (3.03)	8.84** (3.09)	1.23 (1.12)
Pulses	6.40** (2.58)	3.58**l (1.34)	1.06 (0.54)
Foodgrains	–0.40 (–1.37)	1.35* (2.02)	1.77*** (3.93)
Sugarcane	5.08** (2.42)	5.08* (2.01)	0.006 (0.0009)
Food Crops	–0.23 (–0.82)	3.18*** (2.81)	3.41*** (3.16)
Groundnut	–1.45** (–2.69)	–0.27 (–0.32)	1.19* (1.98)
Coconut	1.39*** (5.79)	–	–
Other Non Food Crops	6.00 (1.79)	–	–
Total Non Food Crops	0.48 (1.14)	0.44 (0.52)	–0.03 (–0.04)
Total Cropped Area	–0.12 (–0.46)	–	–

(Figures in parentheses are estimated t values)

*** - significant at one per cent level of probability

** - significant at five per cent level of probability

* - significant at ten per cent level of probability

Substitution and Expansion Effect of Cropping Pattern Changes

By comparing area growth rates of individual crops with the growth rate of gross cropped area (table 2), the crops were divided into three categories, if the growth rate of gross cropped area is found positive. At negative growth rate of gross cropped area, the crops were classified under two categories. During the period 1956-57 to 1967-68, crops, such as, rice, sugarcane, and

coconut were classified under group I since the growth rates of area of these crops were greater than the growth rate of total cropped area. Total food grains and total cereals were classified under group II as growth rates of these crops were positive but lesser than the growth rates of total cropped area, during the same period. Blackgram, greengram, groundnut and other non food crops were classified under group III during the same period.

Table 2: Compound Growth Rates of Area of Major Crops for Pondicherry

(per cent)

Crops	Period I	Period II	Period III	Period IV
Rice	1.23* (2.12)	-0.79* (-2.31)	-0.06 (-0.07)	-1.49 (-1.55)
Total Cereals	0.55 (1.77)	-1.36*** (-3.56)	-0.45 (-0.69)	-2.13* (-2.11)
Blackgram	-5.67 (-0.98)	-2.28 (-1.27)	1.78 (0.51)	0.57 (0.12)
Greengram	-7.16 (-1.13)	1.98 (0.69)	1.58 (0.29)	16.68 (1.47)
Pulses	-5.23 (-0.98)	-0.63 (-0.33)	1.46 (0.39)	4.20 (0.83)
Foodgrains	0.45 (1.73)	-1.23*** (-2.93)	-0.25 (-0.37)	-1.43 (-1.13)
Sugarcane	29.12 (1.48)	2.73*** (2.90)	2.08 (1.11)	3.14 (1.07)
Food Crops	0.97 (2.62)	-1.01*** (-2.81)	-0.06 (-0.09)	-1.13 (-1.04)
Groundnut	-1.21 (-1.01)	-1.09 (-0.99)	-1.30 (-0.25)	-1.98 (-1.29)
Coconut	1.74 (1.23)	0.74*** (3.08)	0.52 (0.84)	1.61*** (3.56)
Other Non Food Crops	-10.55 (-0.50)	0.76 (0.24)	0.46 (0.12)	10.20 (1.16)
Total Non Food Crops	-0.46 (-0.34)	0.13 (0.16)	1.20 (0.39)	1.64 (1.12)
Total Cropped Area	0.77* (1.97)	-0.84* (-2.33)	0.096 (0.18)	-0.68 (-0.64)

(Figures in parentheses are estimated t values)

*** - significant at one per cent level of probability

** - significant at five per cent level of probability

* - significant at ten per cent level of probability

Period I = Pre-green revolution period (1956-57 to 1967-68)

Period II = Post-green revolution period (1968-69 to 1994-95)

Period III = Early post-green revolution period (1968-69 to 1979-80)

Period IV = Late post-green revolution period (1980-81 to 1994-95)

In the post-green revolution period 1968-69 to 1994-95, the growth rate of gross cropped area was found to be negative. During this period greengram, sugarcane, coconut and other non food crops were classified under group I, in which growth rates of individual crops were positive and greater than the growth rate of gross cropped area. During the same period, rice, blackgram and groundnut fell into group II, in which the growth rates of these crops were negative and greater/or less than the growth rate of gross cropped area.

During 1968-69 to 1979-80, blackgram, greengram, sugarcane, coconut and other non-food crops were classified under group I since their growth rates were more than the growth rate of total cropped area. In this period not even a single crop fell into category II. Group III contained crops such as rice and groundnut. In the period 1980-81 to 1994-95 the growth rate of total cropped area was found negative. In the same period, group I had blackgram, greengram, sugarcane, groundnut and other non-food crops. Crops like rice and groundnut fell under group II. The analysis of substitution and expansion effect (table 3) indicated that during pre-green revolution period (1956-57 to 1968-69), there was absolute increase in acreage under the crops falling in group I viz., rice, sugarcane, and coconut to the extent of 6195 ha. The acreage expansion occurred on account of both substitution and expansion effects. The total decline in acreage under the crops falling in group II like blackgram, greengram, groundnut, and other non-food crops accounted for 1030 ha. Thus, out of the total gain in acreage (6195 ha), substituted acreage worked out to 1030l ha, while the remaining gain of 5166 ha was the result of expansion of gross cropped area.

During pre-green revolution period there was absolute increase in acreage under sugarcane, and coconut on account of both substitution and expansion effects.

Though the substituted acreage worked out to 7923 ha during the post-green revolution period (1969-70 to 1994-95), the total increase in acreage under greengram, sugarcane and other non-food crops was 4073 ha due to reduction in gross cropped area[4] (3851 ha). During 1968-69 to 1979-80, out of the total increase in acreage of 2067 ha under blackgram, greengram, sugarcane, coconut and other non-food crops, 543 ha were contributed by substituted acreage, while 1524 ha was by expansion in gross cropped area. The total increase in area during 1980-81 to 1994-95 under crops

4. The compound growth rate of gross cropped area was estimated at -0.84 per cent per annum between 1968-69 and 1994-95.

Table 3: Substitution and Expansion Effect of Cropping Pattern Change (ha)

Crop	SE-I	TE-I	SE-II	TE-II	SE-III	TE-III	SE-IV	TE-IV
Rice	–	4658.65 (75.20)	–5480.46	–	–204.02	–	–7145.16	–
B. Gram	–190.38	–	–1844.35	–	–	938.26 (45.39)	–	440.03 (3.90)
G. Gram	–201.18	–	–	1594.64 (39.16)	–	472.92 (22.88)	–	3969.97 (35.16)
S. Cane	–	1515.11 (24.46)	–	1904.45 (46.76)	–	499.09 (24.15)	–	1281.27 (11.35)
G. Nut	–575.42	–	–598.37	–	–339.46	–	–859.75	–
C. Nut	–	21.35 (0.34)	–	324.22 (7.96)	–	94.52 (4.57)	–	498.86 (4.42)
Other N. Food	–62.56	–	–	249.27 (6.12)	–	62.22 (3.01)	–	5101.93 (45.18)
Total Area	–1029.54	6195.11 (100.00)	–7923.18	4072.58 (100.00)	–543.48	2067.01 (100.00)	–8004.91	11292.06 (100.00)

(Figures in parentheses indicate percentage)
Period I = Pre-green revolution period (1956-57 to 1967-68)
Period II = Post-green revolution period (1968-69 to 1994-95)
Period III = Early post-green revolution period (1968-69 to 1979-80)
Period IV = Late post-green revolution period (1980-81 to 1994-95)
SE and TE denote substitution and total effect for various periods.

like blackgram, greengram, sugarcane, coconut and other non-food crops was 11292 ha. Of the total increase in area during the late post green revolution period, substituted area worked out to 8005 ha. and expanded area was estimated at 3287 ha.

The empirical results presented in Table 4 depict that during 1956-57 to 1968-69, expansion effect was more prominent, contributing 83 per cent, while the substitution effect formed 17 per cent of the changes in cropping indicating that area sown more than once and net area sown increased during this period due to increase in irrigation intensity[5]. During 1968-69 to 1994-95 the total changes in cropping pattern was purely due to substitution effect and expansion effect was negative indicating that net area sown decreased during the period[6]. The negative expansion effect was more pronounced during 1968-69 to 1994-95[7]. The substitution effect was more prominent during 1980-81 to 1994-95 and contributed 71 per cent, whereas, expansion effect was only 29 per cent during the same period. This implied that area sown more than once was lesser during these periods implying slower growth in cropping intensity[8].

Area sown more than once and net area sown increased due to increase in irrigation intensity.

Table 4: Share of Substitution and Expansion Effect on Crop Area

(ha)

Type of effect	Period I	Period II	Period III	Period IV
Substitution	1029.54 (16.62)	7923.18 (194.55)	543.48 (26.29)	8004.91 (70.89)
Expansion	5165.57 (83.38)	–3850.6 (–94.55)	1523.53 (73.71)	3287.15 (29.11)
Total Effect	6195.11 (100.00)	4072.58 (100.00)	2067.01 (100.00)	11292.06 (100.00)

(Figures in parentheses denote percentages)
Period I = Pre-green revolution period (1956-57 to 1967-68)
Period II = Post-green revolution period (1968-69 to 1994-95)
Period III = Early post-green revolution period (1968-69 to 1979-80)
Period IV = Late post-green revolution period (1980-81 to 1994-95)

5. The compound growth rates for net area sown and area sown more than once worked out to –0.43 per cent and 3.48 per cent per annum from 1956-57 to 1967-68.
6. The compound growth rate for net sown area was –0.77 per cent during the period between 1968-69 and 1994-95 and it was –0.80 per cent per annum from 1980-81 to 1994-95.
7. The compound growth rate for gross cropped area during the period between 1968-69 and 1994-95 worked out to –0.84 per cent and it was –0.68 per cent per annum from 1980-81 to 1994-95.
8. The compound growth rate of cropping intensity was –0.07 per cent during 1968-69 to 1994-95 and it was 0.12 per cent during 1980-81 to 1994-95.

Effect of Prices on Area Allocations Decisions

Table 5 shows the regression coefficient with their 't' ratios, coefficient of determination, the adjustment coefficients and elasticities. Paddy has negative and statistically significant price elasticity of supply. Among the pulses, greengram has positive and statistically significant price elasticity of supply. Similarly, sugarcane has positive and statistically significant price elasticity of supply. In the case of groundnut, the regression coefficient for lagged price is negative and statistically significant. The shortrun elasticities of all selected crops are inelastic though some of them are significant.

Table 5: Results of response functions and estimates of adjustment coefficients and elasticities

Crop/ Estimates	Rice	Black-gram	Green-gram	Sugar-cane	Ground-nut
Constant	19716*** (12.38)	541.87*** (2.38)	206.85 (0.70)	676.43*** (4.253)	3334.3*** (9.221)
A_{t-1}	0.3859*** (6.61)	0.7017*** (7.398)	0.5907*** (2.899)	0.5907*** (2.899)	0.5346*** (4.344)
P_{t-1}	–9.764*** (–6.77)	0.0628 (0.128)	0.7913* (1.802)	0.7385** (2.305)	–0.4333*** (–4.541)
R^2	0.61	0.66	0.64	0.76	0.42
β	0.61	0.24	0.41	0.47	0.86
SR Elasticity	0.05	0.008	0.32	0.14	0.13
LR Elasticity	0.08	0.03	0.78	0.30	0.15

(Figures in parentheses denote t values)
N = 39 for all crops except greengram for which it is 20.
*** – P 0.01 (two tailed test), **–P 0.05 (two tailed test),
* – P 0.10 (two tailed test)
SR and LR denote short run and long run elasticities.

The adjustment coefficients of paddy, blackgram, greengram and sugarcane are significantly greater than zero, which show that the farmers responded fairly rapidly to changes in their economic environment. This suggests that for these crops, shifted variables other than price play a more important role in determining the acreage. The negative price elasticity of paddy may be explained by the subsistence nature of production, where the farmer partly consumes and partly markets his crop. It is quite likely that the farmer has fixed cash debt to repay, so that the decrease in price forces him to sell more of his produce in order to fulfill his debt obligations and there may not be any substitutable crop. Similarly, an increase in price would encourage the farmer to market less of his crop and a smaller volume of marketed supply is needed now to obtain some cash income. If these are the conditions under which the farmer has to operate, then the negative price elasticity of supply would not contradict the contention that the farmer is rational (Khatkhate, 1964).

The shortrun elasticities range from the low figure of 0.008 – 0.05 for blackgram and paddy to the medium figures of 0.13 – 0.14 for groundnut and sugarcane and right upto high figure of 0.32 for greengram. The long run elasticities range from 0.03 for blackgram to 0.78 for greengram. These results indicate that peasants are relatively quick to adjust fairly rationally to changes in economic environment like development in irrigation and market infrastructure etc apart from price.

Peasants are relatively quick to adjust to changes in economic environment like development in irrigation and market infrastructure etc apart from price.

Effect of Changes in Cropping Pattern on output

The increase/decrease in returns due to cropping pattern changes is the aggregate result of increase in proportionate area under certain crops and the reduction in the proportionate area under certain other crops. The contribution of various crops in the total return due to changes in cropping pattern for various periods is presented in Table 6. It is found that in absolute terms the total returns due to changes in cropping pattern for four crops at the constant base year prices decreased by Rs. 0.41 lakhs over a period between 1956-57 and 1994-95. Though crops like sugarcane and groundnut contributed for increased returns, the decline with respect to rice is highest to the tune of Rs. 0.6 lakhs, as a result there is a reduction in return during the overall period.

Table 6: The Effect of Cropping Pattern Changes on Return

(Rs in lakhs)

Crop/ Estimates	Rice	Black-gram	Sugar-cane	Ground-nut	Net Return
Total Period	–0.6	0.00	0.05	0.14	–0.41
Period I	–36.62	0.00	–0.04	–0.20	–36.86
Period II	0.01	0.02	8.27	0.07	8.37
Period III	–0.48	–0.01	2.52	–0.18	1.85
Period IV	0.38	–0.02	0.55	–1.47	–0.56

Total period = 1956-57 to 1994-95
Period I = Pre-green revolution period (1956-57 to 1967-68)
Period II = Post-green revolution period (1968-69 to 1994-95)
Period III = Early post-green revolution period (1968-69 to 1979-80)
Period IV = Late post-green revolution period (1980-81 to 1994-95)

The period between 1956-57 and 1967-68 witnessed reduction in return by Rs. 36.86 lakhs due to changes in proportionate area under select crops. The negative contribution of rice was highest with Rs. 36.62 lakhs. In the post-green revolution period (1968-69 to 1994-95), there was positive change in return by Rs. 8.37 lakhs due to changes in the proportionate area under specified crops. The analysis showed that the largest contribution in this respect came from sugarcane, and it worked out to Rs. 8.27 lakhs. Other crops have marginally contributed for increased return due to changes in cropping pattern. Similarly, in the early post-green revolution period (1968-69 - 1979-80), the return increased by Rs. 1.85 lakhs due to changes in proportionate area under the select crops. The increase in this respect was highest in sugarcane (Rs. 2.52 lakhs), while the decline was maximum in rice (Rs. 0.48 lakhs). In the late post-green revolution period (1980-81 - 1994-95), there has been a negative change in return, which was mainly due to groundnut (Rs. 1.47 lakhs). Paddy and sugarcane have positively contributed by Rs. 0.38 lakhs and Rs. 0.55 lakhs, respectively. These results coincide with the performance of share of agriculture in net state domestic product at state level[9].

Conclusion & Policy Implications

The analysis of performance of various crops revealed that cereals registered negative growth rate in area but productivity exhibited a positive growth rate. The decrease in area was more than compensated by increase in productivity, as a result, production showed positive growth rate. In the case of pulses and sugarcane, both area and productivity together contributed for higher production. Groundnut showed declining tendency in area and production while productivity registered positive growth rate. The analysis of substitution and expansion effect indicated that there was an absolute increase in acreage under major crops like rice and sugarcane due to both substitution and expansion effect during pre-green revolution period. In the post-green revolution period, the total change in acreage was purely due to substitution effect and expansion effect was found negative indicating the declining tendency of net sown area.

The results of price effect on area allocation decisions reveal that rice showed negative but statistically significant price elasticity of supply. On the other hand, greengram and sugarcane showed positive and significant price elasticity of supply. The short run elasticities of select crops were found inelastic. The estimated adjustment coefficient indicated that the area allocation decisions were influenced by the economic environment in which the farmers operate apart from price.

The overall impact of changes in cropping pattern on output showed a decline in return over the period of the study. Further probe into the study indicated that the reduction in return was more in pre-green revolution period, while there was a positive change in return during post green revolution period. The plausible reasons could be introduction of high yielding varieties, supply of quality inputs and development in market infrastructure including remunerative prices for crops.

The study indicates that the area under major foodgrains such as rice is decreasing on one side, while commercial crops, such as, sugarcane show a positive shift in area. In order to ensure food security of the Union territory, there is need for sustaining the area under rice through assured supply of water with price support. It is also evident from the study that there is a reduction in return due to proportionate change in area under rice. The adjustment coefficient and the price elasticity of rice suggest the need for development in economic environment like market infrastructure and irrigation, etc.

In order to ensure food security of the Union territory, there is need for sustaining the area under rice through assured supply of water with price support.

Sugarcane is found to be a promising crop and contributes for increase in return due to favourable economies of production. This calls for diversifying sugar industry to promote backward and forward linkages. It is found that the shift is in favour of pulses and the productivity contribution for increased production is less as compared to area. Hence, through extension efforts and price support, the production of pulses could be augmented. Groundnut is found to be a major oilseed of the Union Territory but the crop fails to show good performance over the period. Since groundnut favours the growth of linked industries in the Union territory, the crop has to be made relatively more profitable through appropriate seed-fertiliser-irrigation-technologies.

[9] The share of agriculture in Net State Domestic Product (NSDP) was 12.92 per cent in 1980-81 and it declined to 6.79 per cent in 1989-90.

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Feature

Productivity & Diversification in Haryana Agriculture

J.P. Singh & V.P. Sharma

The advent of new technology and development of infrastructure facilities have not only replaced traditional agriculture practices in Haryana but also created awareness among the farming community to convert subsistence practices farming into commercial farming. Under the condition of traditional farming, only conventional methods of cultivation were adopted and there was no major shift in the cropping pattern for several years. Under modern cultivation practices, short duration high yield variety seeds have significantly increased production and productivity in the state.

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Agricultural production has achieved spectacular increase in India in the wake of new agricultural technology. It encompasses the use of high yielding varieties of seeds, chemical fertilisers, irrigation and plant protection measures along with the use of agricultural machinery and implements. Before the mid-sixties, increase in foodgrain output in India came mainly due to growth in the cultivated area and extension of irrigation. But, after the introduction of new seed-fertiliser-irrigation technology, high yielding crop varieties (HYVs) have brought notable increase in the output of foodgrains in the country.

Commercial Farming Practices

The new technology has not only replaced traditional agricultural practices but also created awareness among the farming community to convert subsistence practices to commercial farming. Under the condition of subsistence farming only conventional methods of cultivation were adopted and there was no shift in the cropping pattern and cultural practices for several years. Under modern cultivation practice, short duration high yielding variety seeds are scientifically evolved. Therefore, in the single cropland where assured irrigation facilities are available two or three crops are grown. Along with it, the introduction of chemical fertiliser and plant protection measures have significantly increased yield rates. Under commercial farming, the ultimate objective of the farmer is to maximise the net income. In order to obtain the highest profit, diversion of food crops to commercial crops has often become inevitable. The factors that influence diversion of crops in any particular region or state may be many. Physical features, such as soil and climate, technical limitations, such as irrigation and drainage, economic influence by way of market mechanism, land tenure, local habits and sociological complexities etc. cause variation in cropping pattern. Thus the extent of change in cropping pattern varies from zone to zone and even within the zone from region to region.

Haryana State is one of the major contributors to the central pool of foodgrains in India. This is attributed mainly to the introduction of new technology and speedy infrastructure development in the state. After the introduction of high-yielding varieties, the yield of rice increased by eleven times, wheat by six times, and total foodgrain production increased by more than four times. Haryana, having advanced agriculture with marked diversities in agro-climatic conditions, is likely to be characterised by uneven agricultural performance among various regions. Regional differences in agricultural growth arising out of these varied conditions tend to get further accentuated due to varying levels of investment in rural infrastructure and adoption of improved technology. With this perspective in view, an attempt has been made to study the growth in area, production, and productivity of all major crops in all the districts of Haryana. As new technology has brought in considerable changes in cropping pattern, the extent of crop diversification at the district level has also been examined. The specific objectives of the study are as follows:

Regional differences in agricultural growth arising out of varied conditions tend to get further accentuated due to varying levels of investment in infrastructure and adoption of improved technology.

- To study the growth in area, production and productivity of principal crops in Haryana.
- To measure the extent of diversification in Haryana.

Data & Methodology

The study is based on, time series data on area, production, and yield of major crops collected from various issues of Statistical Abstract of Haryana. Important food and non-food crops, namely, rice, jowar, bajra, maize, wheat, barley, gram, total pulses, rapeseed & mustard, total oilseeds, American cotton, desi cotton, and total cotton have been included in the study. All the erstwhile seven districts, namely, Ambala, Karnal, Jind, Rohtak, Hisar, Mahendragarh, and Gurgaon and Haryana State as a whole have been studied separately.

While assessing trend, production variability, and crop diversification, the focus is on the comparative performance of agriculture in two time periods: the early part (i.e., period I: 1966-1979) vis-à-vis the later part (i.e., period II: 1980-1994) of the green revolution period.

To study the pace of growth in area production and yield in two periods, compound annual growth rates were estimated by fitting a log linear trend function of the following form:

$$LnY = a + bt$$

where Y is production/area/yield and t represents time variable. The growth rate 'r' was estimated by $r = (e^b - 1) \times 100$. The equation was estimated using the ordinary least squares method. In order to measure the variability in production, coefficient of variation was used.

To measure the extent of crop diversification in different districts and the state as a whole, the Herfindahl index (Theil, 1967) was worked out for each year from 1966-67 to 1994-95.

$$\text{H-index} = \Sigma p_i^2$$

Where $p_i = \Sigma A_i$, A_i, = area under ith crop, ΣA_i = total cropped area, and i = 1, 2, 3... N (number of crops).

The value of H-index closer to one indicates specialization and closer to zero diversification and vice versa. Zero (i.e. total diversification) and one (i.e. total specialization) bound the value of H-index.

Results & Discussion

Growth in Production, Area, and Yield

Haryana has witnessed tremendous growth in agricultural production in the last three decades. Although Haryana is a small state, its topography and agroclimatic conditions vary considerably from north to south and from east to west and so does the performance of crop production. Divergent agricultural performance among the districts/regions arises from variations in technology adoption and development of physical and institutional infrastructure and diversification from agricultural to non-agricultural activities. Therefore, performance with regard to growth in production, area and yield and risk in production and yield of foodgrain and some important non-foodgrain crops have been examined for each district and compared between the two time periods.

District-wise growth rates of production, area, and yield of different crops during the two periods are given Tables 1, 2, and 3.

The results reveal (Table 1) that there has been a spectacular growth in foodgrains, oilseeds, and cotton

in Haryana in the last three decades. Oilseeds production registered highest rate of growth (10.12%) followed by cotton (5.44%) and foodgrains (4.48%) per annum over the 29 year period under reference. The rate of growth for total foodgrains production was 4.61 per cent per annum in the first period while it declined to 4.42 per cent per annum in the second period. While for wheat, the major commodity among foodgrains, the growth rate declined steeper i.e. from 7.16 per cent in first period to 5.54 per cent per annum in the second. Although rice and wheat have registered remarkably high growth in their respective production over the 29 years in all the districts, the pattern of decline in production from first period to the second has also been a common feature of all the districts with Rohtak for rice and Hisar for wheat as the two exceptions. Production of maize in the state declined at the rate of 4.15 per cent per annum followed by gram (–3.62%), barley (–2.28%), and jowar (–1.38%). Growth rates of production of all foodgrain crops except rice and wheat have declined consistently almost in all the districts while Mahendragarh, as an exception, has observed increase in growth rates of all the foodgrain and non-foodgrain crops over the period of 29 years. This revealed that increase in production of fine cereals like wheat and rice has been at the cost of coarse cereals and pulses. This fact is evident from the growth in area (Table 2) of various crops.

Increase in production of fine cereals like wheat and rice has been at the cost of coarse cereals and pulses.

Area under total foodgrains increased at the rate of 1.07 per cent annually in the first period while it decreased at the rate of 0.49 per cent annually in the second, making the growth of area under total foodgrains almost stagnant (0.15% annual increase) over the whole period. Only rice (4.89%) and wheat (3.04%) registered increase in their respective areas sown but the rate of growth in the areas of these crops also slowed down in the second period. Growth in area under rice has decelerated in almost all the districts, as the annual growth rates were lower in the first period than the second, except for rice in Ambala and Karnal and for wheat in Hisar.

Areas under jowar, bajra, maize, barley, and pulses (including gram) had declined over the period in all the districts. However, some of them have improved their position in the second period.

Compound growth rates of yield of various crops grown in the state have been shown in Table 3. The results reveal that the three major groups of crops grown in the state i.e., foodgrains, oilseeds, and cotton have registered growth rates of 4.33, 4.10, and 1.45 per cent annually in their yields, respectively during the period as mentioned. As evident from the growth rates, the momentum of growth in yields for these crops has been higher in the second period. This is in contrast to the rate of growth in area for these crops except for total cotton implying that the growth in yield has been the major source of sustaining the rate of growth in production of these crops in the state. Looking at the individual growth rates of the crops for the state as a whole, all the crops have registered positive growth in their respective yields. Yields of all the crops (both foodgrains and non-foodgrains) except rice have increased at a faster rate in the second period than in the first for the state as a whole. Rice is the only crop at the state level, which witnessed deceleration in its area, yield, and consequently production, in the second period. All the districts have also recorded positive growth rates over the whole period for all the crops except for gram. Gram has shown decline in growth rates of area, yield, and production in all districts (except for Mahendragarh) and the state as a whole over the total period.

Diversification of Crop Production

Crop diversification referring to larger crop mix creates a land use conflict among the various crops and crop groups like foodgrains and non-foodgrains, especially on small farms. Diversification of agriculture, which envisages changes in production activities, is being recommended for various reasons. With farm holdings below two hectares in size, the average net income is not sufficient to support a minimum standard of living. It is being suggested that such holdings can be made viable by inducing them to shift to high value crops. In rainfed and dryland areas, crop diversification is important from the point of view of checking soil erosion and conserving water resources for maximizing the returns from available resources. In the case of

In dryland areas, crop diversification is important from the point of view of checking soil erosion and conserving water resources. In the case of agriculturally developed regions, diversification is being suggested for maintenance of soil structure and soil fertility and also to check over-exploitation of ground water resources.

Table 1: Compound Growth Rates of Production

Crop	Period	Hisar	Ambala	Jind	Karnal	Rohtak	M.garh	Gurgaon	Haryana
Rice	I	**13.46**	**8.62**	**17.53**	**12.98**	2.60	–	**24.63**	**12.19**
	II	**6.12**	**7.71**	**4.31**	**2.39**	**9.29**	–	**16.58**	**4.00**
	aggregate	**10.58**	**8.13**	**11.69**	**7.08**	**8.16**	–	**15.49**	**7.85**
Jowar	I	**–15.44**	–	**–7.77**	–5.59	**–5.62**	2.38	2.91	**–4.85**
	II	–2.73	–	–7.06	**–13.28**	–0.49	1.13	1.98	–0.80
	aggregate	**–11.26**	–	**–4.81**	**–7.31**	–0.73	0.82	1.29	–1.38
Bajra	I	–5.31	–7.59	**5.25**	–6.88	–3.80	3.98	–6.26	–1.71
	II	0.86	2.57	–3.07	–1.29	–2.26	3.41	–0.58	0.70
	aggregate	**–2.61**	–0.81	0.17	**–2.90**	–1.68	4.63	**–0.63**	0.05
Maize	I	**–9.25**	0.45	**–5.53**	–4.20	–6.20	–	–5.34	–2.21
	II	**–5.93**	–1.61	**–11.82**	**–12.75**	**–7.98**	–	**–4.84**	**–4.41**
	aggregate	**–7.33**	–1.06	**–7.80**	**–9.12**	**–7.54**	–	**–4.59**	**–4.15**
Wheat	I	**7.23**	**7.14**	**9.40**	**6.68**	**5.24**	**25.70**	**5.53**	**7.16**
	II	**8.21**	**5.36**	**5.53**	**4.93**	**3.71**	**6.36**	**3.73**	**5.54**
	aggregate	**8.31**	**6.34**	**7.51**	**5.45**	**5.11**	**12.56**	**4.95**	**6.41**
Barley	I	**–8.34**	–6.66	–0.87	**–11.31**	–4.12	7.24	**–7.31**	**–4.46**
	II	**12.04**	**–8.89**	–0.33	**–12.27**	–2.27	**–4.02**	**–6.25**	–1.50
	aggregate	**3.26**	**–5.04**	–0.97	**–11.35**	**–2.51**	0.40	**–4.85**	**–2.28**
Cereals	I	**4.00**	**5.71**	**8.26**	**7.65**	**3.47**	**12.82**	1.49	**5.78**
	II	**7.52**	**5.60**	**4.33**	**3.73**	**3.45**	**4.86**	**2.91**	**4.66**
	aggregate	**6.48**	**5.72**	**6.45**	**5.41**	**4.23**	7.62	**3.12**	**5.41**
Gram	I	–1.30	–1.74	–0.48	**–10.01**	–5.67	9.59	**–7.90**	–0.99
	II	–0.83	**–7.56**	**–9.50**	–4.93	**–8.00**	5.31	**–9.79**	–0.50
	aggregate	**–2.52**	**–10.16**	**–7.95**	**–15.75**	**–8.42**	2.31	**–10.42**	**–3.62**
Pulses	I	–1.42	–0.13	–0.32	**–9.03**	–5.31	9.63	**–6.77**	–0.84
	II	–0.84	**–7.14**	**–6.14**	1.16	1.51	5.21	**–6.32**	0.27
	aggregate	**–2.51**	**–5.51**	**–5.98**	**–9.29**	**–4.49**	2.25	**–7.52**	**–2.95**
Foodgrains	I	2.27	**4.96**	**6.10**	**6.55**	2.06	**11.55**	0.65	**4.61**
	II	**6.61**	**5.22**	**3.82**	**3.71**	**3.34**	**4.91**	**2.66**	**4.42**
	aggregate	**4.83**	**4.99**	**4.86**	**4.95**	**3.24**	**5.98**	**2.45**	**4.48**
R&mustard	I	0.75	4.50	4.10	**–11.16**	**6.78**	**16.08**	–4.03	0.63
	II	**12.93**	1.91	**8.51**	0.07	**18.88**	**20.09**	**13.44**	**15.36**
	aggregate	**8.33**	**6.21**	**8.55**	0.02	**13.54**	**18.65**	**8.69**	**10.12**
Oilseeds	I	0.76	–1.24	4.21	**–10.17**	**6.85**	**16.51**	–2.89	0.45
	II	**12.99**	5.66	**8.65**	**10.41**	**19.28**	**20.04**	**12.97**	**15.41**
	aggregate	**8.33**	6.21	**8.55**	0.02	**13.54**	**18.65**	**8.69**	**10.12**
Cotton	I	**5.36**	0.57	**4.29**	**–6.28**	**–4.84**	**–0.18**	**–4.29**	**4.74**
	II	**6.32**	**–15.51**	**8.33**	–3.32	2.47	**8.31**	–	**6.21**
	aggregate	**5.57**	**–2.96**	**6.66**	**–2.04**	0.80	**7.77**	–	**5.44**

Figures in bold are significant at 5 per cent probability level.

Table 2: Compound Growth Rates of Area

Crop	Period	Hisar	Ambala	Jind	Karnal	Rohtak	M.garh	Gurgaon	Haryana
Rice	I	**8.85**	**2.99**	**13.60**	**6.40**	5.28	–	**25.25**	**6.36**
	II	**4.54**	**4.26**	**3.02**	**2.48**	**5.59**	–	**11.87**	**3.22**
	aggregate	**6.89**	**3.71**	**8.39**	**4.58**	**4.97**	–	**11.39**	**4.89**
Jowar	I	**–17.57**	–	**–8.57**	**–11.36**	**–2.20**	–2.01	–0.40	**–4.74**
	II	**–9.61**	–	**–9.30**	**–13.62**	–1.63	**–4.46**	0.83	**–1.95**
	aggregate	**–14.04**	–	**–8.28**	**–10.84**	**–1.36**	**–1.94**	–0.85	**–3.01**
Bajra	I	**–8.02**	**–4.22**	**4.18**	**–5.04**	1.27	**7.83**	**–3.82**	–0.09
	II	**–3.21**	–2.16	**–5.89**	–2.78	**–7.53**	**–2.13**	**–4.20**	**–3.47**
	aggregate	**–5.50**	**–2.86**	**–1.92**	**–5.19**	**–3.63**	**1.47**	**–2.66**	**–1.97**
Maize	I	**–6.77**	**2.28**	–2.44	–1.96	–0.40	–	–0.82	–0.36
	II	**–9.74**	**–3.51**	**–14.70**	**–14.22**	**–12.97**	–	**–7.45**	**–6.78**
	aggregate	**–7.14**	**–2.15**	**–10.66**	**–10.04**	**–8.42**	–	**–5.15**	**–5.38**
Wheat	I	**3.68**	**3.11**	**6.73**	**4.49**	**3.32**	**23.90**	**4.03**	**4.71**
	II	**4.16**	**2.06**	**1.50**	**0.75**	0.12	**0.02**	–0.75	**1.41**
	aggregate	**4.26**	**2.57**	**4.11**	**2.33**	**1.80**	**9.45**	**2.10**	**3.04**
Barley	I	**–10.10**	–4.15	–0.50	**–9.60**	–4.23	2.43	**–6.51**	**–5.40**
	II	2.64	**–11.19**	**–8.08**	**–14.88**	**–7.62**	**–6.86**	**–10.18**	**–6.38**
	aggregate	–1.48	**–7.28**	**–5.38**	**–12.77**	**–4.43**	**–2.81**	**–6.79**	**–5.10**
Cereals	I	**–3.07**	**2.38**	4.13	**3.24**	**1.57**	**8.56**	–0.55	**1.87**
	II	**2.55**	1.99	–0.26	**1.14**	**–1.19**	**–1.28**	**–1.86**	0.28
	aggregate	0.38	1.92	**1.64**	**2.08**	0.15	**2.34**	–0.42	**1.09**
Gram	I	–2.35	–2.01	0.04	**–10.00**	**–4.62**	**8.85**	**–10.43**	–1.07
	II	**–4.88**	**–11.13**	**–11.99**	**–11.23**	**–11.10**	–2.32	**–9.49**	**–5.12**
	aggregate	**–3.17**	**–9.87**	**–7.48**	**–14.94**	**–7.91**	0.67	**–10.34**	**–3.84**
Pulses	I	–2.71	–2.10	0.13	**–8.98**	**–4.21**	**8.53**	**–8.68**	**–1.24**
	II	**–4.78**	**–7.09**	**–9.77**	**–4.79**	**–3.84**	–2.21	**–6.69**	**–4.37**
	aggregate	**–3.21**	**–6.28**	**–6.08**	**–9.37**	**–4.71**	0.56	**–7.79**	**–3.48**
Foodgrains	I	**–2.99**	**1.35**	**2.92**	**1.80**	**0.26**	**8.87**	**–1.97**	**1.07**
	II	0.20	**1.16**	**–1.55**	**1.00**	**–1.53**	–1.57	**–2.22**	**–0.49**
	aggregate	**–0.79**	**0.74**	**0.16**	**1.34**	**–0.72**	**1.81**	**–1.34**	**0.15**
R&mustard	I	–0.39	1.79	3.20	**–7.38**	3.83	9.38	**–7.25**	–0.80
	II	**6.46**	–1.19	**5.72**	–1.05	**13.56**	**13.04**	**9.79**	**9.56**
	aggregate	**4.18**	**1.82**	**4.49**	**–2.99**	**9.61**	**12.34**	**4.19**	**5.78**
Oilseeds	I	–0.40	**–2.77**	3.38	**–6.89**	3.87	9.74	**–6.41**	–1.01
	II	**6.57**	1.04	**5.76**	**5.95**	**13.78**	**13.00**	**9.15**	**9.52**
	aggregate	**4.18**	1.82	**4.49**	–2.99	**9.61**	**12.34**	**4.19**	**5.78**
Cotton	I	**4.14**	–1.79	**1.95**	**–7.29**	**–5.78**	**5.51**	**–4.64**	**3.08**
	II	**4.48**	**–12.99**	**6.93**	–1.65	1.17	**5.20**	–	**4.36**
	aggregate	**4.20**	**–4.47**	**4.55**	**–2.70**	0.02	**7.07**	–	**3.93**

Figures in bold are significant at 5 per cent probability level.

Table 3: Compound Growth Rates of Yield

Crop	Period	Hisar	Ambala	Jind	Karnal	Rohtak	M.garh	Gurgaon	Haryana
Rice	I	**4.24**	**5.46**	**3.46**	**6.19**	–2.54	–	–0.49	**5.49**
	II	1.51	**3.31**	1.25	–0.08	**3.50**	–	**4.21**	0.76
	aggregate	**3.45**	**4.26**	**3.05**	**2.39**	**3.04**	–	**3.68**	**2.82**
Jowar	I	2.59	–	0.88	6.51	–3.50	4.48	3.32	–0.12
	II	**7.61**	–	–2.47	0.39	1.17	5.85	1.14	1.17
	aggregate	**3.23**	–	**3.79**	**3.96**	0.64	**2.81**	2.16	**1.68**
Bajra	I	2.95	–3.51	1.03	–1.95	–5.01	–3.57	–2.53	–1.63
	II	**4.21**	4.83	3.00	1.53	**5.70**	5.66	3.78	4.32
	aggregate	**3.06**	2.12	**2.13**	**2.42**	2.02	3.11	**2.09**	**2.06**
Maize	I	–2.67	–1.79	–3.17	–2.28	**–5.82**	–	–4.56	–1.86
	II	**4.22**	1.97	**3.38**	1.71	**5.73**	–	2.83	**2.55**
	aggregate	–0.21	**1.11**	**3.20**	1.03	0.96	–	0.59	**1.30**
Wheat	I	**3.43**	**3.91**	**2.50**	**2.10**	1.86	1.45	1.44	**2.34**
	II	**3.89**	**3.23**	**3.96**	**4.15**	**3.59**	**4.26**	**4.51**	**4.07**
	aggregate	**3.89**	**3.68**	**3.27**	**3.05**	**3.25**	**2.84**	**2.80**	**3.27**
Barley	I	1.95	–2.62	–0.37	–1.89	0.11	**4.69**	–0.85	0.99
	II	**9.16**	**2.58**	**8.43**	**3.07**	**5.79**	**3.05**	**4.38**	**5.22**
	aggregate	**4.81**	**2.42**	**4.66**	**1.63**	**2.01**	**3.30**	**2.08**	**2.96**
Cereals	I	**7.30**	**3.25**	**3.97**	**4.27**	1.87	3.92	**2.05**	**3.83**
	II	**4.85**	**3.53**	**4.61**	**2.56**	**4.70**	**6.22**	**4.86**	**4.37**
	aggregate	**6.07**	**3.74**	**4.73**	**3.26**	**4.08**	**5.16**	**3.55**	**4.27**
Gram	I	1.07	0.28	–0.52	–0.01	–1.10	0.68	2.83	0.08
	II	**4.26**	4.02	2.82	**7.10**	3.50	**7.82**	–0.32	**4.87**
	aggregate	0.67	–0.33	–0.51	–0.95	–0.56	1.63	–0.08	–0.23
Pulses	I	1.33	2.02	–0.45	–0.06	–1.16	1.02	2.10	0.41
	II	**4.14**	–0.05	**4.02**	**6.25**	**5.56**	**7.58**	0.40	**4.86**
	aggregate	0.72	0.82	0.11	0.09	0.23	1.68	0.29	0.54
Foodgrains	I	**5.42**	**3.56**	**3.10**	**4.67**	1.79	2.46	**2.67**	**3.51**
	II	**6.40**	**4.02**	**5.45**	**2.68**	**4.95**	**6.59**	**4.98**	**4.93**
	aggregate	**5.67**	**4.22**	**4.68**	**3.56**	**3.99**	**4.10**	**3.84**	**4.33**
R&mustard	I	1.14	2.66	0.87	–4.08	2.84	**6.12**	3.47	1.44
	II	**6.07**	**3.14**	**2.64**	1.13	**4.68**	**6.23**	**3.32**	**5.29**
	aggregate	**3.99**	**4.31**	**3.88**	**3.10**	**3.59**	**5.62**	**4.31**	**4.10**
Oilseeds	I	1.17	1.58	0.80	–3.53	2.87	**6.17**	3.77	1.48
	II	**6.02**	**4.58**	**2.74**	**4.22**	**4.83**	**6.23**	**3.50**	**5.38**
	aggregate	**3.99**	**4.31**	**3.88**	**3.10**	**3.59**	**5.62**	**4.31**	**4.10**
Cotton	I	**1.18**	2.41	**2.30**	1.09	0.99	**–5.40**	0.36	**1.61**
	II	1.76	–2.89	1.31	–1.70	1.29	2.95	–	1.77
	aggregate	**1.31**	**1.58**	**2.02**	0.68	**0.78**	0.65	–	**1.45**

Figures in bold are significant at 5 per cent probability level.

Table 4: Herfindahl Indices

Year	Hisar	Ambala	Jind	Karnal	Rohtak	M.garh	Gurgaon	Haryana
66/67	0.24	0.20	0.21	0.20	0.23	0.42	0.19	0.19
67/68	0.22	0.20	0.21	0.19	0.21	0.31	0.19	0.18
68/69	0.23	0.21	0.19	0.24	0.24	0.41	0.21	0.19
69/70	0.24	0.22	0.22	0.26	0.22	0.39	0.21	0.20
70/71	0.25	0.24	0.22	0.29	0.23	0.38	0.22	0.20
71/72	0.24	0.25	0.21	0.31	0.23	0.37	0.21	0.20
72/73	0.21	0.24	0.21	0.33	0.23	0.32	0.23	0.19
73/74	0.21	0.24	0.21	0.30	0.23	0.35	0.21	0.19
74/75	0.19	0.22	0.19	0.29	0.23	0.33	0.20	0.18
75/76	0.22	0.22	0.21	0.29	0.23	0.36	0.22	0.20
76/77	0.23	0.24	0.22	0.32	0.25	0.36	0.24	0.21
77/78	0.22	0.23	0.22	0.35	0.25	0.35	0.24	0.20
78/79	0.23	0.25	0.23	0.37	0.26	0.35	0.26	0.21
79/80	0.22	0.26	0.22	0.40	0.28	0.39	0.28	0.21
80/81	0.21	0.25	0.22	0.39	0.26	0.31	0.34	0.20
81/82	0.24	0.27	0.23	0.40	0.26	0.31	0.26	0.20
82/83	0.23	0.30	0.27	0.43	0.31	0.32	0.33	0.23
83/84	0.22	0.32	0.24	0.43	0.27	0.30	0.30	0.22
84/85	0.20	0.31	0.25	0.43	0.28	0.29	0.27	0.21
85/86	0.21	0.29	0.24	0.43	0.27	0.30	0.26	0.21
86/87	0.22	0.31	0.26	0.44	0.27	0.31	0.27	0.21
87/88	0.25	0.33	0.30	0.45	0.36	0.27	0.33	0.25
88/89	0.22	0.32	0.25	0.44	0.26	0.29	0.30	0.21
89/90	0.23	0.34	0.25	0.44	0.30	0.26	0.31	0.22
90/91	0.23	0.34	0.25	0.43	0.27	0.26	0.28	0.20
91/92	0.23	0.35	0.27	0.43	0.29	0.26	0.27	0.21
92/93	0.24	0.37	0.29	0.45	0.28	0.25	0.29	0.22
93/94	0.24	0.35	0.28	0.45	0.29	0.23	0.31	0.22
94/95	0.24	0.34	0.28	0.45	0.27	0.24	0.31	0.22
CGR/I Per	–0.71	**1.36**	0.55	**4.78**	**1.42**	–0.49	**2.36**	**0.77**
CGR/II Per	0.63	**2.16**	**1.49**	**0.71**	0.22	**–2.12**	0.02	0.24
CGR/Aggr	0.09	**2.18**	**1.27**	**2.76**	**1.11**	**–1.71**	**1.73**	**0.57**

Period I: 1966/67-1979/80, Period II: 1980/81-1994/95.
Figures in bold are significant at 5 per cent probability level.

agriculturally developed regions, diversification of cropping pattern is being suggested for maintenance of soil structure and soil fertility and also to check over-exploitation of ground water resources. Diversification of varietal-mix is important because predominance of one or two high yielding strains in large contiguous area may result in the spread of some serious diseases capable of wiping out the entire crop from the region. These considerations apart, development in technology, a move towards export orientation of Indian agriculture and changes in the trade environment for farm products are likely to induce shifts in cropping patterns and resource use. While the magnitude of the changes may vary in different sub-sectors of agriculture, their consequences are of importance for various reasons like, equity and sustainability of agriculture.

The introduction of HYVs of cereals, particularly wheat and rice in mid sixties, has increased foodgrain production by 323 per cent in Haryana. As a result of increased area under HYVs and consequent increase in use of modern inputs like chemical fertilizer, pesticides, insecticides and increased water availability, changes in cropping pattern have also emerged. This change can

Table 5: Share of Crops to Total Cropped area in Haryana (%)

Crop	Period	Hisar	Ambala	Jind	Karnal	Rohtak	M.garh	Gurgaon	Haryana
Rice	I	1.93	17.87	4.50	25.56	2.74	0.01	0.59	7.13
	II	4.49	28.77	12.08	40.52	5.29	0.03	1.85	12.64
Jowar	I	1.83	0.24	7.42	2.03	13.41	1.59	8.83	4.58
	II	0.16	0.03	2.18	0.38	11.64	0.97	8.03	2.63
Bajra	I	22.01	1.86	22.62	4.02	18.95	46.20	23.60	21.07
	II	8.37	1.14	15.80	1.46	12.30	39.40	19.06	14.41
Maize	I	0.30	14.93	0.99	6.24	1.03	0.04	0.99	2.51
	II	0.11	9.60	0.19	1.26	0.33	0.01	0.54	0.97
Wheat	I	17.93	34.68	26.46	45.26	35.52	7.96	31.31	27.11
	II	30.26	46.48	43.08	51.71	47.23	14.80	47.25	37.23
Barley	I	1.67	1.72	2.46	2.33	2.71	4.04	10.75	3.42
	II	1.09	0.55	0.98	0.29	1.58	1.89	4.96	1.47
Pulses	I	32.14	21.95	27.46	10.86	21.80	35.42	18.37	24.62
	II	18.99	8.03	11.20	1.89	10.65	25.25	6.20	13.30
Oilseeds	I	5.58	5.84	2.77	2.10	2.07	3.87	5.26	3.95
	II	9.20	4.78	4.77	1.54	9.09	14.78	11.95	8.28
Cotton	I	16.62	0.90	5.32	1.60	1.76	0.88	0.31	5.61
	II	27.34	0.62	9.71	0.96	1.91	2.86	0.17	8.96

be visualized in terms of diversification/specialization of crop production in Haryana.

The introduction of HYVs of cereals increased foodgrain production by 323 per cent in Haryana.

The yearwise diversification measures in terms of Herfindahl index for different districts and for Haryana State are shown in Table 4. For increasing diversification, Herfindahl index (H-index) is decreasing and it approaches zero if diversification is perfect. Conversely, it takes a value of unity where there is complete specialization. By looking at the growth rates of H-index in different periods, it is clear that adoption of green revolution technology has affected the cropping pattern across the districts in state.

Among all districts, Hisar is the only district where the HYVs of green revolution have not shown any impact on the cropping pattern during the last 29 years. The proportion of area under rice, jowar, bajra, maize, wheat, barley, gram, rapeseed & mustard, and cotton has remained almost the same during the period under study. Surprisingly, Ambala and Karnal, agriculturally the most advanced districts from the very beginning, have experienced significant changes in cropping pattern in the post-green revolution period. In Ambala, the H-index increased significantly at the rate of 1.36 per cent per annum in the first period and it increased even faster i.e. at 2.16 per cent per annum, in the second period. It implied that the cropping pattern in Ambala district is heading towards specialization rather than diversification. Similarly, Karnal district experienced a change in cropping pattern even more speedily in the first period i.e. at the rate of 4.78 per cent per annum, the highest in the state. In the second period, the increase in H-index is relatively low (0.71) but it is quite significant, implying that the cropping pattern in Karnal is increasing at decreasing rate and heading toward stabilization in favour of specialization. Rohtak and Gurgaon experienced tremendous changes in cropping pattern in the first period while the cropping pattern stabilized in the second period. Interestingly, Mahendragarh, which was the driest region of the state upto mid-sixties, has observed an extremely favourable change in its cropping pattern. Diversification has been maintaining increasing trend in Mahendragarh, as shown by significantly decreasing growth rate, –2.12 per cent per annum, in the second period. Overall situation of diversification in the state is not encouraging. Diversification in the state decreased significantly, i.e. at the rate of 0.77 per cent annually, in the first period while it remained almost stable in the second period. However, the significantly positive growth rate of 0.57 per cent in

H-index indicates that Haryana State is heading toward specialization.

Period-wise share of different crops to the total cropped area is shown in Table 5. It is interesting to note that among cereals, only rice and wheat have registered marked increases in their respective shares to the cropped area in the second period in all the districts and the state as a whole. Conversely, all other cereals i.e., jowar, bajra, maize, and barley performed badly regarding their share to the total cropped area in the second period in all the districts and in the state as a whole. Share of pulses to the total cropped area decreased from 24.62 per cent in the first period to 13.30 per cent in the second period in the state. The pattern of decline in share of pulses to the total cropped area was a common feature of all the districts of the state.

The share of non-foodgrains area to the total cropped area in the state as a whole was increasing. Oilseeds and cotton have registered marked increases in their respective shares in the second period. Share of oilseeds increased from 3.95 per cent (in the first period) to 8.38 per cent (in the second period) while, cotton witnessed an increase in share of about 3.35 per cent between the two periods in the state. As all regions of the state are not suitable for growing oilseeds and cotton, the per cent share of these two crops has differences regarding increase/decrease in different districts. For example, oilseed did fairly well in Hisar, Jind, Rohtak, Mahendragarh, and Gurgaon while cotton captured area in Hisar, Jind, and Mahendragarh, which are the main regions for growing these crops.

The analysis on growth and diversification in the state indicated that with the advent of new technology and development of infrastructure like irrigation facilities and price support, few crops, which have registered a major breakthrough in their productivity, have replaced other crops grown in the state. This has been leading to the situation that could be termed as increasing specialisation in the relatively developed regions of agriculture.

With the advent of new technology and development of infrastructure like irrigation facilities and price support, few crops, which have registered a major breakthrough in their productivity, have replaced other crops grown in the state.

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Feature

Sugarcane Cultivation in Punjab: Growth Performance & Future Prospects

Jaswinder Kaur, Bant Singh & P.S. Rangi

This study highlights the major problems inherent in the cultivation and expansion of area under sugarcane in Punjab; and has also come up with suggestions which have emerged through discussion with the respondent farmers to overcome these problems.

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In northern India including Punjab, Haryana and Uttar Pradesh, wheat-paddy cultivation has dominated the cropping pattern. This cropping system requires more water and nutrients than any other system and, thus, ultimately deteriorates soil health and causes lowering of water table. The mono-culture system of wheat and paddy cultivation has resulted not only in ecological imbalances in many areas but has created many environmental problems too. Secondly, wheat-paddy cultivation since late eighties and early nineties has reached the plateau limit with respect to yields. The yields of these crops have become almost stagnant even at increased use of farm resources. Many efforts have, therefore, been made through policy measures and research to develop and encourage some alternative cropping systems that could replace and check the expansion of wheat-paddy cultivation in the area. Visualizing the multidimensional impact of intensification of wheat-paddy cultivation on the farm economy in general and resource degradation in particular, Punjab Government had appointed an Expert Committee (1985) to suggest ways and means to diversify the state agriculture and check the expansion of wheat-paddy cultivation in the state.

Wheat-paddy cultivation requires more water and nutrients than any other system and, ultimately deteriorates soil health and causes lowering of water table.

Crop Diversification

Amongst the various crops that could supplant wheat and paddy cultivation, sugarcane is considered to be the most suitable for extensive cultivation under Punjab conditions (Singh & S.P. Mehra, 1995). Sugarcane is already

grown in large parts of the state and is the fourth largest crop with respect to total output value obtained. However, since 1970-71 both area and production of sugarcane have shown a declining trend. The area under the crop which was 128 thousand hectares in 1970-71 decreased to nearly 80 thousand hectares in 1994-95. Earlier (prior to 1980) the reasons for decrease or slow growth of area under sugarcane in the state were attributted to the low number of sugar mills in the state (there were only six sugar mills in the state until 1979-80) which could crush only 10-20 per cent of the total output of cane produced in the state. To expand the cultivation of sugarcane there has, therefore, been consistent demand for more sugar mills in the state (S.S. Grewal & P.S. Rangi, 1982). To meet the growing demand for sugar and create employment opportunities, the number of sugar mills in the state increased to 10 in 1987-88, 17 in 1990-91 and 20 in 1995-96. The combined crushing capacity of the sugar mills which was just 7000 tons per day before 1980-81 increased to more than 40,000 tons in 1994-95. However, the moot point is that despite considerable increase in the number of sugar mills, increase in yield and escalation in the prices of sugarcane and gur over the period under reference, both area and production of sugarcane in the state have shown a declining trend. This dwindling performance of sugarcane production has also affected the sugar industry in the state. The fate of sugar mills directly depends on their production performance. There is, therefore, an urgent need to investigate the reasons behind this scenario. Present study is an attempt in this direction with the following objectives in view:

Despite considerable increase in the number of sugar mills, increase in yield and escalation in the prices of sugarcane, both area and production of sugarcane in the state have shown a declining trend.

- To work out the growth in area, production and yield of sugarcane in different districts of Punjab since 1970-71 to 1994-95.
- To examine the economics of sugarcane cultivation vis-a-vis its competing crops under Punjab conditions, and
- To investigate the reasons detrimental to expansion of area under sugarcane in the state.

Source of Data

The data used for studying the first and second objectives have been taken from secondary sources, and the data on the problems and difficulties faced by farmers in the cultivation and expansion of area under sugarcane have been collected from 300 farmers of varying farm size groups, selected under a centrally sponsored project, "Comprehensive Scheme for Studying the Cost of Cultivation of Principal Crops", being run in the department of Economics and Sociology, Punjab Agricultural University, Ludhiana, on a pre-tested schedule. The sample of the scheme is scattered and randomly selected with respect to different tehsils.

Besides information on area put under sugarcane crop, the respondent farmers were asked to rank the problems that inhibit them from increasing area under sugarcane in the order of their severity. The data pertains to the agricultural year 1995- 96.

Results & Discussion

Growth in Area, Production and Yield

Sugarcane is a competing crop with respect to both wheat and paddy under Punjab conditions. The technological developments in these crops, therefore, have great bearings on the cultivation of sugarcane in the state. Secondly, government policy with respect to control and decontrol of sugar prices for PDS, and the behaviour of sugar mills during surplus seasons affect the decision of farmers regarding increasing or decreasing the area under sugarcane in the ensuing crop season. The data and growth rates of area, production and yield of sugarcane in the state from 1970-71 through 1994-95 presented in table 1 and growth curves in Fig. 1 show that there have been cyclical movements in these variables over the period under consideration. Despite significantly high growth rates of 1.4854 per cent achieved in the yield, there has been a net decrease in the area under sugarcane crop in the state during this period. As is evident from table 1 and Fig. 1, there have been low and high pitch movements in area and production of sugarcane in the state. Depending on the wavering sugar policy of the government and erratic behaviour of sugar mills with the cane producers, nearly three years of buoyancy period has been alternately followed by a downtrend of about equal length.

Economics of Sugarcane Cultivation vis-á-vis its Competing Crops

Besides physical and ecological factors, the cultivation of a particular crop in an area is determined by its relative profitability over the competing crops. So is the case with sugarcane. Wheat and paddy crops both, grown in sequence, are the major competing crops for

Besides physical and ecological factors, the cultivation of a particular crop in an area is determined by its relative profitability over the competing crops.

sugarcane in Punjab. The economics of sugarcane cultivation has, therefore, been examined in relation to these crops grown in a single rotation. The results of a study (Avtar Singh & S.P. Mehra 1995) presented in table 2 show that net returns from the cultivation of sugarcane as sole crop exceed those from wheat and paddy crops rotation by about 20 per cent under Punjab conditions. These results of getting higher net returns from sugarcane over wheat-paddy cultivation per unit of area were also corroborated by another study (Tiwari & D.K. Singh 1981). Therefore, in monetary terms, sugarcane cultivation is more profitable over the next best alternative, wheat-paddy cultivation in the state.

Table 1: Area, Production and Yield of Sugarcane and Number of Sugar Mills in Punjab, 1970-71 to 1994-95

Year	Area (000 Hac.)	Production (000 Mt.)	Yield (Kgs./Ha.)	Number of sugar mills
1970-71	128	527	4117	
1971-72	103	403	3912	6
1972-73	102	469	4602	6
1973-74	110	582	5289	6
1974-75	121	605	4997	6
1975-76	114	613	5374	6
1976-77	113	607	5371	6
1977-78	115	652	5612	6
1978-79	108	612	5663	6
1979-80	77	393	5099	6
1980-81	71	392	5526	8
1981-82	101	582	5772	8
1982-83	103	623	6098	8
1983-84	84	553	6580	8
1984-85	79	492	6230	8
1985-86	78	504	6473	10
1986-87	97	611	6300	11
1987-88	106	582	5496	13
1988-89	97	600	6186	13
1989-90	103	650	6312	13
1990-91	101	601	5941	17
1991-92	109	693	6348	18
1992-93	112	688	6141	18
1993-94	77	468	6121	19
1994-95	80	495	6219	19
Compound growth rate From 1970-71 to 1994-95	–0.9057** (–2.172)	0.5522 (1.201)	1.4854*** (3.615)	

Note: Figures in parentheses are "t" values

Table 2: Gross Returns, Variable Expenses and Net Returns from Sugarcane and Wheat-Paddy Cultivation, 1989-90.

(Rupees per hectare)

Item	Wheat-Paddy	Sugarcane
Gross Returns	25,811	41,428
Variable Expenses	16,892	30,776
Net Returns	8,919	10,652

Source: Avtar Singh & S.P. Mehra, 1995.

Reasons for Decrease in Area Under Sugarcane

From the analysis it is clear that despite significant increase in the yield levels and economic edge over its competing combination of wheat and paddy crops, the area under sugarcane in Punjab during the last two and a half decades has not increased appreciably, rather it has shown a decreasing trend (table 1) and the area under sugarcane in the state continued to vibrate around one lakh hectares. To assess the factors which hinder the expansion in area under sugarcane in the state, analysis was carried out at two levels – quantitatively, and qualitatively.

Quantitative Analysis

The factors that affect area under sugarcane in a crop season and could be quantified are –

X_1: *Lagged area under sugarcane* – in thousand hectares.

X_2: *Lagged yield of sugarcane* – taken in kgs. per hectare.

X_3: *Crushing capacity of sugar mills* – this has been taken in terms of the ratio of the quantity of cane crushed during the previous season to the total quantity of cane produced in the state and is expressed in per cent terms.

X_4: *Lagged price of sugarcane* – is the average price of sugarcane in rupees per quintal realised in the previous season.

X_5: *Lagged ratio of sugarcane price to the average of wheat and paddy prices* – Since relative

Fig. 1. Growth in Area, Production and Yield of Sugarcane

Table 3: Estimates of Factors Affecting Area under Sugarcane in Punjab 1971-72 through 1994-95

	Area Under Sugarcane (000 ha)	Lagged Area (000 ha)	Lagged yield (kgs/ha)	Ratio of cane crushed to total production (per cent)	Lagged price of sugarcane Rs./qtl.	Lagged price ratio of sugarcane to wheat and paddy prices (per cent)	Lagged price of Gur Rs./qtl.
1971-72	103	128	4117	10.64	7.37	10.66	76.45
1972-73	102	103	3912	8.86	10.00	12.87l	76.45
1973-74	110	102	4602	10.96	12.35	16.42	129.54
1974-75	121	110	5289	13.83	12.35	13.29	158.33
1975-76	114	121	4997	13.84	14.35	15.15	166.39
1976-77	113	114	5374	15.70	14.35	15.30	129.50
1977-78	115	113	5371	15.49	13.25	14.05	149.98
1978-79	108	115	5612	15.52	13.50	14.30	129.15
1979-80	77	108	5663	16.25	12.50	12.60	93.70
1980-81	71	77	5099	13.10	14.26	13.53	220.00
1981-82	101	71	5526	14.95	24.00	21.10	294.82
1982-83	103	101	5772	26.36	23.00	16.74	176.69
1983-84	84	103	6098	22.56	20.00	14.48	198.07
1984-85	79	84	6580	25.24	22.00	14.80	254.45
l985-86	78	79	6230	27.22	24.00	15.88	254.45
1986-87	97	78	6473	29.80	25.50	16.38	332.67
1987-88	106	97	6300	39.53	27.50	17.43	333.80
1988-89	97	106	5496	35.66	29.50	17.37	343.72
1989-90	103	97	6186	42.46	33.00	18.24	332.99
1990-91	101	103	6312	49.78	38.00	19.73	420.26
1991-92	109	101	5941	51.62	45.00	20.73	447.63
1992-93	112	109	6348	60.21	47.00	18.37	406.46
1993-94	77	112	6141	63.25	48.00	16.31	525.23
1994-95	80	77	6121	71.84	60.00	17.81	773.97
C.G.R.	-.7592*	-.8010*	1.5697***	9.0375***	7.9703***	1.3764***	8.4337***
1971-72 to 1994-95	(-1.731)	(-1.784)	(6.299)	(18.904)	(18.393)l	(4.659)	(11.615)

Note: Figures in parenthesis are "t" values of the respective variable

* Significant at 10 per cent

*** Significant at 1 per cent.

prices of competing crops affect the area under a particular crop, the ratio of sugarcane prices to the wheat and paddy prices has been considered and expressed in per cents.

X_6: *Lagged price of gur* – since making of gur is an alternative activity to crushing of sugarcane by the sugar factories, the average prices of gur in the previous year has been considered to affect the area under sugarcane in the current season.

Estimates of the area under sugarcane and those of the factors affecting area under sugarcane from 1971-72 through 1994-95 are presented in table 3. Compound growth rates and regression analysis were carried out to examine the impact of these factors on the area under sugarcane in the state. The table shows that the growth rates of all the factors (except that of lagged area) were positive and significantly high, while for area under sugarcane, the growth rate was significantly negative at 10 per cent level. It is surprising that despite significant

growth and impact of all these so called "pushing factors", the area under sugarcane has recorded negative growth. This is a paradoxical phenomenon.

The results of regression analysis (table 4) also bring out the insignificant impact of these factors on the area under sugarcane. The very low and insignificant value (0.4187) shows that these factors had little impact on the decision of farmers to put more area under sugarcane in the state.

Table 4: Values of Regression Coefficients of the Factors Affecting Area under Sugarcane in Punjab from 1971-72 through 1994-95

	Variable	Regression Coefficient (Elasticity)
a:	Constant term	1.078991 (4.31438)
X_1:	Lagged area under sugarcane	0.705379 (0.32388)
X_2:	Lagged yield of sugarcane	–0.219425 (0.42470)
X_3:	Ratio of crushing capacity to total production of sugarcane	–0.210356 (0.30616)
X_4:	Lagged price of sugarcane	0.020253 (0.43021)
X_5:	Lagged ratio of sugarcane price to the average of wheat–paddy price	0.712708 (0.42353)
X_6:	Lagged price of gur in the state	0.149024 (0.20385)
R^2:	Coefficient of multiple regression	0.4187

Note: Figures in parenthesis are the standard errors of the respective variables.

Qualitative Factors

These are the factors which can not be quantified on any measuring scale but they do affect the area under sugarcane crop directly or indirectly. An attempt was made to identify and isolate these factors, and rank them according to the intensity of their influence on farmers with respect to increasing or decreasing the area under sugarcane. The information on these factors was collected from the sample farmers selected under the "Comprehensive Scheme for Studying the Cost of Cultivation of Principal Crops", in the state of Punjab for the year 1995-96.

Sugarcane cultivation is not uniformly spread in the state–it is more concentrated in some districts and sparse in others. That is why in 12 out of 30 clusters of sample villages, none of the selected farmers put any area under sugarcane during the last three years. It may be due to the reason that soil, climate and other factors were not suitable for cultivating sugarcane in these areas which included Faridkot, Bathinda and Mansa districts and parts of Moga, Ferozepur and Amritsar districts. Information with regard to the problems faced in expanding area under sugarcane was therefore, collected from the remaining 180 respondent farmers from 18 village clusters.

The respondents were asked to rank the given set of ten problems (identified in consultation with the selected farmers themselves) in the order of their intensities i.e. the most severe and most pronounced problem was to be given rank one, the next severe problem rank two, and so on, the least severe problem being given rank ten. From the ranking of different problems by the selected farmers, average rank-score was then worked out for each problem for their final ranking in the order of their severity/impact on the decision making of the farmers with regard to the extent of area to be put under sugarcane in the next season. Separate marks were then assigned to each rank given to each problem by the farmers. The maximum score of 10 marks was assigned to Rank-1 with 1 mark to Rank-10 in that order. Average rank-scores were then worked out for each problem as follows:

$$q_j = \frac{1}{N} \sum n_{jk}, m_{jk}$$

Where: q_j = average rank-score of j th problem.

N = total number of sample farmers.

n_{jk} = number of farmers giving k th rank to j th problem.

m_{kj} = marks given to k th rank of j th problem.

Table 5: Average Rank-Scores and Ranks of Different Problems Inhibiting increase in Area under Sugarcane in Punjab

Problem	Average Rank-Score	Rank
Problems in marketing of sugarcane	9.45	I
Non mechanisation of operations of sugarcane cultivation in relation to wheat and paddy	7.84	II
Delayed payment by sugar factories	6.68	III
Small size of holdings	6.41	IV
Labour problems for harvesting of sugarcane	5.88	V
Damage by rats etc. to sugarcane crop	5.52	VI
Returns from sugarcane are less over wheat-paddy crop rotation	4.50	VII
Shortage of irrigation water	3.30	VIII
Present varieties of sugarcane are not suitable	2.88	IX
Other miscellaneous problems	2.54	X

Average rank-scores and ranking of different problems in chronological order, based on their average scores, are given in table 5.

As is seen in Table 5, the following ten problems were identified as limiting the area under sugarcane in the state:

Problems in Marketing

These problems were reported to be the most limiting factor in increasing the area under sugarcane in the state. Marketing problems included difficulties in acquiring indent slips, transportation of cane to the collection centres and ill-behaviour of mill owners with the farmers. Majority of farmers reported that only influential people could get indent slips easily while ordinary farmers had to strive hard to get the indents in time. Similarly, small and medium farmers who did not have their own mode of transport face difficulty in transporting the produce, as they could not bear high transport charges. During surplus reason, the behaviour of mill owners was not co operative and they made undue deductions on flimsy grounds. These lacunae discouraged farmers from increasing the area and production of sugarcane.

Non Mechanisation of Operations

Sugarcane is the only crop wherein major operations like sowing, hoeing and harvesting have not been mechanised, whereas in case of its competing crops of wheat and paddy all these operations are mechanised. Also no weedicide is used in sugarcane and farmers have to give hand hoeings to the crop. Since farmers prefer to get the work done easily and speedily, they prefer to go in for wheat and paddy cultivation, as there are no constraints for the cultivation of these crops.

Delay in Payment

The third discouraging factor to increase area under sugarcane is delay and uncertainty in payments made by sugar factories. Payment is not made spontaneously but is delayed by years. Since farmers have to meet their farm and family expenses, they experience great financial hardship in case of delayed payments. So they opt to cultivate other commercial crops wherein payment is quick and assured.

Small Size of Holdings

The land holdings of majority of cultivators in the state area are less than 5 acres and, they can not put larger area under sugarcane because they have to grow other crops mainly cereals for home consumption, and as fodder for animals. Moreover, the income from sugarcane is realised only after a year and small farmers can not afford to wait for such a long period to get cash for their family needs.

Labour Problems

As mentioned, the major operations for sugarcane cultivation have not been mechanised and farmers face labour problem particularly for harvesting in the months of November-December and April-May when there is peak demand for labour for harvesting of Kharif and rabi crops respectively. So many farmers do not increase area under sugarcane due to labour problems faced by them in preceding years.

Damage by Rats etc.

Many farmers reported that they do not cultivate sugarcane because it is damaged by rats and other wild animals. Consequently, the returns from sugarcane are reduced.

Return is Less Over Wheat and Paddy Crop Combination

A good number of farmers felt that the net returns from sugarcane are less than that from wheat and paddy crops taken together. They also felt that returns from these crops are not only higher but are assured too. So they are not inclined to put enough area under sugarcane.

Shortage of Irrigation Water

Some of the farmers, particularly in Ropar and Hoshiarpur districts, advanced the reason of shortage of irrigation water for not increasing area under sugarcane as in their area, water table is too low and pumping out water is expensive.

Variety Not Suitable

The existing varieties of sugarcane being cultivated in the state are assessed to be poor and susceptible to many diseases like red rot and wilt. So farmers are not willing to increase area under sugarcane with existing varieties.

Other Miscellaneous Problems

Some farmers reported other problems for not cultivating sugarcane particularly in non mill areas. These included non availability of fuel material and heavy investment needed for making gur, etc.

Suggestions for Increasing Area & Production

For encouraging farmers to put more area under sugarcane, the following points need to be considered by the concerned agencies:

More Sugar Factories in Surplus Regions

Although, the number of sugar mills in the state has increased by more than three folds during the past fifteen years this increase had little impact on the area under sugarcane in the state (table 1). It is because of the reason that majority of the additional sugar mills under co-operative sector were established in such areas where sugarcane was not grown at all, or was sparsely grown. These sugar mills, thus, run at a very low capacity. On the other hand, sugarcane in some surplus areas, due to lack of sugar mills, either rotted or was burnt by the farmers to clear the fields for next crops. So, to increase and encourage the cultivation of sugarcane in the state, additional sugar mills should be established in surplus regions only.

Fair Distribution of Indent slips

Favouritism in the distribution of indent slips should be dispelled. A computerised system should, therefore, be evolved and farmers should be informed about the dates and quantities of sugarcane to be delivered at the collecting centres.

Delivery of Sugarcane

The large farmers, who have influence and rapport with the officials of mills, market their produce directly at mill site. This not only creates traffic problems and accidents but also affects the time schedules of other farmers for delivery of their produce at the collection centres. All farmers should deliver their produce at the collection centres, from where it should be carried to factory yards by trucks/trollies owned by the mills.

Timely Payment

Since sugarcane is almost a full year crop, farmers need the cash proceeds of their produce immediately to meet their farm and family expenses. On the contrary, their payments are delayed for uncertain periods. This harassment of the farmers should be overcome by ensuring timely payment. Sufficient interest rate should be paid as penalty on delayed payments. This will encourage farmers to put more area under sugarcane.

Supply of Good Variety Seed

The existing varieties have not found favour in some areas particularly in southern districts. Even in other areas they have become susceptible to various diseases and insect/pest attacks. So, through locational research, high yielding varieties – resistant to diseases and insect/pest attacks should be evolved and distributed to farmers at subsidised rates.

Higher Price for Cane

Although, the existing floor price of sugarcane is not low, to encourage farmers to increase area and production of sugarcane, its parity price with respect to its competing crops should be sufficiently high. This can be done by giving bonus to farmers for supplying cane to sugar factories. This will not only ensure increased supply to factories for longer period and sustain the employment of various categories of workers but will also help in checking pollution and resource degradation caused by intensive cultivation of paddy in larger areas.

If earnest efforts are made by researchers and policy makers, the state can break the cobweb of cyclical production of cane and move on a growth path with respect to production of sugar and sugarcane. This will give boost not only to farm economy but to the sugar industry too which would have a catalytic effect for overall development of industries and prosperity of the state economy.

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Feature

Forest Scenario in Assam: Some Emerging Issues

Nilotpal Borthakur

Forest is an important renewable natural resource base playing a great role in the environment. Conservation and promotion of this natural resource is a priority and, hence, environmentalists call for its national exploitation commensurate with its potential and in consonance with ecological principles. In the face of continuous and unscientific removal, this natural resource has become 'scarce' in initially rich Assam state. The present study is, therefore, a scientific probe to highlignt some of the basic issues on Assam forest.

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Forest being one of the most important renewable natural resources, its role in the economic and social development of the country has been well recognised. Globally, India ranks low in per capita forest cover and average forest production as compared to other countries. Moreover, India's forests have been shrinking by 1.5 million ha per year due to ever increasing human and livestock population and their growing requirements. The continuous shrinkage of forest land and resources has become a cause of deep concern to environmentalists and the government.

In this context one should not ignore the fact that Assam is one of the most underdeveloped states in India although she is abundant in forest resources. But the backward economic and infrastructural facilities have considerably limited the development of forestry in the state. Hence, a scientific enquiry is the need of the hour to examine some of the macro aspects of the forest problem in Assam. The present study is an attempt in this direction.

Actual Forest Cover

The National Forest Policy, 1988 enunciates that 33 per cent of the total plains area of the country should be under forest/tree cover, whereas in hilly and mountainous terrain, the aim should be to maintain 66 per cent of the area under vegetative cover with a view to preventing erosion, and degradation and simultaneously ensuring stability of the fragile eco-system. As against this policy resolution, even the officially recorded forest area in

The National Forest Policy, enunciates that 33 per cent of the total plains area of the country should be under forest/ tree cover.

Assam was only 21,222 sq km i.e. 27.0 per cent of the geographical area of the state in 1994. The official records further reveal that forest area as per cent of geographical area dipped to 25.3 per cent in the mid seventies (Table 1). Moreover, the per capital availability of forest area in Assam records continuous decline over years.

Analysis of forest cover in Assam, when studied more precisely with the help of remote sensing data presents an alarming situation for the state. The dis-aggregated forest area data based on satellite information during the year 1990 revealed that Assam had a total forest area of 22l per cent the geographical area (Table 2). If the degraded forest area of 2.7 per cent is deducted from the total percentage of forest area, state's actual forest area remained at 19.3 per cent.

Table 1: Forest Area in Assam (1961-94)

Year	Forest area (sq km)	Forest area as per cent of geographical area	Per capita availability of forest area (ha)
1961	20,550.0	26.2	0.18
1966	20,800.0	26.5	
1971	21,150.0	26.9	0.14
1976	19,840.0	25.3	
1981	20,159.4	25.7	0.11
1986	21,441.6	27.3	
1991	21,684.5	27.6	0.09
1994	21,222.2	27.0	

Source: Principal Chief Conservator of Forest, Guwahati.

Although the plains districts of the Barak valley, namely Cachar and Karimganj had percentage of forest area higher than the national norm, the hill districts of Karbi Anglong and North Cachar hills recorded significantly lower percentage of forest area. The situation was worse in certain districts of the Brahmaputtra valley. It was observed from the records that the percentage of forest area in the plains districts of Barpeta, Goalpara, Nalbari, Golaghat, Jorhat, Lakhimpur and Darrang dropped alarmingly to below 10 per cent level.

Distribution of Forest Area

According to the National Commission on Agriculture (1976), "the role of forests—productive, protective and bio-aesthetic—entitles them to an adequate share of land to promote public wellbeing and to ensure balanced eco-system. An 'adequate share' of forest is very essential to maintain the delicate balance of the eco-system as well as the economy of a region." Hence in addition to bringing the targeted 33 per cent of the geographical area under forest all over Assam, it is also important to ensure its uniform distribution. In the

Table 2: District-wise Forest Area in Assam (1990)

District	Evergreen/ Semi evergreen	Deciduous	Degraded	Forest plantation	Total
Barpeta	–	19,413 (5.87)	–	3,998 (1.21)	23,411 (7.08)
Dhubri	8,535 (3.11)	37,990 (13.84)	–	–	46,525 (16.95)
Goalpara	–	6,997 (2.46)	13.024 (4.58)	8,183 (2.88)	28,204 (9.91)
Kamrup	–	64,281 (13.58)	37,839 (7.99)	15,140 (3.20)	1,17,260 (24.77)
Kokrajhar	64,744 (13.73)	80,930 (17.15)	4,604 (0.98)	14,843 (3.15)	1,65,121 (35.00)
Nalbari	2,918 (1.44)	8,008 (3.95)	1.602 (0.79)	–	12,528 (6.19)
Dibrugarh	97,680 (13.91)	19,888 (2.83)	10,250 (1.46)	2,915 (0.42)	1,30,733 (18.62)
Sibsagor	17,416 (6.69)	1,047 (0.40)	9.394 (3.61)	800 (0.31)	28,657 (11.01)
Jorhat	25,221 (8.66)		–	2,403 (0.82)	–
Golaghat	17,084 (4.86)		–	13,521 (3.83)	–
Nagaon	5,671 (1.02)	45,185 (8.16)	12,016	(2.17)	1,936 (0.35)
Lakhimpur	36,206 (6.40)		–	3,239 (0.58)	–
Darrang	12,149 (3.51)		–	10,368 (3.00)	698 (0.20)
Sonitpur	81,401 (15.49)	333	(0.06)	23,657 (4.50)	2,470 (0.47)
Cachar	1,63,816 (32.11)		–	29,591	(5.80)
Karimganj	18,697 (10.17)		–	27,494 (11.95)	1,370 (0.19)
Karbi Anglong	2,47,640 (23.97)	1,69,661 (16.43)	6,844 (0.66)	26,748 (2.59)	4,50,893 (43.64)
NC Hills	1,80,591 (36.93)		–	7,938 (1.62)	–
All Assam	9,79,769 (12.5)	4,53,733 (5.8)	2,13,784 (2.7)	79,101 (1.00)	17,26,387 (22.0)

Figure in the parentheses indicate percentage to total geographical area.

Source: Assam Remote Sensing Application Centre, Guwahati.

In addition to bringing the targeted geographical area under forest, it is also important to ensure its uniform distribution.

present study, therefore, the changing distributional pattern of forest in Assam over a period of time was analysed with the help of Gini ratio and Sen's poverty measure.

Gini ratio was estimated by the equation

$$G = 1 - \sum_{i=1}^{n} (P_i - P_{i-1})\,(K_i - K_{i=1})$$

Where, G = Gini ratio

P_i = Cumulative proportion of geographical area in the i^{th} district

K_i = Cumulative proportion of forest area in the i^{th} district

i = 1, 2, 3,.....n indicate districts

Sen (1976) made an attempt to measure poverty index (P) as follows:

$$P = \frac{2}{(Q+1)\,n\,Z} \sum_{i=1}^{Q} (Z - Y_i)\,(Q+1-i)$$

where, P = Measure of poverty

n = Population size

Y_i = Income of the i^{th} individual arranged in ascending order of magnitude

Q = Number of people at or below the poverty line

Z = The poverty level of income

This poverty index (P) was used in the present study to formulate an index of absolute deprivation of some regions of the minimum or optimum forest area. In the operational model the forest area per sq km of geographical area of i^{th} district was taken for Y_i, the per capita income of the i^{th} individual in the theoretical model. An optimal forest area of 33 per cent of geographical area in each district was taken for the poverty line income 'Z' in the theoretical model. 'Q' was the number of districts having forest area below the optimal level and 'n' the number of districts i.e., population size.

In both these ratio measures, the ratio nearer to 1 indicates high degree of unequal distribution of forest area and vice versa. The estimated Gini ratio was 0.02 in 1960, showing almost uniform distribution of forest area among the districts of the state. Against this, inequality in forest distribution was observed in subsequent periods as the Gini ratio gradually increased to 0.22 in 1994. Gini ratio calculated from remote sensing data revealed a relatively more uneven distribution with a Gini ratio of 0.32 (Table 3).

Table 3: Distribution of Forests Among Geographical Areas of Different Districts

Ratio measure	1960	1970	1980	1990	1994	Remote sensing data 1990
Gini ratio	0.02	0.011	0.17	0.16	0.22	0.32
Sen's 'P' measure	0.27	0.26	0.37	0.31	0.32	0.61

The phenomenal degradation of forest brought in many a change in the forest distribution which was captured through Sen's 'P' measure. The estimated 'P' value was 0.27 in 1960 which increased to 0.37 in 1980. However, Sen's 'P' value marginally declined to 0.32 in 1994. The problem when perceived through remote sensing data appeared more serious. The 'P' value was as high as 0.61 which indicated the gravity of the problem. This implied an increasing deficit of forest area from the optimum level in the regions deprived of the minimum forest area and the number of districts sharing this gap was also increasing during the period 1960-94. The forests of districts furthest below the optimum forests line were more severely affected than the others. The problem was more acute in the districts of Goalpara, Barpeta, Nalbari, Golaghat, Jorhat, Lakhimpur, and Darrang. The increasing 'P' value also indicated the increasing inequalities in the distribution of forest area.

Deforestation

Deforestation is the permanent conversion of forest land to other uses like pasture, shifting cultivation, mechanised agriculture or infrastructure development. In Assam, the consequences of deforestation are perceived in the form of denuded hills, frequent temperature changes and recurrence of floods.

Deforestation is the permanent conversion of forest land to other uses like pasture, shifting cultivation, mechanised agriculture or infrastructure development. In Assam, the consequences of deforestation are perceived in the form of denuded hills, frequent temperature changes and recurrence of floods.

Encroachment is one of the major causes of deforestation in the state. The encroachment area increased from 1,311.97l sq km in 1982 to 2,517 sq km in 1995, registering 91.90 per cent increase. According to the latest report available with the Forest Department, the government of Assam rehabilitated 1,46,106 persons of various ethnic groups in the reserved forests till 1995. The problem of encroachment in the reserved forests had become more acute due to rapid increase in population and influx of people from across the border. Moreover, encroachment problem was also severe along the Assam-Nagaland border. According to information received from the Forest Department, 35,219 ha in the karbi Anglong East division, 79,940 ha in the Golaghat division and 24,350 ha in the Sibsagor division were under the grip of encroachers till 1991-92.

Apart from encroachment, forest area was also lost for various other activities from time to time. According to the Forest Survey of India report, Assam lost forest area of 2,325 sq km during 1983-95 due to various non-forest activities. The period 1989-91 alone recorded loss of 1,307 sq km of forest.

Similarly, the state Forest Department records reveal that Assam's forest cover, which was 20,550 sq km in 1961, decreased to 18,723.4 sq km in 1994 with a percentage decline of 8.89 per cent during the period. The official records further reveal that during 1971-76, 1,310 sq km of forest area had been lost with an average annual deforestation rate of 262 sq km. Although forest area in Assam increased during the periods 1961-71 and 1976-81 due to changes in reporting area and afforestation, there was continuous decline in forest area since 1980 with average annual deforestation rate of 102.6 sq km during 1981-94. The government reports revealed that altogether 72.6 thousand ha of forest area had been lost due to various reasons including 19.7 thousand ha for river valley projects, 6.6 thousand ha for construction of roads, 2.9 thousand ha for other purposes during 1951-76.

The slopy lands in the two hill districts of Assam have traditionally been allocated to forestry. Some of these forest lands used to be allocated to crops for 2-3 years after clear felling and burning a patch of forest. This traditional system called *jhum* (shifting) cultivation implied that after 2-3 years of cropping, the area under cultivation would be abandoned for a long period. However, with the increase in population the period of fallowing to allow natural regeneration of forest patch by farmers gets shorter to just 2-3 years. Thus, the newly regenerated patch returns to the farmer much earlier and it results in permanent degradation of forest land.

The available remote sensing data reveal that the area under current *jhum* in the hill districts of Assam increased from 82,708 ha in 1986-87 to 92,254 ha in 1993-94. Similarly, abandoned *jhum* area also increased from 92,049 ha to 1,09,690 ha during the same period (Table 4). Against this area under evergreen/semi-evergreen forest, deciduous forest, pure bamboo forest and mixed bamboo forest decreased by 20.9 per cent, 38.57 per cent, 21.07 per cent and 23.46 per cent, respectively during the same period. It is, therefore, obvious that the areas under evergreen/semi-evergreen, deciduous, pure bamboo and mixed bamboo forests contributed positively towards increase in current as well as abandoned *jhum* areas in the hill districts of Assam.

The traditional system called *jhum* (shifting) cultivation implies that after 2-3 years of cropping, the area under cultivation would be abandoned for a long period. However, with the increase in population the period of fallowing to allow natural regeneration of forest gets shorter.

Table 4: Extent of Shifting Cultivation in the Hill Districts of Assam

Type of forest area	1986-87	1993-94	Percentage increase(+)/ decrease(–)
Current jhum area	82,708 (5.4)	92,254 (6.02)	(+) 11.50
Abandoned jhum area	92,049 (6.00)	1,09,690 (7.15)	(+) 19.20
Evergreen/ semi-evergreen forest	4,19,296 (27.36)	3,31,663 (21.64)	(–) 20.90
Deciduous forest (Sal & Teak)	25,432 (1.65)	15,622 (1.01)	(–) 38.57
Pure bamboo strands	93,896 (6.13)	74,104 (4.83)	(–) 21.07
Mixed Bamboo	5,58,976 (36.48)	4,27,814 (27.92)	(–) 23.46

Figures in the parentheses indicate percentage to the total geographical area of the hill districts

Source: Assam Remote Sensing Application Centre, Guwahati.

Net sown area in Assam has been increasing steadily over the years. In 1951-52, net sown area was 18.92 lakh ha and increased to 27.77 lakh ha in 1993. In order to ascertain the principal components behind increase in the net sown area, trend estimates of various components of land classification were made for the period 1951-81. It was observed from the estimates that net sown area increased due to extension of cultivation

primarily to the fallow lands and partly to forest lands as these two components of land classification recorded significant declining trend during 1951-81. The other two components namely, 'area not available for cultivation' and 'other uncultivated land excluding fallow land' registered increasing trend over the years. Resettlement of flood and erosion affected people of Majuli in the reserve forests along the Assam-Nagaland border, Doigrong reserve forest in Golaghat district and in Deototal grazing reserve in Lakhimpur district are some examples of using forest land for settlement and agricultural purposes. Even government records revealed that 17.6 thousand ha of forest land was lost due to agricultural purposes during 1951-76 in Assam.

Table 5: Compound Growth Rates of Different Land Use Classes in the Plains Division of Assam During 1951-81

Land use class	Compound Growth Rates
Forest	–1.285*
Area not available for cultivation	0.826
Other uncultivated land excluding fallow land	0.918
Fallow land	–3.176**
Net sown area	1.381**

**Significant at 1 per cent probability level

*Significant at 5 per cent probability level

Afforestation

Afforestation measures in Assam gained momentum through various Five Year Plans. Plantation raised during Five Year Plans under productive forestry is presented in Table 6. The total area afforested under different plantation schemes was 2,283 ha in the first Five year Plan (1951-56), which increased to 45,710 ha in the Sixth Five Year Plan (1980-85). But the afforested area during the Seventh Five Year Plan (1985-90) declined to 37,378 ha. It is interesting to observe that according to the Forest Survey of India report, total loss of forest area during 1983-95 was 2,23,500 ha in Assam, while the total afforested area under productive forestry schemes during 1985-95 was only 96,676 ha.

In general areas, total plantation under different productive schemes was 6,309 ha in 1991, which increased to 6,646 ha in 1993. Total plantation declined to 5,421 ha in 1995 which was due to reduced plantation under the 'Matchwood', 'Teakwood' and 'Quick growing species' schemes during 1993-1995. Similarly, in the hilly areas, afforested area declined from 6,243 ha in 1991 to under 3,773 ha in 1995. It was due to reduced plantation under 'Regeneration', 'Matchwood', 'Teakwood', 'Plywood', 'RDF', 'Bamboo' and 'Minor forest product' schemes during the period 1992-95.

The government of Assam introduced Social Forestry scheme in 1980 with an aim to plant trees in all barren government and community lands and lands where encroachment had already started. The progress under this scheme was satisfactory till 1987 resulting in increase in the afforested area. But total area afforested under this scheme fluctuated widely after 1987.

Conclusion

At the present rate of declining trend of forest cover and the increasing demand for non-forest land, the objective of achieving optimum forest cover as well as

Table 6: Afforested Area During Five Year Plans Under Different Productive Forestry Schemes in Assam

(in ha.)

Plan Period	Name of schemes								
	Regeneration	Match wood	Teak wood	Ply wood	R.D.F.	Khoir	Q.G.S.	M.F.P.	Total
1st Plan	2,164	–	–	–	–	55	–	64	2,283
2nd Plan	4,624	1,444	–	–	479	1,179	–	55	7,799
3rd Plan	2,713	1,352	3,409	1,471	603	939	3,378	24	13,867
Adhoc Plan 1966-69	1,076	767	788	582	225	–	2,205	4	5,648
4th Plan	4,073	1,891	3,621	657	630	–	4,404	34	15,310
5th Plan	9,963	5,075	6,435	6,005	4,785	–	5,784	44	38,091
6th Plan	9,811	4,215	6,210	7,855	6,214	–	11,385	20	45,710
7th Plan	10,243	4,116	5,666	7,455	1,858	–	8,010	30	37,378

R.D.F.: Rehabilitation of Degraded Forest, Q.G.S.: Quick Growing Species, M.F.P.: Minor Forest products

Source: Principal Chief Conservator of Forest, Guwahati.

Search for alternative means towards satisfying the energy, food, fodder, timber and paper needs of the people will have a great bearing in protecting the existing forest.

ecological balance, remains elusive. To be pragmatic, the forest policy must emphasize the need for arresting the present deforestation rate before aiming at increasing the forest cover. This necessitates a comprehensive analysis to identify the factors, both subjective and objective, responsible for forest degradation and their quantification. Search for alternative means towards satisfying the energy, food, fodder, timber and paper needs of the people will have a great bearing in protecting the existing forest. Due emphasis must be given to research and development in these aspects as any technological breakthrough will immensely lessen the burden on the forest.

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Feature

Technological Gap in Autumn Rice Cultivation

R.C. Sarmah & Jayanta Sharma

Autumn rice known locally as ahu rice is an important crop of Assam cultivated during March-April to July-August. Production recommendations are available for the farmers to learn and adopt for increasing the yield considerably. This study assesses the knowledge of farmers on the crop and the extent of adoption of production recommendations which are of great interest to extension and research workers. It concludes that there is ample scope for increasing the productivity of ahu rice to 60 quintals per hectare by improving the level of working knowledge of farmers on the crop.

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Rice is the leading cereal crop grown in three seasons covering 25.80 lakh hectares which constitute about 80 per cent of the annual cropped area of Assam. Winter rice known locally as *sali* is the main crop among the three rice crops and occupies about 70 per cent of the total annual rice area in Assam. Autumn rice or *ahu*, the next important rice crop accounts for about 25 per cent of the annual rice area with summer rice or *boro* covering the remaining 5 per cent.

Traditionally *ahu* rice is considered second to *sali* rice as per values attached by the farmers in Assam. Farmers tend to pay attention to the production of *sali* rice and treat *ahu* rice as the insurance in case the former fails to give good results. Ahu rice also faces competition from jute, another important crop of Assam, cultivated in the same season. Research and extension emphasis for evolving farmer-friendly-technology of *ahu* rice production has not been as prominent as for *sali*. Of late, farmers of Assam have started taking *ahu* rice cultivation seriously and productivity has started increasing.

In order to sustain farmer interest in the crop, it becomes essential to know their knowledge of recommended practices, the technological gap pervading in the cultivation of the crop and also the cropping patterns where *ahu* rice is an important component crop. This information will give a direction to identify thrust areas for development.

Materials and Method

Multistage random sampling was done for selecting respondents from Darrang district, selected purposively for the study. Initially two Agricultural Extension Officer (AEO) circles were selected randomly from each of the three agricultural sub-divisions of the district. Twelve Village Level Extension Worker (VLEW) circles, two from each of the sample AEO circles, were selected randomly. One village from each sample VLEW circle was

chosen randomly for drawing the sample farmers. The farmers considered in this study were those who cultivated recommended *ahu* rice varieties in atleast one *bigha* of land (0.388 hectare). Accordingly, a list of farmers fulfilling the criterion was prepared for each of the 12 villages. From these lists 204 farmers were selected by using proportionate random sampling.

Knowledge gap was conceptualized as the difference between the required knowledge on the recommended practices of *ahu* rice cultivation and the knowledge actually possessed by individual respondents. For measuring knowledge gap a knowledge test questionnaire was prepared and administered covering important practices of the crop. Technological gap was taken as the difference between the selected recommended practices of *ahu* rice cultivation and actual adoption of these practices by the farmer respondents. It was calculated by using the Technological Gap Index (Wagmare & Wagmare, 1987).

Results and Discussion

Knowledge gap

Knowledge gap of respondents on individual practices of *ahu* rice production is presented in Table 1. Table 1 shows that knowledge gap on seed treatment was alarmingly high, i.e., 95.22 per cent, followed by disease management (86.64%) and seed rate for line sowing which was 74.51 per cent. Knowledge gap for practices like spacing and insect pest management was found in the range of 50 to 60 per cent. Between 30 to 40 per cent gap was evident for some practices, viz., seed rate for transplanted ahu, application of nitrogenous, phosphatic and potassic fertilizers and weed management. The knowledge gap on recommended variety, sowing time, seed rate for broadcasted *ahu* and irrigation was negligible.

Table 2 further reveals that majority of the respondents i.e., 74.02 per cent had medium knowledge gap and 20.59 per cent had high knowledge gap, the average being 54.68 per cent. Thus, majority of the farmers did not have adequate knowledge on production recommendations of *ahu* rice and more than half of the production recommendations were not known to them.

Majority of the farmers did not have adequate knowledge on production recommendations and more than half the production recommendations were not known.

Table 1: Knowledge Gap on Practices of *ahu* Rice Cultivation

N = 204

Practice	Knowledge gap (%)
Variety of ahu rice	
Direct seeded	6.86
Transplanted	9.80
Sowing time	
Direct seeded	2.45
Transplanted	13.24
Seed rate	
Broadcasted	11.98
Line sowing	74.51
Transplanted	31.46
Spacing	
Row to row	57.84
Plant to plant	55.88
Seed treatment	95.22
Application of nitrogenous fertilizer	33.92
Application of phosphatic fertilizer	36.11
Application of potassic fertilizer	39.71
Weed control	41.42
Insect pest control	52.87
Disease control	86.64
Irrigation	23.69

Table 2: Classification of Farmers According to Knowledge Gap

N = 204

Class	Rangel (%)	Frequency	Mean	S.D.
Low	0 - 33.33	11 (5.39)		
Medium	33.34 - 66.66	151 (74.02)	54.58	12.98
High	66.67 - 100.00	42 (20.59)		

Technological Gap

The cropping patterns designed and pursued by the sample farmers with corresponding technological gap in *ahu* rice cultivation are presented in Table 3. A perusal of the table reveals that *ahu* rice followed by *sali* rice had been the governing cropping pattern for all the farmers. However, great variations occurred in the

selection of third, fourth and fifth crop which is why as many as 18 cropping patterns were noticed. Among the cropping patterns adopted by atleast 10 per cent of the farmers were *ahu* rice-*sali* rice, *ahu* rice-*sali* rice-oil-seeds, *ahu* rice-*sali* rice-pulses and *ahu* rice-vegetables.

Table 3: Cropping Pattern-wise Technological gap in HYV *ahu* rice cultivation

N = 204

Cropping pattern	Frequency (%)	Technological gap (%)
ahu rice - *sali* rice	59 (28.92)	69.10
ahu rice - *sali* rice - Oilseed	29 (14.22)	63.32
ahu rice - *sali* rice - Pulses	23 (11.27)	57.74
ahu rice - *sali* rice - Vegetables	21 (10.29)	55.98
ahu rice - *sali* rice - boro rice	13 (6.37)	60.02
ahu rice - *sali* rice - Wheat	13 (6.37)	64.22
ahu rice - *boro* rice - *sali* rice	12 (4.38)	70.49
ahu rice & Jute - *sali* rice	6 (2.94)	68.33
ahu rice & Jute - *sali* rice - Vegetables	7 (3.43)	50.16
ahu rice & Jute - *sali* rice - Pulses	2 (0.98)	52.22
ahu rice - *sali* rice - Pulses & Oilseeds	2 (0.98)	64.72
ahu rice - *sali* rice - Wheat & Oilseeds	2 (0.98)	57.77
ahu rice - *sali* rice - Wheat & Vegetables	2 (0.98)	51.73
ahu rice - *sali* rice - Oilseeds & Vegetables	2 (0.98)	49.45
ahu rice & *boro* rice - *sali* rice - Oilseeds & Vegetables	1 (0.49)	50.00
ahu rice & Jute -*sali* rice - *sali* rice - Oilseeds & Vegetables	6 (2.94)	45.41
ahu rice & Jute - *sali* rice - Wheat & Vegetable	3 (1.47)	45.19
ahu rice & Jute - *sali* rice - Wheat & Oilseeds	1 (0.49)	34.44

As regards technological gap of *ahu* rice in different cropping patterns, it was more than 50 per cent. However, it was slightly less than 50 per cent in majority of the cropping patterns where jute was a component crop. This could be attributed to the fact that jute growers by and large had commercial orientation and thereby, their tendency to use recommended technology could have been extended to *ahu* rice also. Technological gap tended to go on the higher side if rice happened to be the sole crop in the pattern. Usually *ahu* rice stands second to *sali* rice in the scale of preference by the farmers in Assam. As such, farmers use all the resources they possess in the cultivation of *sali* rice, unknowingly giving step-motherly treatment to *ahu* rice. Measurement of technological gap in *sali* rice could only confirm this trend.

Table 4 reveals the technological gap in selected recommended practices of *ahu* rice among the farmer respondents. Cent per cent technological gap was found in seed treatment, 96 per cent in seed rate for line sowing, 82 per cent in the application of FYM, 70 per cent in the application of nitrogenous fertilizer, 76 per cent in phosphatic fertilizer, 65 per cent in potassic fertilizer, 76 per cent in weed control for transplanted *ahu* and 89.76 in irrigation. Area gap under HYV was calculated at about 45 per cent. Technological gap for seed rate in transplanted ahu, weed control in direct seeded *ahu* and tillage operation was at tolerable level. Technological gap in pests and disease control was not measured as the farmers said that pest and disease did not occur so far in *ahu* crop.

The data collected shows that more than half of the area under *ahu* rice was put to local varieties where adequate doses of fertilizers and weed management practices were not followed seriously. The reason for 100 per cent gap in seed treatment was due to purchase of HYV seeds by farmers from external sources which they believed were treated at source and secondly, the fact that farmers never treated seeds of local varieties. As regards seed rate gap, farmers adhered to broadcasted method for local varieties and transplanted the HYV. Such treatment was due to age old experience of the farmers with broadcasted *ahu* and their belief that HYV should invariably be transplanted. But they used more than the recommended seed rate only to ensure proper plant population. Although fertilizers of three types were applied in HYV mostly, the farmers did not yet realize the implication of balanced doses. A wrong perception prevailed that there was no need of application of FYM if inorganic manuring is done, which is why the gap for FYM application was higher than the three inorganic fertilizers. The farmers did not prefer direct seeding in lines as the practice called for more labour and more time compared to broadcasting and more seeds compared to transplanting. The farmers had the habit of weeding the direct seeded crop mainly because of fear of failure but not in transplanted crop because they observed reduced growth of weeds and more strength of the crop to withstand weeds. The second lowest gap was noticed in case of tillage operation which in fact was due to over adoption, i.e., the farmers exceeded the recommended number of tillage because

they were the better iudge for this operation.

Table 4: Technological Gap Among Respondents in Practices of *ahu* Rice Cultivation

N = 204

Practice	Frequency (%)	Mean Qty/Number used	Techno-logical gap (%)
Area under HYV of *ahu* rice	204 (100.00)	0.412 ha	44.83
Tillage	204 (100.00)	4.79 (nos.)	19.83
Seed rate			
Broadcasted	103 (63.73)	118.05 (Kg/ha)	12.41
Line sowing	8 (3.92)	88.75 (Kg/ha)	96.37
Transplanted	148 (72.54)	59.18 (Kg/ha)	32.85
Seed treatment	0 (0.000)	0.00	100.00
Application of nitrogenous fertilizer	126 (60.87)	42.9 (Kg/ha)	70.22
Application of phosphatic fertilizer	124 (60.78)	49.05 (Kg/ha)	76.61
Application of potassic fertilizer	108 (52.94)	21.9 (Kg/ha)	64.76
Application of FYM	85 (41.67)	4702.95 (Kg/ha)	82.60
Weed control			
Direct seeded ahu rice			23.07
Hand weeding	4 (1.96)	1.00 (nos.)	
Mechanical weeding	132 (64.71)	1.84 (nos.)	
Hand weeding + Mechanical weeding	34 (16.67)	2.01 (nos.)	
Chemical weeding	0 (0.00)	0.00 (nos.)	
Transplanted ahu rice			76.38
Hand weeding	23 (11.27)	1.00 (nos.)	
Mechanical weeding	55 (25.96)	1.25 (nos.)	
Hand weeding + Mechanical weeding	5 (2.45)	2.00 (nos.)	
Chemical weeding	0 (0.00)	0.00 (nos.)	
Irrigation	16 (7.84)	1 (no.)	89.76

The farmers were further classified in terms of technological gap in *ahu* rice as shown in Table 5. The table indicates that an average of 72.61 per cent technological gap was noticed among 34.31 per cent of respondents, 54.97 per cent gap among 64.71 per cent of respondents and a very negligible 0.98 per cent of respondents had an average gap of 32.22 per cent. The overall mean technological gap, i.e., 60.80 per cent was on the higher side, depicting that the sample farmers by and large used less than 40 per cent of the production recommendations of *ahu* rice.

Table 5: Classification of Farmers as Per Technological Gap in *ahu* Rice Cultivation

N = 204

Range (Technological gap)	Frequency (%)	Techno-logical gap (%)	Overall mean (%)	S.D.
0 - 33.33	2 (0.98)	32.22		
33.34 - 66.66	132 (64.71)	54.97	60.80	11.24
66.67 and above	70 (34.31)	72.61		

N.B.: Figures in brackets indicate percentage

It becomes essential here to present a few sets of classified data in order to anticipate the reason for such a high technological gap. The data in table 6, are on operational land holding, size of plots, distance of plots from home, area and yield of *ahu* rice. The table shows that around 60 per cent of the respondents were small farmers. The average land holding was 1.79 hectares. It appears that marginal farmers did not cultivate *ahu* rice. The average size of plots for 80.88 per cent of the farmers was 0.36 to 0.86 hectare. Comparing the average plot size to that of average operational land holding, it seemed that on an average, a farmer had atleast 3 cultivable plots which he had to manage simultaneously. The mean distance of farm from home was 0.27 km. Even if a farmer goes to each of the plots once a day, theoretically he had to walk roughly 1 km. This would lead to drudgery during cultivation and a farmer would very likely cut down the quantum of technology use. As regards area under *ahu* rice, 33.87 per cent of the total potential area was under *ahu* rice, the share of HYV was 18.69 per cent and that of traditional variety 15.18 per cent. Mean *ahu* area per farmer was 0.75 hectare which means more than one hectare of land was either kept fallow or engaged in other crops.

Table 6 further shows hat the average yield of HYV *ahu* rice was 37.29 quintals per hectare whereas traditional varieties yielded 23.25 quintals per hectare. The yield of HYV of *ahu* rice was 14 quintals higher than the traditional variety per hectare and for rainfed condition the yield was really good.

Table 6: Frequency and Percentage Distribution of Farmers According to Situational Variables

N = 204

Characteristics	Category	Range	Frequency (%)	Mean	S.D.
Size of operational land holding	Marginal	Below 1 ha	6 (2.94)		
	Small	1.1 - 2 ha	121 (59.31)	1.79 ha	0.43
	Big	Above 2 ha	77 (37.75)		
Average size of plot	Small	Upto 0.36 ha	24 (11.76)		
	Medium	0.36 - 0.86 ha	165 (80.88)	0.61 ha	0.25
	Large	Above 0.86 ha	15 (7.35)		
Distance of farm from house	Short	Upto 0.18 km	77 (37.75)		
	Medium	0.18 - 0.36 km	101 (49.51)	0.27 (km)	0.09
	Long	Above 0.36 km	26 (12.76)		
Area under *ahu* rice	H.Y.V.	–	18.69%	–	–
	Traditional variety	–	15.18%	–	–
	Total	–	33.87%	0.75 (ha)	0.32
Yield of *ahu* rice	Traditional variety	–	–	23.25 (q/ha)	–
	H.Y.V.	–	–	37.29 (q/ha)	1.3

Implications

- The yield of HYV *sali* rice may be raised to 60 quintals per hectare in the study area by reducing the technological gap drastically, because, with 60 per cent technological gap persisting, the farmers could harvest around 37 quintals of HYV *ahu* rice per hectare. The biggest barrier to reach this stage is the colossal knowledge gap of the farmers on the production recommendations of HYV *ahu* rice and their untapped capability. Therefore, minimizing the knowledge gap and strengthening the farmer's capability should be the proposed extension strategy.

Minimizing the knowledge gap and strengthening the farmer's capability should be the proposed extension strategy.

- There are 23,000 field management committees constituted by farmers of Assam locally known as *Pathar Parichalana Samity* which have already embarked in collective farming. The executive members of the *Samity* should be properly guided to demarcate compact area for such farming. Besides, the executive members may also influence others in choosing lease-in-land in such a way that a farmer has both his own and leased-in land in one compact area. Such measures will certainly improve management of the land and crop. As a result, the farmers will put more area under HYV *ahu* and come forward to adopt better practices.
- Reduced use of FYM may be for two reasons—adequate quantity not being available and difficulty in carrying to field. Both these problems may be solved by encouraging the farmers to prepare compost in the field itself by digging a compost pit at one corner of the plot.
- In order to preserve moisture for *ahu* rice cultivation the farmers should be instructed to do summer ploughing and mulching the field with left over straw. This practice will also suppress weed growth.

Reference

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Feature

Supply Elasticities in Tea Plantations – The Case of Assam

C. Hazarika

Tea is a commodity of great commercial importance from the standpoint of the Indian economy. Assam is a leading state in tea production in India. This paper attempts to study the supply behavior of tea planters in Assam using Koyck distributed lag model with asymmetric price variable for the period from 1970-1995. It is concluded that planters respond to price not in terms of acreage but in terms of yield and there exists a certain degree of asset fixity in case of tea in Assam.

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Tea is one of the most important beverages in the world and is a commodity of great commercial significance. India remains the largest producer and consumer and a consistent exporter of tea.

Indian Scenario

Production of tea in India has increased from 283 million kg in 1950-51 to 753.90 million kg in 1994-95 registering an annual compound growth rate of 2.50 per cent annum. Assam is the leading state in the country in tea production. Assam has an area of 2.37 lakh ha under tea, which is 55.72 per cent of all-India acreage. During 1993, the production of tea in Assam was 0.403 million tons accounting for 53.16 per cent of the total production of the country. It accounted for 15.62 per cent of the total world tea production. Assam has been experiencing a production growth rate of 6.23 per cent per annum during the period 1951-1991. The area expansion was 2.56 per cent whereas productivity growth was 3.58 per cent per annum during the same period.

Current concern in Indian tea industry is to raise production in order to meet domestic requirements. Internal consumption of tea has been rising so rapidly that it is expected to offset the supply. Some estimates have shown that domestic requirement would be around 710 million kg by 2001. Further, to maintain India's global share of exports, the requirement is estimated to be 270 million kg i.e. the total requirement of tea by the turn of the century will be around 1000 million kg. This gives rise to apprehensions that, the entire production would be absorbed by domestic consumption leaving only negligible quantity for exports. Although total export earnings from tea has increased from Rs. 122.25 crores in 1960-61 to Rs. 1058.70 crores in 1994-95, the percentage share of earnings from tea exports to the total export earnings has declined from 19.04 per cent to 1.98 per cent. The export earnings from tea is quite substantial, and export markets once lost may be dif-

ficult to regain even if a programme of massive production is launched later. Therefore, there is a need to study the supply of tea and the factors influencing it. Furthermore, since the tea industry is predominantly in the private sector, prices have a very important role to play in stimulating production.

This necessitates an analysis of supply elasticities of the tea estates to help formulate policy measures to remove the production constraint in Indian tea industry, particularly in Assam. To keep up the export trend, it is necessary to take up urgent measures to enhance the production of tea. In this context, information on elasticities of supply response would help in identifying the economic problems and difficulties in designing appropriate price and production policies. The estimate of supply response to price changes and other economic incentives will provide guidelines to tackle the problem of static production, price and international trade. In perennial crops like tea, the productivity response is more important than the acreage response because of the bottlenecks in extending the area. Reliable empirical estimates about the degree of responsiveness of supply to various factors will help to judiciously evaluate the whole fabric of past and present policies. This will also help to address the problem of income stabilization and assist in formulating price policies. Price is an effective instrument in the hands of policy formulators for moulding production towards the desired goal. Hence, an attempt was made to study the supply response of tea planters to various factors in Assam.

Reliable empirical estimates about the degree of responsiveness of supply to various factors will help to judiciously evaluate the whole fabric of past and present policies.

Literature Review

Literature on crop supply response is concentrated mainly on the supply of annuals, and perennial crops received little attention till the sixties. A number of studies have been done in recent years to verify the response of farmers to price. The studies by and large found positive and significant supply elasticity for individual crops and dispelled the notion of perversity of supply response to price. Perennial crops posed difficulty in model specification because there is a long gestation lag between planting and harvesting, and the yield of a tree changes with age so that acreage has to be complemented with age distribution in order to act as a useful proxy for planned production.

Chan (1962) made a systematic attempt to analyze the supply response of rubber estates of Malaysia for the period 1948-59. She used regression analysis to explain the production response by variously defined price. The real breakthrough in perennial crop supply methodology came in a study by French and Bressler (1962) who developed supply response for lemons in terms of new plantings and removal relationships. Nerlove's lagged adjustment model was used by Bateman (1965) to study the relationship between planting and prices and between planting and output in Ghanaian cocoa for the period 1946-62. Stern (1965), Arak (1969) and Maitha (1970) also attempted different models to study the supply response of perennial crops.

Rajagopalan and Meenakshisundaram (1969) formulated a model to explain the production behaviour of Indian tea industry. They examined the effect of lagged area, yield, price and time trend on the production of tea. Tweeten and Quance (1969) related the stock of productive assets to relative price, lagged productive assets and time. Wolffram (1971) suggested an alternative method, which splits the price, based on the computation of first difference of the observations. The increases were summed up in formulating the increasing price variable and it assumes constant values during falling price. The decreasing price variable was also similarly constructed. Olayami and Oni (1972) also studied the difference in planting response to rising or decreasing price for cocoa. They concluded that the asymmetry in response might be due to low salvage value of cocoa crop. Sarkar (1972) argued that supply response of tea is highly price inelastic in the short run. Using the data for 1948-70, Saylor (1974) examined the supply response of coffee in Sao Paulo, Brazil. He used the Nerlovian distributed lag function with the inclusion of zero-one dummy variable and increasing/decreasing price variable as suggested by Wolffram (1971). Uma Devi (1977) studied the output supply and acreage response with respect to natural rubber in India for the period 1948-49 to 1974-75. The estimates were made using Fisherian and Nerlovian type of price expectation models. She considered the Nerlovian specification to be much more reliable for policy use. Chawdhary and Ram (1978) studied the supply response of Indian tea during 1953-73. Surprisingly they got negative price co-efficient for area. While studying the supply response of Australian orange growing industry, Alston (1980) observed that expected profitability of growing oranges significantly influenced planting. An important feature of this study was that the price was not hypothesized to influence yield on the ground that growers tended to standardise cultural practices. Mishra (1985) examined the supply response of tea by producers of different size classes to change in prices in India as a whole and in three regions viz.,

Terai, Dooars and Darjeeling in West Bengal. Ipe and Prabhakaran (1988) analysed the supply response of natural rubber in India for the years 1953-54 to 1983-84 using Nerlovian expectation model. Barah and Chiranjeevi (1991) also estimated the supply response for Indian tea using Nerlovian expectation model. They suggested that stability of price is a crucial factor for maintaining stable growth of tea production.

In the long run, supply could be controlled by adjusting area as well as application of inputs; in short term, supply could be controlled only through application of inputs to effect changes in productivity.

Methodology

For the supply response function, area and productivity were taken as the dependent variables and related separately with lagged area, rainfall, time, price of the made tea and other developmental programs as independent variables. An alternate formulation of price was also tried. The price variable was split into an increasing and a decreasing variable. This was done to examine the fixed asset theory. Fixed asset theory suggests that farmers may be less responsive to price decreases than to price increases.

Since the data for new plantings, replanting and removal of tea bushes were not available, the actual area was considered as bearing area. The price of made tea expressed in rupees per kg was the weighted average of prices that prevailed at three auction centers viz., Guwahati, Calcutta and Siliguri. As the prices of successive years were found to have high multi-collinearity, the choice of a specific form of lag distribution was difficult. The weights used were the actual quantity of made tea sold annually through these auctions.

Generally, area rather than output, is taken as dependent variable in supply response model, to explain the behavior of planters with respect to price changes since area expansion and removal were under the control of planters. The decision of planters to expand or remove the existing bush depended upon the price of tea and other constraints such as land availability, finance etc. The yield variable is also controllable to a certain extent by the planters in terms of application of inputs and other cultural practices. Thus, in the long run, supply could be controlled by adjusting area as well as application of inputs and the planter's decision to invest on the expansion or reduction of area would depend upon the future return of the crop. Hence, the price variable assumes importance. Since tea crop is identified with a gestation period of five years and with economic yield for a continuous period of 45 to 50 years, planters could have various options in the long run. But in the short run, supply could be controlled only through application of inputs to effect changes in productivity.

Supply could be improved either through extension of area, replanting and replacement, and increase in productivity through efficient utilization of resources. So the planter's expectation of price depends not only on recent years but also to many years. Besides it is not possible for planters to adjust instantaneously for any change in price due to many constraints. So, in the present study the price variable was given different lags. To estimate the acreage response, the price variable was lagged by five years since the gestation period was about five years. Any change in the bearing acreage is reflected within these five years' price changes through new planting, replanting and replacement. Likewise, for the productivity response equation, the price variable was lagged by two years assuming that any major change in productivity could be realized within this period. Rainfall also influences tea productivity since tea crop is mainly dependent on the monsoon. Moreover tea industry has experienced technological and biological innovations in the recent past through introduction of high yielding clonal varieties which come to bearing in shorter period with higher yield potential and improved method of fertilizer application and control of pests and diseases. Hence a trend variable was introduced to take account of this factor.

The Tea Board of India has introduced various development programs for the development of tea industry. Since these schemes were introduced in different years and the disbursement of money was not in a phased manner, a dummy variable was used to measure their impact on acreage and productivity response. Ordinary Least Square (OLS) method of estimation was used to estimate the co- efficient of all the equations.

Distributed Lag Model

In several cases, reaction of the dependent variable to change in other independent variables is delayed due to several reasons which are technical (involvement of time in production), institutional (licensing, supply of credit) and psychological (behavior of people about the expectation of future event based on past). Because of these reasons, lagged variables are used in econo-metric models as

explanatory variable. Consider the following model,

$$B_t = f(P_{t-j}) + U_t, \qquad t = 1, 2.....$$
$$j = 0, 1, 2.....$$

Where, B_t = Bearing area of tea in current year

P_{t-j} = Price of tea lagged by different years

U_t = Additive stochastic disturbance term

In this model, all the present and past values of explanatory variable can influence the dependent variable. Thus the effect of a change in the explanatory variable could be spread over time with the dependent variable gradually adjusting over time to a change in the explanatory variable. In the linear function with time invariant parameters, the general relationship becomes the linear distributed lag model.

$$B_t = a_0 + a_1 P_t + a_2 P_{t-1} + ... u_t$$

$$B_t = a_0 + \sum_{j=0}^{\alpha} a_j P_{t-j} + u_t \qquad (1)$$

where, a_0 and a_j are the parameters to be estimated and a_j is the j-th reaction co-efficient and it is usually assumed that

$$\text{Lim } a_j = 0$$

$$\sum_{j=0}^{\alpha} a_j = a < \alpha \qquad (2)$$

The vanishing of a_j in the limit means that following a change in the explanatory variable P, the dependent variable B eventually reaches, perhaps in asymptotic fashion, a new equilibrium.

If all a_j after a_m (m = number of lagged term) vanish, the model reduces to a finite distributed lag. In this case, the upper limit of the summation sign in equation (2) is m. The finiteness of the sum in (2) means that any finite change in P that persists indefinitely results in a finite change in B.

The time shape of the adjustment in B in response to the change in P is the 'signature' of the particular distributed lag under consideration. The weight W_j is defined as

$$W_j = \frac{a_j}{a} \qquad (3)$$

Then the distributed lag model could be written in normalized form as:

$$B_t = a_0 + a \sum_{j=0}^{\alpha} W_j P_{t-j} + U_t \qquad (4)$$

As per definition, the weights sum to unity and if all the a_j are positive, then so are all the weights so that:

$$W_j \geq 0 \sum_{j=0}^{\alpha} W_j = 1 \qquad (5)$$

From Eq. (3), the weight W_j might be interpreted as the fraction of the long-term effect accomplished in period $t-j$.

However, an econometric problem of estimation arises because of the distributed lag model Eq. (4) since it contains an infinite number of co-efficient. The alternative for this might be, first assume a finite distributed lag model in which after a certain period, the co-efficients are all zero and estimate the initial co-efficient of the model. Even then, further problem arises as to the choice of the period for which the co-efficients are zero and there is no theoretical justification for any particular cut- off. Further as in the case of infinite number of lags, there will generally be a multicollinearity problem.

The alternative approach is to assume a particular structure for the coefficients in Eq. (4) i.e., a maintained hypothesis to overcome the problems encountered with direct estimation of the co-efficient. One of the simplest and most widely used structure is the Koyck distributed lag (or geometric lag) for which the co-efficient declines geometrically and is given by:

$$a_j = \lambda a_{j-1} = \lambda^2 a_{j-2} = \lambda^j a_1$$

all j, $0 < \lambda < 1$

Here the a_j form a geometric series with each co-efficient being a certain proportion of the previous one so that the co-efficients become successively smaller as they relate to earlier time periods.

The model could be written as:

$$B_t = a_0 + a_1 P_t + a_2 \lambda P_{t-1} + a_3 \lambda^2 P_{t-2} + U_t \qquad (6)$$

lagging one period and multiplying by λ,

$$\lambda B_{t-1} = a_0 \lambda + a_1 \lambda P_{t-1} + a_2 \lambda^2 P_{t-2} + ... \lambda U_{t-1} \qquad (7)$$

Taking the difference i.e., Eq. (6-7)

$$B_t - \lambda B_{t-1} = a_0 (1-\lambda) + a_1 P_t + (U_t - U_{t-1}) \quad (8)$$

The model can be written as:

$$B_t = \lambda B_{t-1} + a_0 (1-\lambda) + a_1 P_t + V_t \quad (9)$$

Where, $V_t = (U_t - U_{t-1})$

The lagged dependent variable B_{t-1} heuristically takes the place of all the lagged independent variables P_t, P_{t-1}..... This model included as slope coefficient only two parameters a_1 and λ. The parameter a_1 measures the strength of the initial reaction to a change in P, whereas λ measures the rate of decay of the distributed lag. The normalized weights for the Koyck distributed lag could be obtained as

$$W_j = \frac{a_j}{\Sigma a_j} = \frac{\lambda_j}{\Sigma \lambda_j} = (1-\lambda)^{\lambda}_j > 0 \quad (10)$$

$$j = 0, 1, 2,.....$$

The difference $(1-\lambda)$ is called the speed of adjustment.

In the present study the area of tea in bearing was taken as dependent upon price prevailing five years earlier and hence the variable considered was P_{t-5} and it was distributed lag beyond this period, i.e., P_{t-6}, P_{t-7}, P_{t-8}....and so the Koyck transformation would involve B_{t-1} and P_{t-5} only.

Consider the following function

$$B_t = a_0 + a_1 P_{t-5} + a_2 B_{t-1} + a_3 P_{t-6} \quad (11)$$

Griliches (1967) argued that often it would be difficult to distinguish between distributed lag model and model with no lag but with serially correlated errors. He suggested that one way of checking this is to include the lagged value of the explanatory variable in the regression equation. In the present case it was P_{t-6}. If the co-efficient of this variable is approximately equal to the product of the co-efficient of the lagged dependant variable (B_{t-1}) and the co-efficient of the current value of explanatory variable (P_{t-5} in the present case) with sign reversed, then it is a model with serially correlated error rather than a distributed lag model. Only when Durbin Watson (DW) test showed that the serial correlation of errors is not serious, the model could be interpreted as a distributed lag model.

From the nature of scatter diagram, a log-log function was specified. The estimable equations were:

Acreage Response

$$LnB_t = a_0 + a_1 LnB_{t-1} + a_2 LnP_{t-5} + a_3 LnP_{t-6} + a_4 LnRF_{t-1} + a_5 D_1 + e^u \quad (12)$$

$$LnB_t = a_0 + a_1 LnB_{t-1} + a_2 LnP_{t-5} + a_3 LnP^d_{t-5} + a_4 D_1 + e^{u1} \quad (13)$$

Productivity Response

$$Ln\, Y_t = a_0 + a_1 Ln\, P_{t-2} + a_2 Ln\, RF_{t-1} + a_3 Ln\, T + a_4 D_1 + e^{u2} \quad (14)$$

$$Ln\, Y_t = a_0 + a_1 LnP^j_{t-2} + a_2 Ln\, P^d_{t-2} + e^{u3} \quad (15)$$

Where,

B_t = Bearing area of tea in ha in year t,

P_{t-2}, P_{t-5} and P_{t-6} = Price of tea in Rs/kg lagged by two, five and six years

Y_t = Productivity of tea as kg per ha in year t,

RF_{t-1} = Rainfall in cm lagged by one year,

T = Trend (1, 2,.....n),

D_1 = Dummy

= 1, if development scheme were in operation,

= 0, otherwise, and

u, u_1, u_2, and u_3 = random error terms

Data on different variables were collected for the period from 1970-1995 from various published sources.

Results & Discussion

Supply relation sets out the quantities of product that will be produced at an expected price under given conditions of technology, input price etc. During any year, the supply of tea is virtually the production since a negligible quantity is retained for personal consumption on the estates. Supply comprises two dimensions i.e. area and productivity. These two aspects were analyzed separately.

Area Response

The independent variables supposed to influence area decision such as lagged area, lagged price, dummy variable (D_1) to represent the operation of different developmental programs implemented by Tea Board and asymmetric price variable were regressed on total area under stock of full bearing bush. The estimated equation is as follows:

$$Ln\,\hat{B}_t = \underset{(0.910)}{1.761} + \underset{(0.077)}{0.851^{*}}\,Ln\,B_{t-1} + \underset{(0.017)}{0.038^{**}}\,Ln\,P_{t-5} - \underset{(0.019)}{0.003}\,Ln\,P_{t-6} - \underset{(0.014)}{0.01}\,Ln\,RF_{t-1} + \underset{(0.074)}{0.106}\,D_1$$

$R^2 = 0.98$ $\qquad$ $DW = 2.178$

Figures in parentheses indicate respective standard errors

* Significant at 1 per cent probability level

** Significant at 5 per cent probability level.

The Griliches equality was tested and found to hold fairly upto first decimal. Thus there was a problem of serial correlation in the model. However the *DW* test showed that the problem was not serious and there was no significant loss of precision of estimates. Therefore the equation is interpreted as it is. The co-efficient of multiple determination (R^2) was 0.98 and all the variables had the expected sign. The total bearing area was found to be significantly responsive to all the variables included in the equation except the rainfall lagged by one year and the dummy variable.

This model is a fair approximation of the distributed lag model with koyck transformation. So the co-efficient of P_{t-5} (a_1) showed the short-run elasticity of area response. Long run elasticity was obtained by using the formula $a_1/1 - a_2$ where a_1 and a_2 were the co-efficient of P_{t-5} and B_{t-1} respectively. The short run elasticity was 0.038 and long run elasticity was 0.255. The short run elasticity was very small since tea planting and bringing the crop to bearing is a long time process.

The elasticity co-efficient of lagged area (B_{t-1}) yielded as adjustment co-efficient of 0.149. This implied that in one year, as high as 14.90 per cent of the total desired change in area could be realized. Using the adjustment co-efficient (λ), the time taken for area to respond to the extent of 95 per cent of the change in price was estimated as

$$(1 - 0.149)^n = 0.05$$

This gave a value of $n = 18.57$ years. This together with the short run elasticity of 0.038 and long run elasticity of 0.255 reflected the rigidity of area response to price spontaneously. It generally indicated the very slow adjustment of acreage in the long-term. Various techno-institutional and subjective factors seemed to influence the decision making of tea planters in Assam. The decreasing price variable was included to examine the asymmetry in supply response. The estimated equation is as follows:

$$Ln\,\hat{B}_t = \underset{(1.858)}{2.113} + \underset{(0.157)}{0.828^{*}}\,Ln\,B_{t-1} + \underset{(0.018)}{0.034^{**}}\,Ln\,P_{t-5} + \underset{(0.004)}{0.0012}\,Ln\,P^{d}\,t-5 + \underset{(0.10)}{0.0098}\,D_1$$

$R^2 = 0.99$ $\qquad$ $DW = 2.149$

Figures in parentheses indicate standard errors

* Significant at 1 per cent level

** Significant at 5 per cent level.

The co-efficient of decreasing price variable (P^{d}_{t-5}) was 0.0012, which is much less than the normal price elasticity (0.0340). The co-efficient of decreasing price was positive and non-significant. It showed that the response due to fall in price is substantially less when compared to increase in area due to rise in price. This result substantiates the fixed asset theory, which implied that due to fixity of resources planters do not remove area already brought under tea cultivation during falling price. In order words it could be stated that even during periods of falling price area increased but the rate of increase was substantially lower than that during periods of increasing price.

The response due to fall in price is substantially less when compared to increase in area due to rise in price. This result substantiates the fixed asset theory.

Yield Response

The yield was regressed with independent variables like two years lagged price, trend, rainfall lagged by one year, decrease in price, and dummy variable representing developmental schemes of Tea board. The estimated model is as follows:

$$Ln\,\hat{Y}_t = \underset{(0.136)}{6.797} + \underset{(0.063)}{0.195^{*}}\,Ln\,P_{t-2} + \underset{(0.105)}{0.139}$$

$$Ln\ RF_{t-1} + 0.122^{*}\ Ln\ T + 0.193^{*}\ D_1$$
$$(0.022) \qquad (0.068)$$
$$R^2 = 0.88 \qquad DW = 1.32$$

Figures in parentheses indicate standard errors
* Significant at 1 per cent level.

The estimated equation showed a good fit as evidenced by the high value of the coefficient of multiple determination (R^2). All the coefficients had the expected sign. The co-efficient of P_{t-2} represents the elasticity of productivity response for price changes. The result showed that productivity response came with a lag of two years and the co-efficient was 0.195. It is interesting to note that the co-efficient of expected price was positive and significant. This seemed plausible because planters adjust the yield in response to short run price expectation through intensive cultivation and by varying the plucking decisions. This contradicts the findings of Alston (1980) who contended that in perennial crops yield did not respond to price since growers standardized their cultural practices.

Planters adjust the yield in response to short run price expectation through intensive cultivation and by varying the plucking decisions.

The co-efficient of rainfall (RF_{t-1}) though positive was not significant. This might be because in Assam, in spite of variation in rainfall, the threshold minimum required to ensure mean yield was realized in almost all the years. The co-efficient of the variable trend (T) was positive and significant showing 0.122 per cent growth rate per annum. This might be due to the technological breakthrough achieved by the introduction of new clonal varieties and improved cultural practices over time.

The significance of the dummy variable (D_1) showed that the various developmental schemes helped in improving the yield of tea in Assam. This variable had no impact on bearing area under tea. Thus developmental schemes helped only in the improvement of yield and not in expansion of area under tea. The estimated equation to test the theory of asymmetry price is as follows;

$$Ln\ \hat{Y}_t = 7.169 - 0.082^{***}\ Ln\ P^{i}_{t-2} - 0.006\ Ln\ P^{d}_{t-2}$$
$$(0.226) \quad (0.046) \qquad (0.043)$$
$$R^2 = 0.68 \qquad DW = 1.16$$

Figures in parentheses indicate standard errors
*** Significant at 10 per cent level

It was found that the extent of fall in yield due to a one per cent fall in price was smaller when compared to the rise in yield due to one per cent rise in price. So it could be inferred that the decline in yield during the periods of falling price was comparatively less than the increase in yield during the period of rising price. Thus the yield response also indicated an asymmetric relationship as was noticed in the case of area response.

The aggregate supply elasticity was obtained by adding the two components of the output elasticities estimated. The response of output to price is a combination of elasticities of acreage to price and of yield to price. Thus the long run aggregate estimated supply elasticity was 0.45 and the aggregate short run elasticity was 0.23. This indicated that in the short run, supply will increase by 0.23 per cent and in the long run by 0.45 per cent, in response to a unit change in the lagged price.

From the discussions, it could be seen that there existed a certain degree of asset fixity in the case of tea and the elasticity of yield was greater than that of area. The overall performance of the acreage model in the long run supply response behavior appeared to be not satisfactory. But the performance of yield model was found to be quite satisfactory. Planters normally responded to price not in terms of acreage but in terms of yield. The reason for low acreage elasticity might be that tea is a crop of high location specificity. Expansion of area through replantation, replacement or extension required heavy investment. The low elasticity for yield with respect to lagged price might be due to the existence of higher proportion of old uneconomic bushes of tea in Assam. So despite its being a commercial crop, the possibilities of responding to price incentives was obviously very poor and severely limited.

The low elasticity for yield with respect to lagged price might be due to the existence of higher proportion of old uneconomic bushes of tea in Assam. So despite its being a commercial crop, the possibilities of responding to price incentives was obviously very poor and severely limited.

For ideal responsiveness, there should be a high degree of commercialization and both the input and product markets should be competitive and there should not be any technological constraints on production adjustments. But in the case of tea in Assam, all the

above conditions are not fully satisfied. This industry was started in the initial phases with exclusive British capital and enterprise. Of the 688 plantations, 389 had a size exceeding 200 hectares (1990-91). They accounted for 88.28 per cent of total tea production in Assam. These units are not only big in size, but also have interlocking interest spread from tea production, distribution and sales to finance, insurance, shipping and warehousing. There are also very few buyers. In Guwahati Tea Auction Center, only five brokers handled about 90 per cent of the sales. The market structure like oligopsony or near monopsony in tea auction might have generated less dependence on price variability in making decisions regarding changes in yield or acreage.

Since tea is a location specific crop, the area is more or less locked up in few favorable agro-climatic zones. So the productivity improvement is only limited to rehabilitation. Rehabilitation involves heavy initial investment as well as a long gestation period to attain economic bearing stage. This would result in unattractive profit for a long period during the rehabilitation programme.

As discussed, planters were more responsive to improve yield than acreage. Therefore the price should be high enough to overcome the risk associated with expansion and thereby to improve productivity. In Assam 32.85 per cent of the existing bush were uneconomic, as they had crossed their optimum economic life (upto 50 years). Therefore replacement is essential to recover from the low productivity situation. Planters are more concerned with short-term gains through intensive manuring and improved cultural practices rather than adopting long-term measures like replacement, replanting or new planting.

All these peculiarities suggest that a price change must persist for a long time, and the price stimuli required to produce an expansion should be sufficiently high enough to outweigh the risk enhanced by such a change.

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Policy Implications

- Planters respond to price not in terms of acreage but in terms of yield. So, the possibilities of exploring the avenues of increased production basically lie in yield improvement through yield increasing technological changes and intensive use of different inputs. The Government can influence changes in yield first by regulating the price of tea and secondly with suitable taxes and subsidies reducing the cost of production of tea. A judicious price policy linking input price with output price is necessary.
- Acreage models were relatively less efficient to explain the supply behavior. The main impediment to expansion of area under tea was the non-availability of required areas of plantable lands in the traditional tea growing states. So efforts should be made to plant tea in non-traditional areas which fulfill other requirements.

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Book Reviews

Corporate Restructuring: An Indian Perspective *by P.K. Mattoo*, Macmillan India Ltd., New Delhi, 1998, p. 204, Rs. 275.

Corporate structure in today's fast changing ferociously competitive business world has to be flexible and responsive to environmental demands so as to exploit emerging opportunities and meet competitive challenges on sustainable basis. In the wake of policy reforms leading to liberalisation and globalisation, many enterprises in India embarked on programme of restructuring their business and organisational set up to cope with the new developments but the same could not help them to achieve the desired objective primarily due to the fact that corporate restructuring was done on an adhoc basis and lacked strategic focus. In fact, corporate restructuring is a structured decision making process based on strategic fit between corporate needs and business opportunities and organisational competencies. Such a process to be effective, calls for crafting of strategic restructuring plans and their efficacious effectuation through detailed procedures and schedules. The present book by Mr. Mattoo is an endeavour in this direction by making available to the decision makers a modular methodology for undertaking the design and implementation of corporate restructuring packages.

The entire book has been organized into seven chapters. Chapter 1 is devoted to providing background material by discussing the objectives and scope of corporate restructuring and its costs. Historical evolution of corporate restructuring is also brought out in this chapter. Current approaches to restructuring have been briefly discussed. Corporate restructuring as a modular exercise forms part of the introductory chapter. The second chapter sheds light on the methodology of collection of data and information about the corporation under structuring and procedures and practices regarding performance appraisal.

The process of strategy formulation and its implementation have been meticulously elaborated in four chapters—Chapter 3 to 6. However, discussions in these chapters are generic in nature and lack focus on restructuring of business enterprises. Emerging perspectives of corporate restructuring in India have been examined in the last chapter. It has rightly been observed that during the post-liberalisation era, Indian corporates are more bothered about how to deal with competitive pressures generated by deregulation and unrestricted entry of MNCs into the Indian market. Management attitude and not management structures, the author notes, is the real problem in Indian corporate world. The author emphasises upon the need for the adoption of an indigenous approach to restructuring. However, no model approach has been suggested.

In sum, the book on Corporate restructuring may prove to be valuable to practising managers as well as to management scholars.

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Managing the Future: Unlocking 10 of the Best Management Books *by Vic Zbar* (1994, Macmillan Education Australia), 1999, Universities Press, Hyderabad, Distributor Orient Longman, p. x + 129, Rs. 100.

The text under review is itself a collection of the reviews of ten contemporary management books by other authors, evaluated by the reviewer as revolving around a common central theme, which is given as the primary title of the collection. It is targeted at busy practising managers, hard pressed for time, who remain constantly motivated to acquaint themselves with yet newer insights given the opportunity, for carrying out their tasks in still better ways than ever. This desire, nevertheless, can be often noticed to take a back seat in the crowd of other competing priorities, each seeking

fulfilment earlier than the other. This text has been aimed to fill this gap as a "sampler" or "taster's guide" for the books it reviewed, such that the manager could be made aware of the "best bits" of each, and encouraged for a fuller reading of the texts "that capture the imagination". Aspects of managing the future fascinate all concerned as they confront simultaneously both the puzzle and the promise inherent in the related tasks.

With this in view, the author offers a conducted tour of some emerging thinking in management and organisation theory, by providing executive briefs of ten selected books.

It is a novel attempt, indeed, and quite unique in the treatment of the adopted objective. Zbar suggests one set of ten books here and he gives his reason for doing so against each individual title in the Introduction. We can simply go by that which is quite sufficient for accepting the book in the same vein as presented. The books included in this summarization exercise and the appealing features which the author has sought to communicate of each in nut-shell can be identified sequentially as follows:

Robert Reich (1991). The work of Nations, Simon and Shuster: Written by then the Secretary of Labour in Clinton administration, it analyzes global economic developments and the implication of these for work and workers when resources cross national borders effortlessly, rendering the concept of nation states rather irrelevant.

Peter Senge (1992). The Fifth Discipline, Random House: Coming from a well-known management thinker and academic, affiliated with Sloan School Management in MIT, it prescribes systems thinking and the need to see the whole picture as well as its parts, through five disciplines, viz. Personal Mastery, Mental Models, Building Shared Vision, Team Building and Systems Thinking that need to be mastered in order to build successful learning organisations.

David Osborne and Ted Gaebler (1992), Reinventing Government, Addison-Wesley: Distilled from experiences as practicing consultants in government sector activities in the US, through the success stories of how some Governments are meeting the challenges of new information society, the authors draw together the lessons therefrom into a set of ten working principles for transforming the public (government) sector.

Tom Peters (1992), Liberation Management, Pan Books: Another in line from a best-seller author, written as a sort of handbook for surviving and experiencing success, it advocates, apart from closeness to customer, the transformation of organisational structure, through six broad sub-themes supporting the main contention, as vital key to corporate success.

David Limerick and Bert Cunnington (1993), Managing the New Organisation, Business and Professional Publishing: Acclaimed by Australian HR Institute and HR professionals, this book by the Authors, both from Griffith University in Queensland, provides description of the organisation for the 21st century, graduating from a period of profound, rapid, discontinuous change to a period of network organisation characterized by collaborations, partnership and alliances, through four "blueprints"—the traditional classical approach, the human approach, the systems approach, and the collaborative organisation approach.

Jan Carlzon (1989), Moments of Truth, Harper & Row: Translated into 16 languages, a practicing CEO gives an account of how he transformed three major corporations in the modern customer-driven world, which includes advice to business leaders on the development of strategy, organisation structure with a customer focus, motivation of employees, and communication within organisation.

Stephen Covey (1990), The Seven Habits of Highly Effective People, The Business Library: This book, already a celebrity perhaps, focuses on the individual and the essential habits that give rise to better performance in any context, such as to, Be Productive, Begin with the End in Mind, Put First Things First, Think Win/Win, Seek First to Understand Then to be Understood, Synergize, and Sharpen the Saw.

Leonie Still (1993), Where to from here?: The Managerial Woman in Transition, Business and Professional Publishing: Authored by a vice-chancellor, at Edith Cowan University in Western Australia, as the culmination of 10 years of research, it includes findings on the progress of women in management (in the eighties) and examines women's careers, women and leadership, the barriers to success, and access to power with a view to developing success strategies for managerial woman in 1990s and beyond, for promotion, and for the achievement of personal and professional identity.

Charles Handy (1989), The Age of Unreason, Harvard Business School Press: This book, already another celebrity from one of the gurus of modern organisation and management theory, professes that the future is not immutable and that people have the ability to shape what happens. The essential clue is that simultaneous to acquiring skills of managing in the new age, people must also work to shape the state where they would want to be, as comes the title phrase.

Peter Drucker (1993), Post-Capitalist Society, Butterworth-Heinemann: Coming from another guru, this one takes the reader to the "big picture" comprising of transformation in Society, Polity and Knowledge while drawing out implications for individuals and organisations. This book moves beyond mere management theory to a discussion of the changes that are currently impacting on politics, economics and global society, with analysis of current trends so as to assess, if not to predict, what the future may hold, and identify the opportunities that await the people there.

The executive summaries in the text are given in ten sections or parts, following a Foreword by National President of Australian Human Resources Institute and the Introduction, devoting each part on a particular book and its author. A part starts with brief biographical information on the author(s), and proceeds through indicating the significance of the selected book, a summary on the main ideas espoused in the book as author's basic argument, and a descriptive sentence on each chapter of the books, highlighting the most significant chapters there.

While appreciating the existence of varied differences between the views of authors of these ten texts, this book underscores three "common key features" of today's corporate world in them:

- the globalization of the market economy
- the importance of knowledge as the main source of value added
- the growing significance of communication and information technology;

and the three significant "structural features" as: networks, self-employment and teamwork. Another common thread, according to author, is in their appearance, "whether by accident or design", as next generation descendants from Deming's 14 points (Out of Crisis, Cambridge University Press, 1986).

This book has not been claimed as a substitute for the texts that it discusses, which is obvious. It admittedly aims to give the reader just a taste of what each of the books has to offer. But, the readers of this text have to entirely rely upon the author about the extent and efficiency of this work in capturing the most representative aspects of the original books. Taking into account the author's expertise as a practicing consultant and writer, specializing in organisational development and management education, a director of Zbar & Schapper consulting who has also taught organisation behaviour and management studies at Swinburne University of Technology, he comes as very much a competent authority to guide the readers for the stated purposes.

Interested organisations can obtain this book for benefit of their important managers. Academic libraries also can keep its copies for users to refer to as model of efficient summaries of important books.

Being a book of summaries, timeliness must be a desirable aspect. According to publication dates, the surveyed books have all appeared between 1989 and 1993, ten to seven years earlier from now when it is published in the present form. In 1994, when published first in Australia, it was indeed much more timely with regard to its appeal and usefulness. Another five have elapsed by now since then, possibly taking their exponential toll in that regard. Such books can be brought to the target audience as early as possible for wider dissemination and productive consumption, the sooner the better. This can be considered by the Publisher for future occasions. It is expected that many initiated managers in target sphere will already have been through some of the reputed texts in original by now in the meantime. For others, it is a good opportunity offered by this text to get to know better late than never about important management books from an expert analyst. Author can consider in future for inclusion of ISBN of the summarized books and addresses of distant publishers in the text, to become of additional help to interested readers of such publication, which can go quite someway in fulfilment of the book's secondary objective, too.

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Improving your Measurement of Customer Satisfaction—A guide to creating, conducting, analysing and reporting, customer satisfaction measurement programs, *by Terry G. Vavra,* Wheeler Publishing, New Delhi, First Indian. Reprint, 1998, p. 490 Price not mentioned.

Delivery of quality service is the contemporary topic in the management echelons of corporates operating in service sector. The real problem in improvement of perceived quality is in identifying suitable customer satisfaction benchmarks, quantifying them and carrying out customer satisfaction measurement (CSM). Since what cannot be measured can not be improved, creation of customer satisfaction indices and their analysis and reporting becomes crucial. Vavra, in his significant work, through eleven chapters, has deliberated on a wide range of topics from the philosophy of customer satis-

faction to designing the questionnaire, analytical tools, to monitoring changes in performance and globalising customer satisfaction measurement. Vavra, has been himself involved in customer satisfaction for last 15 years with such leading multinational companies as Rolls-Royce, Motorola, Merrill Lynch, Ferrari and AT&T. Though Hayes (1991) and Kessler (1996) have also done work on measuring customer satisfaction which was published by American Society for Quality Control (ASQC), Vavra's work which was also first published by ASQC is unique in the sense that it identifies basic problems in customer satisfaction measurement (CSM) and tries to solve these in a reasonably realistic perspective. One such issue is the logistics of data collection for CSM especially gaining access to customers and even before that, the customer participant selection. Vavra aptly describes the right methodical approaches to solve such problems.

With liberalisation in service sector and development of more uniform customer expectations worldwide, particularly in health care, banking and hotel industries, globalising CSM is an inevitable issue before marketing and quality professionals of service industries. The special challenges of international measurement and logistics in CSM have been duly focussed by Vavra.

The book ends with a good bibliography on customer satisfaction but frankly speaking, the book would have been a real jewel if some case studies would have been also added which Vavra, being an experienced customer satisfaction professional, could have easily done. However, the book is invaluable for those corporate executives in service quality and field service management who believe in the philosophy of customer satisfaction and also marketing research (MR) professionals/consultants who want to improve the effectiveness and efficiency of CSM programmes for their clients through better logistics of satisfaction data collection and designing better tools for CSM analysis and reporting, ultimately facilitating the delivery of Total Quality Service (TQS).

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Organisation Development, Interventions & Strategies *by S. Ramnarayan, T.V. Rao and Kuldeep Singh* (ed.), Response Books, New Delhi, 1998, p. 408, Rs. 450.

The book presents twenty one engrossing essays from some of the leading OD experts. Each paper is a thorough presentation of a theme and these are consolidated to emerge as one continuity of subject: OD. The editors have set the pace of the book in the opening lines of the preface 'Organisations that do not change when needed or are not sensitive to the need for change do not survive long' and 'OD offers one such perspective and process for developing the adaptive and coping capabilities of an organisation.' This book attempts to present a comprehensive account of the various concepts, interventions and strategies, of the OD process.

The book is divided into three sections, Section One covers the concepts and interventions. Comprising seven chapters, the section starts with a historical overview of the context, definition, history, characteristics and operational components of OD by Keith C.D'souza and Kuldeep Singh. The authors point out that OD has several distinguishing characteristics such as behavioural science base, normative approach, deliberate intervention, normative reeducative strategy, systems approach, use of action research model, use of external consultants and long term focus. In Chapter 2, Ramnarayan and Priyanka Grover present a checklist of issues for OD practitioners and discuss as to how to identify and diagnose problems and establish priorities for action. A proper diagnosis calls for development of appropriate diagnostic skills. Ramnarayan and Nilkant, in Chapter 3 discuss the utility of training programmes as forums for diagnosing an organisation.

The next two Chapters, from Udai Pareek deal with the development of an individual through person-focused and role-focused intervention. The author focuses on the characteristics of the role focused intervention, role analysis, techniques to carry out role analysis, managing and measurement of role stress, role negotiation and role contribution. This chapter is indeed a first major attempt to consider and develop Role as a focal unit of OD interventions. Chapter 6 by E. Sendil Kumar and S. Ramnarayan stresses the participation of employees during various phases of diagnosis, evaluation and action taking. The approach demands collaboration and involvement of the employees so that concerned organisational members become self reflective practitioners and not uninvolved spectators.

Process consultation has an important bearing to enhance group effectiveness. In Chapter 7, S. Ramnarayan and E. Sendil Kumar answer such questions as what constitutes process consultation, types of process interventions and benefits. OD is concerned with organisational improvement and development and enhancing the self worth of an individual. OD interventions have to involve the total organisation influencing the pattern of interaction among all levels of people. Ishwar

Dayal discusses these aspects while emphasizing a people oriented strategy of OD intervention.

Section Two of the book comprises six chapters which detail experiences of the application of OD in Indian organisations. Essays on OD interventions such as survey feedback (Ch. 11), HRD audit (Ch. 12) provide useful information. Chapter 13 by Udai Pareek and Somnath Chattopadhyay provides interesting experiences of OD efforts in NGOs.

OD was introduced in India about two decades ago. L&t is credited to be one of the first organisations in India to have established a separate HRD department. Crompton Greaves and Voltas are some of the other frontrunners. These companies also carryout regular surveys to bring improvements in their organisational culture. One had looked forward to a paper devoted to an organisation of this category detailing the survey feedback or listing down of the benefits it achieved or improvements it carried out which ultimately led to the growth of the organisation. It is known that some of the one time front runners have lost the sheen possessed earlier. An analytical review of these situations with reference to OD interventions and strategies would have been a welcome essay as a part of Section Two. The editors point out that in India almost one out of ten business organisations practice OD today. Contrasted with Quality Movement which got introduced comparatively later this is not an encouraging scenario. One would have desired a chapter analyzing the reasons of low interest.

Section Three of the book is devoted to contemporary issues and strategies. In a highly engrossing and thought provoking paper (Chapter 15), M.B. Athreya presents an integrated and strategic perspective of OD. The author has proposed a conceptual frame work of HRD and a comprehensive model of a HRD system which explains interlinkages with OD. HRD has been rightly referred to as 'universal human quest for actualization'. Jagdeep S. Chhokar in Chapter 16 has attempted to compare the fields of study of OD and Quality Movement, and to present an integrative approach combining the two complementarily. Important components of Quantity Movement, total employee involvement and continuous improvement are indeed a part of OD as well. Besides, both require commitment of top management.

Dipti Sethi in Chapter 18 describes application of OD intervention to NGO's. These organisations have distinct and different needs and characteristics and require interventions primarily to develop their self renewal and coping capabilities. Next, Udai Pareek explores the concept and nature of power politics and empowering in the context of OD, which has the main objective to empower various persons and roles. Vijay and Rupande Padaki discuss organisational value systems as alternative perspective in OD. It is an interesting paper where the authors have attempted to answer as to why organisations differ in their value system. The concluding Chapter by S. Ramnarayan describes learning processes in organisations. The author examines such issues as environmental pressures on organisation change.

The book has presented OD in proper perspective explaining the application and impact of various important interventions. Experiences from Indian organisations as real-life examples have increased the value and usefulness of the book. Many papers included in the book will prove to be the first source of information on the concepts. The book should prove to be useful for practising managers, professional OD and HRD consultants and academicians. It should also be read by all those who are interested to bring about transformatibnal change in their organisation.

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Professional Management *by Sarma P.S.* Ph.D., New Age international (P) Ltd. 1998, pp. 104, Rs. 195.

Professional Management is the essence of successful businesses. It has been defined as a continuous collective process of optimising resources and activities through and by competent people to achieve predetermined goals within a set period. The flavour of the book is its hammering of the concept that 'Professional Managers are not born, they are made'! The book elucidates how one can be trained to be a successful and well balanced manager. The book is a timely introduction in the current backdrop where economies are on growth path and the demand for professional managers will only rise.

Broken down into specifics, the functions of a Professional Manager appear familiar and are:

- Formalising Visions and Goals
- Planning and Organising
- Human Resourcing and Developing
- Information and System Resourcing
- Enhancing plans to accomplish goals
- Asset Resourcing

- Implementing activities and action plans
- Team Building and Coordinating
- Monitoring and Steering Processes
- Achieving set targets and the vision

A skeptical viewpoint is that most managers have similar duties to perform, so what is new that a 'Professional Manager' does. It is here that the author scores by bringing in his experience to highlight the subtleties of professional management vis à vis general management. The book clearly implies that the above functions are a preamble to a Professional Managers Constitution. It is the next plane. Professionals who are managers by Providence should strive to become 'Professional Managers' by choice.

The two important pre-requisites to make great Professional Managers are excellent skills and top competence. Additionally, one must have the ability to synchronize and assimilate the above qualities at appropriate time and place. Professional Management can be practised by competent personnel virtually at all levels of an organisation.

Management Development Programmes have a key role to play in infusing an attitude for professional management. Organisations replete with Professional Managers appear as a team performing an orchestra to create music instead of noise. Such teams show exemplary problem solving abilities. Successful strategies and ideas emanate profusely from such a management machinery. The author however cautions that Management Development Programmes should be judiciously chosen and targeted. Effective communication, creative thinking, corporate planning, inter-personal skills, quality culture etc. need to be promoted. And importantly skills acquired must be put into practice. The author has stressed frequently in the book the need for office automation and development of efficient information systems too as they are designed to facilitate Professional Management practices.

In support of Professional Management the author further emphasises attention towards two components of 'Organisation Development', namely:

- Self Development (by Self)
- Management Development (by Organisation)

Developing clear personal objectives and growth paths, honing skills for creativity and innovativeness, adaptability and commitment, ability to train and influence and to build a team etc., are areas where the onus lies on the individual himself. Whereas the organisation needs to concentrate on motivation and recognition, providing necessary training for group interaction and team work, encouraging risk taking and problem solving efforts, and provision of sound guidance and ample opportunity to its personnel in order to enable 'Professional Management' to engender and take root.

The book is thus a compendium on Professional Management. It is designed for the busy executive who may need a quick insight into aspects of Professional Management. It will serve as a guide to the manager inclined to take initiative for achieving higher growth. And for the curious and uninitiated, the book should provide the impetus to consider pursuing Professional Management as a means to self actualisation.

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Empowering Rural Labour in India: Market State and Mobilization ed *by R. Radhakrishna & Alakh N. Sharma,* Institute of Human Development, New Delhi, 1998, Rs. 195.

Amelioration of the conditions of rural labor is one of the most important prerequisites for tackling the problem of poverty in India. But rural labor is a composite mix which calls for different kinds of interventions. Their problems vary depending on their age, gender, skills and physical and social environments. However, of late, social scientists have identified a new way to help in tackling the disparate problems of the deprived sections of the community through a common approach. The idea that is now mooted as a panacea for the problem of economic deprivation is empowerment. According to the proponents of this idea, empowerment of the vulnerable groups should be the most important aspect of any program that seeks to tackle the problem of poverty.

And this is precisely the issue which has been ignored in most of the poverty alleviation programs drawn up by governments in the past. Most non government organisations have also largely failed to address this crucial issue. Even experts working in this area have largely chosen to kowtow this line. Either the issue of empowerment was put on the back burners or it was thought that the programs to increase the incomes of the poor would improve their standing in their communities. Fortunately the realization of this serious lacuna has gradually dawned among policy makers and

academics in recent times. Though policy measures that have chosen to incorporate this important ingredient in welfare programs are still very few and far between, researchers have managed to zero in on the target and highlight the crucial role of empowerment in tackling the problems of poverty.

The collection of articles in this edited volume on empowering rural labor in India seeks to highlight how the complementary and contradictory market forces force the government and other organisations to stimulate public action for correcting the imbalance of the labor market in favor of the rural poor. The first six essays in Part One of the book trace the changes in rural markets. The long term trends and recent developments are discussed in detail both at the micro and macro levels. Case studies of state intervention in rural labor markets form is the second part of the book. The focus of discussion in this section is on the broad policy measures to ensure the smooth working of labor markets, the major issues facing rural labor, the government interventions to improve their lot and especially the experience with minimum wages. Some of the papers in this section investigate the operational issues and the impact of the various employment programs sponsored by the government and also of the ways for improving them. The last part of book discusses the role of various agencies like political parties, trade unions and non governmental organisations in the rural labor market. Three case studies of the impact of unionization of rural labour in different state—Kerala, Andhra Pradesh and Bihar—are also included. The conclusion is that mobilization as a whole has had a positive impact on labor not only in terms of wages but also in terms of their overall security. The last paper looks at the empirical evidence of the impact of non government organisations.

Overall the book is a good choice for those interested in issues related to labor. It would especially give both policy makers and researchers greater clarity on the issues pertaining to rural labor in the emerging scenario and the need for more innovative measures to improve their welfare.

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ASSOCHAM

Small Business Entrepreneurs in Asia & Europe: Towards a Competitive Perspective, Ed. *by Mario Ruttan & Carol Upadhya*, Sage 1997, Rs. 395.

Small and tiny entrepreneurs have been the forerunners of capitalist transformation, especially in the largely agrarian Asian region. The book under review makes an invaluable effort towards the development of a new theoretical framework for the study of Small Scale Enterprises intertwining the lessons of the past and contemporary eras. It is an outcome of a successful workshop on 'Asian Entrepreneurs in Comparative Perspective' organised to converge on a more precise social profile of rural and regional level entrepreneurs in Asian. It also ventures to compare entrepreneurial relation to one another with similar classes in Europe. The papers are a comparative perspective on small entrepreneurs with regard to social and economic characteristics. The book traverses two regions of India (South and West), three countries in Southeast Asia (Indonesia, Malaysia, and Thailand), and two in East Asia (China and South Korea). It also contains two contributions by Rutten and Lesges and three papers on Europe.

The contents starting with a comparative outlook of small-scale entrepreneurs in Asia and Europe are further spread over four detailed parts viz. South Asia, Southeast Asia, East Asia and Europe. The sections are organised without compromising the readability. The original in-depth case studies elaborating the emergence of new business classes with peasant background make interesting reading. Each case study is a unique experience to understand the details of rural and provincial entrepreneurs. By compiling these experiences the authors have immensely enriched the literature especially in a comparative perspective. The study reiterates that the small and tiny enterprises virtually become the real change agents, both economically and politically irrespective of its origin and nature of activity.

Interestingly this volume by combining studies on similar business classes in different countries and regions contributes to the development of a new theoretical framework encompassing both east and west. It eschews the prevailing eurocentric and orientalist paradigms. The book includes six case studies of rural or local entrepreneurs from six Asian countries. Three case studies from Europe focus on rural and economic transformation. It represents a cross section of current research on regional level rural entrepreneurs. The book provides a different perspective on the nature of capitalist development facilitated by regional-level and rural based entrepreneurs. The authors put forward a different approach for looking into the ways in which capitalist transformations affect various levels of society, and how these charges are similar or different in other countries. The discussion then follows the emergence of small capitalist enterprises and the growth of new entrepreneurial classes (middle level business classes) as part of the overall processes of capitalist development in Asia (and Europe) today. Their overall economic and political significance and capacity to act as inde-

pendent agents of social and political changes are relevant in any kind of situation. These sections make interesting reading.

The book also fills the knowledge gap on the emergence of new regional business classes in Asia within a broad comparative perspective. Its central thrust is a comparative study of small capitalist entrepreneurs in Asia and Europe. The authors feel that ultimately it may help in developing a broader theoretical framework to study entrepreneurship encompassing both east and west. The book also gives a clear picture on two major theoretical orientations. The approaches to the study of entrepreneurship provide a brief outline of the shape of the 'cultural and structural' perspectives of the debate in the Asian Context. While the former emphasizes the cultural embeddedness of capitalist development, the latter in contrast was based on Marxist theories of capitalist transformation, emphasizing macro-economic or political factors in employing the development of entrepreneurship. Both these approaches have common root in the nineteenth century European social thought, hence share certain assumptions about the nature of capitalist development. The editors are not advocating either structure-or culture-centered analysis, but they argue for the development of an actor centred theory, which combines the above two by looking at how political, economic and cultural processes interact within the historical process of capitalist development.

Evidence reveals that research on entrepreneurship initiated by general social theories in the 60s and 70s addressed debates on theoretical region-specific issues which limited the scope for comparison of similar cases across regions. The description on the genesis of small investors makes interesting reading. During the last two decades, the capitalist world had undergone profound transformation leading to sea changes in industrial organisations known as flexible accumulation. This has resulted in opening new opportunities for independent small investment entrepreneurship. Small businesses in different regions tend to develop various kinds of linkages not only with large firms but also among themselves. The case studies in the volume also emphasize that the creation of complex networking relation among entrepreneurs has been the central strategy in the development of small-scale enterprises for as instance, Italy's 'flexible specialization' mode of industrial organisation, where large number of small firms are interlinked by the elaborate relation of subcontracting. Italian and Korean cases illustrate that business relations may be established informally and orally rather than through legal instruments. This may lead to issues like the nature of a social system which could promote cooperative capitalist development and the role of social relations and trust in such systems. Evidently the case of Italy shows that, dense networks of community organisations may increase the strength of local horizontal ties, leading to higher degree of mutual trust among entrepreneurs, which in turn can reduce the transaction costs and in the long run produce economic benefits. This is something we need to explore more, given our sound base in trusteeship and cooperation.

There are also other points which need to be looked carefully in the Indian context – social networks or rather both traditional and modern social organisations are widely used constructively by overseas Chinese businessmen to strengthen their business relations. The paper on Malaysia reveals how Chinese businessmen use their positions on the committees of various kinds of organisations like schools, temples and social clubs to boost their business. The concept of social network is also widely used in many papers in the volume. Usually the basis for building up network is on considerations such as kin, caste, clan, ethnicity etc. The case study on South India reveals that caste is used as a central feature of business organisations.

All the papers in the volume reiterate that, family oriented business organisation in itself is not necessarily an ingredient for entrepreneurial success. Asian businessmen are not necessarily family based. Same is the case with South Korea. But China is just the opposite. In other regions, networks especially social networks, are viewed as a kind of social capital, which is essential as insurance against an uncertain future. The paper on Dutch entrepreneurs gives more light in this area. Another point, which can be emulated in the case of India, is that of using the networking strategy for managing labour relations. In essence, studies of entrepreneurs reveal that social networks are central to their functioning for European and Asian businessmen. There are also clear evidences that government policies are crucial in promoting the growth of small industries. But over dependence on the State is not healthy. The Chinese example suggests that, when a strong State withdraws or is in a weak position, as in rural areas, private entrepreneurs flourish. The Korean textile manufacturing has developed in spite of the absence of a government policy to promote rural small-scale industrialization. The message is that the State should play only a pro-active role rather than focusing on excessive regulations and harassment through controls etc. In most of the cases, regional business classes play a very important role as agents of capitalist transformation and not mere product of state policies.

Mostly entrepreneurs show a tendency to enter the political area for economic success. It is also pointed out as a strategy to diversify family interests. Another strategy to promote commercial interests is through

business associations. It may also be used to work towards a common front against labour, as in the case of the brick manufacturers association in Thailand. These fronts are used to discipline workers and decrease labour mobility.

The state favouring large business at the expense of small has been highlighted by several case studies on Asia and Europe in this volume. An Indian case study of industrial estate in western India throws light on specific strategies to articulate class interests. The politics of business organisations reveal deeper social alignments and socio-economic differences. Entrepreneurial development in rural areas usually leads to some kind of economic differentiation marked by symbols of social exclusivity such as educating their children beyond the usual standard, adopting distinctive life-styles etc., as evident from case studies. Interestingly, the close social and cultural connections between rural and urban capitalist classes has been pointed out in the case of both South India as well as in rural Thailand.

The volume emphasizes the need to develop a theoretical model for a comparative study of regional business classes. This is imperative as both the structural and cultural modes of analyses have become inadequate. Both the above approaches ignore the role of human agency. The study of entrepreneurship, according to the authors should take the lead in exploring the inter connection between individual agency and wider social structures and cultural traditions.

Study of economic behaviour, dealing with markets, firm or individual entrepreneurs has been in the centre stage. Papers in the volume also reflect this, trying to understand entrepreneurs as social actors, they can't be abstracted from the social institution and systems. Business relations are best examples of economic activities embedded in social relation. The papers demonstrate the impossibility of conducting business activities without the support of social network webs.

The case studies also elaborate the role of small-scale entrepreneurs in bringing about capitalist transformations. Another interesting point, as demonstrated by studies here is the inter-dependency of entrepreneurs for their success, in today's expanding spree of world capitalism, which while exerting towards uniformity also interacts with local structures and cultures resulting in oblique business organisations and entrepreneurial behaviour. In this context comparative analysis of this nature can explore the diversity and employ insights to strengthen the conditions that promote the growth of industrial entrepreneurship. Such in-depth comparative contemporary knowledge about small entrepreneurs and regional level business classes will stimulate the emerging new industrial environment.

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Gearing up for Patents—The Indian Scenario *by Prabuddha Ganguli*, University Press, Hyderabad, 1998, p. 288, Rs. 205.

The yester years had witnessed a hot debate in India on issues surrounding Intellectual Property Rights (IPR) in general and patents in particular. But today a consensus has been arrived on the necessity of looking at the matter more pragmatically. This is perhaps due to the realization that India can not remain aloof from the developments that have been taking place in the field of global trade since World Trade Organisation (WTO) came into existence in 1995. Therefore, the need of the hour is to learn more about IPR and derive benefits thereof. Unfortunately, awareness on IPR, especially patents is abysmally low in India. One reason for this is lack of adequate literature on the field. The book under review is a timely attempt which can bridge this gap to a certain extent.

The book presents plenty of information on IPR spread over its seventeen chapters and nine appendices. The author gives a brief account of the components of IPR namely patents, design, trade- mark, copyright etc. and goes on to describe the history of patents. He discusses various aspects of patenting in India, presents the chronological developments of IPR in India and an overview of patenting in the country. It has been pointed out that unlike industrially developed countries, patenting as a tool has not been effective in India. This is evident from the fact that number of patents filed is much less in the country when compared to the developed world and the number of patents, in force, has drastically reduced over the years. More importantly, 80 per cent of the patents filed in India are by foreigners.

Patents in India are under the charge of Controller General of Patents, Design and Trade mark (CGPDT) which, in turn, is controlled by the Department of Industrial Development in the Ministry of Industry. The structure and jurisdiction of Indian Patents Office are given, in detail, in the book and the author also discusses inventions which are patentable or non-patentable in India. A knowledge of the Act is a pre-requisite for applying for new patents as well as for protecting an existing one. Special provisions of the India Patents Act,

1970 are discussed with suitable examples. Patenting is a well structured process as laid down in the Act and one has to follow this strictly while applying for patents. The book presents the twelve points scale of patenting in India along with the statutory time-frame and also attempts to impart knowledge on how to prepare patent documents and procedures for patent opposition.

The Patents Act provides certain exclusive rights to the patentee, his agents or licenses to make, use, exercise or distribute the invention in India. But the Act alone cannot ensure effective protection unless there exists a strong enforcement machinery to implement it. That is why enforcement of patents is very important. The enforcement of patents is not within the jurisdiction of the Patent Office and this is handled by the civil courts. The issues of patents enforcement are discussed by the author. In India, it is possible to challenge a patent even after it has been granted and sealed by the Patent Office. This can be done by filing a revocation suit in a High Court. The revocation procedures are laid down in the book.

Literature on patents is an important source of technical and scientific information. In India, information on patent filing, accepted patents, patent opposition proceedings, lapsed patents, working/non-working patents etc. are documented in the weekly Gazette published by the office of the CGPDT. Any person interested in patent information can access the same through a formal request to the concerned patent office after paying the prescribed fees. The sources of patent information and names of databases containing patent information are given, in detail. The author also outlines various regional and international treaties relating to patent protection. The WTO attempts to bring uniformity in patenting systems across countries. The Indian system also needs to be changed considerably for TRIPs compliance. The book highlights the modifications required in the Indian Patents Act.

A number of issues relating to patents are being debated widely. These include: whether a researcher be allowed to use a patent process without licence or permission from the patentee, what is the best mode of protecting a software—copyright or patent, should any one be allowed to own patents on human DNA sequence? These and many more controversial issues concerning patents are discussed. Lastly, the book projects patents as a tool for strategic management of business enterprises. At the end, nine appendices add value to the book which through its seventeen chapters presents a wealth of information on IPR and patent.

The most important fact about the book is its timeliness as in India an urgent need is felt now than ever before to know about patents. Other distinguishing features of the book include its lucid language, schematic presentation of facts and presence of a large number of case studies. This can be expected from the author who is a researcher, a qualified attorney and an expert in the area of IPR. Therefore, all words of appreciation mentioned in the Foreword by Dr. Mashelkar, Director General, Council of Scientific and Industrial Research (CSIR) and a renowned IPR expert are quite fitting. Anybody interested in knowing about IPR and patents will find this book very useful.

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