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Knowledge Creation & Management

Biswajeet Pattanayak & Rajnish Kumar Misra

The global economy is itself related to an epochal evolution. The industrial age that has ruled human life since the late 18th century is quickly fading away. The evaluation of technology through such developments as cheap networks for data transmission like the Internet, is shifting the focus of economic activities from the production and consumption of material things (starting from the basic material units given by atoms) to the production and consumption of information (starting from the basic information units given by bits). Indeed, it is the existence of a global information infrastructure that makes the global economy possible in the first place. In this new era, what do knowledge creation and management entail? The article provides the answer.

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Knowledge has become increasingly relevant for organisations since the shift from an industrial economy based on assembly lines and hierarchical control to a global decentralized, information driven economy. With the emergence of global economy, organisations now work, compete and cooperate on a worldwide scale. As a consequence, they must be able to maintain and reproduce their core competencies and corporate identity regardless of geographical distance, linguistic and cultural differences of the markets in which they operate. At the same time, they must be capable of creatively enriching such competencies with knowledge coming from the local communities that participate in their global workplace. Furthermore, they must be able to keep up with the fast pace of worldwide competition by optimizing time to market and by being highly innovative in their products and services. Ultimately, they must put maximal effort into preserving, reusing and generating intangible assets, in the form of competencies, images and reputation. Tangibles, such as land and labor can be bought at competitive prices in the global marketplace. Intangibles cannot be, because their value is tightly bound to the specific and unique organisational context in which they originate.

Knowledge Management Architecture

The knowledge lifecycle (Fig. 1) hinges on the distinction between "tacit knowledge" and "explicit knowledge". Explicit knowledge is formal knowledge that can be packaged as information. It can be found in the documents of an organisation – reports, articles and manuals, patents, pictures, images, video, sound, software etc. Tacit knowledge is personal knowledge embedded in individual experience and is shared and exchanged through direct, face to face contact. Tacit knowledge can be communicated in a direct and effective way. By contrast, acquisition of explicit knowledge is indirect, it must be decoded and recorded into one's mental models, where it is then internalized as tactic knowledge.

In reality, these types of knowledge are like two

sides of the same coin and bear equal weight in the overall knowledge of an organisation. Tacit knowledge is practical knowledge that is key to getting things done, but has been sadly neglected in the past, very often falling victim to the latest management gimmick. For instance, the recent spate of business process re-engineering initiatives, where cost reduction was generally identified with the laying off of people – the real and only repositories of tactic knowledge – has damaged the tactic knowledge of many organisations. Explicit knowledge defines the identity, the competencies and the intellectual assets of an organisation independently of its employees, thus it is organisation knowledge par excellence, but it can grow and sustain itself only through a rich background of tactic knowledge.

Tacit Knowledge From Explicit Knowledge	Socialization	Externalization
	Internalization	Combination

Fig. 1. Knowledge Lifecycle

Knowledge Conversion

Knowledge management goes beyond the purely social characterization of the environment given by Nonaka and Takeuchi (1995) and tackles issues directly related to the management of the Information Technology infrastructure. In today's information driven society, much of the environment of an organisation is given by its Information Technology infrastructure.

- What kind of Information Technology can contribute to make knowledge flow, supporting its conversion from explicit to and from tacit to explicit?
- What kind of Information Technology can best support the explicit knowledge that an organisation has about itself?
- What kind of software is needed to support the exchange of tacit knowledge in organisations of knowledge workers?
- How can we manage through Information Technology the bulk of explicit knowledge contained in the collections of documents of organisation?

The four components of knowledge management architecture can answer these questions. These four basic knowledge processes are as follows:

Developing new knowledge: Companies survive by the continuous development of new knowledge based on creative ideas, analysis of failures, daily experiences and work in R and D departments. Corporate memories can support these processes by, for instance, recording failures and successes.

Securing new and existing knowledge: Individual knowledge must be made accessible to others in the organisations who need that knowledge. This knowledge must be available at the right time and place. Knowledge stored in corporate memories becomes persistent overtime and if properly indexed, it can be retrieved easily.

Distributing knowledge: Knowledge must be actively distributed to those who can make use of it. The turn around speed of knowledge is increasingly crucial for the competitiveness of companies. To support this process, corporate memories need a facility for deciding who should be informed about a particular new piece of knowledge.

Combining available knowledge: A company can only perform at its best if all available knowledge areas are combined in its new products. Products and services are increasingly being developed by multi disciplinary teams. Corporate memories may facilitate this by making it easier to access knowledge developed in other parts of the organisation.

It is argued that good knowledge management involves the continuous streamlining of these processes to improve the learning capacity of the organisation. Therefore, a corporate memory must be organized in such a way that it maximally supports each of them. However, this is not enough. In real organisations, the processes interact in complex ways and the nature of these interactions should be taken into account as well. For example, the ability to combine different types of knowledge depends on the way knowledge is distributed throughout the organisation.

A core concept in technological support for knowledge management is the corporate memory. A corporate or organisational memory can be characterized as a comprehensive computer system which captures a company's accumulated know-how and

A corporate memory is a comprehensive computer system which captures a company's accumulated know-how and other knowledge assets and makes them available to enhance the efficiency and effectiveness of work processes.

other knowledge assets and makes them available to enhance the efficiency and effectiveness of knowledge intensive work processes. The successful development of such a system requires a careful analysis of established work practices and available Information Technology infrastructure. This is essential for providing a cost effective solution which will be accepted by the users and can be evolved in the future.

The global market place of the future will be characterized by shorter development cycles and harder fights on the quality battlefield (with respect to products) and with respect to organisational structures—by lean organisations, Total Quality Management (TQM) and the advent of the virtual enterprise. In this situation knowledge has been recognized as a company's most important asset for successful competition and management strategies like organisational learning and corporate knowledge management are receiving growing interest. Enterprises are realizing how important it is to "know what they know" and be able to make maximum use of the knowledge. This is their corporate knowledge asset. This knowledge asset resides in many different places such as data base, filing cabinets and people's heads distributed right across the enterprises.

Current Knowledge Management Deficits

Highly paid workers spend much of their time looking for needed information: This ubiquitous fact is in stark contrast with the considerable efforts which have been made in enhancing productivity of lower paid production workers by placing every tool they need within the reach of their hand. Even though it may be doubted that work processes which require knowledge and creativity can be rationalized to the same extent, it is more than obvious that a huge potential for improvement exists.

Essential know-how is available only in the heads of a few employees: This lack of documentation is becoming even more serious with changing work habits which reduce the availability of individual know-how and impede communication between employees.

Valuable information is buried in piles of documents and data: Even when relevant knowledge is explicitly documented, its identification is becoming more and more difficult due to the continuously growing flood of irrelevant information.

Costly error repeated due to discard of previous experiences: This is mostly a direct consequence of the afore mentioned deficits. It is mentioned here explicitly since it highlights the costs of insufficient knowledge management and offers a tangible goal for improvements.

Delays and sub-optical product quality result from insufficient flow of information: This is how lack of knowledge management shows at the bottomline since rapid development of new products with high quality and low cost is becoming more and more essential for a company's successful competition in the global market place.

Knowledge Management

Intellectual capital and related knowledge need to be consciously managed to best develop and leverage their potential value to the organisation. The field of knowledge management is little more than 10 years old. Kael Wiig, a consultant and AI specialist, is one of the field's most prominent advocates, and is most likely the probable founder of knowledge management movement. He coined the term at a 1986 conference in Switzerland sponsored by the United Nations—International Labour Organisation and stated "Knowledge management is a systematic, explicit and deliberate building, renewal and application of knowledge to maximize an enterprise's knowledge related effectiveness and returns from its knowledge assets".

Knowledge management is a systematic application of knowledge to maximize an enterprise's knowledge related effectiveness and returns.

Knowledge management is the formalization of and access to experience, knowledge and expertise that create new capabilities, enable superior performance, encourage innovation and enhance customer value. We have seen the industrial age eclipsed by the information age between 1960 and 1990. In the 1990's the knowledge age has emerged to supercede the information age. Much of the value-added work in enterprises today is primarily knowledge based and there seems to be no end in sight to this trend. For example the work of the following functions or departments is nearly totally knowledge based—Customer Service, Information system, Finance, HR/Administration, Management. Even in manufacturing industries, where there is a physical product, much of the work revolves around computer—aided and manufacturing (CAD/CAM) workflow management and just-time scheduling and delivery.

Knowledge management process

Knowledge Management is considered a key part of the strategy to use expertise to create sustainable com-

petitive advantage in tomorrow's business environment. Beckmans has proposed a comprehensive eight stage process for knowledge management – Identify, Collect, Select, Store, share, Apply, Create, Sell.

The identify state determines which competencies are critical to success. For example every organisation needs robust knowledge about its customer's needs and expectations, products and services, finances, processes, management, employees and other organisational and environmental aspects. Then, the related strategic and knowledge domains are identified. (Knowledge domains are specialized subject matter areas where recognized experts can demonstrate superior performance). Next the existing levels of expertise in the workforce are assessed for each knowledge domain. Once the gaps between existing and needed expertise are determined, domain experts together with training and Information Technology professionals can begin constructing education programs and performance support systems to improve expertise levels.

The collect stage deals with acquiring existing knowledge, skills, theories and experience needed to create the selected core competencies and knowledge domains. In order to be useful, knowledge, expertise and experience must be formalized by making it explicit. In addition, practitioners should know where and how to purchase needed knowledge and expertise in the form of database and expert systems. In order to acquire expertise, valid knowledge sources should be identified. For example – employee suggestion programs, domain experts and best practices database might provide valuable sources of knowledge.

The select stage takes the continuous stream of collected, formalized knowledge and assesses its value. Is their insight within the acquired information? Is this piece of knowledge already in the organisational memory? Is the acquired knowledge a new plausible domain theory that needs to be added to the knowledge repository? Clearly, domain experts must assess and select the knowledge to be added to the organisational memory. Without a strong filtering mechanism, the corporate memory will be nothing more than a tour of sable, where the valuable nuggets of knowledge are lost in a sea of informational data. However, it is important that a diversity of view points from multiple domain experts be represented where appropriate. Initially, one framework should be selected as the basis for organizing and classifying knowledge to be stored in the knowledge repository.

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The store stage takes the nuggets of knowledge and classifies them and adds them to the organisational memory. This corporate memory resides in different forms – in human minds, on paper and electronically. Knowledge in human minds needs to be made explicit and formalized in order to be useful. What does this mean? Knowledge must be organized and represented into different knowledge structures within a knowledge repository, just as data and information are organized and represented into different types of database. Much of this knowledge can be represented in electronic form as expert systems.

The share stage retrieves knowledge from the corporate memory and makes it accessible to users. The workforce makes their needs and personal interest known to the corporate memory, which then automatically distributes any incoming new knowledge to its "subscribers" either electronically or by paper. In addition, individuals, groups and department often share ideas, opinions, gossip, knowledge and expertise in meetings held in person or through groupware. It is crucial that the potentially valuable portions of these communications, discussions, arguments and collaborations are made available to the capture stage of knowledge management process, for example – differing points of view and their rationale should be captured as part of any decision making process as well as the method used to reach the final decision.

The apply stage retrieves and uses the needed knowledge in performing tasks, solving problems, making decisions, researching ideas and learning. In order to easily access, retrieve and apply the right pieces of knowledge at the right time in the right form, more than a query language is needed. Integrated Performance Support Pystems (IPSS) Uliuslow and Bramer are being used by leading organisations to greatly increase the performance and capabilities of knowledge workers. First to ease access, natural classification systems need to be built for browsing or retrieving knowledge. To retrieve just the right knowledge requires that the system understand the user's purpose and con-

To receive knowledge at the right time requires a proactive system that monitors user actions and determines when it is appropriate to intervene.

tent. To receive knowledge at the right time requires a proactive system that monitors user actions and determines when it is appropriate to intervene. Users can also customize the format in which knowledge is presented. Finally, users can request reference, advisory, testing and certification modules.

The create stage uncovers new knowledge through many avenues—such as observing customers, customer feedback and analysis, causal analysis, bench marking and best practices, lessons learned from business re-engineering and process improvement projects, research, experimentation, creative thinking and automated knowledge discovery and data mining. This stage also covers how to elicit nonverbal, unconscious knowledge from domain experts and turn it into documented formal knowledge.

There appear to be two paradigms for knowledge management. The one that has the greatest currency at this point is concerned with managing information contained in some kind of depository or other, be it a set of electronic database, a professor's collected lectures noted or a company archives going back 37 years stored in stable that nobody dare dispose because of fear of a law suit. The archival paradigms are well represented in corporate processes management consultant's expertise, and a variety of tools. The second paradigm for knowledge management has to do less with the administration of existing information than with the creation of new knowledge of knowing practices of the construction of work scopes where knowledge is generated.

	What we know	What we don't know
We know	*Answered questions* (1st quadrant) What we know that we know (expertise in hand) • Depository • Archives • Data banks	*Unanswered questions* (2nd quadrant) What we know that we don't know.... but have ways of finding out about, expertise we know we have to get. • Market intelligence • State of the organisations
We don't know	*Unquestioned answers* (3rd quadrant) What we don't know that we know • Local knowledge • Tacit knowledge and practice • Competence in invisible communities of practice	*Unquestioned questions* (4th quadrant) What we do not know that we don't know • the unimaginable • the question we never thought of asking • An evolutionary quantum jump

Fig. 2. Knowledge Management Process

The eighth stage—the sell stage is where new products and services are crafted from intellectual capital and can be marketed external to the enterprise. Before this stage is possible, considerable maturity should be attained in the other seven stages.

New sources of knowledge and insight are formalized and captured by the knowledge management process and made available to users who need the knowledge (as shown in Fig. 2).

The quadrants are explained as follows:

1st quadrant: It is concerned with all those things that information systems have dealt with since time immemorial—from accountant's ledger to university libraries to training modules stored in ring bender of CBT modules. It is well supported by current information, technologies, search engines, access control algorithm of the links.

2nd Quadrant: It is concerned with what an organisation knows it needs to know but doesn't currently—the knowing practices that deal with updates on the current states of the organisation and its environment, market intelligence, information about suppliers and so on.

3rd Quadrant: It deals which what exists already but is often invisible to the management and the outsider—the tacit knowledge present in communities of practice where the real work gets done. Given that the very misuse of this kind of knowledge is overlooked in most organisations, there is little support for it concept by default.

4th Quadrant: It concerns the sphere of the unimaginable—the condition of states the organisation doesn't even know it might want to know about.

Knowledge creation and management are highly critical for the success of any organisation as they can achieve:

- Increase in Productivity
- Improvement in quality of production
- Better coordination
- Improvement in work environment

In today's changing scenario knowledge management is essential to make the organisation innovative and productive. The role of HR professionals in the organisation is to take up this challenge to create and manage knowledge in the organisation.

□

Focus

Managing Knowledge Strategically in Globalized Era

Pradeep Gupta

In this era of rapid change and uncertainty, companies need to create new knowledge, nurture it and disseminate it throughout the organisation, and embody it in technologies, products and services. Knowledge management programmes may be a means of galvanising companies to develop knowledge as a source of value creation, redirecting their attention away from capital, natural resources and labour as the only economic resources that matter. Knowledge resides primarily in people and it is people who create, use and share their ideas to attain business results. The companies that prosper with knowledge management will be those that realise that it is as much about managing people, as information. This article explains how intellectual assets can be preserved and developed in the knowledge economy for sustainable competitive advantage.

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The global industry environment today is full of complexity, uncertainty and turbulence. Enterprises have to be continuously in search of new ways to cope with the challenges posed by the ever increasing internal and external competition. New concepts and approaches are required so that enterprises can restructure, transform and re-invent themselves to meet such competition. In order to cope with the competitive trends, firms are increasingly trying to excel at managing cost, quality, innovation, delivery, processes and performance. Global industrial competition has been accentuated by various factors which include overcapacity of production facilities in industries, increasing segmentation of markets, changing customer values, need to lower break-even point owing to market conditions, exchange rate fluctuations, equipment and process technology changes etc. As there would be no more sheltered markets, subsidies, licenses, quotas and restrictions, inefficient and marginal firms will have no alternative but to wind up.

The Changing Scenario

India's liberalisation measures have gained importance in the context of all-round changes in the global business scene. The Indian industry is facing unfettered competition from within the country and abroad. Companies can no longer expect that the products and practices that made them successful in the past will keep them viable in the future. Pricing pressures leave no room for inefficient production. The cycle time for developing new products and getting them on the market is becoming more and more compressed. Companies now require quality, value, service, innovation, and speed to market for business success, and these factors will be even more critical in the future.

Increasingly, organisations will differentiate themselves on the basis of what they know. The next decade organisations will be ones 'that know how to do new

things well and quickly'. In their search for new efficiencies, knowledge-based activities of developing products and processes will become the primary internal functions of the firm and the ones with the greatest potential for providing competitive advantage.

Managing knowledge is the formalisation of and access to experience and expertise that create new capabilities, enable superior performance, encourage innovation and enhance customer value. Knowledge management involves the identification and analysis of available and required knowledge, and the subsequent planning and control of actions to develop knowledge assets so as to fulfil organisational objectives. There are several drivers for managing knowledge—marketplace becoming increasingly competitive and rate of innovation rising so that knowledge must evolve and be assimilated at an even faster rate; competitive pressures reducing the size of the work force which holds this knowledge; trends for employees to retire earlier and increasing mobility leading to loss of knowledge; globalization, which means acquiring knowledge about new environments, cultural and economic issues etc.

Managing knowledge is the formalisation of and access to experience and expertise that create new capabilities, enable superior performance, encourage innovation and enhance customer value.

With rare exceptions, the economic and producing power of a modern company or nation lies more in its intellectual capabilities than in its hard assets—raw materials, land, plant and equipment. Intellectual knowledge creates most of the value added for firms in the larger service industries—like software, medicare, communication, education, entertainment, accounting, law, publishing, consulting, advertising, retailing, wholesaling, transportation etc. By the current year, Mckinsey & Co. estimate that 85 per cent of all jobs in America and 80 per cent of those in Europe will be knowledge based.

Knowledge alone can provide a sustainable advantage to an organisation. Eventually, competitors can almost always match the quality and price of a market leader's current product or service. By the time that happens, though, the knowledge-rich, knowledge-managing company will have moved on to a new level of quality, creativity or efficiency. The knowledge advantage is sustainable because it generates increasing returns and continuing advantages. Unlike material assets, which decrease as they are used, knowledge assets increase with use: Ideas breed new ideas, and shared knowledge stays with the giver while it enriches the receiver.

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Managing Intellectual Capital

Success in the market place is increasingly linked to an organisation's ability to manage its intangible and often invisible assets such as knowledge and competence of people. To preserve intellectual assets in a knowledge economy the following important considerations should be borne in mind.

Tracking Intellectual Assets

Attracting and nurturing talent has become the single dominant force in business. Businesses must nourish customers and shareholders, but they must also embrace the employee—an asset that can easily walk out the door. Business can ignore this new paradigm of 'people power' but only at its peril. Although it was always important for Indian companies to manage their human resources, it has become imperative now because of the following reasons.

Firstly, the demand for talent outstrips its availability. In India, there is a host of new industries—Information Technology, Financial Services, Media and Entertainment—all competing for the best people. Uttar Pradesh, considered to be one of the most backward states is today at number four among Indian states in software exports. India has become the world's scouting ground for talent. Germany, Ireland and Japan have all recently joined the US in opening their doors wider to Indian information technology professionals. Second, people want to be their own boss or at least work in a company that is entrepreneurial. So the pool of available employees is contracting. Third, the dispersal of decision-making within companies and across borders means the search for talent has filtered down from the

top to all levels of a company. In an increasingly competitive world, the top-down approach to managing is proving ineffective. Decisions need to be made at every level and quickly. Managers must spot, incubate and groom talent at every level of the organisation, because more people need to be making high quality decisions. Finally, greater business complexity has placed a premium on talent. Complexity calls for an ability to look at a problem from different perspectives and a high degree of creative thinking.

Developing intellectual capital is for formulating the Future Strategy. British Telecom has a futurologist now. Hindustan Lever Ltd. executives spent six months at Unilever just pondering on the future. Therefore, investment in education and knowledge and making it the top priority will determine the future. As per the theory presented by Austrian economist Josef Schumpeter Creative Destruction is good for mankind. To transform itself into a butterfly, a caterpillar has to go through process of destroying its past. The same applies to modern organisations. They have to accept that rapid change is the order of the day and the threats and challenges must be converted into big opportunity.

Valuing Intellectual Assets

Intellectual capital is as important as financial capital in providing an accurate picture of the enterprise's true worth. If an organisation is considered to be a tree—then the fruit, which is visible is financial performance—and the roots, which are hidden is intellectual capital. If the organisation concentrates only on the fruit and ignores the hidden values, it will not endure over the long run. Valuing intellectual capital needs to be part of the business processes in the organisation. Unlike the US, where the markets were awarding heavy premiums to knowledge companies, human capital valuation in India is still restricted to a handful of firms.

Intellectual capital is as important as financial capital in providing an accurate picture of the enterprise's true worth.

Human capital valuation is done for a variety of reasons—ranging from the desire to conform to the US Generally Accepted Accounting Principles (GAAP) for raising money from markets abroad or to communicate the worth of one's human resources to investors. Infosys began quantifying the value of its employees in its annual report way back in 1996. Aptech, a computer education and software company has also made a novel addition to its annual report with the company's performance on the human resources front.

Some of the most pioneering work in this area has been done by Swedish Insurance firm Skandia. Skandia undertakes an internal audit of the company's intellectual capital every year and issues a report to stockholders and investment community. One goal of this analysis is to convince investors of the value of Skandia's Knowledge Capital. The Skandia system maps its performance on various key, but non-financial parameters. It incorporates about 30 key indicators in various areas, which are monitored on a yearly basis. The areas are financial, customer, process, human, and development focus. In 'human', the key indicators include turnover, proportion of managers, proportion of female managers and training cost per employee.

A number of models such as Lev & Schwartz model, cost of replacement model, opportunity cost approaches, behavioural model etc. are being used by Indian companies for quantifying employee value. Infosys Ltd. uses Lev & Schwartz model, which involves a three-step calculation. First, the employees are classified as per age and function. Second, their future earnings (till retirement) are calculated on the basis of a set of assumptions that includes expected salary hikes, improvements in productivity, inflation and the like. Third, the future earnings are discounted at the current cost of capital to arrive at the human capital value.

However, this method is not free from shortfalls. In an ideal market, the salary paid to an employee would be equal to the value he adds to the company. That is not how things work in the real world. Thus with its focus on the employee's wages (present and potential), the Lev & Schwartz model might calculate the employee's value to the economy and the company's payouts to the employee, but it doesn't determine the value the employee denotes to the company. That, in fact, is a downside that the Lev & Schwartz model shares with the other valuation model that Ranbaxy has chosen—the Cost of Replacement Model. As can be guessed, the cost of replacement model calculates the worth of employees in terms of their replacement cost. The rationale is that in replacing an employee, a company takes financial hits on recruiting, training, initial dips in efficiencies while the recruit comes upto standard, and so on. This overall cost, says the model, is the actual human capital.

But with debate still raging on how companies should manage their human capital, it is difficult to judge which model works best. Even the most complex model requires companies to make subjective judge-

ments. This is the reason why Consumer Electronics Multinational Philips and Reliance Industries Ltd. has stayed away from Human Resource Valuation. The real challenge for companies undertaking human resources valuation is presenting a realistic picture of their human resources. Managing intellectual capital and understanding the implications of knowledge management in an organisation are not easy tasks. Of 80 corporations surveyed by Arthur Andersen during a 1995 knowledge conference, more than three-quarters called knowledge management an essential or important part of their business strategy. But more than 90 per cent admitted they hadn't yet developed reliable ways to link knowledge management to financial results.

The challenge for companies undertaking human resources valuation is presenting a realistic picture of their human resources.

Growing Intellectual Capital for Tomorrow's Needs

The potential for new ideas arising from the stock of knowledge in any firm is practically limitless – particularly if the people in the firm are given opportunities to think, to learn, and to talk with one another. In order to have competitive advantage in the globalized era, a knowledge organisation must focus on the following imperatives. Companies should revamp their performance appraisal system to include contributions to the firm's knowledge base as an important part of compensation decisions. Many companies already have included contribution to knowledge base in their programs for promotion, such as Lotus which devotes 25 per cent of the total performance evaluation of its employees to knowledge sharing. Asia Brown Boveri evaluates its managers not only on the results of their decisions but also on how much knowledge and information is supplied and applied in the decision processes. It should be ensured that knowledge sharing is rewarded more than knowledge hoarding. Knowledge sharing is most critical element in building knowledge organisations.

As knowledge is continuously changing, it is necessary to dedicate and maintain a group of people (full-time) that continuously update, and maintain the knowledge repositories, as well as validate the knowledge in the repositories. These activities should be conducted under the auspices of the Chief Knowledge Officer (CKO). Many companies like GE lighting, XEROX PARC, Hoffman-LaRoche, Ernst and Young, Mckinsey and others have created the post of CKO or an equivalent role (i.e. Intangible Assets Director, Director of Lessons Learned, etc.) to manage the process of capturing, distributing, and effectively using knowledge. In addition, the knowledge management system should be easy enough for members at all levels of the organisation to use.

In a global economy, knowledge is a company's greatest competitive advantage and it will be the currency of the new millennium. Intellectual capital must be treated properly and shared appropriately with others in the organisation. Successful companies of the future will be those who do the best jobs of capturing, storing and leveraging what their employees know and how fast they can know something new. □

People forget how fast you did a job...but they remember how well you did it.

– Howard W. Newton

Focus

Managing Organisational Intelligence

Kavita Singh

This paper attempts to identify the nature and meaning of organisational intelligence. Organisational intelligence has been viewed as the collective assemblage of all intelligence that contribute towards building a shared vision, renewal process, and direction for entity. Different strategies to enhance organisational intelligence have been discussed. The role of organisational culture in developing the knowledge-based organisation has been identified with the help of both the contents of organisational knowledge and capabilities to leverage knowledge. Finally techniques of implementing and evaluating knowledge management strategies have been highlighted. The process of managing organisational intelligence from knowledge management perspective calls for organisations to develop the capability to learn new ways of operating and recreating themselves and those that are able to do so will emerge as intelligent organisations.

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In the present day world, 'change' has become an inevitable part of life. Organisations that do not change when needed or are not sensitive to the need for change do not survive long. They are overtaken by others. Successful organisations take proactive steps to change or create new benchmarks and standards for others to follow rather than wait for others to set the standards. In other words, they become what are referred to as 'intelligent organisations'.

Change & Adaptability

Madhukar Shukla (1997) has made a very interesting observation, where he draws a comparison between dinosaurs and human beings to discuss the impact, reaction and therefore the outcome of change. He goes on to discuss the existence, sustenance and ultimately destruction of dinosaurs which were not able to survive in the inhospitable environment because of not being able to adjust to the changing climate of the earth. On the other hand, human beings, who showed a divergence in their behavioural patterns and could adapt to changing environmental conditions, were able to survive. They learnt to manipulate things, make tools, and create symbols to capture, utilize and transfer knowledge, which they had created and acquired. In fact, they even evolved to the level where they could defy the natural laws to suit their aims.

The moral of this evolutionary anecdote can be summed up in a formula:

$$L \geq C$$

where L is learning; C is change.

That is, "It is fundamental law of ecology that for any organism to survive, its rate of learning must be equal to, or greater than the rate of change in its environment" (Garratt, 1987). The example of the dinosaurs and human beings is quite applicable to large number of companies today. In contrast to the dinosaurs, humans could survive and proliferate through the climatic changes, because

they could learn, and because they discovered how to leverage their learned knowledge. Amidst the present environmental changes the same principle applies to businesses as well.

Indian organisations are facing a turbulent environment today in the form of:

- The rate of changes being exponential creating the compulsion to adjust to the fast changing business realities on a continuous basis. Learning to adapt to change has become a necessity for survival.
- The complexity of change depicted in the form of new products, new markets, new technologies, new competitors in the market, new regulations, new rules of the game, and so on. These changes are increasingly making earlier strategies obsolete and creating new knowledge requirements.
- The unpredictability of change which is now non-linear and chaotic. The blurring of boundaries among product categories, markets, customer segments, technologies, etc. is creating unforeseen consequences in the competitive environment.

In such a rapidly changing and turbulent environment, updating of knowledge base must lie at the core of corporate strategy. And, it cannot be a one time exercise. Competition through knowledge requires continuous updating of one's learning and knowledge base in order to remain in tune with the changes in the external and internal environment. Companies must become what are called as knowledge base or learning organisations.

Competition through knowledge requires continuous updating of one's learning and knowledge base.

Knowledge Base in Organisations

Corporate executives have started recognizing the business sense in building an organisation in which knowledge and learning become the axial principles (Shukla, 1997).

- 'The rate at which individuals and organisations learn may become the only sustainable competitive advantage' (Ray Stata, Chairman, analog devices, USA)
- 'Traditional corporations expend a lot of energy running their own internal machinery. It is the learning organisation with its shared vision and system thinking, that is ideally suited for tomorrow' (Ravi Sanathanam, CEO, Hindustan Motors).
- 'In a truly global organisation of the future, knowledge networking will be a critical success factor' (K.N. Shenoy, CEO, Asea Brown Boveri, India).
- Learning is not a luxury. It's how companies discover their future (Aries P. Geus, Planning Chief, Royal Dutch/Shell Group of Companies).
- 'To retain and develop managers, we will have to develop a company that is attractive and less arrogant. Only learning organisations can fulfill these needs' (Apuil Busari, Director, Motorola India).
- 'We are a learning organisation. The moment someone comes up and says that he has stopped learning, that means there is trouble' (Joseph P. Abraham, VP, Tata Consultancy services).

Governor Glendening of Maryland, in his state-of-the-state address on January 21, 1999, indicated.

> "..... The future of our world is fast becoming knowledge based.... Nowhere is the emphasis on knowledge more pronounced than in the job market.... In the 21st century, the greatest skills will be the capacity to acquire new skills. In the new economy, acquiring knowledge will be a life long journey, not just a destination to be reached."

Echoing this statement and those by others, we have entered the knowledge age. In order for companies to sustain their competitive edge, it is increasingly important that they replenish their intellectual capital and knowledge assets. Many organisations currently are NOT "knowledge organisations". They have not totally embraced the concept of knowledge management and have not maximized their use of knowledge internally and externally to their customers, stakeholders and shareholders. In order to maintain their competitive edge organisations have to capitalize on their 'organisational intelligence'.

Organisational intelligence – An overview

Companies are realizing that their human capital and structural capital are the distinguishing elements of their organisation. Human capital refers to the 'people

power' and structural capital is the database, patents, intellectual property, and related items that employees cannot readily take home with them.

The thrust of knowledge management is to create a process of valuing the organisation's intangible assets in order to best leverage knowledge internally and externally. Knowledge management, therefore, deals with creating, securing, capturing, coordinating, combining, retrieving, and distributing knowledge. The idea is to create a knowledge sharing environment whereby, "sharing knowledge is power" as opposed to the old adage "knowledge is power".

Knowledge management deals with creating, securing, capturing, coordinating, combining, retrieving, and distributing knowledge.

Modest knowledge efforts could commence in organisations with a "yellow page" directory of mapping knowledge areas to experts within the organisations. A best practices or lessons learned knowledge repository could also be created to facilitate knowledge sharing efforts. There should be a knowledge management infrastructure within the organisation whose mandate is to identify, analyze, manage, maintain and disseminate knowledge to appropriate individuals within the organisation and externally to others. Many organisations have already created a "Chief Knowledge Officer" position or equivalent to help spearhead those knowledge management efforts. Through web-based and Intranet technologies, we now have the connectivity to allow the collection of knowledge base to be disseminated more easily than before. This will help contribute towards building an entity's organisational intelligence.

Organisational intelligence" (Liebowitz, 2000) is:

- The problem of gathering, processing, interpreting, and communicating the technical and political information needed in the decision-making process (Wilensky);
- The organisation's ability to deal with complexity, that is, the ability to capture, share, and extract meanings from the market place signals (Haeckel & Nolan);
- The capacity for computation which can be applied to information that is externally gained or internally generated to meet survival challenges (McMaster);
- Information processing functions that permit adaptation to the environmental demands and are related to innovation, initiation and implementation (Glynn);
- The intelligent behavior of organisations as a function of their designs (Nonaka);
- The cognitive functioning through which information flows through organisations (Halal & Kull);
- Understanding organisations as learning systems and creative systems (Nevis; Mumford & Gustafson).

Organisational intelligence is the collective assemblage of all intelligence that contribute towards building a shared vision, renewal process, and direction for the entity. Specifically, organisational intelligence involves the knowledge functions depicted in Fig. .1.

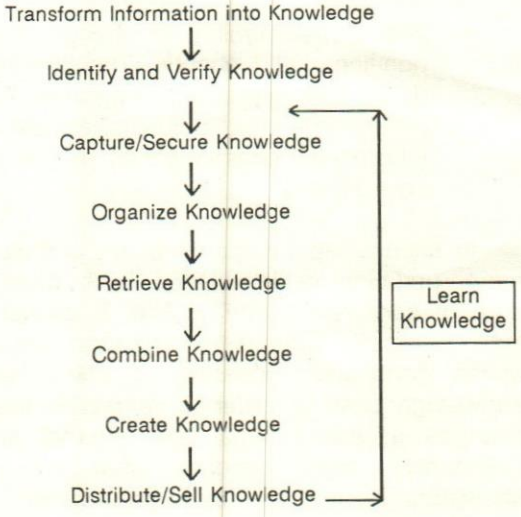

Fig. 1. Knowledge Functions in Organisational Intelligence

The Process of Knowledge

Transforming information into knowledge involves synthesis and conversion of useful data and information into knowledge. For example, rules of thumb acquired over years of experience and learning may result in knowledgeable short cuts to help in the decision making

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process. Other types of knowledge (i.e., procedural, declarative, episodic, metaknowledge) need to be identified in organisations and verified as relevant knowledge. Once knowledge is identified, it should be captured or acquired and then secured within the organisation. Then it must be organized in a way in which others in the organisation can retrieve this knowledge and apply it to their situations. They will also combine this knowledge with knowledge of their own within the context of their situation. This will result in a synergistic way of creating new knowledge for the organisations. This knowledge then would be distributed within the organisation or to the stakeholders and possibly sold. New knowledge would, then be learned, captured, secured within the organisation, and then the cycle would continue.

Factors & Strategies

The following are different strategies that may be useful for the organisation to increase intelligence and rise to the level of 'knowledge organisation':

- Investing in education and training of the firm's human capital.
- Developing knowledge repositories for preserving, sharing and distributing knowledge.
- Providing a 'motivate and reward' system to encourage employees and management to contribute to the organisation's knowledge repositories and use this knowledge.
- Evaluating annually each member of the firm on the quality and quantity of knowledge bases as well as organisational knowledge used and value added results by that firm member.
- Developing methodologies for managing and structuring the knowledge in the knowledge repositories.
- Having knowledge fair/exchange to encourage informal communication sharing among communities of practice.
- Developing Centers of Expertise or Corporate Knowledge Centers with associated affiliates in the company in the core competency areas.
- Providing an infrastructure of individuals whose main job is to manage the creation, development and maintenance of the knowledge management systems.
- Adapting to the changing competitive environment by forming project teams based on employee knowledge profiles.
- Integrating knowledge management with the strategic goals of the organisations.

In the Halal et al (1998) study on organisational intelligence, five key factors were identified that comprise organisational intelligence. These were organisational structure, organisational culture, stakeholder relations, knowledge management, and strategic processes. In this report, those organisations exhibiting "low intelligence" would typically have a centralized structure, bureaucratic culture, conflicting stakeholder relations, isolated knowledge management, and authoritative strategic processes. Those organisations with "high intelligence" would have a decentralized structure, entrepreneurial culture, cooperative stakeholder relations, integrated knowledge management, and participative strategic processes.

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In the same study (Halal et al, 1998), the following functions (Table 1) were identified as related to organisational intelligence:

Table 1: Functions related to Organisational Intelligence

Function	Organisational intelligence
Measurement	Organisational intelligence quotient (if it could be determined)
Information technology	Organisational IT systems
Structure	Network of business units
Subjective filter	Organisational culture
External linkages	Stakeholder relations
Knowledge store	Knowledge management
Strategy formation	Strategic processes
Direction	Leader
Guidance	Mission
Decision-making	Strategy
Covert system	Information organisations
Routine decisions	Policies and procedures
Knowledge gain (single loop learning)	Training and actions
System improvement (double loop learning)	Organisational change

Knowledge Management

About 50 per cent of the fastest growing companies in the US are knowledge intensive organisations, via selling the knowledge and know-how of their employees rather than manufactured products or providing services (Mentaz & Apostolour, 1998). Management consulting firms are typical examples of knowledge-intensive organisations, and one would think they would be among the leaders of "knowledge organisations". However, according to a survey (Reimus, 1996) on knowledge management activities of consulting firms, about 60 per cent of the consultancy firms maintained no active "best practices" database; less than 25 per cent utilized the internet to support a basic range of internal activities; and the actual mechanisms and processes in place for managing acquisition, screening and selection of best practices at many consultancies were largely informal. Mentaz & Apostolour, (1998) did a comparative analysis of experiences in managing corporate knowledge in consulting firms and concluded the following:

- The success of the knowledge management efforts was largely due to the creation of a knowledge friendly culture in the organisation.
- A crucial element for the company to establish a positive knowledge culture is the type of people that a firm attracts and hires.
- Knowledge management projects benefit from senior management support.
- Clarity of purpose and vision is a critical factor with knowledge management efforts.
- The right blend of information technology and organisational infrastructure is very important for the knowledge management efforts to succeed.

So why should companies be interested in knowledge management for increasing their organisational intelligence? According to Mahe and Rieu (1998), enterprises sometimes have to preserve knowledge/have suffered knowledge losses/need a large amount of knowledge/or need to lose knowledge. Knowledge preservation is needed in high technology sectors to avoid the serious danger that a loss of mastery of these technologies would represent. The problem of loss of knowledge is typically recognized after the fact, where the vital expertise may have left the company through retirements, layoffs, transfers, departures and the like. The greater need for knowledge is typically used to master the increased variety of products. Losing knowledge may be necessary to increase one's innovative capacity—that is, to sometimes forget what we know and start from scratch to design a new product.

> **Losing knowledge may be necessary to increase one's innovative capacity—to forget what we know and start from scratch to design a new product.**

In order for organisations to better leverage learning, Davenport and Prusak (1998), advocate the following:

- Think of organisation as a "system"
- Build and facilitate communities of learning and practice.
- Focus on issues of personal development and "mastery".
- Create less hierarchical, more "self-organizing" organisational structures.
- Plan with the use of scenarios.

From the 1996 knowledge management study, conducted by American Productivity and Quality Center, several key findings emerged. At the time of the study, the highest organisational buy-in about knowledge management was found among professional and knowledge workers. Senior management was next to recognize the importance of knowledge management, with middle management lagging behind. Team-based cultures were found to be much more amenable to knowledge sharing. Another finding from the study was that both push and pull approaches to knowledge management should be done together, vs. using only one of these techniques alone. Push approaches desire to capture knowledge in central repositories and then push it out into the organisations. Pull approaches expect people to seek the knowledge they need.

Culture: The Key Ingredient of Organisational Intelligence

According to Michael McGill & John Slocum book, 'The Smarter Organisation', Corporate Culture was to companies in 1980s what the "one best way" had been in the prior 100 years. By focusing on culture, a fundamental understanding of what the company values could be achieved. In the 1980s, the culture changes program focused on determining the shared values, then using management practices to increase understanding across the company. According to them, any strong culture company (like GM) will be limited in its

capacity to learn by the very nature of its culture. They add that a company involved in promoting its own culture is unlikely to be open to enhancing and expanding in the way that learning requires: it cannot get outside its understanding box!

The key to success for many organisations is the commitment to learning from every aspect of organisational experience. Creating and fostering a climate that promotes learning will ultimately give a sustainable strategic advantage to the organisation. According to Hayduck (1998), several factors are attributed to the development of a culture within an organisation. These include:

- Unique national culture of employees.
- Business environment of the company (the reality in which the business operates, which is dependent on its products, competitors, customers, technological dependence, and the level of government influence).
- Types of employees hired in the organisation.
- Dynamic relationship between the business environment and the employees hired in the organisation.
- Introduction of new processes into the organisation.
- Interaction between the employees and the systems, structures, and business established by the management.

The key to success for organisations is the commitment to learning from every aspect of organisational experience.

The American Productivity and Quality Center (APQC) has performed a number of benchmarking studies on knowledge management. One of the studies indicates that culture and behaviours are the key drivers and inhibitors of internal sharing (O'Dell & Grayson, 1997). The real issues are: how can people be motivated and rewarded for sharing and what can leaders do to help establish and reinforce a supportive culture? Another knowledge management study by APQC (1996) found the following common factors in companies whose cultures have become more supportive of knowledge management (thus enhancing the organisational intelligence of the entity):

- Leadership, Leadership, Leadership.
- Make a big deal of successes (of organisations rather than individuals), even if you have to go back and reframe an earlier organisational success as an example of successful knowledge management and transfer.
- Provide the tool necessary for people to find the information and knowledge they need themselves.
- Clarify the business case and value prepositions in concrete terms.

At Arthur Anderson, for example, there were two simultaneous approaches to creating a culture more supportive of knowledge management: the bottom-up approach creating a sense of community and trust among people, and a top-down approach creating the norms, standards, and overall value statements that are used by the top management to drive strategies and (tolerated and not tolerated) behaviour (APQC, 1996).

To be truly effective, knowledge management must be accompanied by organisational change. Marshall et al. (1996), in their study of risk management group indicate that the firm needs to understand what knowledge it has and seek out the knowledge it needs; organisational knowledge should be transferred to those who need it in their daily work and accessible to those who may need it as events warrant; new knowledge should be rapidly generated and made accessible throughout the organisation; controls developed to embed the most reliable and robust knowledge; organisational knowledge tested and validated periodically; and the firm should facilitate knowledge management through its culture and incentives. Examples of incentives include awards (non-monetary) and recognition, bonuses, and other monetary awards, personnel evaluations and promotions, special focus meetings, and general communication approaches (Wiig, 1996).

New knowledge should be rapidly generated and made accessible throughout the organisation.

Creating Knowledge Based Organisations

For many managers, programs of change can be complex and frustrating. In many situations, the best intentions, along with copious amount of human and financial resources are devoted to creating a knowledge-based organisation with little or no results. In these situations, key management within the firm

may doubt the viability of knowledge as a corporate resource and slip back into "tried and true" patterns of gathering, applying, and disseminating sources of knowledge. Firms that exhibit expertise along dimensions of infrastructure and process elements will tend to be conducive to adopting knowledge based capabilities that are key for organisational success (Gold, Malhotra & Segars, 2001). In the absence of these capabilities, a program of transformation through knowledge management may be doomed before it begins. Rather than focusing the initial efforts of knowledge management entirely on codifying and classifying knowledge or entirely on creating an environment for knowledge sharing, a more successful approach may be to invest in change efforts along both dimensions.

Davenport et al, (1998) also note that this tendency to optimize one aspect of knowledge management can cause these projects to produce detrimental effects in customer service and innovations. In essence, a singular focus on process capabilities through reengineering and technology can rob the firm of rich knowledge resources. The firm attempts to overcodify tacit knowledge and, in doing so, destroys or alters robust source of knowledge. This can result in products and services that lose their market appeal and premium pricing because customers view them as commodity. Likewise firms may also overemphasize infrastructure capability, thereby losing efficiencies in the capture and transfer of knowledge. Clearly, managers seeking to establish effective programs of knowledge management must balance both the content of organisational knowledge (tacit and explicit) and capabilities to leverage knowledge (infrastructure and process). As illustrated in Fig. 2, the outcomes of alignment in capability and content are key to realizing the full benefit of knowledge management without suffering the negative consequences of imbalance between content and capability. Also, organisations must realize that knowledge management represents a collection of initiatives rather than a single project. As illustrated, application of process capability to explicit knowledge is codification of knowledge. In essence, these projects attempt to apply a 'high tech' approach for capturing and storing source of knowledge. Application of infrastructure capability to explicit knowledge is an integration initiative. Here, the goal is to combine and synthesize knowledge constructs for the development of new knowledge objects. Managers must understand that codification and integration initiatives applied to tacit knowledge can yield less than desirable results. Alignment of capability and content are the crucial elements for the success of a knowledge management initiative. Process capabilities applied to tacit knowledge result in mining for elements of knowledge that can be

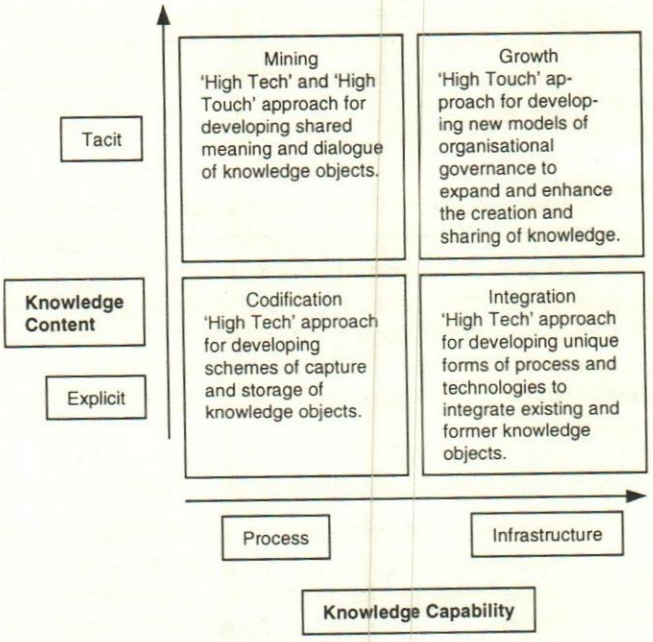

Fig. 2. A Portfolio of Knowledge Opportunity

shared and for process mechanisms that can provide context for captured forms of knowledge. This is a 'high tech' and 'high touch' initiative that seeks to leverage the efficiency aspect of process capability, yet preserve the richness of the tacit knowledge content. Finally, infrastructure capability applied to tacit knowledge results in the growth of new knowledge through sharing and exchange mechanisms. This 'high touch' approach seeks to develop new models of organisational governance to enhance knowledge creation. Importantly, it is possible for the organisation to launch mining based knowledge management initiatives targeted for explicit knowledge content. The cost of this misalignment can be cost overruns, lack of access to codifiable knowledge, and unneeded bureaucracy.

Knowledge management represents a collection of initiatives rather than a single project.

Implementing Knowledge Management Strategies

There are varieties of Knowledge management development, which can add up to organisational intelligence. Wiig (1999) points out a few of these areas:

- There will be major knowledge transformation functions and repositories, such as capture and codification functions, and computer-based knowledge functions such as training and educa-

tional programs, expert networks, and knowledge based systems, and the different knowledge applications or value realization functions where work is performed or knowledge assets are sold, leased or licensed.

- Knowledge management will be supported by many Artificial Intelligence developments including intelligent agents, natural language understanding and processing, and knowledge representations and ontologies that will continue to develop and, by providing greater capabilities, will be relied on to organize knowledge and to facilitate knowledge applications to important situations.
  - An enterprise should experience faster organisational and personal learnings through more effective discovery of knowledge via systematic methods.
  - There should be less loss of knowledge through attrition or personal reassignment achieved by effective capture of routine and operational knowledge from departing personnel.
  - Intelligent agents deployed internally and externally will offload data detective work required to locate and evaluate information required in many knowledge worker situations ranging from plant operators to ad hoc strategic task force.
  - Electronic advisory or consulting services are already emerging whereby knowledge-based systems can be bought in areas ranging from tax-advice to individuals to water treatment for thermal power plant.

Knowledge management will be supported by Artificial Intelligence developments.

Evaluating Knowledge Management Strategies

Expert choice (2000), by Expert Choice Inc. (www.expertchoice.com), is a decision support system that automates a process known as the analytic hierarchy process (AHP) developed by Thomas Saaty. It has been used extensively throughout the world and could be helpful in evaluating which knowledge management strategy an organisation should pursue. The different criteria for evaluating knowledge management strategies are:

- *Cost:* the total cost of the knowledge management alternative.
- *Culture:* the cultural impact of the organisation in terms of acceptance of knowledge management approach.
- *Time to implement:* the amount of time needed to implement the knowledge management approach.
- *Productivity:* the estimated worker productivity due to knowledge management approach.
- *Knowledge retention:* the ability to retain critical knowledge at high risk of being lost.
- *People retention:* the likelihood of retaining persons due to the knowledge management approach.
- *Return on vision:* the return of the strategic vision due to the knowledge management approach.

Conclusion

So how does one create and manage organisations with high intelligence? As is apparent from the foregoing discussions, building and managing such an organisation involves more than just making isolated changes in the organisational systems and structures or implementing certain practices. Since a knowledge-based strategy aims at creating new operating paradigms or industry standards, an organisation can succeed in doing so only by developing capabilities to continuously transform itself. Only then can it create and participate in the envisioned future. To create new paradigms outside, the organisation must also create new paradigms for itself.

An organisation can succeed by developing capabilities to continuously transform itself.

Such a goal, however, requires radical efforts to change the mind-set and mental model of people about the organisation per se. Given the fact that the rate and complexity of change will only go on increasing, the conventional models of organisations (which focused on creating stability) will need review and revision as well. It is a historical fact that paradigmatic changes in society are not pushed and imposed from above; they occur because of a pull of emerging practices and technologies. Social systems (whether political structures, families, or organisations) invariably resist, or are the last to adapt to, new realities. Thus, the greatest challenge in the future will not be quick adaptation or creation on new practices and technology; the greatest challenge for organisations will be to develop the capability to learn new ways of operating and recreating themselves. Those that will be able to do so will emerge as intelligent organisations.

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Size is not a deterrent to success. I've never seen a small company that didn't want to be a big one. The challenge is being big without being slow.

– Louis V. Gerstner Jr.

You can't communicate. Everything you say and do or don't say and don't do sends a message to others.

– John Woods

Knowledge Management: Building Relevance Through Introspection

Gautam Brahma

Knowledge Management (KM) awareness does not always lead directly to changes in the behavior of practicing managers. There is a need to establish usefulness in the context of their individual work. Once this is done behavior will be driven by the need for increasing personal effectiveness. Personal experimentation with local KM initiatives will commence and will also spur a demand for larger, all embracing initiatives that fully leverage the intellectual capital from erosion.

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When individual practicing managers read about Knowledge Management (KM), they often form one of the following opinions:

- This is something driven by IT. It involves buying and deploying complex software and the right hardware to run it. Obviously, it is a big budget activity best handled by the Chief Information Officer. It looks useful for the company. I would definitely like to be a part of the initiative after all the systems are in place and I have been suitably trained.
- This is something baffling. There are lots of unfamiliar terms and coloured boxes and arrows being used by everyone who writes about it. I can see the value of converting tacit knowledge to explicit knowledge in the workplace so that it can be picked up and used by a lot more people. However, I do not know what I can do to make it happen in my area of control. I also do not know whether all tacit knowledge is useful when made explicit. I know how to balance myself on a cycle but will find it hard to describe how I actually do it. Even if I could, would it really help another person learn to ride a cycle? There are too many imponderables here. I will wait for some company-wide initiative to do all this and will then do what I am told.

In both cases, even the positive minded managers decide to do nothing as they cannot see how they can individually start using KM to improve their own efficiency and effectiveness as managers. This is in contrast to other tools for planning, analysis, budgeting, and performance management where the link with one's own work is very clear. It is true that many companies provide specific training to their managers on how to do effective planning and make tools available to help this happen. However, even where they do not do so, managers pick up tips and tools from all around to do their own

planning because they can see that this makes them better managers. When it comes to KM, it is not at all clear what they can do on their own. Hence, in the minds of managers, KM becomes an initiative that 'others' or the 'organisation' has to worry about.

When managers do not relate to KM at a personal level, they have to be either coerced or given incentives to participate in the organisation's KM initiatives. Organisations have reported using all manner of incentives and awards, both trivial and serious: frequent flier miles, chocolate covered ice-cream bars, mouse pads, weightages in appraisals, laptops, holiday trips, 'Not Invented Here But I Did It Anyway' Awards etc. One never hears of managers being given incentives to do budgeting or planning. This is because those activities are seen by them as directly a part of their job and vital for their effectiveness as managers. If KM can be seen in the same way, it would not require incentives or force. ('Force' is mentioned here because some organisations continue to naively 'demand' participation in KM initiatives little knowing that, as a participant put it in a recent conference on KM in Asia, 'Knowledge can only be volunteered. It cannot be conscripted.')

Budgeting or planning activities are seen as part of job and vital for effectiveness as managers. If KM can be seen in the same way, it would not require incentives or force.

It is true that KM uses IT enablers that can often be complex and expensive. It is also true that a lot of writing on KM is couched in jargon and obfuscation. However, there is much in KM that can be practiced by individual managers to make themselves more effective. This practice will naturally yield much better results if organisation-wide deployment exists but can be useful even without that.

Discovery Exercises

Three exercises, if performed by managers on their own, can provide them useful insights into the way they have used KM in the past without knowing it, and also into the critical need to do so in the future.

- List all the actions that you think you performed well over the last week that were important for the organisation. Use any criteria for importance that you think fit. Now, for each of these actions, ask yourself how you came to perform them the way you did. (Explore issues like: Were you formally trained to do so? Did you act as directed by someone else? Did you learn from watching a senior or a colleague in the past? Did you learn this from a book or an article? Did you combine something you had read with something you had been trained to do with something you had watched other people do? If you learnt from others was this something that was organized? Or accidental because you happened to share space or simply be around?...)
- From among those who report to you, think of the person you believe is the best in terms of usefulness to the organisation. Again, use any criteria you think fit. Now imagine, in as much detail as you can, the consequences if this person does not show up for work starting tomorrow and can never be reached in any way either in person or over the phone and other means. (Explore issues like: What will be the effects on the working of the organisation? How long will they last? What if any will be the costs that can be associated with these impacts?...)
- Repeat the exercise above for yourself. In other words, imagine the impact on the organisation if you stopped coming to work starting tomorrow and could not be reached by anyone ever. (Explore issues like: If your supervisor is asked to make an assessment would it be similar to yours? Or would he underestimate the impact because he does not know enough of your work? Similarly, could you have underestimated the impact in the second exercise above? Is this impact possible even if you stay on but become disinterested or less productive?...)

Potential Learning

These exercises sensitize managers to the ways in which they actually acquire and add to knowledge. The exercises also reveal the immense value of intellectual assets within the organisation. With luck, they also show up how these assets are likely to be underestimated. Finally, they strongly underline the need to do a good job of KM. The most important thing is

KM is something managers must do atleast to protect organisation from the hidden costs associated with the loss or degradation of intellectual assets.

that all this is done in the context of personal experience in the normal setting of one's work. KM then becomes something that all managers must do if they want to be effective as managers. It is also something they must do at least to protect their organisation from the hidden costs associated with the loss or degradation of intellectual assets. Managers can then begin taking the first steps in doing KM as well as they can to manage their own job better, by doing more to learn from others through observation and instruction and by creating greater opportunities within their own teams for local initiatives. These initiatives could range from collaborative work, sharing of good and bad experiences, and consciously consulting listed 'experts' to even creating appropriate repositories for frequently asked questions, frequently encountered problems, unusual experiences, useful reports, success stories, and failure postmortems.

KM initiatives range from collaborative work, sharing of experiences, to creating repositories for frequently asked questions, encountered problems, success stories, and failure postmortems.

The insight provided by the introspective exercises into the unconscious acquisition of tacit knowledge (through observation of the behavior of others and combination of this with one's own experience and ideas) is itself very illuminating. Managers realize that they have been practicing KM all along without knowing it or calling it by that name. They can then choose to simply make this activity more effective by doing it wilfully.

The introspective exercises also generate a healthy respect for several current organisational practices. They are KM initiatives by another name and need to be recognized as such, built upon and made more effective. They do not have to rubbed off altogether while designing a grand new KM initiative for the organisation. This itself goes a long way in creating a feeling of organisational self-worth and generating goodwill towards KM.

Organisational Benefits

At first sight, fragmented KM initiatives seem to fly in the face of effective KM that leverages the resources of the organisation as a whole. However, these individual initiatives driven from personal realization of the usefulness of KM can create a pull effect for organisation-wide KM. They can thus reduce the learning and acceptance phase and eliminate resistance. In addition, they can improve the quality of the design of the organisation-wide KM initiative as managers contribute from direct personal experience, need, and conviction in this exercise. Again, these local initiatives set to rest the notion of KM as something that is IT intensive and best used only by the IT savvy. In fact, managers find that the spirit of KM can be captured even without IT investments. Finally, it leads to greater maturity and mutual respect as managers discover multiple 'experts' existing in narrow areas within their own span of control and also as they realize that they owe their effectiveness to countless others.

The spirit of KM can be captured even without IT investments.

Conclusion

Introspective exercises can establish the personal usefulness of KM, leading to local KM initiatives that can have numerous direct and indirect benefits. These range from greater mutual respect in the work groups to better eventual design of organisational KM systems and reduced dependence on incentives. KM can then be seen as yet another tool in the skill set of the practicing manager and not as an exotic, expensive fad of senior management.

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Knowledge Management: Emerging Perspectives

Mahesh Chand Garg

Knowledge management is a relatively new and fast-moving field. It is the collection of processes that govern the creation, dissemination and utilisation of knowledge. Knowledge management is not something separate from the rest of the organisation, requiring a separate organisation and staff. The basics—strategy, organisation, budget, incentives, community, technology and measurements—are aimed at weaving knowledge sharing into the fabric of the organisation in order to enhance overall enterprise performance.

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Over 130 years ago, Karl Marx revolutionised political and economic thought with the publication of his manifesto *Das Kapital.* In it, he called for a world economy in which the workers owned the factors of production. Today his vision of a grand communist society lies in tatters. It is supremely ironic, then, that at the end of the 20th century, the most competitive bastions of capitalism have surrendered ownership of their most valuable factor of production-knowledge-to the workers. This was not entirely intentional. It just so happens that knowledge has become the most important factor of production for information economy, and knowledge resides primarily in the minds of the workers. This is a dramatic change in thinking for most economic models, and requires a fundamental reappraisal of the way that organisations manage this newly empowered resources.

Knowledge has emerged as the key differentiating factor for organisations in the late 1990s. In decades past, companies relied on economies of scale, marketing and sales proficiency or the quality and customer service movements to drive their competitiveness. Technology, however, is leveling the playing field. Parity in quality and service is increasingly becoming the norm across all industries. The remaining bastion of competitive differentiation is innovation. Companies which are most successful assume that competitors will always be able to emulate what they do over time, and the only way that they can stay ahead is to innovate before their competitors, leaving them to play catch-up. These companies have developed a sense about themselves, their competencies, and their intellectual assets that sets them apart. As these companies shifted from natural resources to intellectual assets, executives have been compelled to examine the knowledge underlying their businesses and how that knowledge is used. At the same time, the rise of networked computers has made it possible to codify, store and share certain kinds of knowledge more easily and cheaply than ever before.

As companies shifted from natural resources to intellectual assets, executives have been compelled to examine the knowledge underlying their businesses.

Meaning of Knowledge Management

In today's fast-changing global markets, success is no longer tied to the traditional inputs of labour, capital or land. The new critical resource is inside the heads of employees: knowledge. What a company knows—and how it leverages that knowledge—has never been more essential for success. Suddenly, it seems, everyone is talking about "Knowledge Management". As a formal discipline, knowledge management is relatively new. One of the problems with knowledge management is the absence of common naming terms, concepts and features. Also, as it is a cross-disciplinary domain, knowledge management can be difficult for many people to understand. In many ways, knowledge management is a process, a methodology rather than a product. It is a methodology for dealing with the business problem whereby most knowledge gained through experience is informal in nature and is not captured in a formal way. There are many definitions of knowledge management. One definition of knowledge management is that it is the systematic management of knowledge processes by which knowledge is created, identified, gathered, shared and applied. Knowledge management is about connecting people to people, and people to information, to create competitive advantage. Knowledge management is the discipline of capturing knowledge-based competencies, storing and diffusing them in order to add value to the business.

Knowledge management is the systematic management of knowledge processes by which knowledge is created, identified, gathered, shared and applied.

Knowledge management is about connecting people to people, and people to information, to create competitive advantage.

Knowledge management involves the identification and analysis of available and required knowledge, and the subsequent planning and control of actions to develop knowledge assets so as to fulfil organisational objectives. Knowledge assets are the knowledge regarding markets, products, resources, technologies, skills, systems that a business owns or controls and which enable it to achieve its objectives. The more efficient an organisation is in using its knowledge assets, the greater its opportunity to improve performance and gain a return on the investment made in knowledge acquisition. In essence, the effective management of knowledge assets forms the cornerstone of the learning organisation.

The goal of knowledge management is providing access to the following types of information to all who "need to know" it:

- Formal corporate information such as policies, procedures, and product information.
- Informal information such as documents, reports, presentations, and proposals.
- Expertise, often recorded in documents like lessons learned, stories and case histories.

This information is stored in a special database called a knowledge base. The knowledge base is a large reference and is sometimes called an on-line reference. Because users have access to information—and the resulting learning—whenever they need it, knowledge management promotes just-in-time learning.

Literature Review

The literature on the subject of knowledge management covers three main areas:

The Method Approach: It is the use of systems, methodologies and associated technology-based processes that successfully capture, collate and manage knowledge. The stress is on proprietary knowledge collection systems, groupware products or the development or intranets. There is also some discussion on manual systems for knowledge capture and evaluation, which tend to look at formal organisational structures with practice groups; the clear delineation of selection processes and criteria; the responsibility allocated being hierarchically based.

The Expert Approach: It is the culture, organisational styles and protocols that enable successful access, dissemination and sharing of knowledge. The challenge is at of managing the expert. The stress here is on cul-

ture building, values, teams and leaders, staff retention and pay/promotion incentives.

The Research Approach: It is the application of advanced computer modelling and artificial intelligence techniques to knowledge management. There are also theoretical studies concerned with knowledge management as an academic discipline, often concentrating on developing a pure definition of knowledge.

The first two categories are largely impressionistic, based upon works of consultancy organisations and descriptions of their proprietary knowledge management products; or anecdotes of business culture. There are a few brief surveys which provide some evidence. This area has yet to receive academic research attention. The third category has produced a considerable number of publications and provides a detailed academic underpinning to the subject. There are a number of web sites providing information for those interested in the field.

The Value of Knowledge Management

In an organisational context, data represents facts or values of results, and relations between data and issues have the capacity to represent information. Patterns of relations of data and information and other patterns have the capacity to represent knowledge. Yet, what is the real value of information and knowledge, and what does it mean to manage it? We understand things based on the associations we are able to discern. If someone says that sales started at Rs. 1,00,000 per quarter and have been rising 20 per cent per quarter for the last four quarters then the sales are now about Rs. 2,07,000 per quarter. This is because we know what "rising 20 per cent per quarter" means.

Yet, if someone asks what sales are apt to be the next quarter, we would have to say, "It depends!" Because although we have data and information, we have no knowledge. This is a trap that many fall into, because they don't understand that data doesn't predict trends of data. What predicts trends of data is the activity that is responsible for the data. To be able to estimate the sales for next quarter, we would need information about the competition, market size, current production capacity, extent of market saturation, current backlog, customer satisfaction levels associated with current product delivery, the extent of capacity utilisation, and a whole host of other things. When we amass sufficient data and information to form a complete pattern, we would have knowledge, and would then be somewhat comfortable estimating the sales for next quarter. Anything less would be just fantasy!

In this example what needs to be managed to create value is the data that defines past results, the data and information associated with the organisation, its market, its customers and its competition, and the patterns which relate all these items to enable a reliable level of predictability of the future. What we would refer to as knowledge management is the capture, retention, and reuse of the foundation for imparting an understanding of how all these pieces fit together and how to convey them meaningfully to some other person. The value of knowledge management relates directly to the effectiveness with which the managed knowledge enables the members of the organisation to deal with today's situations and effectively envision and create their future. Without on-demand access to managed knowledge, every situation is addressed based on what the individual or group brings to the situation with them. With on-demand access to knowledge, every situation is addressed with the sum total of everything anyone in the organisation has ever learned about a situation of a similar nature. Which approach would one perceive would make a more effective organisation?

Knowledge management is the capture, retention, and reuse of the foundation for imparting an understanding.

Basics of Knowledge Management

Around the world, executives are increasingly confronted with the question of how to launch an enterprise-wide knowledge sharing programme. In some ways, the most difficult thing is the getting started, i.e., how to persuade the staff of the organisation to adopt the approach with enthusiasm, when at first it seems unfamiliar, counter-intuitive and strange. For the purpose of communicating the change idea, storytelling has proven to be an effective methodology. Once the organisation has decided to adopt knowledge-sharing as an approach, the management faces the question: what specific action steps need to be taken? Since knowledge management can involve changes in every facet of an organisation, it is sometimes difficult to know where to begin. Among the many things that need to be done, the following seven are the amongst the highest priority:

Knowledge management strategy: The first and most difficult step in launching a knowledge management programme is to place a strategy for sharing knowledge. It entails a collective visioning as to how sharing knowledge can enhance organisational performance, and the reaching of a consensus among the

senior management of the organisation that the course of action involved in sharing knowledge will in fact be pursued. Implicit in such a process is a set of decisions about the particular variety of knowledge management that the organisation intends to purse, including: what knowledge to share? with whom to share knowledge? how will knowledge be shared? why will knowledge be shared? and will knowledge be shared? Without such decisions, the opponents of knowledge management will sooner or later be able to block the shift, and so thwart the organisation's systematic ability to share its knowledge.

Organisation: In order to launch enterprise-wide knowledge management, some kind of organisational arrangements need to be put in place. Organisations are still experimenting with the right way to organise – some putting the function in operations, some putting it in strategy or finance, some putting it in the computing group, and some locating it as a function of top management. Whatever the organisational location, a pattern of arrangements that is becoming increasingly common includes:

- a very small central coordinating unit with overall coordination responsibility, and spearheading the change process in the organisation, making the case for change, solving problems as they emerge, measuring progress, providing support to communities of practice, and in general, doing whatever needs to be done in order for knowledge management to succeed:
- decentralised implementation responsibility resting with line managers of the existing business;
- help desks or communities of practice as the key instrument for sharing; and
- some kind of capacity to make organisation-wide policy decisions.

There is less agreement as to where to place the coordinating unit and there is no absolute right answer. Each organisation will decide depending on the politics and preoccupations of the organisation at the time. If the computer group provides a congenial and supportive home for the unit, that may be the best interim location. But it is important to keep the implementation arrangements light and flexible, so that they can be adjusted to deal with the changes in the organisation's business.

Budget: The provision of financial resources for sharing knowledge is often an unambiguous signal to staff that the organisation has definitely decided to incorporate knowledge sharing into the way the organisation functions. Funding will be needed to cover the incremental costs of the central processing unit, the technology, the communities and help desks. The main focus of the financial provisioning should be on support to operations. If more than 20 per cent of the resources are being spent on technology, a review may be warranted as to whether knowledge sharing has become confused with information management. In public sector organisations, the relative level of budget for knowledge management is particularly important in terms of signaling to the organisation's employees the importance that the organisation attaches to knowledge management.

Incentives: Since knowledge sharing usually entails a change in the way business is conducted, it entails a shift from vertical modes of behaviour to horizontal knowledge-sharing behaviours. It is important that the relevant behaviours are reflected in incentive systems. Thus, the value of knowledge sharing must be reflected in the on-going personnel evaluation, periodic merit review or pay bonuses of the organisation, so that managers and staff can see that knowledge sharing is one of the principal behaviours that the organisation encourages and rewards. In practice, information incentives in the form of recognition by management and visibility within the organisation can often be more powerful than the formal incentive system. In the long-term, however, the establishment of incentives through the regular personnel and reward system of the organisation can establish a clear value framework that confirms that knowledge sharing is not a mere management fad, but a part of the permanent fabric of the organisation.

The value of knowledge sharing must be reflected in the periodic merit review or pay bonuses of the organisation.

Community of Practice: An essential ingredient of knowledge sharing programmes in organisations is the community of practice. Community of practice means a group of practitioners who share a common interest or passion in an area of competence and are willing to share the experiences of their practices. It differs from a work team, principally in that it has no specific time-bound work objective, but exists indefinitely for the promotion of the issue or issues around the community is formed. In undertaking knowledge sharing programmes, most of the organisations have found that the nurturing of knowledge-based community of practice is a sine qua non to enabling significant knowledge sharing to take place. Such communities of practice are typically based on the affinity created by common interests or

An essential ingredient of knowledge sharing programmes in organisations is the community of practice.

experience, where practitioners face a common set of problems in a particular knowledge area, and have an interest in finding, or improving the effectiveness of, solutions to those problems. Various tools can be used to strengthen such communities, including the establishment of specific work objectives for the community, the provision of adequate staff, financial resources, technology and management support to enable it to conduct its activities. Launching and nurturing communities of practice for knowledge sharing programmes can be accomplished in the following ways:

- Endorsing informal communities that already exist.
- Asking practitioners what issues they care about.
- Instructing leaders to form communities.
- Launching purely virtual communities.
- Launching communities among the incorrigibles.

Nurturing of knowledge-based community of practice is a sine qua non to enabling significant knowledge sharing.

The effectiveness of a community is most easily measured by surveying the members of the community and asking them whether and to what extent the community has proved helpful to them and why.

Technology: The reach of know-how and experience possessed by individuals can be greatly extended once it is captured and explicated so that others can easily find it and understand and use it. In modern times, reports of activities, minutes of meetings, memoranda, proceedings of conferences, and document filing systems maintained by organisations are traditional commonly-used devices for recording content in paper format so that it can be transferred to others. More recently, electronic databases, audio and video recordings, interactive tools and multimedia presentations have become available to extend the techniques for capturing and disseminating content. Although these tools are not yet everywhere available in the developing world, they are spreading rapidly and present a unique opportunity for developing countries to benefit most from the technological revolution now unfolding. The availability of new information technology, particularly the world wide web, has been instrumental in catalyzing the knowledge management movement. Information technology may, if well resourced and implemented, provide a comprehensive knowledge base that is speedily accessed, interactive, and of immense value to the user.

Measurement: Organisation-wide knowledge sharing programme requires significant investments and entails major management effort, as well as behavioral changes throughout the organisation over a significant period of time. Putting in place a system for measuring progress is an essential step for a sustainable knowledge-sharing programme. The organisation must be prepared to accept some ambiguity or at least to rely on non-traditional measures, when it tries to evaluate the impact of knowledge-sharing. Measuring that impact, either in terms of return on investment or development impact, remains problematic. In principle, inputs lead to activities, which generate outputs, which in turn produce outcomes, which in turn result in overall impact. But each link of this chain poses its own measurement difficulties. In the early stages of the programme, the focus will inevitably be on inputs and activities. As the programme gathers momentum, the focus of measurement will increasingly shift to outputs and outcomes. Ideally, one would like to be able to go on to measure the impact of knowledge-sharing, but it is important to recognise that few, if any, organisations have been able to establish the clear links between inputs and outcomes that would convincingly demonstrate impact.

Organisation-wide knowledge sharing programme requires investments as well as behavioral changes throughout the organisation.

If these seven things are put in place, and kept in place over a sustained period, then the organisation will be well on the way to become a knowledge-sharing organisation. Conversely, if the organisation is not doing even one of these elements, it may want to consider whether its knowledge-sharing programme is likely to be sustainable.

Implementing Knowledge Management

To implement knowledge management, how much

does an organisation need to change its culture? Some people believe that a wholesale transformation is required in the way people work and act; but this is largely a myth. The fact is that successful knowledge management programmes work *with* organisational cultures and behaviours, not *against* them. There's no question that human nature and certain aspects of the corporate culture of organisations can interfere with the smooth operation of a knowledge management programme. Some individuals are proprietary about knowledge they possess, believing that their advancement and status depend on their demonstration of unique or exceptional knowledge. Some managers fear a loss of control if their department's knowledge is made available to others. Some staff members feel, at least initially, that they are required to make an extra effort to share knowledge without deriving any benefit from the process. And some supervisors are uncomfortable with the idea of staff members spending time on knowledge-sharing rather than completing traditional tasks.

To a certain extent, these problems are addressed through open communication about knowledge management and its benefits. Nevertheless, there's also need to take a new look at how people achieve recognition and rewards in organisations that practice knowledge management. Often, this cultural change occurs as a direct result of the process of implementing knowledge management. People begin to realise that by sharing knowledge, they become recognised as people who have expertise in particular areas. This can be formalised through official recognition of people who have made outstanding contributions to knowledge-sharing.

People frequently think that it will not take much time to implement knowledge management. Knowledge management is not a project that begins and ends, but an ongoing and evolving change in the way an organisation operates. Additionally, knowledge-sharing can grow across organisational boundaries and could encompass cooperating organisations.

Conclusion

Knowledge management helps an organisation to gain insight and understanding from its own experience. Specific knowledge management activities help focus the organisation on acquiring, storing and utilizing knowledge for such things as problem solving, dynamic learning, strategic planning and decision-making. Knowledge-sharing is becoming the control driver of the 21st century economy. Among the many companies which now recognise their stock of human capital as the major asset to business success, access to knowledge and just-in-time learning are more important than ever before. The continuous changes and innovations in information technology and telecommunications will make knowledge even more accessible. The seven basics—strategy, organisation, budget, communities, technology, incentives and measurement—are aimed at weaving knowledge-sharing into the fabric of the organisation in order to enhance overall enterprise performance.

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Be a good listener. Your ears will never get you in trouble.

— Frank Tyger

Gaining Competitive Advantage Through Managing Knowledge

Hemant Kumar Sabat

As technology leads the transition of economy from an industry-based to information-oriented age, knowledge management appears as a crucial competitive weapon. Using knowledge more powerfully than competitors do is the challenge of the information age. By institutionalizing corporate culture and establishing systems that inspire people to share their know-how, a firm can deliver on the full promise of the power of knowledge entity. This demands a change in the way we harness the power of the knowledge entity. This paper describes the drivers of Knowledge Management (KM), the elements of KM, how KM can come to be understood as a critical part of a company's competitive strategy, and how to deploy a sustainable KM system that suits the business needs of an organisation.

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Today we live amidst a shift in society and economy: a shift from the Industrial Society to the Information Society. True to Peter Drucker's (1988) call, while undergoing this unsettling transition, the business world heralds an information-based organisation. Using knowledge more intelligently, and hence, effectively, than the competitors is key to battling it out in the global information age. Many organisations are devoting significant resources to turning what they collectively "know" into something more valuable than what their competitors know. But these organisations are also discovering that it is difficult to make progress. A major hurdle has been the limited number of successful models to help managers. Much of the focus in Knowledge Management (KM) bailiwick has been on technology systems—and figuring out why people do not use them.

The second hurdle is how to implement the knowledge management process to gain sustainable competitive advantage in a fiercely competitive marketplace. The primary power of knowledge resides in the knowledge capsule and its application to a situation. Though hoarding knowledge preserves short-lived power with the owner, it limits utilization of knowledge to its full potential. People share ideas and information only when they need to. Understanding what people need to share to compete successfully will determine what type of knowledge management system to use—and how much technology a company actually needs. Developing systems that encourage and empower people to share knowledge is the key to deliver on the full promise of cocooned power of knowledge. Further, a company's deployment strategy needs to address company culture as well as enabling technology for KM. All the technology in the world will not coerce knowledge out of people who want to hoard it. People will freely share their insights and know-how only when their environment encourages them to do so. Creating that environment through appropriate business systems in place is the key to successful deployment of KM business philosophy.

Developing systems that encourage and empower people to share knowledge is the key.

The Drivers of Knowledge Management

Change is the normality; it is the constant. The single driver that is stirring change faster to generate new corporate realities is the world working towards a truly global economy functioning in conjunction with the technological revolution, in particular, Information Technology (IT) revolution (Sabat, 2001a). Fierce global competition, dynamic aspirations, and expectations of customers that influence markets, and technological breakthroughs have synergistically combined to render conventional information systems anachronistic, unproductive and inefficient.

To weather the inclement storm, companies have adopted business models that have a different value proposition altogether. For example, originally, the consulting firms provided a resource[1]: *business problem solvers* for their clients. So, the consulting firms positioned themselves as "generalists". As the clients have begun sourcing people from the same pool that the consulting companies use, the clients expect their consulting companies to broaden their offering by including consulting firms' *broad experience* and, more importantly, access to the *knowledge* that emerges from this experience. This requires the consulting firm to demonstrate the power of its collective knowledge base built through experience (exposure to many real life problems; Geisler, 1999), synthesis (ability to adapt known solutions to new problems), and availability (ability to distribute the firm's knowledge). The quality of people is still important but clients are increasingly requiring deep industry-and/or function-specific expertise. True to this, Hargadon and Sutton (1996) describe the eminent role of a consultant as a technology broker.

The primary power of knowledge is cocooned in the *knowledge entity* itself. This power is unleashed by using the organized and processed data or information to convey understanding, experience, accumulated learning, and expertise as it applies to a current problem or activity. By being a repository and agent of the knowledge capsule, the owner of knowledge derives only secondary power from the knowledge entity. So, if the owner hoards and restricts use of knowledge by others, knowledge goes unutilized to its potential. This defeats the purpose of utilizing knowledge to create value for the greater good.

The potential power of knowledge is unleashed in a shared context. To harness the potential of knowledge, organisations should create this shared context, which refers to a shared understanding of an organisation's external and internal worlds and how these worlds are connected. Fahey and Prusak (1998) emphasize that knowledge is a flow, not stock. It should not be viewed as an entity that exists on its own, that can be captured, transmitted among individual, and stored in multiple ways within the organisation. It is an entity that is in constant flux and change. Individuals create it and it is largely self-generating. Moreover, it connects, binds and invovles individuals; and hence, is inseparable from individuals.

Knowledge is about imbuing data and information with decision and action—and action-relevant meaning. Information abut business issues becomes knowledge when decision-makers determine how take advantage of the information. In this way, knowledge is inseparable from thinking and acting. Not only this, knowledge generation and its use at the level of individual is a never-ending work in progress. At its core, however, getting to different states of knowledge management requires logical reasoning to organise the data and act in a context. So, explicating thinking and reasoning processes is critical.

Moreover, the power of knowledge thrives on increasing returns on economies, a small advantage tends to lead to a larger advantage. So, the more we use an information, the more power of the knowledge entity is unleashed, the more influential it is shaping the future course of action, and the more refined, and hence, useful, the entity is in delivering value. For this insights must be compiled and shared as liberally as possible. Following mechanisms help KM deliver increasing returns to scale economies:

Synergy through collective wisdom

Huge efficiency gains can be achieved by compiling the insights. However, a much deeper understanding can be achieved if compiled insights can be organized and synthesized in a context-relevant form. Because it is generally the case that insights are not independent, but are reflections of a few causal patterns between insights and decision-making, the synergy derived from organisation and synthesis of insights increases the value of insights multi-fold. In essence, these causal links constitute understanding and knowledge.

In consulting firms, for example, consultants work on similar business issues for multiple clients. If there is no

1. Producing and selling knowledge constitutes the core asset or resource of a consulting firm (Sarvary, 1999).

KMS in place, consultants will be forced to replicate a considerable amount of their colleagues' work. As a result, instead of deriving synergies from the firm's collective wisdom to solve client's problems, the consultants will end up providing lower quality service; decisions will be based on *individual* insights rather than *collective* knowledge; the time to market by consultants will increase substantially. The result will be loss of clients. Since most consulting engagements are based on relationships established in a previous engagement (Maister, 1993; The Economist, 1997), loss of clients will also lead to shrinkage of client base. Moreover, loss of clients tantamounts to losing the consulting firm's capability to learn. If the client base is not large enough, the firm with even a good KMS will not be able to generate deep understanding to deliver the broad experience – the current value proposition of a consulting firm, as stated earlier. As a result, the firm will have even less chance to attract new clients. Thus, a small disadvantage may quickly turn into a long-term disability for the organisation. On the other hand, a KMS provides context-relevant collective insights to make decisions.

KMS provides context-relevant collective insights to make decisions.

Higher productivity and improved quality of human capital

Knowledge Management can improve the quality of human capital at a firm. However, for this, people must use KMS. People will use it when they see relevance of KMS' content to their work. For this to occur, the content must be current. Like any system exhibiting increasing returns, knowledge retains its utility only when it is current. A knowledge base will retain its currency if people contribute to it. That said, if people in the organisation see the system as a powerful resource, they are also more likely to contribute to it. This will keep the knowledge base current. Further, by using such a current system, people can focus on more challenging tasks than the mundane data collection. This will not only increase productivity, but also provide higher job satisfaction to employees thereby increasing the quality of worklife, and hence, increasing retention of employees. To the extent that the quality of the job itself is an important factor in attracting good employees, a good KMS results in developing the human capital; this leads to increasing returns to scale.

Shorter time to market

Knowledge Management reduces time to market a service thereby giving competitive advantage to a firm. This benefit arises from the usual feature of systems exhibiting increasing returns to scale namely, being good is important, but being first is crucial. A better product developed later might not have the chance to prove itself because it might not have the chance to establish the standard and its utility. This is especially true in industries that have service offerings with short product life cycles. In high-tech industries, for example, firms that are first to come out with a good product will establish the standard, and subsequent products have little chance in the marketplace. A striking example is Cisco Systems' dominance in routers industry which remains unchallenged by Juniper Networks' higher quality product. Similarly, Microsoft and Intel hold on to their monopoly in computer operating systems and computer chip industries respectively.

Knowledge Management reduces time to market a service thereby giving competitive advantage.

Better management of customer expectations

A key aspect of competition in increasing returns economies is managing customer expectations. This is advantageous in two ways:

- Better management of customer expectations will help a firm build its brand equity. As a result, not only will new customers seek the firm's products[2], but the existing customer base would also turn more loyal to the firm.
- Firms that center their business model on knowledge build their value upon their client relationships by procreating knowledge from their customers. For example, in consulting, a single engagement is often the beginning of a long-term relationship (Maister, 1993; The Economist, 1997). Meeting client expectations is the key to a long-term relationship. This relationship is the source to generate sustainable revenues. In addition, retention of client base strengthens retaining the consulting firm's capability to learn. If the client base is large enough, the firm with a good KMS will be able to generate deep understanding to deliver its sole value proposition to the clients – the broad experience. As a result, the firm will attract new clients.

2. The term "products" refers to physical goods and services.

Profitability from increased mindshare[3]

A premium quality of service to a customer in one engagement or transaction will form expectations about the future web of learning relationships. Customer loyalty is one of the three components of business loyalty[4] (Reichheld & Teal, 1996). Business loyalty generates sustainable revenues and profitability (Sabat, 2001b). In this way, a small advantage may turn into a long-term advantage.

As KM increasingly gains currency in the corporate world, businesses must realize that the concept of KM is nothing new. Corporations always had some process to synthesize their experience and integrate it with knowledge acquired from external sources. (A few of the examples are given in Table 1.) Recent developments in IT have provided new tools to better perform the activity of building knowledge capital. So, what is new about KM is the firms consciously establishing a KM process. IT has a critical role in raising this consciousness because IT's use requires the firm to reevaluate the entire KM process and KM's role within the firm as the firm adopts new business models and new ways to remain competitive. Subsequent sections describe the KM process and IT's role as an enabler of KM.

Table 1: Examples of Knowledge Management Systems

Firm	KMS
Andersen[5]	Knowledge Xchange
Arthur Andersen	AA Online
Bain	BRAVA (Brain Resource Access for Value Addition)
Booz-Allen & Hamilton	Knowledge On-Line
Cisco	Cisco Connection Online
Ernst & Young[6]	Knowledge Web
KPMG Peat Marwick	Knowledge Manager
McKinsey	PDNet Database; Knowledge Resource Directory
Nortel Networks[7]	World Online
Price water house Coopers	Knowledge View; Intellectual Capital Systems
Sabre[8]	Source

3. Mindshare means share of a customer's purchase.
4. Business loyalty has three components: customer loyalty, investor loyalty and employee loyalty.
5. Andersen Consulting in now Accenture.
6. Ernst & Young is now part of Cap Gemini Ernst & Young.
7. The author is currently employed at Nortel Networks.
8. Based on the author's employment at Sabre in the year 2000.

The Knowledge Management Process

From a systemic perspective, the input to KM process is raw information (e.g., individuals' experiences, data acquired from external sources), while the output is knowledge that is useful to solve (business) problems (Fig. 1).

Data	Information	Knowledge	Wisdom
• An elementary description of things, events, activities and transactions without a context	• Organized data that has meaning and relevance to the recipient	• Data or information that has been organized and processed to convey understanding, experience, accumulated learning, and expertise as it applies to a current problem or activity	• Overriding principles
	• Data in context • Relatively devoid of structure	• Information with causal links, and therefore, highly structured	

Fig. 1. The knowledge value chain

From a business process perspective, Knowledge Management is a business process through which an organisation acquires and/or creates and uses (stores and applies) its institutional or collective knowledge (or intellectual capital). It includes three sub-processes (Sarvary, 1999; March & Garvin, 1997): Organisational learning, knowledge production and knowledge distribution.

Knowledge Management is a business process through which an organisation acquires, creates and uses its institutional or intellectual capital.

Organizational learning

Organisational learning is the process through which the firm acquires information and/or knowledge. Generating intellectual capital involves the following two tasks:

- Identifying the desired content proactively, often before it is in finished form
- Getting people to contribute ideas

Both technological and cultural barriers make the process difficult. Groups and individuals have to learn how to submit material electronically, and in most cases, have to undergo a shift in mindset and culture, away from hoarding knowledge, through being a resource of knowledge, and toward sharing ideas. Knowledge management can be successful in learning organisations (Senge, 1990). Companies are focusing on generative learning, which is about creating, as well as adaptive learning, which is about coping. Generative learning requires new ways of looking at the world, whether in understanding customers or in understanding how to better manage a business. It requires seeing the systems that control events. When we fail to grasp the systemic source of problems, we are left to "push on" symptoms rather than eliminate underlying causes. Then the best we can ever do is adaptive learning. Generative learning is more conducive to a sustainable KM practice.

Knowledge production

Knowledge production is the process that transforms and integrates raw information into knowledge, which, in turn, is useful to solve business problems.

Knowledge is produced in two steps:

- Once information has been collected, it must be organized so that it can be represented and retrieved when needed in a suitable form
- Developing the information includes selection and further refinement of material to increase its value for users

Both tasks often occur simultaneously, are normally collaborative, and draw upon the expertise and experience of practitioners.

Organizing the information: Knowledge sharing systems or tools – including knowledge bases, navigational devices, user interfaces, and taxonomies – must be designed to facilitate this process. A knowledge base is a collection of facts, rules and procedures organized into a schema; it is an assembly of all the information and knowledge of a specific field of interest. Two issues arise about knowledge bases: One, proper positioning of material and linkages among the elements are critical. For this reason, knowledge bases are not synonymous with databases. Databases contain little more than fields of raw data, while knowledge bases are sensitive to context and relationship, making the material easier to access, interpret, and use. Two, knowledge bases can further be distinguished by their degree of "filtering:" divergent and convergent.

A knowledge base is a collection of facts, rules and procedures organized into a schema.

Divergent systems: Unfiltered knowledge bases include those that archive documents directly, or that enable many-to-many communication without intervention by others. Such divergent systems are organisational forums to which anyone could post a question, ideas, or document. There is no editing, and no assessment of quality before material is entered into the system. A representative of this category is Arthur Andersen's AA Online. It is an organisational forum for sharing information and ideas using Lotus Notes as platform (March & Garvin, 1997).

Convergent systems: Filtered knowledge bases, by contrast, contain content that has been screened, distilled, and approved for use by recognized experts. At Arthur Andersen, Global Business Practices (GBP), a collection of highly distilled information on best business practices, is a representative of such convergent systems. The material that is entered into these systems is reviewed and approved by subject matter experts as being among the best of its kind (March & Garvin, 1997).

Not only are both systems essential, but they also have to be linked for maximum effectiveness. Convergent systems serve to communicate what experts believe are the best insights, approaches, methodologies, and practices of the time; these throw light on most effective ways of performing particular processes. Yet these face the primary challenge of avoiding obsolescence. In convergent systems, continually refreshing the material to retain its currency is a critical task. Without a complementary divergent process, the material is likely to decay, becoming rigid and out of date. Divergence ensures that new ideas are introduced, making it possible to see what emerging ideas are hot and what unanticipated topics are attracting interest. Moreover, to get people to contribute their tacit knowledge into convergent systems, experts have to be asked specific questions in a context, and provided a forum for them to have a conversation through divergent systems.

Developing the information: While developing the material, an important issue is how to "chunk" the material and divide it into meaningful categories, especially as firms begin to develop "knowledge objects." [A knowledge object is a module of information or knowledge that has been carved out of its original context for reuse in other settings. These include frameworks for diagnosing quality problems, or a set of strategic con-

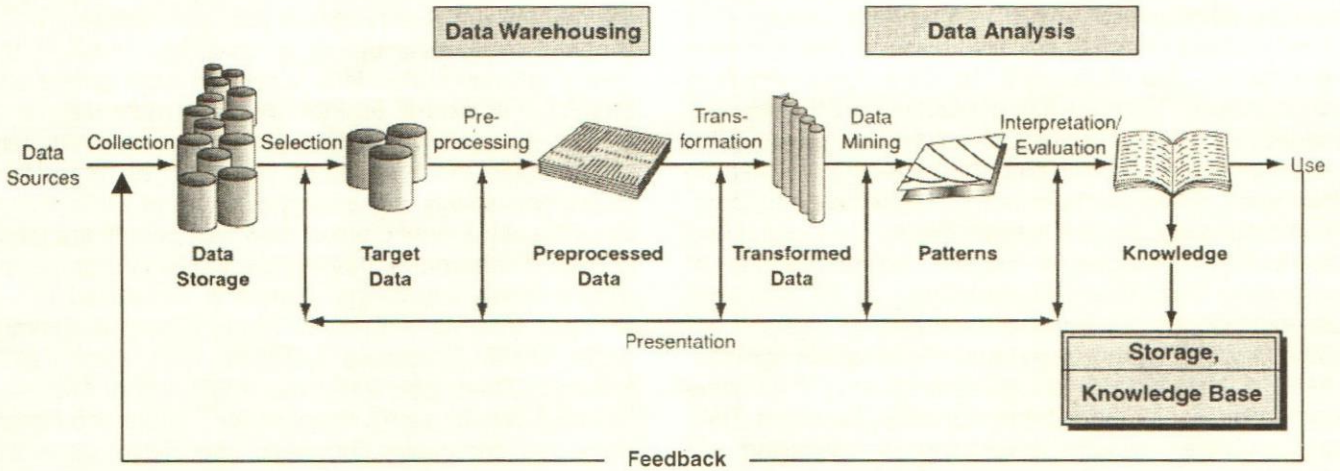

Fig. 2. The Knowledge Management Process

Adapted and modified from Turban, E., McLean, E., & Wetherbe, J. (2001). *Information Technology for Management: Making Connections for Strategic Advantage, Second edition, Wiley & Sons: New York.*

cepts. Ernst & Young's PowerPacks are a good representative of this category[9].] Further, the chunk must fit the context the user is in, and the chunk must be prone to be decoupled and fit comfortably somewhere else. Moreover, the way the material is chunked and constructed will also affect the search mechanisms and tools, especially those that are more advanced.

Knowledge distribution

Knowledge distribution is the process that allows members of the organisation to access and use the collective intellectual capital of the firm. There are two primary objectives of this sub-process:

- Making it easy for people to find what they are looking for
- Encouraging the use and reuse of knowledge

Knowledge distribution allows members to access and use the collective intellectual capital of the firm.

Push versus pull systems: The most critical choice is between "push" and "pull" systems. The push systems make material available by sending large masses of information out to users, while the pull systems wait until users call on the knowledge base to draw material out of it, often through detailed searches. Pull systems are less desirable largely because the typical user is too busy to spend time searching for specific data, frameworks or tools. But then the push systems contain a glut of information. A compromise could be reached through "targeted push" systems that are sensitive to user interests and even their current work context, and proactively deliver material that would be helpful and relevant. Because virtually every professional uses e-mail, tool developers are also working to achieve interoperability between e-mail and knowledge-sharing tools.

The KM process is visually described in Fig. 2.

Knowledge Management Infrastructure

A KMS is the infrastructure necessary to implement the KM process. KMS has two components: new organisational units and roles, and the development and enculturation of knowledge sharing technologies and tools.

A KMS is the infrastructure necessary to implement the KM process.

Organizational infrastructure

The organisational infrastructure of KMS includes organisational units and roles, appropriate training and reward systems, organisational culture, and internal procedures that govern the process. Specialized knowledge management units often emerge, or older units expand their responsibilities, to establish, coordinate, and

9. Based on the author's interview with Ernst & Young (2000)s.

manage the technology and tools, and to facilitate the capture, development, and distribution of knowledge. The work of these units is normally to ensure that common approaches are used and become institutionalized among users. "Communities of practice" are the acknowledged "owners" of content; they have the responsibility of generating and developing the knowledge relevant to their work. As an example, in the corporate world, communications groups are responsible for developing and distributing messages for internal communications. At consulting firms, these communities may be organized around industries, functional expertise, or selected activities such as mergers and acquisitions, or risk management. A knowledge management steering committee comprising senior management provides oversight. Their responsibilities include developing or assessing KM strategies, setting KM investment levels and priorities, and establishing the scope of knowledge-sharing activities.

Chief Knowledge Officers (CKO) or Chief Leaning Officers (CLO champion knowledge management activities, develop strategic approaches to knowledge, and build the knowledge management infrastructure at the firm level. Knowledge Managers work as intermediaries and facilitators. Some focus on process issues, getting people to contribute ideas, developing structures for organizing information, and making sure that content owners carry out their responsibilities. Others work more directly on content, filtering and developing material that has been generated internally through client engagements or externally from published sources.

Despite emergence of several organisational units and roles, companies increasingly face several formidable challenges. One, within professional service firms such as law, tax advisory, consulting, most knowledge managers support client-serving professionals. There are conflicting views about whether people in these roles should work part-time as knowledge managers while also doing client work, rotate in and out of full-time knowledge management roles, or commit to a knowledge management career track. An argument against rotation is: consistency is essential to provide high-quality seamless knowledge services. However, losing touch with clients is a far greater danger. Another debate is over the need for a specialized corps of knowledge managers. Some see these skills as distinctive and hard to develop, while others see the tasks as simple extensions of day-to-day consulting activities.

A greater challenge is to institute changes in performance and incentive systems that are essential to create a culture in which knowledge sharing is the norm. Measurement, however, remains problematic. Tracking is usually easier on the contribution side because an individual's contributions to knowledge bases or online discussions are readily observable, and names can be attached to specific pieces of material. However, the quality of contribution is a subjective assessment and situational in nature. Further, usage is more difficult to assess, especially when data can be accessed remotely. In particular, the number of "hits" on an entry is a knowledge base is only a fuzzy indicator of value; it says very little about how often or how well people are using an idea. Furthermore, this system works in a corporate culture where knowledge sharing is formalized into a standard form as in Ernst & Young (Chard & Sarvary, 1997), KPMG (Gladstone & Eccles, 1991; Alavi, 1997), Andersen (Davenport & Hansen, 1998), Arthur Andersen (March & Garvin, 1997), Fannie Mae[10] Sabre and Nortel. There are companies, however, specifically generalist strategist companies such as McKinsey (Bartlett, 1996), Bain and The Boston Consulting Group, that have invested heavily to facilitate person-to-person contact for knowledge management (Hansen et al, 1999).

Quality of contribution is a subjective assessment. Further, usage is more difficult to assess, the number of "hits" says very little about how well people are using an idea.

IT infrastructure

The second component of KMS – the IT infrastructure – comprises of three technological sub-components: Database management system, Computer Networks and Communication systems and Secure browsing.

Database management system: The database and database management systems collect and hold enormous amounts of information.

Computer networks, and communications and messaging systems: The communication and messaging system helps retrieve and transmit material independent of location. Web technology, e.g., Intranet, and groupware platforms such as Lotus Notes, allow the companies to develop systems to facilitate this process. While firms such as Fannie Mae, Cisco (Nolan et al, 1998), Dell (Hansen et al, 1999), Boston Consulting Group (Chard & Sarvary, 1997) and Booz Allen & Hamilton (Chard & Sarvary, 1997) use Web-based tech-

10. In early 1999, the author had established a Knowledge Management System in a business unit at the Fortune 25 $44B company.

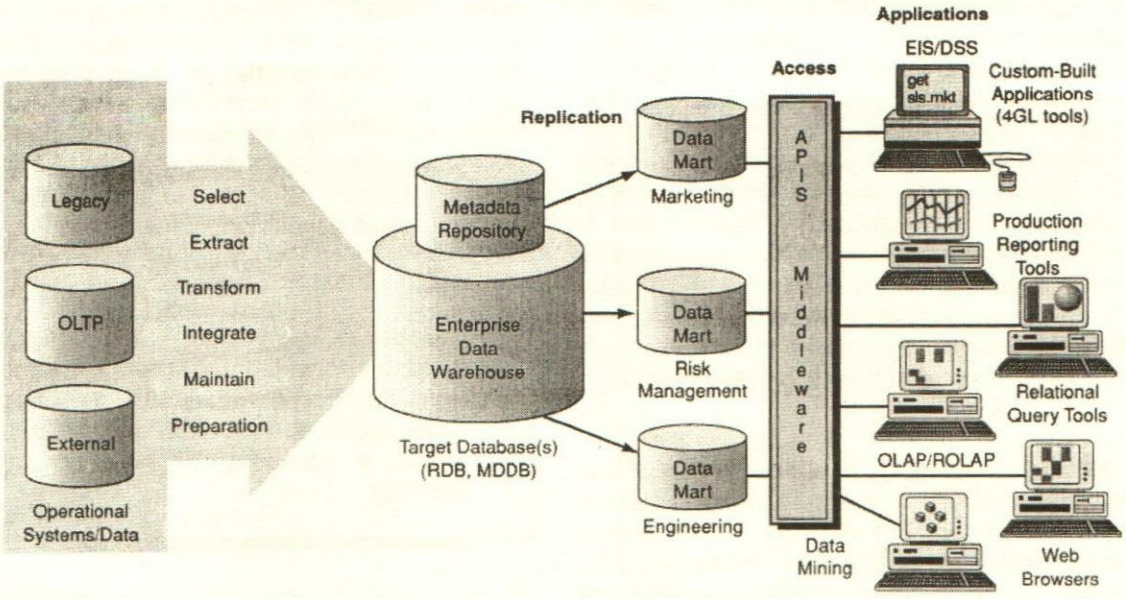

Fig. 3. The Components of a Knowledge Management System

Adapted from Turban, E., McLean, E., & Wetherbe, J. (2001). *Information Technology for Management: Making Connections for Strategic Advantage, Second edition, Wiley & Sons: New York.*

nologies, Arthur Andersen (March & Garvin, 1997) uses Lotus Notes for KM.

Secure browsing: A secure browser allows people to search databases remotely yet protect against unauthorized use. Graphical browsers like Netscape and Internet Explorer provide the necessary security in an Intranet-environment; groupware platforms such as Lotus Notes have an integrated browser with elegant features as well. Figure 3 describes the technological systems of KMS.

Increasingly, the system design issues have become a major concern for companies pursuing KM. Firms face many challenges in this regard. All three of these technologies must be seamlessly integrated on a large scale, and the end result must be robust. Integration and operation of all these technologies have been greatly facilitated by Internet-based standards and architecture, which allow different databases and platforms to work together. In an Intranet-based approach, all the tools and information exist in one place and firms strive to link them together seamlessly, Groupware platforms provide smoother integration with e-mail, better security, easier to manage databases, and easier to structure searches. However, getting all the required data in one location, so that it is accessible through a single search process is a formidable task.

Getting all the required data in one location, so that it is accessible through a single search process is a formidable task.

The concern for data security is a lingering threat—who should see what, when, and with what authorization. That said, the way a data is used depends on the user. The issue of accessibility then is a lame duck control. Another challenge is how to get people to use these systems. These systems should not be another thing that increases people's workload; people should perceive that they have tacked on to their existing responsibilities. To achieve this integration between people and technology, the company needs to understand how people work and what they need in terms of knowledge, access, and communication.

Summary

Companies may begin with a planned structured methodology, or allow its knowledge needs to emerge organically. Depending on corporate culture and business needs, a firm may opt pull, push or targeted push system to distribute information to its employees. Further, it may assign the responsibility of KM throughout the existing organisation, or develop specialized roles and organisational units to carry out the work.

Knowledge Management Strategies

Knowledge Management strategies set forth the

criteria for choosing what knowledge a firm plans to pursue, and how it will go about capturing and sharing it. Some companies focus on technology solutions to manage knowledge. Others focus on people. The right balance depends on a number of factors including the firm's competitive strategy. The starting point to decide a firm's KM strategy is providing answers to high level "what," "who," and "how" questions of KM (Manville & Foote, 1996). It is important to understand what sorts of knowledge are especially critical to support a business, who needs to have what information, and when do they need to know the information. Hansen et al (1999) have proposed two approaches to KM: codification and personalization.

In codification approach, a relatively centralized KMS is built and managed by a centralized authority. Knowledge is carefully codified and stored in robust and well-organized databases, which the employees and customers can access. In personalization approach, by contrast, knowledge is closely tied to the person who developed it, and is shared mainly through direct person-to-person contacts. A company's choice of a particular strategy is dependent on the following factors:

- The way a company serves its customers: offers unique business solutions, or standardized products
- The business model of information network: increasing return on economies through reuse economics, or premium on customized service
- Source of emergence and deployment strategy: effort to connect people to share tacit knowledge (person-to-person), or to synthesize explicit knowledge (people-to-documents)
- Firm's competitive strategy, business value proposition and knowledge base content: "Procedure" type of projects or "Brains" and "Grey Hair" type of projects (described later); lifecycle of the product (mature or innovative); tacit or explicit knowledge
- Size of the firm: small or large
- Type of human capital and associated corporate culture: problem-solvers or implementers

Codification approach to Knowledge Management

If a firm deals with similar problems over and over, then its product is somewhat standardized or requires less modification during reuses. Then, efficient reuse of its codified knowledge is essential. Capturing knowledge from many individuals for reuse by many others is referred to as codification approach. Reuse of knowledge saves work, communications costs, and allows a company to take on more projects. Through reuse, firms derive increasing economies of scale. Software companies, for example, build software that is used in a number of different ways by a number of different customers. In such companies, the firm's KM strategy should have a technology focus.

Capturing knowledge from many individuals for reuse by others is codification approach. Reuse of knowledge saves work, communications costs, and allows a company to take on more projects.

The centerpiece of Cisco's customer self-service strategy is Cisco Connection Online (CCO), a comprehensive, Web-based, online resource for information and networked applications. With about 150,000[11] active registered users from around the world, CCO is accessed approximately 1.5 million times each month, making it the primary vehicle for delivering responsive, round-the-clock customer support. Customers rely on CCO to answer questions, diagnose, network problems, and provide solutions and expert assistance worldwide (Nolan et al, 1998).

The codification approach is the heart to Dell Computer's competitive strategy. Dell provides inexpensive PCs made to order. Dell has invested heavily in an electronic repository that contains all the available components and specified configurations. Customers use it to place orders, suppliers use to fill orders; the system drives the business. Consulting firms, such as Ernst & Young (Chard & Sarvary, 1997; March & Garvin, 1997), Arthur Andersen (March & Garvin, 1997), KPMG (Gladstone & Eccles, 1991; Alavi, 1997), and Andersen Consulting (Davenport & Hansen, 1998), deal with "procedure" type of projects (Maister, 1982). "Procedure" type projects involve a well-recognized and familiar type of problem. While some customization is still required, the steps necessary to accomplish this are somewhat programmatic. Although clients may have the ability and resources to perform the work themselves, they may turn to the professional service firm because it can perform the work efficiently. These firms remove client-sensitive information, and develop knowledge objects by pulling key pieces of knowledge such as interview guides, work schedules, benchmark data, and market

11. Cisco 1997 Annual Report: 11.

Table 2: Approaches to Knowledge Management Strategy

Codification approach	Competitive Strategy	Personalization approach
• Value of Information = Net benefit with information – Net benefit without information • The more we use an information, the more power of the knowledge entity is unleashed, the more influential it is in shaping the future course of action, and the more refined, and hence, useful, the entity is in delivering value • Hoarding knowledge preserves ephemeral power with the owner, but it fails to harness the full potential of the power of knowledge entity itself	Economic model of information network	• Knowledge is tied to the people who develop it
Economics of reuse: • Invest once in a knowledge asset; reuse it many times to achieve economies of scale from returns	Business model of information network	Expert economics: • Charge a premium on firm's customized services to unique business solutions
Effort to synthesize the available problems and solutions	Source of emergence	• Effort to connect people more efficiently
People-to-documents approach: • Knowledge is extracted from the person who developed it made independent of that person, and reused for various purposes • Develop an electronic document system that codifies, stores, disseminates and allows reuse of knowledge	Knowledge Management deployment strategy	Person-to-person: • Knowledge that could has not been codified, and that probably cannot be, is transferred in brainstorming sessions and one-on- one communications • Develop networks for linking people so that tacit[12] knowledge can be shared
• Invest heavily in information technology; the goal is to connect people with reusable codified knowledge	Information technology	• Invest moderately in information technology; the goal is to facilitate communications and exchange of tacit knowledge
• "Procedure" type of projects Some customization is required in the delivery of the service. • Explicit knowledge: Knowledge that can be codified is easier to share and apply with downstream differentiation. Explicit knowledge is most efficiently share in codified form	Firm's competitive strategy, business value proposition and knowledge base content	• "Brains" and "Grey Hair" Type of projects High degree of customization required in the delivery of the service; the level of synthesis or abstraction is limited by high context-dependence. • Tacit knowledge: Tacit knowledge is hard to codify and harder to share, and much harder to apply to a business problem. Tacit knowledge is best shared on a person-to-person basis
• Mature product that are an output of explicit knowledge	Product maturity	• Product innovations that depend on sharing tacit information
• Larger firms tend to foster this approach	Size of the firm	• Smaller firms are amenable to foster this approach
• Recruit people who like structured approach and who can be trained to reuse knowledge • Train people in groups and through computer-based learning • Reward people for using and contributing to document databases Firm-wide norms, incentives, and corporate culture must be explicitly built and communicated. At Ernst & Young, one-fifth of all individuals' performance evaluations is based on utilization of and contribution to KMS (Chard & Sarvary, 1997).	Human capital and associated corporate culture	• Recruit problem-solvers and those who can function in ambiguity • Train people through one-on-one mentoring Through one-on-one mentoring, management grooms people to hold more responsible positions in the company Lessons from the firm's experience are hard to categorize; so, management does not prescribe to consultants what topics they should concentrate on. • Reward people for directly sharing knowledge with others Incentive systems tend to evolve automatically from the very philosophy of the system At McKinsey, evaluation depends on a peer review process and providing relevant knowledge voluntarily to the firm results in visibility and credibility[13].
• Manufacturing/financial services firms: Dell Computer, Fannie Mae, Cisco • Consulting firms: Andersen Consulting, Arthur Andersen, KPMG, Ernst & Young, KPMG, American Management Systems	Examples	• Manufacturing firms: Howlett-Packard • Consulting firms: McKinsey, Bain, Boston Consulting Group

12. Tacit knowledge includes all knowledge that has not yet been articulated or made explicit, or that is known at a non-verbal level and does not lend itself to being described or translated into formal, codified categories.

13. Interviews with McKinsey professionals in January 2000.

Table 3: Advantages and Disadvantages of Knowledge Management Approaches

Codification Approach		Personalization approach

• Increasing return on economies
• In-depth knowledge content
Multiple perspectives on the issue shared across the company ensures more than superficial understanding of the issue
• Opportunity for visionary breakthroughs
Ernst & Young's "Ernie" product has resulted in the emergence of a new line of business in consulting, called "retail consulting". While Ernie is great opportunity for Ernst & Young to leverage the current KMS, it also adds to the system by providing an additional ear for the firm, allowing it to learn about emerging topics and thus focus its knowledge-building efforts in a proactive way. Ernie, thus, adds the benefits of a divergent system to the current convergent KMS.
	Advantages	• High premium on unique products leads to increased brand awareness of solution offerings
		McKinsey typically deals with very high-level management decisions[14].
		• Advantages associated with any market-driven service
		  • Administrative costs are small and the firm's management does not need to deal with the system
		At McKinsey, it is up to the consultants to judge whether the knowledge that they build is valuable enough to be worth their time.
		  • Incentives emphasize connecting people voluntarily
		At McKinsey, evaluation depends on a peer review process and providing such knowledge to the firm results in visibility and credibility.
		  • When knowledge is available, the internal market decides on how valuable it is (i.e., to what extent is there demand for it.
		  • As knowledge is built by the users themselves, it is likely to be relevant and easy to use.
		• Incentive systems tend to evolve automatically from the very philosophy of the system
		• KM tends to be self-regulatory
		This ensures that these do not involve investments that are to be justified. So, the approach is safer.

• Very expensive Cost-benefit issues are to be closely monitored and managed thereby adding overhead to an already large corporate business. • Benefits are hard to measure; so, it is difficult to justify the investment What is the benefit of knowledge? Value of information = Net benefit with information – Net benefit without information How do we measure these elements since one element precludes the other from occurring? • Firm-wide norms, incentives, and corporate culture must be explicitly built and communicated At Ernst & Young, one-fifth of all individuals' performance evaluations is based on utilization of and contribution to KMS (Chard & Sarvary, 1997).	Disadvantages	• Very reactive People are not pushed to build knowledge and because it takes time away from engagement while providing no guaranteed return, people have little incentive to do "research." People wait until sufficient information is available before they draw conclusions. As a result, the firm misses the opportunity to direct resources to study new areas. • Lack of integration of information Information originating from outside the firm might be insufficient because of knowledge-building units are also in the field. • Shallow depth of knowledge content Lack of supervision of the inflow of experience may lead to superficial understanding. Such a system works well for making the firm's existing wisdom available, but it might not be the best for triggering new ideas or revelations that lead to breakthroughs.

14. In Table 3, information about McKinsey is based on author's interviews with McKinsey professionals in January 2000.

segmentation analysis. In essence, the professional service firm is selling its procedure, its efficiency, and its availability. This approach allows many people to search for and retrieve codified knowledge without having to contact the person who originally developed it. This leads to achieving economies of scale through knowledge reuse.

Personalization approach to Knowledge Management

By contrast, due to the nature of business, when knowledge is closely tied to the people who developed it, businesses rely on individuals sharing their intuition and know-how to create innovative or customized products and solutions. Knowledge that has not been codified, and that probably cannot be, is transferred to the users in brainstorming sessions and one-on-one communications. In such sessions, people collectively arrive at deeper insights by looking at the issue from various angles. The chief purpose of information technology at such companies is to help people communicate knowledge, not store it. This is referred to as personalization approach.

Knowledge that has not been codified, and cannot be, is transferred in brainstorming sessions and one-on-one communications. This is personalization approach.

A high degree of customization is required in the delivery of the service. "Brains' and "Grey Hair" type of projects demand personalization approach from the professional service firm (Maister, 1982). Brains type of projects involve problems that are likely to be extremely complex, perhaps at the forefront of professional or technical knowledge. The professional service firm that targets this market will be attempting to sell its services on the basis of the high professional craft of its staff. In essence, this firm's appeal to its market is its "smart people." The key elements of this type of professional service are creativity, innovation, and the pioneering of new approaches, concepts, or techniques—in effect, new solutions to new problems. "Grey Hair" type of projects may require highly customized "output," but they usually involve a lesser degree of innovation and creativity than a Brains project (Maister, 1982). The general nature of the problem is familiar, and the activities necessary to complete the project may be similar to those performed on other projects. Clients with Grey Hair problems seek out professional service firms with experience in their particular type of problem. The professional sells its knowledge, its experience, and its judgment.

Strategy consulting firms, such as Bain, Boston Consulting Group and McKinsey, provide value to clients through Brains and Grey Hair projects. These type of projects require the firm to focus on dialogue between individuals, not knowledge objects in a database to share knowledge. Hewlett-Packard's strategy of developing a series of competitive, innovative products is based on transferring; technical and market knowledge is transferred to product development teams in a timely way. The company invests on communication vehicles to ensure effective person-to-person sharing. Experts from one office visit other divisions to assist product development teams.

Table 2 contrasts the two approaches to KM.

It is tempting to think that the two KM models can coexist in the same company. However, because the drivers of the two approaches contrast in their fundamentals, companies that use knowledge effectively pursue one strategy predominantly and use the second strategy to support the first. Straddling in between the two is a risky proposition (Hansen et al, 1999). Table 3 describes the advantages and disadvantages of each of these approaches.

Measurement of success of KM initiatives

The goal of KM philosophy is empowerment of people through utilization of collective human capital. IT initiatives enable this empowerment process. Because we cannot manage what we cannot measure, we must measure the effectiveness of the KM process. But then, what we measure is what we get. For measurement of KM's effectiveness, the strategic theme from learning and growth perspective is: develop and value teamwork and the ability to think company-wide, yet act locally. This is to be achieved by making local knowledge global by using IT and organisational infrastructure as enablers (Cerny, 1996). This is easier said than done. A few challenges are noteworthy.

In most cases, only a fraction of the available knowledge can be systematically captured and shared. Too much information exists already, and new knowledge is constantly generated. The task is complicated by the fact that a considerable portion of corporate knowledge is tacit. Not only this, tacit knowledge remains elusive, limiting the degree to which internal best practices can be articulated and shared. In transferring such practices, there are hindrances from motivational factors and knowledge barriers. Two of the knowledge barriers are recipients who lack the depth of experience or knowledge to make effective use of new

Table 4: Learning and Growth Measures at an Oil Company

The following strategic objectives are derived from learning and growth perspective at the company:

- Organisational involvement
  - Enable the achievement of our vision by promoting an understanding of SBU's organisational strategy and by creating a climate in which employees are motivated and empowered to strive toward that vision
- Core competencies and skills
  - Integrated view
    Encourage and facilitate people to gain a broader understanding of the marketing and refining business from end to end
  - Functional excellence
    Build the level of skills and competencies necessary to execute SBU's vision
  - Leadership
    Develop the leadership skills required to articulate the vision, promote integrated business thinking and develop people
- Access to strategic information
  Develop the strategic information support required to execute the strategies

These objectives translate into the following measures:

- Climate Survey Index
- Staff attitude survey
- Number of employee suggestions
- Revenue per employee
- Employee learning survey (strategy, marketing and refining business, core values, quality awareness, broad level of skills)
- Information systems survey (use and problem tickets)
- Strategic information availability ratio (access to IT tools)
- Strategic job coverage ratio (upgrading of the skill base and qualified people)

ideas, and problems in identifying with precision the set of interrelated variables and activities that led to success and superior performance at the original site (Szulanski, 1996). Tacit knowledge, therefore, requires distinctive approaches if best practices are to be identified and communicated effectively. Measurement of effectiveness of these approaches is a challenging task.

Table 4 describes a case study on how learning and growth perspective is measured at the Marketing and Refining Division of a Fortune 25 oil company (Sabat, 2000).

Conclusions

Knowledge Management represents a new business philosophy that is changing the competitive landscape. The success of KMS depends on the firm's KM strategy and deployment. The few key KMS that act as benchmarks evolved naturally from the firms' cultures and processes and not due to a systematic effort centered on the KM business philosophy. So, it is not clear whether these efforts can be replicated by others. Although we cannot yet measure their effectiveness or justify the investment, KMS represent an important step forward in harnessing the power of collective knowledge in a community. Companies that isolate KM in functional departments like marketing, IT, finance risk losing its benefits, which are highest when it is coordinated with HR, IT and competitive strategy. Further, people do not resist change per se, but they resist the way they are treated in the process. The integration of technology with people demands a systemic effort on the part of the company and its leadership. Only strong leadership with a cogent vision can provide the direction a company needs to choose, implement, and overcome challenges faced by a new KM strategy.

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Re-engineering through Knowledge Management

Dipak Kumar Bhattacharyya

This paper reviews some definitions of KM and then narrates an experience of its implementation in a truly categorised knowledge organisation, which offers management courses to more than 5000 students across the globe.

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Early in the industrial age, motor/muscle power was provided by the workers for product creation, leaving the thinking job for the management. However, with the changing environment, cognitive skills became more important in every work, be it production on the shop floor or rendering services to customers. Technology played a crucial role in capturing and managing knowledge, making it possible for organisations to harness the potentiality of knowledge by its proper development, growth and maintenance, of course with an approach to periodically retire the knowledge which are obsolete. There are many contributors to knowledge management and learning organisation theories, starting with the concept of 'Gold-Collar Worker' of Kelley (1985) to Argyris (1994), Drucker (1994), Peters (1992), Senge (1990), Setewart (1997), Nonaka and Takeuchi (1995) and many more.

Knowledge is reinforced through learning. Therefore before we define knowledge it is appropriate for us to understand what is learning. Learning is a process of acquiring new skills or knowledge, which results in a new behaviour. Learning can take place through multiple ways. But in organisations the best way to promote learning is by exposure to new experiences. Knowledge is the ability and wisdom to use the learned experiences for achievement of individual and organisational objectives. Knowledge management, therefore, is the process of systematically and actively managing and leveraging the store of knowledge in an organisation.

Any knowledge management initiative needs to be

Knowledge management, is the process of systematically and actively managing and leveraging the store of knowledge in an organisation.

first tested in the light of available *guna* dynamics, as advocated by Chakraborty (1987). Knowledge and skills, when reinforced by values ensure better results. Chakraborty's characterisation of knowledge along three *gunas,* in the light of Indian-psycho-philosophy when reproduced as matrix (as in Table 1) indicates that mere *rajas* without the essence of *satwa* cannot, per se, make a knowledge management and skill enrichment initiative successful in any organisation.

Table 1: Guna Dynamics of Knowledge and Work

	Tamasic	Rajasic	Satwic
Knowledge	Small and narrow way of looking at things which has no eye for the real nature of the world	Seeing multiplicity of things only in their separateness variety	One imperishable, indivisible whole is becoming all and everything
Work	Action undertaken from delusion, in mechanical obedience to instincts, without regarding the strength or capacity, or its consequences, involving a waste of efforts or injury to others	Action performed under the dominion of desire, with an egoistic sense of own personality, done with inordinate effort	Action which is rightly regulated, done without liking or disliking, without any desire of fruit (for himself)
Doer	Works with a mechanical mind, is stupid, obstinate, cunning, insolent, lazy and procrastinating	Eagerly attached to work, passionately desirous of fruit, impure, often violent, cruel, and brutal in the means used, full of joy and grief in success or failure	Free from attachment and egoism, full of a fixed personal resolution and a calm rectitude of zeal, unrelated or undepressed by success or failure

Indian social system had orientation towards developing and maintaining different social groups in terms of certain crafts. The quality elements in a particular craft and the necessary skill elements in the same, were the basis for social stratification. That is why, tracing history, we find, in India, there was a time, when carpenters, goldsmiths and weavers enjoyed the highest status. Over the years, however, such social stratification was aligned along caste-lines, which also had the essence of occupational elements in it.

At this stage, it is important for us to understand the basic difference between skills, multi-skills, competencies and knowledge. Skills are operational attributes to attain some goal or accomplish a particular task. It can either be generic or technical, entry level or advanced. Operationally, skill enrichment is initiated to meet present requirements. Multi- skilling is the process to train employees in varied skills cutting across trade-specific and craft-specific skill sets. This initiative enables employees to perform more jobs within the same job family or to do the entire job from a holistic point of view. Thus multi-skilling optimises manpower utilisation through job enlargement and job enrichment. However, both skill enrichment and multi-skilling are intended to address present organisational requirements. Competencies, on the other hand encompass skills, knowledge, abilities and attributes which are observable, measurable and which change over the passage of time. Organisations do competency mapping in the defined job context to understand the extent of its alignment with vision, mission and define an ideal workforce. Knowledge is a more holistic approach, identified, acquired and developed to use for achieving organisational objectives. Indian *Gurukul*[1] System of learning emphasised on the importance of holistic learning. Knowledge acquired through holistic learning helps employees to think independently and to understand the interdependence, which never gets obsolete. It becomes self-perpetuating and dynamic to address the changing objectives of organisations.

The Study Outline

A study was carried out at Centre for Management Education (CME) of All India Management Association (AIMA), an apex body for management professionals in the country. Among other activities, educational activities of AIMA are the prime and contribute to more than 50% of the total revenue. Being the most widely acknowledged AICTE approved Post Graduate level programmes, which are offered through flexible learning mode (through personal contact programmes) at 39 regular nodal centres, widely dispersed throughout the country, AIMA attracts many working executives as its students. Rest are freshers,

1. Indian *Gurukul* System of learning emphasises on *Shruti* and *Smriti.* Shruti concept says in each individual there is a core or essence, which is an independent perfect constant, characterised by unchanging self-existent *poornatwa* and *ananda.* Smriti sastras are imparted through 'word of mouth'. In the Vedic ages, students had to go to *Guru Griha* for learning. But *Gurus* never used to impart lessons right at the beginning, they rather used to ask students to go around with cattle and explore the nature. This helped the students to think independently and to understand the inter-dependence, i.e., the holistic approach. After this self-learning exercise, *gurus* used to give lessons. Epistemological values of *Gurukul* System are not important for knowledge management. What is important is its scientific process, which makes knowledge self-perpetuating and evolving in a dynamic environment.

a good percentage of whom are, however, doing AIMA's programmes as dual qualification, i.e., simultaneously with some other programmes, in an attempt to develop multi-skill for getting edge over others in a competitive job market. Flexible learning programmes, by default, encounter several problems, in terms of programme delivery, evaluation and student services. This is a global phenomena and AIMA is no exception to this. Increased focus on student services reduces time for other developmental work, which is a continuous process in a competitive environment. Therefore, initial listing of students' complaints was done and it was observed that, most of the problems centre around: Non-receipt of – registration confirmation/identity-cards/assignments/evaluated assignments/grade-cards, Error in grade-cards, Non-receipt of course packs/certificates, Delay in getting replies, Fear of missing important announcements.

From the faculty and other programme managers' side also, service deficiency is mostly considered as the outcome of information overload and insufficient technology-enabled services. As AIMA employs professionals and distinguished academicians for running such programmes, it has no death of creative and innovative people, who are always bubbling with ideas. The education division employs 44 people with average age-mix of 35, which is almost the settlement age-group from the employees' perspective. At this age normally people don't leave and try to identify them with the organisation. Even though in the past there were one or two cases of separation, exit interviews established the fact that they left AIMA for personal reasons rather than for career development elsewhere. Education profile analysis indicated that excepting two cases all are either graduates and professionally qualified (PG level, like; PGDM/PGDITM). Among faculty members all have considerable experience in teaching, research and in industry. Thus the profile of AIMA's human resources in Centre for Management Education division is quite high. Using knowledge management process during the last seven months, AIMA has succeeded in eliminating students' (customers') problems to a great extent and has elevated its brand image, increased enrolment (market share) and quality of services, reduced cycle time for response, reduced overall time requirement in major student related services and finally substantially reduced the cost (almost 25% from the present level).

Service deficiency is the outcome of information overload and insufficient technology-enabled services.

With this track of achievement with knowledge management process, AIMA believes in the philosophy of sharing this experience for others to emulate. How did the knowledge Management process work?

Basic approach to knowledge management process in AIMA was initially to collect information from student (customer) interaction. Students' interactions with AIMA take place in following different ways:

- Direct interactions at information counter.
- Direct interactions with Programme Directors and Programme Managers.
- Direct interactions with examination department.
- Interactions in nodal centres.
- Interactions in Seminars, Conferences and Workshops.
- Interactions through e-mail, letters, fax message and phone calls.

In the pre-implementation phase of knowledge management techniques, maximum efforts were given to record inputs from interactions, which were later analysed and categorised. A list of such response categories, have already been illustrated earlier. Such inputs from students were thereafter further integrated with in-house perceptions through repeated brainstorming sessions.

In the second phase, analysis of available systems was done in the context of student requirements, matching with AIMA's philosophies (vision), mission, goals, objectives and strategies and using KM process, i.e., identification of nature and kind of knowledge required to improve the services. Mapping of available knowledge in the defined job context was done following the competency mapping strategy as follows:

- Workforce Skills Analysis
- Job Analysis
- Supply and Demand Analysis
- Gap Analysis
- Situation Analysis

Workforce Skill Analysis helped to describe skills required to carry out a function. This is a dynamic approach, as it also considers the nature of work changes in AIMA-CME.

Job Analysis focused on tasks, responsibilities,

knowledge and skill requirements, which are required for successful job performance.

Both the Workforce Skills Analysis and Job Analysis were done from inputs collected from survey (through questionnaire responses), interviews with managers and employees and benchmarking information with successful organisations. For technology intensive and machine-enabled jobs, skill set requirements and cycle-time for jobs (as printed in the literature) also contributed as critical input information for such jobs.

Supply Analysis was done considering workforce demographic (in terms of occupation, grades, structure, race, origin, gender, age, service experience, education, training, health status, retirement time and similar other information) trends and present workforce competencies. This helped in understanding the existing workforce status.

Demand Analysis on the other hand helped to identify workforce of the future in line with the vision, mission, objectives, goals and strategies of AIMA-CME. Critical inputs from Demand Analysis contributed to development of competency model for workforce of the future.

With the above input re-inforcers, AIMA-CME undertook Gap Analysis to understand the differences between the workforce of today and the workforce of the future. After such identification of differences, AIMA-CME planned to address those. Addressing the gaps was done through Solution Analysis, taking into account both ongoing and planned changes in the workforce. Solution Analysis also weighed different options to get the work done, either considering institutional or contractual employment. New recruitment, restructuring, training and retraining, redeployment and rightsizing, all were done, in the light of new competency model, in this phase. While doing so, P-CMM (People Capability Maturity Model) of Carnegie Mellon University, levels 2 and 3 were referred to structure the process in a scientific manner. P-CMM levels 2 and 3 focus on 'repeatable' and 'defined' tasks of an organisation. In the 'repeatable' phase, managers take responsibility for managing and developing their people, while at 'defined' phase, organisations identify primary competencies and workforce practices encouraging competency growth. The Mapping Process helped in identification of availability of relevant knowledge for re-engineering process. Knowledge or skills inventory was quantified along skill sets to understand the knowledge and skill gap in the existing manpower. Such quantification was done using a 5 point Likert type scale with discretionary weights (based on experience) for skill or knowledge attributes. The initial skill or knowledge inventory, with gaps in each knowledge group was as in Table 2.

Table 2: Knowledge Inventory

Skill/Knowledge Group	Nature	Measured Gap in Percentage
Technical	Related to specific concepts, methods and tools	10%
Supervisory	Related to effective supervision of others	5%
Interpersonal	Related to communication and effective interaction	10%
Business	Related to general understanding of educational support and infrastructure	20%

After measurement of knowledge gaps for re-engineered process, in-house training plans were scheduled in identified areas like:

- Process and Systems Familiarisation
- Student Relationship Management
- Basic Computer Operation Skills
- Interpersonal and Communication Skills
- Problem solving and analytic skills, etc.

As mentioned, AIMA being a knowledge-driven organisation has no dearth of in-house talent. Hence right mining of such talent, aligning with strategic plans, was in fact the requirement in the capturing phase of knowledge management and there was no need to outsource such knowledge requirements in the acquiring phase. Hence acquiring of in-house knowledge was addressed through in-house knowledge bank. Storing of required knowledge reinforced the knowledge inventory, matching with requirement of charted re-engineered process. Some examples of reengineered process vis-à-vis old process are illustrated in Table 3.

In the subsequent process of KM, i.e., sharing of knowledge, intranet services was strengthened through well designed MIS, making it possible for the employees to reinforce their knowledge on continuous basis. In the application phase, following aspects were monitored by the programme directors (faculty members) and divisional heads to ensure that:

- People are regularly retrieving knowledge
- People are using knowledge in all their action or activity phase
- People are becoming used to collecting information and data through MIS and intranet newswires.

Table 3: Changes after KM process

Reengineered process	Old Process
Single point student interactions at programme managers' level	Multi-point student interactions.
Single channel services to students with proper internal integration within the organisation through intranet.	Multi-channel services to students
Centralised evaluation system	Decentralised evaluation system
Administrative and managerial responsibilities to faculty members	Administrative and managerial responsibilities to registrars.
Charted cycle time for every operation and adhering to time schedule	Uncharted cycle time and flexibility resulting in delay in some major operations, like, course pack delivery, evaluation, declaration of end-term results, etc.

The Knowledge Management process cycle of AIMA-CME is a continuum for periodic retiring and renewing of knowledge through directed innovation and creativity. Directed creativity is the purposeful production of creative ideas, focussing on a topic or area for its subsequent implementation to achieve organisational objectives. Learning from mistakes is encouraged, provided these are judgmental and not *mala fide*. To ensure optimal utilisation of innovation and creativity, AIMA-CME follows these principles:

- Innovate and become creative within the documented policy guidelines, i.e., generate ideas in relation to current/future student needs, benchmark ideas with competitors, search for ideas that reduce cycle time and costs,
- Try to generate focussed and need based ideas
- Identify ideas through brain-storming
- Align ideas to AIMA's vision, mission and strategies
- Make your ideas more participative through interaction among peer groups
- Risk hedge ideas through benchmarking
- Calculate ROI on implementation of ideas
- Institutionalise ideas by proper documentation and implementation

Efficacy of the re-engineering process at AIMA, was tested in one complete operation cycle, i.e., in one quarter (April-June, 2001). For the quarter July-September, 2001, the stock-taking revealed the following situation:

Problems

- Deficiency in one workstation affected the whole service channel.
- Back-up support required as absenteeism rate is more than 20 per cent, mostly among female employees. This necessitated accommodating more manpower than optimum level.
- Wide variation in efficiency level of employees[2].
- Increased dependency on technology-enabled services.
- Required close monitoring and even at times employee snooping[3].
- Feelings of increased job pressure.

Benefits

- Reduced student complaints by 80 per cent
- Increased enrolment by 20 per cent
- Reduced response time to 24 hours (for queries received within working hours and working days).
- Reduced operational costs by 25 per cent
- Knowledge inventory indicated increased knowledge repositories.

Conclusion

Re-engineering at AIMA-CME through Knowledge Management process yielded good results in the first quarter. However, this requires longitudinal study to further authenticate the success. Another important aspect is that one cannot sign off at any stage of implementation of KM process. Periodic retiring and renewal of knowledge is extremely important. For better accounting of results, it is essential to practice the changed systems at least for three-four cycles. Replicating the practices of one organisation may not guarantee success in another. Every organisation has to adopt KM process, matching their own requirements.

2. A knowledge worker leverages skill, knowledge and wisdom in all spheres of activities by learning strategically, by building relationships in terms of what he can offer and by selling added value, no matter where he works or what he does.
3. Employee snooping is direct monitoring of employees movement and activities within the organisation, even at times infringing his or her freedom. ILO has certain directives, which discourage employee snooping.

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More and more CEOs have become conscious that they are the CEO of marketing. You're selling trust.

— Philip Kotler

Will e-tailing Overshadow Physical Retailing?

S.K. Bhattacharyya & Zillur Rahman

With the rapid advancement in Internet technologies, e-tailing has come into being. With the prospect of global reach in scouting sources of supply and customer solicitation, such a business proposition is so exciting that e tailing is often projected as a future substitute of traditional retail business. The authors however argue that it will take time for e-tailing to displace traditional retailing. They propose a framework to identify product groups suitable for e-tailing. According to this framework, e-tailing provides benefits over traditional retailing for a limited number of product groups. It cannot however be denied that the Internet substantially reduces the search time of consumers for product related information. Traditional retailing must therefore use the Internet as a promotional tool for dissemination of information for merchandise and an alternative channel of business transactions.

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After the commercial world was accorded access to the Internet in 1990s, e-business grew up at a very fast pace and the Internet has now emerged as the biggest market place the world has ever had. The Internet has given birth to a new mode of doing business of consumer products, popularly called e-tailing. Hundreds of e-tailing companies are now available on the Net transacting millions of dollars of business every day. According to US Bureau of Census, on-line business of retail establishments in the US alone was 3.5 billion dollars in the fourth quarter of 1999 (Forrester Research). E-tailing stands for electronic retailing. Unlike traditional retailing, an e-tailer does not require any physical retail stores to transact business. In some cases, he need not even have any warehouse for merchandise. What he needs to do is to float a website on the Net, tie up with different manufacturers, transact business with the buyers over the Internet including payment made by the buyers through credit cards and deliver the goods either through the Net or hired courier services.

Competitive Advantage of e-tailing

Perceived Advantages

Proponents of Internet marketing emphasise that e-tailing possesses certain competitive advantages over traditional retailing and will therefore displace the latter on a mass scale within a very short period of time. First, technology of creating a website is relatively inexpensive and can be easily learnt. Secondly, e-tailing does not involve high recurring costs of maintaining sales persons and inventory. Thirdly, it enjoys the prospect of doing business across the globe. E-tailing is, therefore, an attractive business proposition so much so that even venture capitalists and other members of the investment community seem to be euphoric about it. This analysis follows from the draft definition of electronic commerce developed by the U S Bureau of Census. (Masenbourg, 1999). Consider, for example, the astounding market

valuations of some of the e-tailers. Amazon.com.Inc., which was established in 1995 and now sells books, electronic goods and conducts on-line auctions has not so far made any profit, and its annual revenue was only $ 1.6 billion in 2000AD. Still its market valuation was estimated at $ 18.2 billion as of April 20, 2000. Similarly eBay Inc.'s market value was $ 19.6 billion although it registered a meagre profit of $ 11 million against revenue of $ 2.25 billion in 1999. Such valuations seem baffling when we find that market valuations of Sears, Roebuck and Co. was $ 14.2 billion against its net income of $ 1.3 billion and revenue over $ 32 billion in 1999 (Figueierdo, 2000).

It appears that such abnormally high market valuations of the dot.com companies are fuelled by the following beliefs: First, e-tailing enjoys the prospect of doing business across the globe—an opportunity which traditional retailing can not afford to have because of very high investment costs. It can be expected that international tariff barriers will be done away with over time and the concomitant cost differentials that make global trading for some products costly will vanish. 'Cross border partnering' between the manufacturers and the e-tailers will be possible. An e-tailer will be able to negotiate directly with suppliers in another part of the world and obtain better pricing. Secondly, people inherently dislike doing shopping because they need to incur a substantial amount of monetary, time, energy and psychic costs to buy a product. A person now needs to walk a mile or drive to downtown departments to buy even a trifling (?) consumer product like a shirt or a trouser. At the retail store, he faces a wide array of choice, selection out of which is not only time consuming but also 'difficult and incomplete.' e-tailing will eliminate all these troubles and will allow a buyer to select the right shirt and order for it over the Net. Thirdly, with e-tailing, manufacturers can transact directly with the ultimate consumers. They need not have to sell the consumer products through channel intermediaries who take away more value than what they add to the final product. As a result, the manufacturers will be able to offer products at lower prices and earn more profits at the same time. Today, in the multiple tier distribution system of USA, the consumer needs to pay as high as $ 52.72 for a quality shirt against its ex factory price of $ 20.45 (Thornton, 1994). And this price does not include the buyer's search cost for the product. Lastly, technology will be available soon to digitise all the attributes that people consider to select and buy a product and will therefore make it possible for e-tailing to be a virtual shop for all types of products.

With e-tailing, manufacturers can transact directly with the ultimate consumers.

The above expectations seem to have led in the recent past to mushrooming of electronic retail shops offering consumer products that are normally available in physical retail stores. Many of these ventures initially offered products at a discount in order to develop customer loyalty with the hope that such loyalty would one day generate profit which did not however materialise till today.

The Real Scenario

Reasons for this sorry state of affairs of e tailing are not far to seek. Indeed, the competitive advantages of e tailing as cited are mostly exaggerated. Consider for example, the prospect of a global economy. Instead of being a unitary and unified economy, the world may turn out to be a set of regional trading blocks. Emergence of European Union (EU), North American Free Trade Agreement (NAFTA), SAARC etc. all point to this direction. It is likely that developing countries will lower tariff barriers and make import easy to the extent that these measures make the home industry competitive. The assumption that people dislike shopping is also questionable in nature. It indeed speaks of marketing myopia that arises from product orientation approach and against which the marketing authors have long ago cautioned the management. Consider the following propositions, which have high face validity and suggest as to why people prefer shopping (Tauber, 1972).

Motives behind Shopping

Role-Playing: Role-playing is an important facet of life, which an individual cannot and perhaps does not like to ignore. Social culture assigns different individuals different roles to play. Shopping for vegetables and other foods and cooking for the family members are expected of a housewife and are considered as manifestations of her caring for the family. This expected role-playing is so deeply rooted in the minds of women that many housewives will be reluctant to relinquish it in favour of electronic shopping of vegetables and fast foods.

Diversion: Shopping provides a means of diversion from the daily chores of life for many housewives. In the Indian context, in the big cities in which housing is a problem, many newly married middle class couples are forced to stay in a small flat along with other relatives for

economic reasons. Such couples therefore welcome opportunities for shopping outside to develop intimacy, which works as the bedrock of happy married life afterwards. (This has been well illustrated by Mr. Basudev Dhatterjee, an Indian film director, in his an award winning Hindi movie "Gharonda". Indian culture encourages joint family mode. Shopping allows members of a family to spend time together. Indeed many malls like Shoppers' Stop in Delhi, the capital of India, differentiate themselves from other malls as a centre of family shopping which is equipped with traffic generating attractions like car parking and appeal to people of different age groups. Shopping relieves a person from boredom or depression. In this case, he is motivated to buy something not for the expected utility of consuming it but for the utility of the buying process itself.

Pleasure for sensory organs: People sometimes do shopping in order to amuse themselves. The ambience of upscale superstores characterised by soft music and diffused lighting cheers them up. They can also feel and touch various merchandise, which sometimes prompt them to buy products like perfumes or neckties on impulse.

Forum of social interaction: The weekly bazaars in rural India traditionally act as forums of social interaction among people belonging to different villages. In urban environment also, book fairs, exhibitions of arts or handicrafts provide opportunities for making new acquaintances.

Peer Group Meetings: Speciality shops that deal in old stamps, angling equipment or music cassettes serve as meeting places for people having interest in these objects. They regularly visit the shops to meet one another and exchange information and articles for hobby related activities.

Means of Bolstering Ego: Shopping also helps some people bolster their egos. These people feel a sense of status or power when salespersons eagerly take them around the shop, provide any product related information that they seek and feel apparently obliged when they try a product on or out. This sort of satisfaction, however, illusory it may be, prompts some people to defer buying till they visit a number of stores.

Pleasure of Bargaining: Many people like to be considered as astute bargainers. These buyers feel satisfaction, which is directly related to the extent that they think that they have paid less to the seller than what others pay for particular merchandise. As a result, they hop around shops.

Thus a person does shopping not only for satisfying his buying needs but also to satisfy personal and social needs.

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The implicit assumption that e-tailing creates more utility for a consumer than physical retailing also warrants probing. Proponents of e-tailing seem to rely on classical traditional economics to justify its establishment. When economists discuss demand supply relationship, facility locations and transport cost differential are assumed to be non-existent or equal among competitors. These assumptions underscore the time and place utilities created by say, round the corner pharmacy shop, which makes drugs available when and wherever, wanted. Indeed, a carefully designed chain of physical retail stores creates time and place utilities, which the fastest delivery of products transacted over the Net, cannot beat.

Relative Effectiveness of e-tailing of Different Products

Apart from the fact that e-tailing fails to satisfy peoples' social and psychological motives of buying, it is not equally effective for all consumer products as people exhibit different buying behaviours for different products. While people may buy some branded goods without physical inspection, they may not be willing to do so for goods like vegetables or marine products such as fish, for which experiential attributes like touch and taste ultimately influence the buying decisions. In order to understand how buying behaviour differs from product to product and how these behaviours affect e-tailing, a classification scheme of products is suggested: In this scheme, products have been classified into four broad categories using two dimensions—the relative cost of a product and the degree of digitisation of the quality that people seek in the product. The resultant four product categories are shown in Fig. 1.

High Cost Involvement—High Digitisable Quality

Products falling under this category are usually expensive, bought infrequently and self-expressive for the buyers. It is therefore likely that buyers engage in a three-stage decision making process for this category. First they develop beliefs about the product. Then they develop attitude. Finally they make a purchase choice. Buyers' requirement of information about the products is large for the cognitive and affective components of

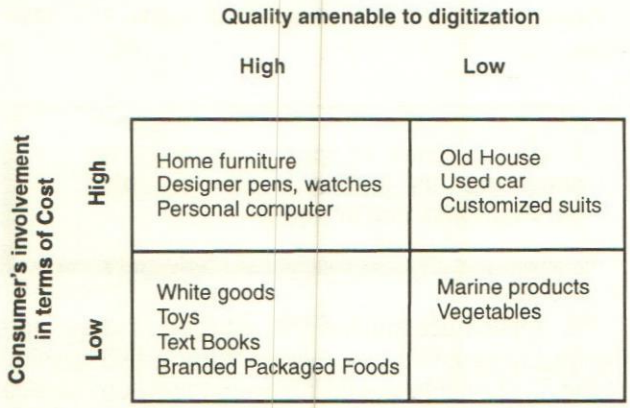

Fig. 1. Classification Scheme of Consumer Products

attitude formation. They actively search for information about the product and various brands. Consequently, on-line advertisements of products substantially reduce the buyer's search cost. Since quality of a product can also be digitised, an attractive online display of the product is possible and competitive positioning of a brand will help it to be included in the consideration set of a buyer. A firm which follows a modular design of production, can also offer its customer a wide range of choice to select from, help him/her design a customised product and order for it.

However, because of high cost involvement, a buyer likes to see the product before he/she decides to buy it. On-line product display therefore increases the traffic flow to the retail showrooms but a buyer finally decides to buy a product on the basis of his/her experience at the retail store. For example, consider the purchase of automobiles in USA. Detailed on-line information about the product specifications, availability of options, dealers' whereabouts are available for all car manufacturers. However since consumers cannot drive a car on the web, auto buyers visit car dealers. According to J D Powers and Associates only 2.7 per cent of the people, who purchased a new vehicle in the first quarter of 1999 purchased their car through an online buying service.

Certain products such as personal computers are however relatively inexpensive and performance rather than looks of the products is important. These products are suitable for e-tailing and buying on-line is expected to increase over time, provided placement of order for customised product is available. It is reported that on-line sales of computers of Dell Computers, USA more than doubled during 1998 and accounted for 25 per cent of the company's total revenues (Regan, 1999).

Products relatively inexpensive and whose performance rather than looks is important, are suitable for e-tailing.

On-line information however provides an important benefit for this product category. On purchase of a high value product, normally people suffer from cognitive dissonance and look for information that justify their buying decisions. A Company can therefore make use of the Internet to provide information such as previous buyers' testimonials on product attributes or salient points of customer satisfaction studies to reassure a new buyer. An important advantage of on-line advertisement is that the exposure does not suffer from the limited span of life associated with other media vehicles such as newspapers or magazines.

In sum, absence on the Net will create competitive disadvantage for sellers; but Net presence alone cannot ensure competitive advantage. Competitive advantage accrues from the company image, brand reputation, product quality, after sales service and most importantly treatment that a prospect receives at the retail store.

Absence on the Net will create competitive disadvantage; but Net presence alone cannot ensure competitive advantage.

High Cost Involvement – Low Digitisable Quality

Quality of products belonging to this category is heterogeneous in nature and cannot adequately be digitised. For example, unless the condition is excellent or very bad, a picture of the inside of an old house or a used car cannot convey its actual physical condition. Similarly, a mere picture of a suit does not provide the feel of texture of the fabric or its colour or ensure the right match between the garment and physique of a person. Availability of 'services applied to goods in order to meet the exact needs of the customer' called adjustment factor in marketing terminology ultimately influences sale of such products. Adjustment factor is defined as the amount of change that is required at the point of purchase by the customer (Bruce, 1967). Besides, quality of a product belonging to this product category is contingent upon the perception of a buyer leading to the same product having different values to different customers. Use of 100% money back guarantee policy is also hardly applicable here to boost sales because of the high cost involvement in 'reversed

logistics', that is resale or disposal of the refunded product.

On-line information can only create awareness about a company dealing in the product category while physical examination of the product and direct negotiation with the seller by a prospect precipitate the purchase. That's why, Usedcars.com in USA does not directly sell online but only informs a buyer of the availability of used cars in a particular area and how to contact the owners (John M.de Figueierdo, *ibid*).

Low Cost Involvement – High Digitisable Quality

White goods, children's toys, packaged goods; textbooks, video and audiocassettes fall under this category. For such products, e tailing has the greatest chance of success. Because of low cost involvement, buying is less risky. Product quality can be easily conveyed through pictures and product descriptions. As a result, consumers are less inclined to examine a product before purchase. However, they follow a two-stage decision making process for the on-line purchase. First, from a particular web site, they select the product and then move around other sites for the lowest purchase deal. They do so because searching on the Internet is far less costly than moving round the physical retail stores. Products such as books, software, music etc. which can be delivered over the Internet can therefore be expected to be traded heavily over time.

It can be hypothesised that lower the cost and higher the degree of digitisation of the features of a product, higher will be the propensity of buyers to buy it over the Internet. To have a competitive advantage, an electronic retailer should meet the following conditions: First, he should be a first mover to the Internet, for a first mover normally enjoys the highest amount of stickiness to its site. Secondly, he should deal in a wide array of products to enable a buyer to do one stop shopping. Amazon.com carries a list of over 3 million saleable book titles and 3-lakh-video titles (John M.de Figueierdo, *ibid*). Thirdly, the web site should have some in-built mechanism like a navigation tool that would reduce a prospect's time, and energy costs associated with searching for information and therefore allow him to do comparison-shopping. Fourthly, it must be prepared to sell its products at the lowest price. (For example, Books.com's search engine allows the buyer to have the access of amazon.com and barnsesandnoble.com. If the competitors' prices are lower, Books.com will sell the books lower than the competitors). Lastly, it should use sales promotion techniques such as surprise gifts or price discounts which buyers value, to encourage site specific loyalty and repeat purchase.

Lower the cost and higher the degree of digitisation of the features of a product, higher the propensity of buyers to buy it over the Internet.

The above recommendations can, however, be copied and cannot therefore guarantee a sustainable competitive advantage. To have a long term competitive advantage, an electronic retailer must be prepared to compete on some other factors such as the lowest delivered cost, fastest delivery, high reliability of products and superb after sales service. In these respects also, it is not easy for an e-tailer to overtake a physical retail store operator. For in case of non-bulky products, consumers themselves came to stores for buying and carry the goods back. Secondly, electrical and electronic goods can be tested for their functioning at the retail stores before a sale is made. Manufacturers of these goods can therefore resort to statistical quality control instead of 100 per cent inspection of finished goods, before these goods are dispatched from the factory. This reduces quality inspection costs, which is substantial when 100 per cent inspection is done for mass produced goods. Thirdly, a retail store salesman can demonstrate to the buyers at the store how to use a technically complex product. This reduces the probability of in-use failures of the product due to improper handling at the buyers' end thereby increasing customers' post purchase satisfaction and reducing incidence of after sales services. All the above, therefore reduces the total delivered cost of a product when it is sold through a physical retail store.

To have a long term competitive advantage, an electronic retailer must compete on lowest delivered cost, fastest delivery, high reliability of products and superb after sales service.

Unlike in USA, the Indian distribution system works for a very low margin. For example, in case of packaged tea, the distribution work is carried out at a margin as low as 3.5-5 per cent, for soaps at 8-13 per cent and for textiles 23-40 per cent. The corresponding retail margins for these goods are estimated at 3.5-5 per cent, 5-8 per cent and 10-20 per cent respectively (Vandari & Vora, 1970). For certain types of products such as toys, again impulse purchases drive sales. Emergency and prescription drugs, which must be delivered immediately or on the same day, are associated with time utilities, which

cannot be easily addressed by an e-tailer without a wide distribution network.

Low cost involvement – High Non Digitisable quality

Goods like vegetables, eatable marine products, and poultry items belong to this category. Here quality differs from product to product and perception of quality differs from person to person. Different buyers have different preferences for the ripeness, colour and other properties of a fruit or freshness of fish. They therefore like to inspect the products before purchase. Perishable character of the products also poses another problem. Resale or disposal of returned materials from the buyers might outweigh the profits gained through sales over the Internet.

Conclusion

The classification scheme discussed suggests that pure e-tailing scores over physical retailing for products which are relatively inexpensive and have experiential attributes that can be digitised. However, the number of such products is not large. It is therefore unlikely that e-tailing will be a viable substitute of physical retailing for all consumer products in the near future. This is however not to say that e-tailing does not have a future. While e-tailing will occupy its rightful place in the economy, traditional retail outlets will continue to play major role in the business of consumer goods. The logical progression in the retail business would perhaps be the integration of e-tailing and traditional retailing. This integration would result in a symbiotic relationship between these two modes of buying and will provide several benefits such as shared information, cross promotion and distribution economies. Consider, for example, the website of Office Depot, a chain of superstores in USA. It contains real time data about store locations and inventory of items for each of the company's 1825 stores. It helps a buyer who wants to purchase, say a printer, decide upon the brand from the product information at OfficeDepot.com, buy it on-line and have the product delivered free of charge the next day. Or he can visit a nearby superstore of the Chain and pick the printer up by himself. By providing information on store locations and inventory online, the company caters to the shopping motive of both the groups of buyers – those who want to buy over the Net and those who want to visit the stores. It is currently working on a pilot programme to create facilities at its physical stores to have access to its website. The buyers can navigate around the site at the stores and decide what to purchase. Their familiarity with the site in turn increases the likelihood of their using the site at home for future buying. Another example of integration between e

The logical progression in the retail business would perhaps be the integration of e-tailing and traditional retailing.

tailing and physical retailing is KB Toys, a chain of retail stores selling toys in USA. The company has tied up with another US based company called BrainPlay.com, an electronic retailer of children products to create a new company called Kbkids.com. which sells a wide array of children's products including toys. Within a few months of its launch, the site of Kbkids was rated by Gomez Advisors as number one in customer confidence. This popularity is attributed to brand image of KB Toys, the company's large chain of retail stores and heavy promotion of the site in these stores. The buyers do not perceive risks in buying through the web site of the company. For they know that anything that is bought on-line can be returned, if found defective or unsuitable otherwise, to any of the more than 1300 retails stores – a distinctive competitive advantage which a pure e-tailer does not have (Gulati & Garino, 2000).

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e-Commerce: Emerging Economic Implications

Veena Pailwar

With the rapid emergence of dot com companies, it has become pertinent to analyze the economic implications of e-commerce transactions. This paper analyzes the impact of e-commerce on the product life cycle, economies of scale, cost of production, production function, competition, intermediation, international trade and employment generation. The paper also points out some of the methodological and estimation problems that the economists are facing in the e-commerce environment.

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With the advent of new technology, especially the Internet enabled technology, more and more business transactions are shifting to the electronic media. e-commerce has registered rapid growth within just five years. Forrester Research, a US based research and consultancy organisation, estimated the size of e-commerce as US$10.6 billion in 1997. This is expected to grow to US$ 223 billion by the year 2001 and further to $327 billion by the year 2002. Gartner group, a consultancy, has estimated worldwide B2B e-commerce transactions as $145 billion in the year 1999 and forecasts that in 2004 worldwide e-commerce would surpass $7.29 trillion. USA leads in the e-commerce economy – Forrester research estimated that the business to business e-commerce transactions were $43 billion in 1998 and expected to be $1.3 trillion in 2003. Even the business to consumer transactions are growing rapidly. From mere $8 billion in 1998, they are expected to grow to $184 billion by 2004.

Compared to the global volume, the spread of e-commerce in India is very low. However, it is expected to grow at a rapid rate. A survey carried out by NASSCOM (National Association of the Software and Service Companies) indicated that during 1999-2000, e-commerce transactions in India were Rs 450 crore. Out of this, Rs. 50 crore was from retail business while the rest constituted business to business transactions. The survey forecasts that the e-commerce in India is likely to reach Rs 1,200 crore during 2000-01. Out of this, about Rs 100 crore could comprise business to consumer transactions and Rs 1,500 crore of business to business transactions. With improvement in telecom infrastructure and increase in PC penetration, e-commerce transactions in India are expected to further jump to Rs 10,000 crore by 2001-2002. Business to Business transactions are expected to constitute a major chunk of e-business transactions in India.

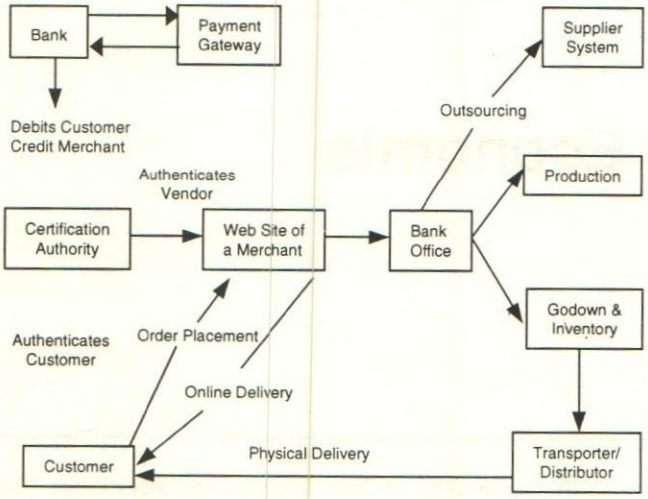

Fig. 1. Schematic Presentation of E-commerce Setup

Concept of e-Commerce

e-commerce refers to buying and selling over the electronic media. Internet enabled technology has emerged as one of the important mediums of e-commerce. In this context, e-business is a combination of computer systems and networks connecting people and companies, that enable them to communicate faster and with greater ease and accuracy. Along with the final purchases and sales transactions, e-commerce economy also encompasses various sales support, customer support and payment services, inter-industry communication, etc.

A schematic view of an e-commerce transaction is laid out in Fig. 1. As indicated in Fig. 1, in e-commerce set up, the consumer places the order for a commodity at the merchant's web page. This information is supplied to the office where it is processed using accounting software. The processed information is then passed on to the supplier of the intermediate goods, to the production units and even to the godowns where the inventories of the goods are kept. At the same time, delivery orders are placed with the courier or other transporters and distributors. Customer makes payment through various e-payment mechanisms. The payment information is first certified by the certification authority. The certified information is then passed on to the bank, which in turn debits customer and credits vendor.

The various features of e-commerce enable companies to close store, reduce inventory requirement, paper work, number of media to deal with and increase the speed of the transactions. The increased efficiency and convenience in transactions is turning more and more consumers and producers to the e-commerce way of transactions.

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Each of the transactions between various parties highlighted in Fig. 1, such as placement of order by the customer directly with the merchant, or through the portal or e-retailer, e-payment system, online delivery or physical distribution system, etc. has economic implications. New concepts and economic questions are surfacing in the new economic environment. Some problems which economists and managers face are as follows:

- Will production and efficiency increase and the production frontier shift outward?
- Will the role of middleman completely disappear in the e-commerce economy?
- Will competition increase?
- Will there be perfect competition and equalization of prices?
- Will it be possible to follow price discrimination?
- Will there be cost reduction on all account?
- How much will be the net gain in shifting from the traditional way of doing business to e-commerce?
- Will government revenue increase due to increase in overall business activities?
- Will money supply and inflation remain unaffected by e-commerce activities and shifting to e-payment system?
- What would be the nature of international trade and international transactions?
- Will there be decrease in employment across the sectors? Will there be no change in the nature of job market?

With the rapid emergence of dot com companies and e-business transactions, even in India, it has become pertinent to analyze the economic implications of e-commerce transactions.

Cost & Pricing of Products

The instant access to large number of sellers by buyers in e-commerce markets makes price com-

parison process simpler and faster. This, along with the auctioning process, might result in price equalization. Prices are expected to be fully flexible in this set up. However Internet also offers easy access of personal information about the consumers to the producers and hence economies are facing customization of products. Customization of the products is likely to result in price differentiation in some product lines.

Table 1: Net Impact on Cost

Decrease in Cost	Increase in Cost
Paperless transactions	Packaging cost
Reduction in inventory level	
Reduction in middlemen	Transportation and distribution cost
Lower manpower	Payment to portals and e-retailers
Reduction in property cost	Increase in number of warehouses
Reduction in advertising cost	e-advertising
Increasing returns to scale	
Lower transaction cost	
	Web page development

Prices of various products are expected to decline in the e-commerce economy on various accounts as summarized in Table 1. Substantial cost reduction is expected on account of lower property cost (warehouses & godowns can be sited in cheap areas unlike supermarkets and showrooms). A small staff requirement for warehouses than for supermarkets is also expected to result in major cost reduction. However the large distances from the place of delivery may not bring down prices to a large extent. The cost of safe packaging and delivery in a reasonable time limit may turn out to be as high as the price of the product. Marketing, e-advertising and running delivery vans cost a lot of money.

Table 2: Saving in Distribution Cost by Product Category

(US $ per transaction)

	Airline Tickets	Banking	Bill Payment	Term Life Insurance Policy	Software Distribution
Traditional system	8.0	1.08	2.22 to 3.32	400 to 700	15.00
Telephone based		0.54			5.00
Internet based	1.00	0.13	0.65 to 1.10	200 to 350	0.20 to 0.50
Saving (%)	87	89	71 to 67	50	97 to 99

Source: OECD (2000).

Intermediation

Traditional production, transaction and distribution process is characterized by the linear point to point path (Fig. 2). In the traditional linear point to point information and knowledge flows, intermediaries play an important role. In the physical world, because of the large distances between production units and consumer units, it is not possible for consumers to approach producers directly and vice versa. The existence of intermediaries, namely distributors/wholesalers and retailers, thus reduces transaction cost for both producers and consumers.

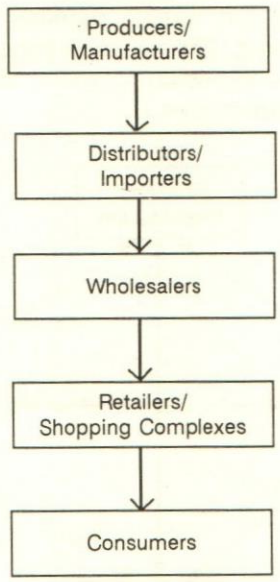

Fig. 2. Traditional Intermediation

In the emerging economic scenario, linear point to point information and knowledge flow no longer full represent the reality. In the process of e-commerce transactions, it is possible for the consumer to contact and place an order with the manufacturer instantly and directly (Fig. 3). Not only can the order be placed on the Internet within a few seconds; a number of goods such as computer software, books, newspapers, entertainment goods such as music, films, videos etc. and various services such as financial, legal and health etc. can be supplied on-line and delivered online within no time. Online ordering and delivery of products is reducing the role of intermediaries. It is also feared that intermediaries would be completely eliminated in the e-commerce economy.

However, these fears may be unfounded. In e-commerce economy, though it is possible to deliver a number of goods and services online, it may not be possible to completely eliminate the physical delivery of many goods because of their very nature. Goods such as vegetables and grocery, garments and shoes, toys and utensils, etc. can not be delivered online. Though intermediaries like wholesalers and retailers can be

eliminated in such transactions, it may not be possible to eliminate distributors and transporters. The demand for distributors and transporters is in fact expected to increase tremendously. The speedier and efficient flow of information and knowledge through Internet has made globalization of economies a distinct reality. Increasing returns to scale faced by producers in the knowledge economy is leading to production of larger quantities of products. As these larger quantities may not be absorbed in the immediate domestic market, the remote domestic and foreign markets would be accessed and explored. The distance between producers and consumers is expected to widen and thus create higher value for distributors.

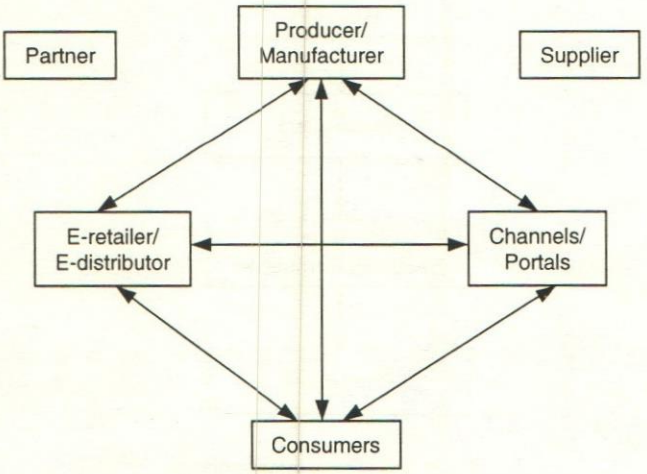

Fig. 3. Cyber Mediation

The existence of those intermediaries is threatened who can not add on to value in the production and transaction process in the new environment. The survival of existing intermediaries would depend on how fast they can redefine their role and create value for their services. As a part of the reinventing process and survival strategy, many distributors, for example, have gone beyond ensuring the movement of the physical product and are increasingly offering services which are technical and financial in nature.

As a survival strategy, distributors have gone beyond ensuring the movement of the product and are increasingly offering services which are technical and financial in nature.

Not only are the existing intermediaries trying to redefine their role and create value for their services, new types of intermediaries are emerging – they are cyber – mediaries (Fig. 3) like e-retailers and portals. e-retailers and portals facilitate accessing information about large number of sellers and price comparison by consumers. They provide space for advertisements for various producers; the search command on portals helps in accessing information about various sellers even when consumers do not know the web site number of the producers. When consumers make a purchase transaction, these intermediaries record personal details of the consumers, (for example the consumers' income group, their preference for brand, colour, size, etc.) Cyber-mediaries process and analyze this information and new products are developed accordingly. With the rising volume and greater customization. business is becoming more complex for any single producer to handle on his own, giving rise to new opportunities for intermediaries. The fact that is emerging from this is that rather than intermediaries getting eliminated, they are getting replaced by cyber mediaries.

Product Lifecycle

Every product passes through different phases in its life (Fig. 4). Technically adept people using their knowledge and ideas invent new products. Visionaries perceiving the demand for the product introduce them to the market and commercially exploit the opportunities provided by the new inventions. In the initial stages of the life of a product, there is uncertainty about the survival of the product in the market. This period of uncertainty is known as Chasm. Slowly pragmatism takes over the market as more and more people realize the benefit of the new product. Product reaches maturity and saturation phases where demand is reasonably constant and stable. Meanwhile, new products embedded with advanced technology are introduced in the market. Public slowly loses the charm for the old product and thus starts the downfall in the life cycle of the product. With the appearance of newer products, people become highly skeptical about the utility of the old product and replace it with the new products.

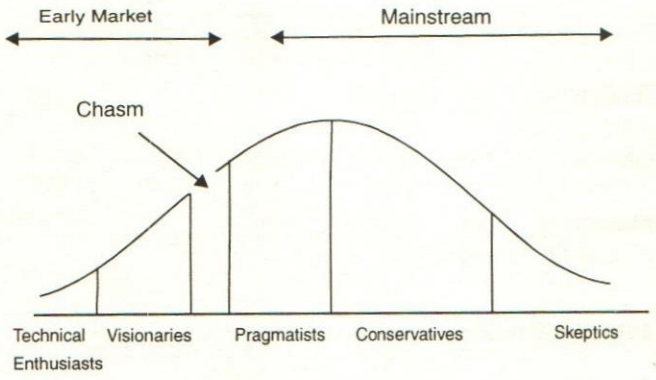

Fig. 4. Product Lifecycle

e-commerce economy is ruled by three i's (ideas, inventions and innovations). Beside land, labour, capital and raw materials, one of the important inputs in the production process in this economy is knowledge and brain power. The new economy provides a fertile ground for converting ideas into inventions and also for commercial exploitation (known as innovation). These innovations lead to the emergence of new products at a fast rate. The increasingly aware consumers reject outdated technology and products. This phenomenon is shortening the average product lifecycle.

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Management of operations by producers, consumers and policy makers is to a large extent based on the forecast of demand and supply conditions. The forecast assumes continuity and predictability of the environment. This implies that product demand is reasonably stable and does not change too much from one period to another. However, reduction in product life cycle is bringing in discontinuity in the planning horizon. Thus forecasting with acceptable accuracy has become difficult.

Production Frontier

Theoretically, in e-commerce economy, order can be placed at any time and 24 hour delivery to customer is promised. This nature of e-commerce transactions, with the availability of wide variety of consumer goods, is expected to increase demand for goods tremendously as shopping is not restricted by limited shopping hours. Tremendous increase in demand is also expected on account of network externalities. When use of an electronic gadget by some consumers prompts other consumers to purchase it and make it convenient to use it for transaction and communication purposes, the economy in that case faces network externalities. In the past also economies have experienced network externalities on account of innovation of electronic equipment such as fax machine, telephone, computer, etc.

In the demand driven economy with no supply constraints, boost in demand is expected to result in higher production. In the process, the resources released, say for example, due to saving of time, information cost, procurement cost and distribution cost, may increase the availability of resources for higher investment and hence are expected to enhance production capacity and shift the production frontier. The nature of production is also changing in the new economy. Growing amount of production now is in the form of intangibles, based on the commercial exploitation of ideas rather than material things. And therefore with given material and human resources, growing use of ideas, technological inventions and innovations would result in shifting of production frontier upward and the supply curve towards right hand side.

Economies of Scale

The new economy is characterized by the use of large knowledge component. For given capital and labour and other resources, increasing knowledge intensity in products and services brings with it increasing returns to scale. In an industry facing increasing returns to scale, manufacturing cost per piece declines as manufacturing volume increases. This occurs because the fixed cost can be distributed over to the bigger quantities of each product. In the e-commerce set up, goods and services, especially intangibles (such as music, films, videos, softwares, banking and other financial services, legal and health services), can be easily supplied to increasing number of consumers with no additional cost or minimum marginal cost. Even some of the tangibles such as books, newspapers, greeting cards etc. can be easily converted into digital form and supplied online with minimum of transaction cost. This provides an incentive to innovate fast as the early bird would capture the market and enjoy increasing returns. Traditional industrial age economic models based on the assumption of diminishing returns would no longer apply in the e-commerce economy.

Competition

Perfect competition assumes large number of buyers and sellers in the economy, free flow of information among agents, efficient allocation of resources among the productive units, zero transaction cost and no barriers to entry. e-commerce economy comes quite close to these features of perfect competition, as large number of buyers and sellers can instantly interact with each other. Consumers can compare the prices of the products of different sellers and obtain goods at the lowest quote. Smaller production units can easily launch a web site and compete with the large firms of the real world. Free flow of information is expected to result in efficient allocation of resources across industries and

e-commerce economy comes quite close to features of perfect competition.

across country boundaries. Transaction cost is almost nil for products which can be converted into digital form and can be supplied online.

However, some of the distinguishing characteristics of the e-commerce set up also have the potential for creating monopoly power in certain lines of products. The e-commerce set up has negligible distribution cost for intangibles and therefore marginal cost of production and distribution is almost nil for these goods. Sale of these goods to a particular customer does not reduce its availability to other potential consumers. Economies of scale arising out of negligible marginal cost, along with network externalities and consumer preference for the already acquired skills, provide natural monopoly power to some of the producers in the e-commerce set up. Early birds are thus expected to reap the benefits in these lines of production.

Therefore, in the e-commerce environment, monopoly is expected to exist along with perfect competition. Competition would be especially seen in those areas where goods and services can not be converted into digital form and economies of scale are not very predominant. Breaking the monopoly power to remain in the competition would require high speed of innovations and making the product visible all the time, whether there is a demand for the product or not. Competition would be basically in the form of converting ideas, knowledge and brainpower into innovations.

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Outsourcing of Product

With the increase in the optimum size of operations, and the economies of scale involved the new economy, large scale production by manufacturers is likely to increase outsourcing of a number of operations to destinations that could provide world class quality at lowest cost. Developing countries could especially benefit in the process as labour and various raw materials are cheaply available there. However it is quite possible that dependence on outsourcing of activities might increase the number of transactions and transaction costs.

International Trade

In the Internet set up, outsourcing of products beyond the national boundaries is much easier than in the old economy set up. Easier access and transfer of information through Internet also makes it easier for multinational organisations to set up production and distribution units world over. The economies of scale involved in e-commerce transactions would motivate producers to approach global consumers.

The Internet offers small and medium firms many of the advantages of large diversified firms. It gives them access to the same information as big firms and makes it easier for them to get into international markets. Consumers can also access global producers and world class output at competitive prices. As a result, national and industrial boundaries are getting blurred. The world is becoming one whole market. Then is the e-commerce environment going to be characterized by free flow of trade? Though theoretically it is possible to achieve free flow of international trade in the economy, practically, barriers to trade would remain in existence. The most important of them is the language barrier. The large transportation costs and transaction costs would further hinder free flow of trade across boundaries. Difficulty in payment especially if the payment is expected to be in foreign currency would further limit the amount of trade across geographical and political boundaries.

The Internet offers small and medium firms the advantages of large diversified firms.

Payment System

Three types of payment systems are emerging in the e-commerce economy. In the electronic debit and credit system, funds are transferred from the customer's account to the merchant's account using ATM, credit cards, etc. However, a traditional bank account transaction lies at the end of every chain. Various forms of Smart Cards are also available for payment over the electronic media. Smart cards are plastic cards with an embedded micro chip. In this payment system, bank approval is not required for each transaction. Clearance takes place every day. Attempts are also being made to invent truly digital money that could be used without recourse to any physical transaction and could exist in the form of bytes stored in the memory of personal computers. This unit of payment may or may not be backed up by reserve account of real money. These units could downloaded from an account supplied as a loan or as a payment, or bought with a credit card over the Internet.

Though emergence of efficient payment mechanism

would enhance the efficiency of e-commerce transactions, it has a number of implications for the monetary policy in the economy. To the extent e-money replaces the existing bank notes and coins on a one to one relationship, the redefinition of monetary aggregates would leave the demand for money unchanged. However to the extent e-money allows people to economize in their holdings of currency, it could lead to decline in monetary aggregates. Large scale introduction of e-money would substantially increase liquidity in the system and increase inflation rate in the country. As of now, there is no effective controlling mechanism of e-money in the economy. Therefore increasing use of e-payment mechanism is expected to loosen the control of monetary authority on the money supply and lessen the effectiveness of the monetary policy.

Taxation & Government Revenue

If e-commerce economy could register higher productivity and growth and the government could effectively tax e-commerce transactions, then customs and sales revenue would increase. However, there are a number of difficulties encountered in taxation of e-commerce transactions. The online delivery of products makes it difficult to administer the customs and taxation law of any country. Taxes are fixed by the local and central government of countries. Taxation authorities do not have the power to tax products which are sold or produced beyond the local/national boundaries. As in the e-commerce set-up, domestic consumers can access the global market, the problem of tax collection becomes crucial.The foremost problem would be to determine which authority would be eligible to collect taxes in such cases: the government of the country where the goods are produced or that where the goods are consumed. The rate of taxation also differs from country to country. Determining the rate of taxation is another problem in the taxation of e-commerce economy. Difficulty in identifying buyers and sellers and the nature of transactions may thus adversely affect the customs and tax revenue collection of the government.

In the e-commerce set-up, the problem of tax collection becomes crucial.

Proposals put at the WTO meets have been arguing that e-commerce is at its initial stages of development and therefore the government should avoid taxation of Internet transactions. Arguments point out that such transactions would increase the prices of goods and thus hinder the growth of new technology and e-commerce. However, not taxing e-commerce transactions brings forth the issue of fairness and equity. Making e-commerce tax-free may erode the tax base and introduce distortions by favouring one mode of delivery of goods and services over the others. Arguments against taxation on e-commerce transactions also ignore the governments' need for tax revenue.

Employment & Income Distribution

It has also been feared that the reduction in number of intermediaries and sales persons due to reduction in number of supermarkets and showrooms would reduce employment world over. The worst affected are expected to be the unskilled manpower. It is true that unskilled labour is getting displaced in a big way in the e-commerce economy. However, large job opportunities are emerging for skilled and knowledge workers, managers and professionals. Likely areas where there is large possibility of increase in employment opportunities are Web development, software development, communication software, application service providers, web based applications, software engineers, network applications, e-commerce, data warehousing, client networking, e-software professionals.

Fears that the computer would replace people have been found groundless. A survey by The Economist (2000) points out that in USA, the unemployment rate has fallen to 4%, the lowest recorded in the last 30 years. A study conducted by NASSCOM–Mickinsey has indicated that the global shortage of IT professionals has gripped India as well. Demand for knowledge workers in 2000-2001 is expected to be 1,40,000 persons whereas supply is going to be just between 73,000 to 85,000 persons. By 2008, additional demand generated would be around 2.2 million persons per year. Recent study by NASSCOM (www. nasscom.org) also points out that the Internet and e-commerce industry employ approximately 82,000 people. It also projects that by March 2003, the Internet and e-commerce industry would employ over 300,000 people.

Conclusion

With the changing nature of economy, economists are encountered with conceptual, definitional, methodological and estimation problems. Traditional and old concepts are increasingly realized to be insufficient to address the wide changes taking place in the economy. For example the conventional method of calculating GDP does not take into account the impact of quality changes. e-commerce may not have improved productivity as reflected from conventional GDP or GNP

statistics, but it has definitely improved the quality of services available to consumers (The Economist 2000). Internet has added to the convenience of a large number of consumers. Rapid growth in product innovations has opened up the possibility of mass customization and personalized goods and services. Consumer satisfaction has definitely increased as a result of increase in the range of goods and services available. In the light of these changes, the present methodology of the NAS needs to be reviewed.

e-commerce may not have improved productivity as reflected from conventional GDP or GNP statistics, but it has definitely improved the quality of services available.

Greater difficulties in prediction, estimation and forecasting are also being encountered in the e-commerce set up. The continuously declining product life cycle is bringing in discontinuity in product life and thus creating problems in the estimation of demand and supply function of various products. Similarly estimation of stable demand and supply function based on the traditional concepts of money (not considering the e-payment mechanism) is becoming difficult. Policy decisions taken on the basis of unstable demand function would undermine the effectiveness of monetary and credit polices.

Specification of production functions for estimation purposes also needs rethinking. Traditional production functions emphasize mainly labour and capital. However the new economy is highly knowledge based and many sectors of the economy are thus expected to face increasing returns to scale. Traditional production functions assuming decreasing returns to scale, would be inappropriate representations for such sectors of the economy. Serious reworking is thus required on the part of economists and statisticians to revamp existing methods of estimations.

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It's in changing the way people work that I think the answers to productivity are going to be found.

– John Sculley

Leveraging Knowledge for e-Business Success

V.S.R. Krishnaiah

The Internet has put a new face on the way business transactions can be conducted. As technology matures, it's clear that the Internet serves as more of a backbone—linking together different business processes and parties (such as customers and suppliers), so that all can smoothly function together as a cohesive unit. The need to manage information overload (created by Internet, Intranet and Extranet) and accelerate the pace of business is making Knowledge Management (KM) technologies a critical factor in e-Business success. The paper discuss the evolution of e-Business, its relationship with KM, and also how emerging KM tools streamline business processes and enhance decision-making.

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A global revolution is changing business and business is changing the world. The competitive environment around most businesses and companies is changing with accelerating speed i.e. competition is becoming worldwide, new products are faster, new producing technologies are emerging and new delivery channels are available. Most businesses are convinced they have two options: either enter into the world of e-business by embracing the Internet and e-commerce, or be left behind in decidedly non-electronic dust.

The current business environment is characterised by the collapse of time and space, competition is no longer restricted to any geographical domain and can strike with lightening speed, from any corner of the world. With the help of Information Technology, companies are reengineering their processes for efficiency and high performances.

Paradigm Shift to Knowledge Economy

We are at the dawn of an age of net worked intelligence—an age that is giving birth to new economy, new politics and new society. The global spread of unfettered capitalism, combined with the inexorable advance of computer processing power, is changing the economic calculus that determines the way companies organize themselves. The economy for the Age of Networked Intelligence is a digital economy. In the old economy, information flow was physical: cash, cheques, invoices, bills of lading, reports, face-to-face meetings, analog telephone calls or radio and television transmissions, blueprints, maps, photographs, musical scores and direct mail advertisements. In the new economy, information in all its forms becomes digital reduced to bits stored in computer and racing at the speed of light across networks. Using this binary code of computers, information and communications become digital. The new world of possibilities thereby created is as significant as the invention of language itself, the old

paradigm on which all the physically based interactions occurred. The technological whirlwind sweeping us into the digital economy is relentless.

The new economy is also a knowledge economy based on the application of human know-how to everything we produce and how we produce it. In the new economy, more and more of the economy's added value will be created by brain rather than brawn. Figure 1 underlines the core characteristics of this paradigm shift, highlighting how the development of the knowledge economy has a potential to alter substantially all aspects and features of the commercial environment.

Industrial Economy				**Knowledge Economy**
From:				*to:*
Market-place	→	Doing business	→	Market space
Hierarchies	→	Organising business	→	Networks
Scarce physical resources	→	Economics in Business	→	imitless digital resources
Machine/ craft workers	→	Populating business	→	Knowledge/ intellect Workers
Real estate and plant	→	Infrastructure in business	→	Information and communications technology

Fig. 1. The Shift from Industrial economy to knowledge economy

IT is making change exponential

In his essay "The Coming of the New Organisation", management theorist Peter Drucker (1988) notes that it is simple to state that information technology is transforming business; what this transformation will require of companies and their managers is hard to decipher. The capacity to expand a business's limits far outstrips the capacity of its management to explore the new opportunities presented. The Internet compounds this. Companies which have undergone wrenching changes in the past decade recognised that the key to success lies in their ability to leverage information. Their belief is, armed with data, their employees will make better decisions which will have a direct impact on the bottom line.

Key to success lies in ability to leverage information.

CIOs and IT managers in charge of guiding their organisation's e-business efforts are in uncharted territory. They lack proven business models, and without such roadmaps, find themselves in the disconcerting position of pioneers—the ones with arrows in their backs—leading their organisations into unexplored territory. While the path an e-business should take today may be unclear, the vision of where an organisation should go in the future is even hazier because there are no reliable forecasts regarding e-business.

Evolution of e-Business

In order to understand what makes an e-business enterprise successful, it is important to see how e-business has evolved over the years. Simply put, e-Business is just business. E- business transforms a business and its value-chain relationships to exploit electronic communications with customers and suppliers. While e-Business is a new platform that fosters more efficient business transactions and creates new market opportunities, it also relies on traditional business fundamentals such as the automation of internal and external business processes. This automation began with electronic data interchange (EDI), which allows trading partners to exchange high volumes of structured data electronically—often over the Internet. EDI-enabled companies reduce paperwork, transmit information instantly and avoid the need to re-key information, reducing time and errors.

e-Business fosters more efficient business transactions and creates new market opportunities.

e-Commerce came into being with the advent of the Web, which made worldwide instantaneous communication possible. The Web provided a direct link between buyers and sellers, allowing customers to purchase products online. While there has been some fallout in Web business targeted to the consumer arena, business-to-business (B2B) enterprises are still going strong. B2B exchanges, where third parties bring together buyers and sellers through trading communities, become the next stage in the e-Business evolution. Here the focus is on making transactions with aggregation points lowering transaction costs. While many of the transaction processes are complex—requisitioning, supplier sourcing, order matching, fulfillment, settlement and content management—they are virtually transparent to the buyers and sellers of the trading community.

The most recent development in e-Business, and one offering companies a tremendous opportunity, is collaborative commerce. Collaborative commerce is

much more than buying and selling. It is a single virtual business entity that includes the entire supply chain, addressing the full range of processes internally and among businesses. While the flow of commerce in most demand and supply chains consists of a long series of complicated steps, in collaborative commerce this flow is facilitated because suppliers, the organisation and customers all work as one unit toward a common goal. In order to meet this goal, however, companies must successfully define and optimize their business processes to avoid bottlenecks and breakdowns along the way.

Rise of Electronic Trade Exchanges

Marketplaces have always been part of civilization, forming wherever farmers and producers and traders could conveniently gather. Soon roads and entire towns grew up around such gatherings to form the infrastructure required for efficient trade. Trading practices, protocols, and even laws evolved to facilitate and protect trade. In much the same way, electronic marketplaces are emerging in the world of e-business. Often referred to as web exchanges or Internet trading exchanges (ITEs), these online marketplaces bring buyers and sellers together to conduct business. ITEs provide infrastructure services to facilitate commerce such as transaction processing, escrow services and logistics arrangements. Some ITEs also help manage the entire workflow around the transaction by providing services to support project workflow and collaboration.

ITEs will have an impact on the increasingly popular corporate procurement portals, which represent a specialized form of e- business exchange. "Procurement and exchanges will need to coexist in an open manner", notes Steve Hornyak, vice president of strategy and business development of Clarus Corp., a supplier of e-CRM solutions based in Atlanta, USA. In time, procurement systems will have the ability to leverage web exchanges to find the best price and availability of items being sought. Web exchanges have the ability to drive new markets, no different than the stock and commodities markets that now exists. Web exchanges will level the playing field by giving smaller companies, which lack sophisticated infrastructure, access to powerful transactional capabilities and services. To many industry observers, web exchanges represent the future of e- Business. "Trading exchanges is where e-Business is going".

KM Requirements for e-Business

Given the importance of information as the engine of the Internet economy, it's not surprising that Knowledge Management (KM) is becoming an integral part of the e-Business solution landscape. Knowledge Management is the Internet productivity solution of the new decade—and much more. KM is a set of tools, technologies, practices and processes that aids employees in displaying, categorizing, filtering and making interferences from information. This, in turn, helps workers transform information into usable knowledge that can deliver a solid business benefit. Examples of KM capabilities for a business corporation are given in Fig. 2.

KM is a set of tools, technologies, practices and processes that aids employees in displaying, categorizing, filtering and making interferences from information.

KM Capability	Description
Server-Side Computing	
Enterprise/Web Content Categorization	Content-based relevancy analysis of enterprise information.
Experts/Communities Database	Information on knowledge sources
Server User Profiling	Basic tracking of interests and behavior of user visiting a particular site or information source.
Client-Side Computing	
Intelligent Information Retrieval	User-aware search agents retrieve relevant information in advance.
Personal Content Categorization	Context-based relevancy analysis and clustering of personalized information
Information Consolidation	Single interface for tracking and indexing all user-relevant information.
Information Visualization	3D rendering of structured and unstructured information such as 3D graphing and relationship mapping
User Learning and Adaptation	Agent on client "watches" and learns user behavior, interests and current context.
Natural Language Processing	Speech user interface and handwriting recognition.
Notification	Client agent unobtrusively notifies user of information relevant to current system and context

Fig. 2. Examples of KM capabilities

When implemented as an integrated solution, KM technologies can:

- Decrease time-to-output by enabling e-Business

employees to make faster, better-informed decisions.

- Minimize the time spent "reinventing the wheel" by capturing best-known methods and other expertise, and making this knowledge available throughout the enterprise.
- Foster innovation and raise customer satisfaction by enabling organisations to exploit the full value of their knowledge assets.

KM framework

The basic KM technology framework consists of:

- Aggregating multiple sources of information.
- Applying personalized logic to extract maximum value from it.
- Offering advanced interfaces to help users convert the information to knowledge and share what they've learned.

The relationship of KM and e-Business in a balanced computing environment:

In most enterprises, knowledge management (KM) and e-business initiatives have been approached independently. This may be a sensible pragmatic approach to retain focus and avoid overextending each program. But there are two important interrelationships:

- Achieving KM objectives (improved utilization of expertise and insight, better collaboration, and interchange of experience and knowledge) can be key ingredients in e-business success;
- IT investments supporting KM and e-Business transformation may be linked at the implementation level.

The relationship of KM and e-business therefore challenges both strategic investment policy and IT programs.

Categories of Business Knowledge

Business Knowledge can be categorized in many ways. For the current purpose the following is relevant:

- Knowledge of the enterprise's own capabilities and products (i.e., what it can deliver to its customers and what it requires from its suppliers)
- Knowledge of processes (how to get things done, both internally and in conjunction with external parties)
- Knowledge of customers and suppliers (what requirements they have, what motivates their behavior)

Such knowledge exists in both explicit and tacit form, with the contribution of tacit knowledge typically increasing across these categories. Business knowledge and its exploitation is fundamental, independent of any e-business issues. However the transformation implied by e-business brings knowledge into sharper relief. KM manifests itself in IT implementation in multiple ways:

- KM may be embedded in line-of-business applications
- KM relies on horizontal capabilities such as groupware
- KM may rely on portals (whether for intranet, extranet or Internet use)

KM technologies help solve the business problem of having too much information from too many sources with too little time to digest it. Whether the information is structured or unstructured, KM technologies can enable companies to provide information when and where it's needed, and help workers use the information to make better decisions faster. All these can also be impacted by e-Business. But KM and e-Business relationships go beyond this. For example, Customer data resulting from an e-business distribution strategy will be much richer than was traditionally available to the business—there is potentially more knowledge implied in data from customer interactions (more "context" of the transaction can be captured). KM seeks to leverage this richer (tacit) knowledge.

KM technologies enable companies to provide information when and where needed, and help workers use information to make better decisions faster.

As businesses electronically deliver support (pre- or post-sales), their knowledge is being exposed. Where the knowledge is explicit and designed for external distribution, this is well understood. But the demand will increase to expose more of the enterprise's knowledge to wider constituencies. So KM programs conceived as supporting internal users may be required to extend the user base to trading partners and customers. This has wide-ranging implications—from security, to assessing and providing context for knowledge-based interactions.

Conclusion

Leveraging advanced Information Technologies in general and Knowledge Management tools in particular is more important now than ever before for business corporations. If a company is to succeed at e-business, Knowledge Management must be an integral part of its e-business strategy. To compete in the digital age, businesses need to invest in knowledge Management to meet e-business challenges today and to exploit future KM applications as they emerge.

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Forty thousand wishes won't fill your bucket with fishes.

– Fisherman's saying

Focus

Intranets & Organisational Effectiveness

R. Ramaswamy

Formation of workgroups and cross-functional teams are an essential part of organisational learning exercise. A major inhibiting factor for such a collaborative learning process is the ineffective communication channels within organisations. Intranet is an effective tool for enabling corporate communications, knowledge management and organisational learning, states the author.

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Organisational learning is facilitated by several infrastructures both within and outside the organisation. At the technical level, the infrastructure consists of an integrated system of technologies that are networked to support various types of communication. At the organisational level, formation of workgroups and cross-functional teams enable a communication architecture extending over functional boundaries. At strategy level, the formulation of corporate policies and the alignment of various functional units and business processes creates an environment where everyone can learn and contribute to the knowledge base, and the knowledge so generated is efficiently available to all parts of the organisation where it can be meaningfully utilized for development of new skills and business opportunities. Intranets can play a very useful and effective role at all the three levels. Intranets can ease problems of ineffective information creation and exchange and also enhance collaboration among workgroups.

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Intranet is an effective tool for enabling corporate communications, knowledge management and organisational learning. It is fast becoming an acceptable technology for information generation, access and transfer between office and field locations. By enabling a dynamic response to changes in the work place and the environment, Intranet can give several advantages. The following cases serve to illustrate the point. Silicon Graphics was awarded the Business Environmental Award (1995) for Best Comprehensive Waste Reduction Program for a Large Business. Part of the program's success was attributed to the use of web page for Waste Reduction Program that facilitated direct e-mails by employees. Aerospace giant Lockheed Martin Corp., effectively uses its Intranet to create a cross-platform

solution for internal corporate communication. Nebraska-based DTN's satellite system, sources, compiles, and disseminates up-to-the-minute information on weather and pricing to help retailers to stay abreast of conditions. The "Gyandoot" project of the Government of Madhya Pradesh, India, has demonstrated how Intranets can be used as an effective tool for social engineering.

From a technical viewpoint, Intranet uses the Internet standards for managing the content and communication, namely the HTML and HTTP protocols for content creation and manipulation, and the TCP/IP protocols for communication between the computer networks. By using a standard for web content and communication, the World Wide Web allows the content to be created and shared across diverse platforms.

Literature Survey

Organisational effectiveness is defined as the "ability of an organisation to mobilize its centers of power for action-production and adaptation" (Mott, 1972). Effective organisations are characterized by their higher-quality outputs and their ability to quickly and effectively adapt to changing environment. Organisational design has attracted a lot of attention in the recent years. The social concerns regarding large-scale cultural changes, that have been particularly rapid in the recent years due to the synergising influences of diverse technologies, have constituted a recurring theme for debate and research for the most part of the current information technology (IT) revolution.

Effective organisations are characterized by their higher-quality outputs and ability to quickly and effectively adapt to changing environment.

The management philosophy and strategy of an organisation is a reflection of the basic assumptions and values in its organisational design. Key aspects of design include structure and processes, decision-making and communication networks, leadership style, the overall employee relationship, and the flexibility to respond to fluctuations in environment. Various structures have been identified by academic and popular research, each reflecting a unique set of values, assumptions, and beliefs. One such is the mechanistic form which reflects the values of status quo and efficiency (Nadler, Hackman, & Lawler III, 1979). It is characterized by hierarchical structure, top-down communication, and centralized decision-making. A second structure, the organic structure, is in stark contrast to the mechanistic form. It reflects the values of flexibility and innovativeness, and its design is characterized by an informal, entrepreneurial style which is less rigid in all respects (Nohria & Eccles, 1992). In this structure, decision-making is decentralized and informal, where expertise and judgment are highly valued. Other forms of organisation structures are the high-involvement form and the network form (Miles & Snow, 1986). In the high-involvement, or self-leading form, organisations create a structure reflecting the value of adaptation, one which enables them to tolerate incremental changes. In this structure, employees are given access to resources needed to complete a whole task, like materials, machinery, and information, and are empowered with decision-making authority and the ability to eliminate communication barriers existing between departments and functions. The network structure incorporates a free market style rather than a vertical hierarchy and it reflects the value placed on continuous transformation.

Developing and launching new products, as the way to 'Creating the Future' for the organisation (Hamel and Prahalad, 1994) is possible only if both production and marketing departments function effectively as a team to enable these development works that can lead to early as well as sustained realization of customer satisfaction and delight. With success in development work based on team work, it will be possible for a company to continually raise customer expectations and meeting them, thus building unassailable competitive advantages in the market place. Team working and learning are inextricably linked. Intranets can be deployed to create conditions directed towards encouraging coordination and teamwork. An Intranet provides a tool kit for significantly easier and more intuitive information sharing across employees and business associates.

Intranets can be deployed to create conditions directed towards encouraging coordination and teamwork.

There has been a growing interest in both learning and knowledge in recent years. This is because knowledge is now seen as a strategic asset for competitive advantage. Instead of focusing on physical capital and manual work, the competence and knowledge of the employees have become valuable sources of advantage to organisations (Badaracco, 1991; Drucker, 1993). However, it is not knowledge per se that is important but, as argued by Grant (1996), it is the knowledge integration and interaction that help in sustaining and

nourishing a knowledge management environment in organisations. Intranets can play a proactive role in leveraging the many ways that knowledge can migrate into an organisation and strengthen business performance. By providing facilities for online meetings, document sharing, and messaging, Intranets support collaborative interaction in a big way.

It is not knowledge per se that is important but, knowledge integration and interaction that help in sustaining a knowledge management environment.

Brown *et al.* (1989) argue that the activity in which knowledge is created and organized cannot be separated from organisational learning. Organisational learning has fired the imagination of many academics and consultants and has also risen to prominence in recent years within the management community. According to Senge (1990), one of the reasons for the increasing importance of organisational learning is the inability of the traditional command-and-control management system to motivate employees. The traditional bureaucratic system stifles the talents of the organisation's best people. A number of authors, notably Adler and Cole (1993), and Romme (1996), have suggested that the way hierarchy has been used as an organisational system is at the root of most problems in organisations. According to them, organisational learning attempts to overcome such problems. In the strategic HRM literature, scholars increasingly recognize the need to build flexibility into the organisation. Wright and Snell (1998) argue that firms that seek to increase levels of customer service must develop an amount of flexibility in operations. Such flexibility can be achieved through Intranets which facilitate the formation of self-managing teams which, in turn, can help create situations that could co-produce knowledge through the activity of learning.

Intranet Overview

The Intranet, like the Internet, is built upon the server, the network, and the browser. The server is connected to an Ethernet network that is in turn attached to a personal computer running a browser. The server is commonly called the Web server. All web server software support the Common Gateway Interface (CGI) standard. There are three levels of security that all Web server software should support. The most basic is access restriction to a paper with the use of an ID and a password. The second level of security is restriction by IP address. The third level of security is the Secure Sockets Layer (SSL). This is a security method where all data transmitted between the Web server and the browser is encrypted.

The intranet infrastructure comprises the communication and content standards, and application tools that provide facilities for information access, creation and sharing. The key feature of an intranet infrastructure is the standardization of information content (i.e. the output), rather than the software tools that are used to create the content. It is therefore possible for users working on diverse platforms and software tools to create contents that can be viewed and edited by others, The communication standards of the Internet provide location transparency, and the content standards of the web provide client transparency. An intranet application based on these standards can reach for higher levels of abstraction in design. The Intranet provides both the ability and the motivation to progress to an object oriented approach. Use of component technologies, and reuse of software objects has allowed solutions to be viewed as functions rather than lines of computer code. Through a modular approach to design, users can create tailor-made applications to suit their specific needs. Standard content refers to not only the text and graphics but also the processing logic. Developments in content standards, particularly in XML protocols have enabled intelligent scanning of domain-specific contents that were not possible through traditional HTML protocols. Consumer preference for content standards and intense competition between vendors providing internet applications is now causing the vendors to shift their R&D investments away from developing proprietary locks to providing features that make the content creation and sharing easier for non-technical users.

Intranet applications also extend the use of computers to support unstructured processes. The user has the capability to browse different sites and use search engines to filter the unstructured information. Through an iterative process, the user learns to formulate more specific queries or keywords, which in turn stimulate generation of new ideas and approaches to problem solving. This approach is consistent with providing an infrastructure that enables the users. Current applications aim at supporting workgroup activities

Intranet applications extend the use of computers to support unstructured processes.

and project management functionality in a distributed environment. Such applications that provide customized views of distributed objects can support distributed and decentralized decision making, leading to enhanced competitiveness.

Intranet Planning

The first step in the planning process is to understand the vision and purpose for an Intranet implementation. In many cases, Intranet implementations while increasing networking costs, have generated savings in the costs of traditional process of information creation and distribution. In some cases, Intranet implementations also reduce the number of personnel or even eliminate some of the functions. However, one should not view the intranet infrastructure as a tool for mere reduction of communication costs. Most radical growth in business do not come from cost savings, but from increased opportunities and revenue.

The intranet infrastructure is not a tool for mere reduction of communication costs. Growth in business comes from increased opportunities and revenue.

Organisational expectations from an Intranet can vary, depending upon the level of the executives interested in the Intranet. Senior executives often support Intranet expecting improved support for decision making through availability of quality information, while junior executives are concerned with ease of information access. The corporate policy makers may expect the Intranet to even change their nature of business. Intranet, by itself, does not provide the organisational structure and processes to create and manage information content to suit diverse organisational needs. However, an understanding of the level and scope of expectations can help formulate the best approach for planning the Intranet. Lower-end expectations generally focus on web enabling the existing applications and an Intranet infrastructure to provide a cheaper and user friendly way of providing information, computing and network services. In many cases, these can be achieved through simple computerization and automation of existing processes. A high level of sophistication or automation may intimidate the potential users and inhibit free communication. One simple criterion for measuring the success of an Intranet implementation is the help it provides for users to communicate in innovative and useful ways. When the intensity and innovation in communications become pervasive, every one contributes to the success of the Intranet.

Implementation Issues

Implementation of an Intranet can only be successful if the underlying objectives are clearly and explicitly understood. This poses a great challenge since top-level strategy focus is important. Broadly speaking, the strategy can exist at two levels: first, for organisational adoption and development, and second, for distribution of responsibility. In either case, a people-oriented approach is required, and an explicit programme of communication and training must be formulated to support organisational development.

Since Intranet is based on standard communication and content protocols, the users working on different platforms using different tools for content creation can share their content across the Intranet. However, unlike other IT tools that help automate manual activities, getting real benefits from an Intranet implementation calls for a change of mindset, and innovative ways of processing information. To get the true benefit of an Intranet, managers need to understand the different ways in which information enables their functions. This is fundamentally different from a reporting mindset of the traditional MIS, where reports are routinely circulated even when their content ceases to be relevant to decision making, either because of lack of currency, or lack or authority. Viewed from this perspective, successful implementation of an Intranet infrastructure also relies upon a change in organisational perspectives on decision-making and information sharing.

Existing employees in an organisation may often resist Intranet because of the unknown consequences of its implementation. Many employees in traditional organisations derive their power and patronage from their control over creation and distribution of information. Such employees are likely to resist change, not because of the aversion to the Intranet technology, but rather to the accompanying changes in the organisational structure. The external environment that continuously threatens the survival of the organisation will cause the necessary changes in the organisation so that people accept the new technology, and wake up to its possibilities for competitive advantage. Much of the information in an organisation is associated with its context. In order to be useful, an Intranet implementation must necessarily address the short-term issues related to goal commitments and resource assignments. Such information must be consistent and be available to those who need it. Consistency of information requires updating of information located at different sites, particularly when it is likely to change frequently.

Intranet Architectures

The Internet and Web technologies are based on internationally accepted non-proprietary standards. An Intranet architecture enables information sharing at different levels. At the simplest document level, most organisations are now able to generate their content documents in standard formats such as HTML. Although such standards necessarily sacrifice the sophisticated formatting available in proprietary software, this is adequately compensated by ease of exchange of information content. In dynamic environments, the contents of a document are not static, but rather created on request by user. Such requests represent alternate ways of solving data warehouse requirements. At the application level, Intranets have resulted in modularization of applications into functions that simplify their use by non-technical personnel. Larger applications are decomposed into simplified functions and functional specialists now manage their local information needs.

At the workgroup level, an Intranet architecture provides several facilities. Electronic mail continues to be a common tool for Intranet communications. Threaded discussions and newsgroups integrate email and web functionality by organizing emails around discussions. Variations of threaded discussion support online reviews and collaboration. Forms to database or mail provide a structure for collecting and consolidating user responses. The versatility of different means of communication has implications on the information flow in an organisation. For example, e-mail is a simple form of push medium whereas threaded discussions form a pull medium. Newsgroups can be considered a push variation of threaded discussion. Forms to mail can also be used as a strictly pull page for collecting feedback from the users. Personal Agents provide an intermediate option between complete push and complete pull. An Intranet implementation must address at least some of these issues, and the underlying architecture must support the kind of information flow envisaged after the implementation. These decisions will ultimately influence the patterns of information creation and sharing within the organisation. Newer applications are emerging that integrate many of the Intranet functionality in innovative ways.

Intranet Applications

Traditionally, an information professional was part of a separate and centralized function. In this context, information was considered simply as an intermediary product, being an output of some functional activity and an input to another. The relationship of information with the different functions was well defined. The role of these professionals was distinct from the functional professionals. When IT became more user-friendly and non-specialists learned to use IT to manage their own needs, the role of functional specialists began to change. Many functional people now manage not only their own information needs, but also create and communicate information needed by others. In the changed context, the role of centralized IT professionals has become blurred, whereas information is no longer treated as a flow between different functions, but rather as a vital force that drives the organisational systems and processes. The altered role of information as a key resource, and its full strategic implications are yet to be understood in many organisations.

Acceptance of an Intranet infrastructure provides an additional push to IT towards web-standard content and a global audience. Such a platform-independent approach provides the long-term flexibility for incorporating new functionality and integrating diverse content in the event of changing requirements, including global mergers or partnerships with other organisations. The new organisational model derives its strength from the enormous resilience and flexibility of this global reach. It is therefore crucial for users of Intranet to realize and support the maintenance of vendor independent standards to retain the benefits of globalization. This standardization of content, along with the transparency of location, provides radically different options for supporting distributed applications. Whereas the traditional MIS approach required all the functionality to reside on a centralized computer system, an Intranet implementation can support multiple and smaller computers distributed over a network. An immediate advantage of this approach is the distribution of traffic on the network, instead of routing all traffic through a centralized computer system. Although a central server can use proprietary software, it must be able to deliver standard content.

Advantage of Intranet implementation is distribution of traffic on the network, instead of routing all traffic through a centralized computer system.

Intranet applications are typically modular, and the different modules tend to evolve over time as the processes get better understood. One of the important characteristics of a successful Intranet implementation is its ability to support a learning process, and to evolve in response to user needs. One advantage of this approach is that entire applications capturing all the information and business processes need not be developed in one go. Intranet applications can therefore developed

as an iterative process. Initially, the emphasis is on the creation of the physical or technical infrastructure, consisting of the different hardware and network configurations. An Intranet implementation that is focused on the development of individuals and their contribution to the organisation will have modest technology requirements as compared to complete technology solutions. The next step is to provide solutions to the users so that they begin to use and adopt the technology. An effective Intranet adoption requires an interactive learning approach in application design.

One of the biggest challenges in developing Intranet applications is the need to accommodate increasing user expectations. Unlike classical "waterfall" approaches to systems planning and development, intranet applications require good expectation management and change management skills. Implicitly, these applications must also support diversity across user needs, platforms, and applications.

Intranet applications require good change management skills. These must also support diversity across user needs, platforms, and applications.

Administration Issues

One of the crucial differences between a conventional IT solution and an Intranet application is that the intranet technology, by its very nature, shifts the control of information flow from the central MIS personnel to the distributed functional personnel who are also the creators and users of information. In the traditional IT solution, information flow is based on the push model, where the pre-identified users are provided with routine reports at regular frequencies by the centralized MIS to support their decision making activities. Such an approach was consistent with the earlier hierarchical structure of the organisation and the top-down decision making paradigm. On the other hand, in the pull-model, users look for and get the information when they need. When communication and distribution is delinked from creation, users are no longer given routine information that is not relevant. This requires not only change in the information infrastructure, but also a shift in corporate culture and employee attitude.

When users take responsibility to locate and acquire the information that they need, they find efficient ways to meet their needs and make fewer demands from the centralized MIS personnel. Newer software tools based on intelligent agents help users to keep track of changes in information content, and save the time needed for surfing and searching. The role of central MIS will need to be redefined to support the emerging distributed decision-making paradigm, and to provide the users with the computer skills and tools required to satisfy their information needs, rather than the information content directly.

The ready availability of huge volume of information also means that it is no longer possible to collect and analyze all possible information before taking a "best" decision. The users must develop the skills to take decisions based on partial information, and to decide whether or not further information is required. As users learn to shift from "central push" to "user pull" they develop learning capabilities that ultimately improve the competitiveness of the organisation, even when all competitors have access to all kinds of information. The ongoing tension between the opposing polarities of view, particularly in the context of push and pull of information, will help the organisation develop a symbiotic balance, and keep it on an optimal track.

As users learn to shift from "central push" to "user pull" they develop learning capabilities that ultimately improve competitiveness of the organisation.

One of the formidable challenges in Intranet administration is in seeking a fine balance between control and freedom. A thrust towards control of information tends to "centralize" the Intranet administration, while the thrust towards freedom tends to "decentralize" the information creation and use. This implies a co-existence of formal and informal information on the Intranet. Formal information refers to the officially approved information on the organisation. It has to be officially reviewed for accuracy, currency, and other official liabilities. Informal information can exist at two levels, group level and individual level. Group level information is intended for use within a specific group for project.

At a formal level, different roles have been identified in literature to support Intranet infrastructure. While the names may vary between different organisations, one can describe them as follows: the Web Administrator, the Webmaster, the Publishers, the Editors and the Authors. The Web Administrator is the strategic executive at the enterprise level on all matters regarding the Intranet particularly related to strategy and administration. He could report to the chief executive for organisational strategy, and would be responsible for facilitating

cooperative opportunities and an environment for communication among the various divisions/organisations in the enterprise; and administering the Intranet content infrastructure at the enterprise level. The Webmaster is primarily responsible for technology related issues including training of users to publish, access and take care of their information needs. The Publishers are responsible at the department level, to determine the information that will be created and maintained both for internal and external users, and to follow the corporate policies on completeness and timeliness. Editors determine the information that will be created for specific activities or product groups. Authors create the content which is independent of the communication medium.

Impact on Organisation Structure

In paper based systems, organisational structures are largely centralized. A pyramidal organisation structure is designed around central decision-making and central communications. This has been a dominant structure for most large organizations. In such organisations, information is collected and brought to the top, decisions are taken centrally, and the decisions are conveyed back to the lower levels. When organisations become large and complex, the volume of information increases, and this process becomes slow, unwieldy and chaotic. Yet, most managements continue to follow the same process while using the powerful information technologies merely to speed up the process.

Organisations that are implementing an Intranet architecture must be prepared for severe implications. Traditional organisations consist of many positions that exist only for creation and maintenance of formal information and organised communication. The management of the information system largely defines the character of the organisation. When the medium of communication moves from paper to the Intranet, many of these organisational roles will need to be examined and redefined. Although there is a formal organisational structure for Intranet implementation, by its very nature, an Intranet is successful only when its users readily and willingly adopt it for their information needs. This means that the quality and use of Intranet content cannot be improved through official policies, but rather through a process of collaboration and learning that enable human creativity and innovation through pride and competition. The formal organisational structure must therefore perform the role of enabler for participation rather than that of a provider of information.

Corporate Communications

Corporate communications involves many issues such as choice of communication media, use of communication networks and use of computers for decision-making. Although corporate communication is closely integrated with information processing and organisational communication, it also involves strategic issues and policies on sharing of content, both within and outside the organisation. Corporate communications can be supported by newsletters, web servers, and other electronic information systems. Electronic newsletters are simple, efficient, and easy to distribute. Electronic documents result in substantial economies in the management of corporate communication by reducing distribution costs. Using interactive media and other productivity tools, users can have a wide choice of communication linkages.

An Intranet is a powerful infrastructure for supporting corporate communication. It offers immense opportunities that can alter virtually every organisational communication dynamic and relationship. These relate to information content, information flow, communication climate and communication culture. The Intranet can amplify the ability to reuse and redirect content in unintended ways. The use of Intranets for corporate communication will call for adjustments in user response, particularly with respect to speed, volume and privacy of information.

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An integrated strategy for corporate communication must include culture audits and a well conceived strategic plan of implementation to avoid communication gaps. Such a strategy must emphasize on open-door policies and openness to new ideas that provide fertile ground for the development and use of information technologies. Establishing a line of communication throughout all levels of the organisation is crucial for controlling rumors and building trust. When employees are encouraged to take risks, empowered to make decisions, and are compensated for results, they will find new and innovative ways to use the information, leading ultimately to an organisational climate of learning and building an organisational knowledge base.

New Communication Models

The business value of an information content is constantly shifting from attributes that are easily supported by structure to attributes that require less structure. When

much of the information is publicly available, competitive advantage can only be obtained through subtle interpretations of trends. At the higher levels of management, business exists at the level of conversations and commitments, both of which are unstructured processes. As the volume of information available increases, it becomes more relevant to look for underlying processes that give rise to the trends and ultimately the content. Senior managements would therefore be interested in a communication architecture that provides such insights that help them make business commitments. Only after the commitments are made, the structured processes become important to support the remaining activities.

A communication architecture refers to the physical IT infrastructure underlying an Intranet implementation. Traditionally, this has been accomplished through the use of distributed clients, servers, LANs and other networks, and access is controlled through the use of technologies like digital authentications like passwords and using firewalls. Although the content creation tools used by Intranet are same as those used for Internet and Web applications, an intranet also supports access control so that the information published on the Intranet is accessible only to clients in the group.

An Intranet infrastructure can support group activities of two types: formal and informal. At the formal level, an Intranet enables a form of group interaction known as virtual work groups. These groups consist of individuals who are formally assigned to collaborate on some group activity. At the informal level, the Internet has made distance and time much less of a factor in creating and maintaining communication between communities of interest and their activities. Individuals with like interests and values can find each other, and reinforce and evolve each other's ideas almost instantaneously, regardless of their physical location. This results in the formation of voluntary user groups that share common interests and concerns, and are small, homogeneous, and even addressable. As more people in an organisation adopt the Intranet, they will begin to locate and form such communities of interest that spread across organisational and geographic boundaries. In order to be useful to such user groups, both formal and informal, the Intranet content and administration need proper planning.

Enabling Organisational Learning

Traditional IT solutions are focused towards problem-solving whereas a well-designed Intranet application is oriented towards the learning process in organisations. A good Intranet application will enable users to learn from the existing knowledge base, by extrapolating the information that others have previously captured. At the individual level, learning occurs by combining, in innovative ways, their own experiences with that of the others as codified in the knowledge base. At the organisational level, learning refers to understanding the process of solving the problem, rather than a solution to the existing problem.

Intranet application is oriented towards the learning process in organisations.

While structured problems can be routinely solved through traditional IT tools without even an understanding of the problem, real understanding and learning can take place only in less structured problem domains. Lack of structure in problem definition forces the user to bring forth his experiences from across a spectrum of problem domains to bear upon the problem at hand, and come up with innovative solutions. Although learning can take place both in structured as well as unstructured environments, a learning organisation must be able to accept some degree of uncertainty, and allow the learning process to identify the underlying structure. The success of an Intranet application in enabling a learning organisation depends, to a large extent, on the proper balance on the extent of ambiguity, and a proper mix of "user-pull" and "central push" of information. The process of seeking balance itself will provide opportunities for creating new knowledge.

A New Work Paradigm

In the new Intranet enabled learning environment, the nature of work will be significantly different. Unlike the previous IT applications, where there was a distinction between the application developer and user, an Intranet enabled user can develop his own solutions using the tools available. When everyone has access to information, information by itself, ceases to be the focus of work. Rather, the focus is on creative uses of information using new combinations of application logic and tools available on the Intranet. As users learn to use the Intranet in innovative ways to solve their problems, they also learn to publish their results and experiences on

The focus is on creative uses of information using new combinations of application logic and tools available on the Intranet.

the Intranet, thereby the organisational knowledge base gets enhanced. This experience becomes valuable to other users, possibly in outwardly different contexts and problem domains, who in turn can use these ideas in innovative ways. This enables a continuous learning process and building up of a knowledge base.

The biggest challenge before the management will therefore be to create a culture that supports this process. The trend towards a service-based economy will further reinforce the need for learning organisations. Management appraisal systems will then need radical changes to reward those who enable the organisational learning process, rather than those who use their knowledge and experiences for their personal gain alone. Such systems will help organisations survive in an environment that continuously requires faster and innovative responses from every employee. Effective business managers will learn to integrate the business processes with the Intranet infrastructure and focus on encouraging composites of idea domains that can rapidly address unstructured problem spaces. Since the role of communication is delegated to the Intranet, and the role of publishing is shared by the users themselves, managers will be called upon to be integrators of knowledge pools and catalysts for knowledge creation and sharing.

Employees will shift from their traditional roles as information processors and report generators, to efficient knowledge workers who can handle new challenges and opportunities on their own. The focus of work will change from solving their problems to helping other employees solve their problems as well, so that the organisation builds up formidable competitive advantages. Employees will constantly learn to integrate their judgment and knowledge using latest tools and information on the Intranet.

Conclusion

At different levels of corporate communications, Intranets provide the capabilities to manage organisations in innovative ways. However, significant benefits can flow from this technology, only when users learn to use it for creating knowledge bases for the organisation, rather than as a tool for satisfying routine information needs. Intranets support virtual workgroups who can meaningfully interact to develop creative ways for solving problems and to provide innovative services to customers in an increasingly competitive business environment. Unlike the traditional approach to managing organisations, which emphasized the mechanical use of control processes and operating practices, new organisations must provide room for flexibility and unstructured domains where individuals are encouraged to create new solutions. Such organisations will have a life of their own, using a metaphor from the organic context, when organisations will be forced to learn in order to survive. In the new environment, management control of information systems will necessarily change from providing ready-to-use solutions to accommodating diverse ideas from multiple sources of knowledge and integrating them in meaningful ways. In the new balance at workplace, people will attain greater importance when compared to machines. When knowledge workers are constantly encouraged to use their creative energies, this will restore the dignity of humans at work. The development and nurturing of individual knowledge and its successful blending with the organisational knowledge will be a challenging task for managements and will provide for newer and meaningful opportunities at the workplace.

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Feature

Productivity in Indian Apparel Manufacturing Industry

Rajesh Bheda, M.L. Singla & A.S. Narag

Indian Apparel Manufacturing Industry in facing cut-throat competition in international as well as domestic market. The continuous pressure on unit value realisation is resulting in questions about the competitiveness of Indian apparel industry. Productivity improvement could play a vital role in improving the competitiveness of this important industry. This paper attempts to review the important research work carried out on apparel productivity in India. It also aims to present the summarised findings on the productivity status in Indian apparel industry, it's comparison with competitor countries and factors associated with higher productivity. The paper shows that the Indian apparel manufacturing industry has almost a 100 per cent productivity improvement potential.

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Apparel is an important industry in many countries regardless of their economic prosperity. Being a labour intensive industry, it plays a major role in creation of employment. Apparel products are manufactured and sourced from all over the world and sold in the major consumption markets of USA, Canada, Europe, Japan and Australia. Consumption of apparel is also fast increasing in large developing economies like China and India. Global competition to capture sizable share of these major markets is heating up. The Asian apparel manufacturing countries face a disadvantage in terms of higher transportation time and cost, compared to countries situated in the vicinity of apparel demand centres. Asian apparel manufacturers will have to harness their comparative advantage to retain, if not increase, their share in the global trade of apparel.

As the Asian economies prosper, the standard of living is improving. As a result, the labour and manufacturing costs are rising. On the other hand, the retail prices of apparel products in the western world have remained stagnant for over last five years. This has put tremendous pressure on unit value realisation and profitability of apparel manufactures the world over. In this scenario, apparel manufacturers will need to manage their operations to improve productivity.

Apparel manufacturing productivity was extensively researched in the developed world during 1960s to 1980s. Some of the significant research work on apparel productivity in the western world, (National Economic Development Office 1969; American Apparel Manufactures Association 1976; Wool Industry Research Association 1979; and Manual Geatan 1984) reported on the maximum achievable productivity, the improvement potential and the recommendations for productivity improvement in apparel manufacturing. There was a lack of such research effort in developing world during this period. The subject of productivity in apparel manufacturing in India started catching the attention of researchers in late 1980s and continued through the

Table 1: Productivity Comparison Among Indian Apparel Firms: Manual and Power Operated Machines (1987-88)

	National		Delhi		Bombay		Madras		Small		Large	
Item	Manual	Power	Manual	Power	Manual	Power	Manual	Power	Manual	Power	Manual	Power
Blouses	9.4	12.7[a]	9.3	12.3[a]	10.1	16.0	8.5	8.7	9.0	10.9[b]	9.8	14.4
Dresses	5.6	7.2[b]	5.6	7.5[b]	5.9	7.1	6.0	6.3	5.7	7.6[b]	5.5	6.8[a]
Shirts	8.2	10.3[b]	8.0	11.3[b]	9.1	10.3	8.4	7.9	8.2	11.2[b]	8.3	9.7
Skirts	8.2	11.2[b]	8.2	11.2[b]	7.4	12.9	9.0	8.8	8.3	10.8[b]	7.9	11.7[c]
Trousers	6.0	7.8[b]	6.0	7.8[b]	6.7	8.9[c]	5.2	6.0	6.2	7.8[b]	5.9	7.8[b]

Productivity: Average number of pieces/machine/shift.
Note: a, b and c are significant at 5 per cent, 1 per cent and 10 per cent levels of significance respectively.
Source: Khanna (1991).

1990s. The present paper attempts to review the major research work carried out on apparel manufacturing productivity in India.

Among the studies available on apparel productivity in India, Khanna (1991) is the first known published documentation of the productivity status. The study used partial productivity measure—the Machine Productivity. Table 1 shows machine productivity of apparel manufacturers from Delhi, Madras and Bombay region for five product categories namely blouse, dress, shirt, skirt and trousers. The data clearly shows that factories using power driven machines had better productivity performance than factories using manual machines. As regards shirts, the machine productivity of the national sample was 8.2 shirts per shift for manual and 10.3 shirts per shift for power operated machines.

A study carried out for ICRIER (Khanna 1993) was the first available documentation of apparel productivity comparison of Indian and other Asian apparel manufacturers. The data for Indian manufacturers was drawn in 1990 and data from South Korea, Taiwan, Hong Kong, Thailand and China were collected in 1992. The study focussed on multiple apparel products namely shirts, blouses, trousers, ladies dresses and skirts. The results, as shown in Table 2, indicate that in almost all the garment categories Indian manufacturers had the lowest productivity performance. As regards Gents Shirts, it was 9.12 pieces/shift as compared with 20.87 pieces reported by Hong Kong. If compared with the potential performance of 3.76 shirts per hour, (AAMA 1976) for the US manufacturers at the optimal technology available in 1960, Indian performance is almost one third.

One of the major research studies in the area of productivity in apparel industry carried out at NIFT (Bheda 1997) is 'Productivity Paradigms: An Appraisal of Select Apparel Products in Asian Region'. The study was aimed at measuring the productivity levels achieved by apparel manufacturers in India and other Asian

Table 2: Productivity Level of Apparel Firms (Number of pieces per shift)

Country	Ladies Blouse	Gents Shirts	Ladies Dress	Ladies Skirts	Trousers
South Korea	14.59	17.39	8.77	17.54	15.55
Taiwan	18.89	18.18	12.44	16.63	16.12
Hong Kong	20.56	20.87	20.17	19.25	19.25
China	10.93	13.96	7.83	13.00	6.71
Thailand	16.97	19.75	12.19	20.47	13.08
India	10.18	9.12	6.25	9.62	6.84

Source: ICRIER, 1993.

countries, namely Sri Lanka, Bangladesh, Indonesia, Malaysia, Hong Kong, China and Thailand. The study concentrated on manufacturers specialising mainly in shirts and ladies blouses. The findings, based on the sample size of 46 companies (23 from India and 23 from rest of Asia), indicated significant variation in labour and machine productivity levels achieved by individual factories. As shown in Table 3, Indian sample registered an average machine productivity in sewing room of 9.99 shirts per shift, where as the rest of Asian sample achieved 17.47 shirts per shift. The lowest performance reported by any factory was 5.09 shirts per shift, where as the highest was 25.87 shirts per shift. As regards total labour productivity (operators plus helpers on sewing floor), average for the Indian sample was 7.88 shirts where as the rest of Asian sample registered 12. 87 shirts per shift.

One of the recent studies undertaken by NIFT (Khanna 2000) titled "Competitive Challenge before Indian Textile and Clothing Industry" also provides an update on productivity levels of Indian apparel manufacturers. The study had sufficient response rate for six product categories namely—Shirts, Trousers, Blouses, Skirts, Dresses and Polo T-Shirts. The same products except Polo T-Shirts were also covered in the

Table 3: Productivity Rates in Shirts Manufacturing in Asian Region, 1996

Productivity (Men's Full Sleeve Shirts per shift)	Asia Including India	India	Rest of Asia
Average Machine Productivity	13.17	9.99	17.47
– Minimum	5.09	5.09	5.53
– Maximum	25.87	22.22	25.87
Total Labour productivity	9.71	7.88	12.18
– Minimum	4.07	4.07	4.78
– Maximum	16.64	15.87	16.64
Avg. Machine Productivity at base Technology	10.50	8.07	13.84
– Minimum	4.58	4.58	4.76
– Maximum	11.03	17.05	21.03

Source: Bheda (1997) Unpublished.

Table 4: Productivity in Indian Apparel Industry (No. of pieces per machine per shift)

Garment Type	Number of Respon-dents	NR	Mean	Mini-mum	Maxi-mum
Ladies Dresses	108	244	5.7	1	12.5
Gents Shirts	106	246	9.4	2.5	20
Blouses	97	255	10.3	3	40
Skirts	85	267	9.3	2	24
Trousers	84	268	6.8	2	15
Polo T-shirts	58	294	18.9	5.5	40

Source: Khanna (2000) NIFT.

ICRIER study discussed earlier. As shown in Table 4, the machine productivity for shirts is 9.4 pieces per shift.

Table 5: Descriptive Statistics of Productivity Variables

Measure of Productivity	Valid N	Mean	Mini-mum	Maxi-mum	Standard Deviation
Machine	62	10.03	3.24	19.79	3.36
Labour	62	7.98	2.16	13.62	2.62

One of the recent research works on apparel productivity in India by the present authors apart from examining productivity levels achieved by the industry, involved investigation of factors associated with productivity in Indian apparel manufacturing industry. The study had a sample size of 62 factories drawn from major apparel production centres of India namely Delhi, Mumbai, Bangalore and Chennai. Unlike the three studies by Khanna, this study converted the apparel productivity data of respondents to a standard equivalent unit, i.e. a full sleeve men's shirt with single pocket, for the purpose of productivity comparison. The summarized data on productivity performance of the sample factories is provided in Table 5.

Factors Associated with Productivity

Unlike the studies discussed earlier, this study involved investigation of the factors associated with productivity. The analysis for identifying these factors was based on correlation in the case of parametric variables and ANOVA in the case of non- parametric variables. It was essential to examine whether the difference in the mean value of productivity between populations divided on the basis of category variable was by chance or there were significant differences. It was decided to use one way ANOVA to examine the association of each category of factors with productivity, the dependent variable.

In the case of variables shown in Table 6, the null hypothesis, i.e. 'there is no significant difference in the population mean' was rejected. This means that the alternative hypothesis 'there was significant difference in the means of populations' was accepted.

Table 6: Factors Associated with Productivity: Results of ANOVA

• Production Location	• Payment System
• Organisation Type	• Presence of Industrial Engineering Cell
• Market Orientation	• Rewarding Creative Suggestions
• Major Export Destinations	• Training for Supervisors/ Managers
• Major Product Category	• Operator Training
• Education Level of Operators	• Induction Training
• Production System	• Method of Setting Production Standards

Table 7: Variables Associated with Productivity: Results of Correlation Analysis

Independent Variables	Correlation Coefficient with Dependent Variable: Machine Productivity (Valid N) (Significant at p = 0.05)
• Age	–0.30 (54)
• Rejection Level	–0.42 (49)
• Work in Process	0.37 (35)
• No. of Sewing Machines Installed	0.32 (57)
• Sewing Technology Index	0.30 (56)

The results of the correlation analysis, as presented

in Table 7, show that the factors, namely age of the factory and the rejection level had a negative correlation with productivity whereas work in process, number of sewing machines installed and the sewing technology index had a positive correlation with productivity.

Discussion

The five studies on apparel productivity in Indian apparel industry discussed in this paper have been able to track the productivity performance of the Indian apparel Industry. It is a matter of concern that the productivity performance of Indian apparel manufacturing has not shown any appreciable improvement. Rather the performance has remained stagnant in the region of 9.12 to 10.3 shirts per machine shift. Studies by ICRIER and NIFT have also shown that the productivity performance of Indian apparel manufacturing industry is one of the lowest in the Asian region.

The productivity performance of Indian apparel manufacturing industry is one of the lowest in the Asian region.

A recent study by the authors attempted to examine the perception of the industry on the productivity improvement potential. The mean of the improvement potential reported by the respondents was 18 per cent per annum. However, the top performer factories of the studies reveal almost double the productivity performance compared to the average performance. This indicates that an average apparel Manufacturer in India has an overall productivity improvement potential of almost 100 per cent. This potential can be very crucial for improving the competitiveness of the Indian apparel industry.

The study has also brought out useful insight into the factors associated with productivity. A scrutiny of these factors suggests that the manufacturers who had invested in training of operators, supervisors and managers had significant productivity gains. The manufacturers with larger scale of operations, better technology and presence of industrial engineering activities were more productive than the others. Best practices in human resource management like suggestion scheme for employees and performance based payment system were associated with higher productivity. It is also noteworthy that most of the factors associated with productivity are controllable and can be manipulated by the management to improve productivity.

Manufacturers with larger scale of operations, better technology and presence of industrial engineering activities were more productive.

Conclusion

The research studies reviewed in this paper clearly show that the Indian apparel industry has a stagnant productivity paradigm of about 10 shirts per machine per shift. The positive side is that the top performance is almost double of the average performance, which apparel manufacturers can aspire to achieve. The factors associated with productivity indicate that the factories with superior technology, higher production scale and better techno-managerial practices have gained substantially in terms of productivity. Indian apparel manufacturers could adopt these best practices to achieve higher productivity.

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Feature

Productivity Trends in Indian Manufacturing Sector

B.S. Prakash

Using the data from the ASI reports of CSO for the period 1979-98, the paper draws a comparative profile of Structural Change and Productivity Trends in the two constituents of Organized Manufacturing Sector (OMS) viz. the 'All Industries' segment and the 'food products sector' (fps) group. In particular, making a comparison of growth between the rural and the urban sections of the units, the paper finds that the industrial climate in the first eight years of nineties has contributed toward promoting a balanced and productivity-linked employment growth.

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The issue of employment expansion with productivity gains has been an important aspect of interest for policy planning and research. The focus became more critical with the opening up of the economy in the beginning of nineties. Apprehensions of declining employment prospects (in quantitative as well as qualitative terms) were expressed in some initial studies of nineties (Mundle, 1992; Agarwal & Goldar, 1995). The perceived impact was unlikely to be uniform in all the sectors of the economy, hence, to understand the nature and content of emerging scenario, it is important to study individual sectors for their structural change. Structural Change in the context of an industry refers to changes in the variables of the industry such as number of units, investment, employment, value added etc. (IAMR, 1995). Towards the later half of nineties, signs of improvements on the employment/productivity fronts in the agro-based sectors were reported (Sharma & Saxena, 1998). This view was coupled with the explanation that decline in employment will be mainly due to slow growth in organised sector employment, particularly by the units of the 'modern sector' failing to generate jobs 'at a rate higher than the rate of labour force growth' in the economy (Ghose, 1999).

Decline in employment will be mainly due to slow growth in organised sector employment, particularly the 'modern sector'.

The present paper seeks to examine the trends in employment and productivity characteristics in the two constituents of organised manufacturing sector (OMS) viz. the 'All Industries' segment and the 'food products sector' (fps). Organised Manufacturing Sector (OMS) refers to those industrial units covered under the Annual Survey of Industries (ASI) of CSO. Specifically, they in-

clude all those units employing 10 or more persons if using power and 20 or more otherwise. The 'All Industries' segment of OMS considered here includes the nineteen 2-digit National Industrial Classification (NIC) divisions of 20-21 to 39 while the 'food products sector' refers to the particular division of 20-21. The paper draws on the results of two recent studies by the author: (i) Structural Change and Productivity Trends in the Organised Manufacturing Sector (All Industries): 1981-98 and (ii) Structural Change and Productivity Trends in the Agro-Food Organised Manufacturing Sector: a Case Study of Food Products Industrial Division (1981-98). In particular, this paper seeks to empirically investigate the growth profiles of "All Industries" and food product sector (focussing specifically on the rural and urban segments of the units) in terms of four key variables: Number of Units (NU), Employment (Empt.), Fixed Capital (FC) and Net Value Added (NVA). This is supplemented by a study for their productivity trends in terms of three derived variables viz. Labour Productivity (NVA/Empt.), Capital Productivity (NVA/FC) and Capital Intensity (proxied by capital labour ratio i.e., FC/Empt.).

Methodologically, the paper is based on the data from the reports of ASI for the years 1979-98. A 3-year moving average is considered to minimise the fluctuation in the data series leaving in effect an ultimate data set for the years 1981-98. For making temporal comparison, all value figures have been deflated by using the Wholesale Price Index for 'all manufactured' and 'food products' groups respectively with the year 1981-82 as the base. The growth rates have been computed by the fitting of semi-log curves while elasticities are computed by fitting of double-log curves. With the justification for the specification of productivity model derived from axiomatic and a-priori considerations (the latter by correlation analysis), the objective of determining a functional relationship for the productivity structures is achieved by regressing Net Value Added figures on those of labour and capital components of productivity. For achieving stationarity in time series used and minimise the levels of collinearity between independent variables (IVs), absolute changes over the preceding year in the index of NVA are related with the absolute changes in the indices of IVs by which the time series for this part of the analysis stands reduced to 1982-98. The results of the test for 'impact of reforms' and 'structural stability/change' are based on the application of F-tests (also called chow-test) i.e., $F_{IR} = \{(S_1-S_2)/n_2\} \div \{S_2/n_1-k\}$ and $\{F_{ss} = S_5/k\} \div \{(S_4/n-2k)\}$ by employing the residuals of the regressions for different time periods: S_1 for 1982-98, S_2 for 1982-90, S_3 for 1991-98, $S_4=S_2+S_3$ and $S_5 = S_1-S_4$, $n_1 = 9$, $n_2 = 8n = n_1+n_2$ and k the number of parameters estimated including the intercept term.

Based on the results of the econometric analysis aimed at determining a structure for their productivity relationships, the paper presents the results of tests for impact of reforms and structural stability/change in the two focal industrial segments under study.

Structural Change

Number of Units and Employment

For the 'All Industries' group, the number of units (NU) in rural areas has increased from an average annual growth rate (AAGR) of 3.2 per cent in eighties to 5.0 per cent in nineties (Table 1). The corresponding increase for urban areas is from 0.05 per cent in eighties to 2.1 per cent in nineties. Associated with this growth in NU (which can be considered to reflect on the favourable climate for industrial expansion during the period), the employment in rural areas grew at an AAGR of 1.5 per cent in eighties and 5.1 per cent in nineties. The corresponding increase in the growth for urban areas is from –0.8 per cent in eighties to 2.3 per cent in nineties. The growth for the 'All Industries' segment both in terms of 'NU' and employment has thus been higher during nineties both for the rural as well as the urban OMS units.

In the case of units for the food products sector (fps) too, a somewhat similar trend in the growth of both the 'number of units' and employment is noticed. While the growth in respect of both 'NU' and employment have been more in the post-reform years of nineties than during the pre-reform years of eighties, the turn around in the growth of employment for the rural units from the significant negative growth of eighties (–3.4 per cent) to a significant positive growth in nineties (+3.9 per cent) is what is particularly more interesting to note. This is also indicative of the fact that while the growth in number of units (NU) for the rural areas during eighties (2.4 per cent) contributed negatively for increase in employment, its (NU's) growth in nineties (3.6 per cent) contributed to a significant increase in employment growth. Also, since the corresponding growth rates registered for urban 'fps' units was relatively low (from –0.34 per cent in eighties to 1.1 per cent in nineties in respect of 'NU' and –2.8 per cent in eighties to 1.1 per cent in nineties in respect of employment), it also ap-

The turn around in the growth of employment for the rural units from the significant negative growth of eighties to a significant positive growth in nineties is interesting.

Table 1: Growth in Number of Units (NU), Employment (Empt.), Fixed Capital (FC) and Net Value Added (NVA) by Location: 1981-98.

ACGR (%)

Period	Location	All Industries				Food Products Sector			
		NU	Empt.	FC	NVA	NU	Empt.	FC	NVA
1	2	3	4	5	6	7	8	9	10
1981-90	Rural	3.2*	1.5*	9.9*	29.7*	2.4*	–3.4*	2.5*	14.0*
	Urban	0.05	–0.8*	6.0*	2.7*	–0.34***	–2.8*	15.7*	5.8*
1991-98	Rural	5.0*	5.1*	17.0*	13.3*	3.6*	3.9*	13.9*	9.1*
	Urban	2.1*	2.3*	9.7*	8.3*	1.1*	1.1*	9.6*	8.9*

Source: ASI reports by CSO for different years.

Note: All value figures are at 1981-82 base and annual compound growth-rates (ACGRs) are calculated by fitting semi-log curve by using the data for all the years (not just point to point) in the series. *, **, *** stand for significance levels for t-tests at 1 per cent, 5 per cent and 10 per cent levels respectively.

pears fair to infer that the growth for rural 'fps' units has been relatively more favourable than for their urban counterparts.

Investment and Net Value Added

In terms of fixed investment in 'Plants and Machinery', the growth for rural 'fps' units during eighties (2.5 per cent) is far lower than the 'All Industries' average (9.9 per cent) [Table 1 again]. The corresponding growth for urban 'fps' units (15.7 per cent) is, however, significantly higher than the 'All Industries' growth of 6.0 per cent. Since the trend in the growth of employment is largely negative during eighties (except for a solitary positive growth of 1.5 per cent registered for the rural OMS units of the 'All Industries' segment), the capital intensive nature of production practices of eighties is evidenced to have significantly contributed to the declining growth in employment in general. Its impact on output, however, has been particularly noteworthy for rural OMS units going by the significant 29.7 per cent growth in net value added (NVA) for 'All Industries' segment during eighties. Equally impressive and significant in this respect is the 14.0 per cent growth in NVA for the rural 'fps' units despite a relatively low (2.5 per cent) growth in investment during eighties. Such impressive double digit growths in NVA is not, however, seen for the urban units during eighties (both for the 'All Industries' as well as the 'fps' segments), although the growth in this respect was two times higher for 'fps' units (5.8 per cent) than for the 'All Industries' (2.7 per cent) segment. The evidence is, therefore, pointing towards a rural based output linked industries expansion in the pre-reform years of eighties, both of the 'All Industries' as well as the 'fps' segments, with their corresponding employment growth registering a declining impact during the period.

The capital intensive nature of production practices of eighties contributed to declining growth in employment.

In the post-reform years of nineties, the investment trends for both the segments under comparison are similar: 17.0 per cent for 'All Industries' rural as against 13.9 per cent for the corresponding 'fps' segment and almost an equal 10.0 per cent each for the urban units. Again, the value added output also has grown closely: 13.3 per cent for rural 'All Industries' units compared to 9.1 per cent for rural 'fps' units and 8.3 per cent for urban 'All Industries' segment compared to 8.9 per cent for urban 'fps' units. The trend in the growth in employment during nineties also has been positive for all four categories, with the rural units registering higher rates than the urban ones. The above growth rates (which are in absolute value terms) at first glance, therefore, reveal that the post-reform years of nineties have proved to be an 'investment based, output linked and employment promotive period' for the OMS units in general with the tilt in its growth being relatively more in favour of rural units than the urban ones. But this needs to be verified by studying the trends in relation to their 'number of

The post-reform years of nineties have proved to be an 'investment based, output linked and employment promotive period'.

units' which have significantly grown in the post-reform years for both the rural as well as the urban units and for the 'All Industries' as well as the 'fps' segments. The trends in this respect (Table 2) are confirmed for 'investment' and 'output/NVA' but are revealing of a different picture for employment. Not only that the growth in 'per unit employment' (PUE) was consistently negative during eighties for all four categories (i.e., rural and urban for 'All Industries' as also 'fps' segments), their corresponding growth rates in the post-reform years of nineties are very low (in the range of 0.1 to 0.3 per cent only). The modest growth in PUE during nineties is thus indicative of a near stagnancy in the average employment per unit. In other words, the growth in employment in terms of their absolute numbers observed before is mainly attributable to the growth in 'number of units'. The conclusion, therefore, is that as the growth in 'number of units' is indicative of a favourable overall climate reflective on the industrial policies of the time, the first eight years of nineties can be considered to have favoured growth of both the 'All Industries' as well as the 'fps' OMS units in general.

Table 2: Growth in Per Unit Ratios of Employment (PUE), Fixed Capital (PU FC) and Net Value Added (PU NVA) by Location: 1981-98

ACRG(%)

Period	Location	All Industries			Food Products Sector		
		PUE	PU FC	PU NVA	PUE	PU FC	PU NVA
1	2	3	4	5	6	7	8
1981-90	Rural	–1.8*	6.6*	26.5*	–5.9*	0.1	11.6*
	Urban	–0.9	5.9*	2.7*	–2.5*	16.1*	6.2*
1991-98	Rural	0.07	12.0*	8.4*	0.3***	10.3*	5.5*
	Urban	0.14*	7.5*	6.2*	0.1	8.5*	7.9*

Source and Note: As in Table 1.

First eight years of nineties have favoured growth of OMS units.

Productivity Trends

Labour Productivity (LP)

Growth in labour productivity (LP) which reveals the 'value added output per employee' (i.e., NVA/Empt.) was highest for rural units during the pre-reform years of eighties for both the 'All Industries' (28.2 per cent) as well as the 'fps' units (17.5 per cent) [Table 3]. As noted before, the rather high growth in LP is attributable mainly to the high growth in NVA and low growth in employment during the period. Their corresponding growth rates for the urban units during the pre-reform years of eighties, though relatively lower, was more than two times higher for 'fps' units (8.6 per cent) than for the 'All Industries' segment (3.5 per cent). The trend is once again attributable to the decline in the growth of NVA for the urban units during eighties. The trend in LP during the post-reform years of nineties is more modest but yet significant with the growth rate registered being 8.3 per cent for 'All Industries' rural and 5.1 per cent for 'fps' rural units. Similar is the case for urban units in which the growth rate for the 'All Industries' segment is 6.0 per cent and that for the 'fps' units is 7.8 per cent.

Table 3: Growth in Labour Productivity (LP), Capital Intensity (CI) and Capital Productivity (CP) by Location: 1981-98

ACGR(%)

Period	Location	All Industries			Food Products Sector		
		LP	CI	CP	LP	CI	CP
1	2	3	4	5	6	7	8
1981-90	Rural	28.2*	8.4*	19.8*	17.5*	6.0*	11.5*
	Urban	3.5*	6.8*	–3.5*	8.6*	18.5*	–9.9*
1991-98	Rural	8.3*	11.9*	–3.6*	5.1*	9.9*	–4.8*
	Urban	6.0*	7.4*	–1.4*	7.8*	8.5*	–0.7*

Source: As in Table 1

Note: LP = CI + CP

Capital Productivity (CP) vis-à-vis Capital Intensity (CI)

Capital Productivity (NVA/FC) which signifies the 'value added output per unit of capital invested' also has registered positive growth rates only for the rural units during the pre-reform years of eighties (19.8 per cent for 'All Industries' and 11.5 per cent for 'fps') [Table 3]. As it is directly related to the extent of Capital Intensity experienced by the industry during the period, a better idea of its trend can be obtained by studying the trends in the two (i.e., CP and CI) together. The Capital Labour Ratio (i.e., FC/Empt. or the level of fixed capital per unit of labour) is taken as a measure of capital intensity here (McG Hill, 1973). The trend therein is revealing of the fact that for the urban units during eighties, the decline in CP is proportional to the increase in CI for the two industrial groups under focus [6.8 per cent increase in CI is accompanied by a negative growth of 3.5 per cent for 'All Industries' and 18.5 per cent increase in CI has resulted in a steep decline in the growth of CP of the order of –9.9 per cent for the 'fps' segment].

The trend signifies that while the rural units during eighties have experienced the impact of technological change for their increase in labour productivity, for the urban units it is marked by the factor of 'substitution of capital for labour or capital deepening. The empirical requirement for identifying 'technology' as the factor contributing for the growth in LP is: a positive growth in CI is accompanied by a growth in LP greater than or equal to that in CI and that in CP either rising or remaining unchanged. Alternatively, the growth in LP is attributable to capital deepening if: a positive growth in CI is accompanied by a growth in LP less than that of CI and a substantial decline in the rate of growth of CP (Ghose, 1994).

The trends in productivity and capital intensity for both the 'All Industries' as well as the 'fps' segments show a similar situation of 'capital deepening' during the post-reform years of nineties, with the trend in CP for urban units showing an improvement over that in eighties for both the industrial groups under focus. For the rural units, on the other hand, there has been a steep decline during nineties in the rates of growth for both the factors of productivity (labour as well as capital). This decline for the rural units is despite an increase in the capital intensity between the pre and post-reform periods for the two groups under comparison (from 8.4 per cent to 11.9 per cent for 'All Industries' and from 6.0 per cent to 9.9 per cent for the 'fps' units). The linkage of productivity improvements with capital infusion is thus evident for the urban units but not their rural counterparts. In other words, the advantages for the urban units in terms of better infrastructure and scale economies contributing to productivity gains are in sharp contrast to their relative inadequacies for the rural units.

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Employment Elasticity

Notwithstanding the variations in the trends of major factors/variables of comparison in general and the increasing trend in the growth of capital labour ratio in particular, the trends in the employment elasticities for both the industrial segments under focus are indicative of a positive situation to note. The improvement in this respect is for both the rural as well as the urban units with the turn around for urban units being relatively more prominently indicative of the change. The latter refers to the phenomenon of "jobless growth in eighties" noticed uniformly in the employment elasticities (with respect to both value added output and investment) for urban OMS units standing changed to one of positive growth in nineties (Table 4) for both the 'All Industries' as well as the 'fps' segments. In particular, the employment gains reflected by the strides in their post-reform year values compared to their pre-reform period's, is much higher for the rural 'fps' units than that for their 'All Industries' level, both with respect to output as well as investment. The increase in the values of employment elasticities are by 0.33 and 0.15 percentage points for output and investment respectively for the rural 'All Industries' units as compared to 0.61 and 1.29 for the rural 'fps' units. The corresponding values for urban units are 0.41 and 0.37 for the 'All Industries' segment and 0.50 and 0.30 for the 'fps' group. For urban units, the extent of improvement between the two periods was nearly the same for both the 'All Industries' and the 'fps' groups with respect to output as well as investment.

Table 4: Employment Elasticity with respect to Value Added Output (NVA) and Investment (FC) by Location: 1981-98

Period	Location	All Industries		Food Products Sector	
		NVA	FC	NVA	FC
1	2	3	4	5	6
1981-90	Rural	0.05*	0.15*	–0.23*	–1.01*
	Urban	–0.14	–0.13*	–0.37**	–0.18*
1991-98	Rural	0.38*	0.30*	0.38*	0.28*
	Urban	0.27*	0.24*	0.13*	0.12*

Source: As in Table 1

Note: Elasticities are estimated by fitting double-log curve using once again the values for all the years in the series.

The conclusion, therefore, is that while in the post-reform years of nineties, 'the extent of employment returns or gains' is decidedly more across board in all respects of comparison (i.e., rural/urban and NVA/FC), the gains in employment are particularly more for the rural 'fps' units than that of their 'All Industries counterpart. The interpretation of gains for rural and urban units is only in terms of their location of units which might realistically leave to doubt whether major benefit of their mere location is actually accruing for the rural masses per se. Although it might well be a fact that many of these units may only be definitionally 'rural' but operationally mainly 'urban' located as they might be close to urban limits or centres (Chadha, 1999), it still is considered fair to assume that in terms of non-farm and off-farm employment gains (particularly with the raw materials for the 'fps' units basically coming from agriculture dominated rural masses) the benefits for the

Table 5: Regression Results of Productivity Model: 1981-98.

Location/ period	Co-efficients for IVs and Values of Key Test Statistics								
	Intercept	LP	CP	T	DT	Adj. R-Sq	DW	F_{IR}	F_{SS}
1	2	3	4	5	6	7	8	9	10
AI (Rural)									
1982-98	–0.03 (–0.47)	0.97 (7.5*)	0.15 (0.71)	0.01 (1.3)	–	0.97	0.65		
1982-90	–0.11 (–1.54@)	0.64 (4.03*)	0.96 (3.51*)	0.01 (1.62@)	–	0.97	1.29	5.3**	6.4**
1991-98	–0.05 (–0.81)	0.88 (8.95*)	0.12 (0.49)	0.01 (1.74@)	–	0.93	2.00		
AI (Urban)									
1982-98	–0.01 (–0.36)	1.0 (6.5*)	0.30 (1.64@)	0.002 (2.6**)	–	0.91	1.04		
1982-90	0.02 (2.13***)	0.63 (6.2*)	0.88 (6.3*)	0.002 (1.78@)	–	0.98	2.68	5.9**	7.6*
1991-98	–0.13 (–1.56@)	1.95 (4.97*)	–0.73 (–1.57@)	0.01 (1.49@)	–	0.95	1.95		
FPS (Rural)									
1982-98	–4.4 (–1.5@)	0.48 (4.2*)	0.73 (3.43*)	0.36 (1.1)	9.5 (2.4**)	0.90	1.78		
1982-90	11.8 (–1.8@)	0.41 (2.49***)	1.18 (2.82**)	0.87 (1.42)	–	0.86	2.18	0.28	0.69
1991-98	4.42 (1.47)	0.64 (5.5*)	0.39 (2.44**)	0.22 (1.37)	–	0.99	1.68		
FPS (Urban)									
1982-98	–3.4 (–0.31)	0.81 (4.6**)	0.09 (0.20)	0.40 (0.61)	AR(1) 0.57 (1.75)	0.84	1.18		
1982-90	18.2 (3.2**)	0.17 (1.0)	1.67 (3.9**)	0.37 (0.90)	–	0.91	2.19	1.03	2.18@
1991-98	6.1 (2.14***)	1.31 (11.7*)	–0.98 (–3.4**)	–0.53 (–2.4***)	–	0.96	2.15		

Note: *, **, *** stand for significance level of co-efficients for 't' and 'F' tests at 1,5 & 10 per cent levels respectively and @ for 20 per cent level for 1t' and 25 per cent level for F-test. AR(1) stands for first order correction for serial correlation by Cochrane – Arcutt procedure.

Dependent Variable is Net Value Added. AI: All Industries; FPS: Food Products Sector, T = 1, 2,..... in chronological order and DT = 0 for 1982-90 and 1 for 1991-98.

rural sections of population are likely to be significant considering direct as well as indirect gains. In other words, the growth of the two industrial segments viewed in a holistic sense is revealing of productivity linked employment gains during nineties with the returns being relatively more favourable for the rural based establishments of the 'fps' units than their urban and 'All Industries' segment of OMS units.

The growth of the two industrial segments is revealing of productivity linked employment gains during nineties.

Determination of Functional Relationship

The attempt here is aimed at exploring the possibility of segregating the relative contributions to net value added (NVA) of labour and capital components of productivity and to test for the stability/change of their derived productivity structures. In particular, the significance of labour productivity to NVA is deemed to reflect on the extent of impact on the productive employment returns to the sector and that of capital

productivity on the value added returns to changing investment levels. The results of the exercise are revealing of a significant 'impact of reforms'[1] (at 5 per cent level) to both the rural (F_{IR} = 5.3) and the urban (F_{IR} = 5.9) units of the 'All Industries' segment along with a significant structural change registered therein (F_{SS} = 6.4 and 6.6 respectively) (Table 5). In particular, for the rural as well as the urban units of the 'All Industries' segment, the impact of both the labour as well as the capital components of productivity returns are evidenced to have had an equally significant positive impact on real value added returns during eighties. During the post-reform years of nineties, however, a relative decline (though yet positive) in the returns of capital on value-added is evidenced for rural units with the corresponding impact on urban units showing a declining negative trend.

For the 'fps' segment, on the other hand, the situation evidenced is one of relative structural stability. This means that unlike in the case of 'All Industries' (where owing to the significance of 'structural change' registered therein the results of the two sub-period regressions had to be studied separately), in the case of 'fps' units, the single result for the combined period of 1982-98 could itself be relied upon. The results are revealing of a situation similar to that of 'All Industries' rural case: an equally significant positive impact by both LP and CP on NVA for the rural 'fps' units but by only that of LP or labour productivity for the urban 'fps' units. The results are thus corroborative of the earlier conclusion on productivity linked employment gains/returns with the 'impact of reforms' 'not yet'[2] revealing any adverse impact on the organised manufacturing units of the 'fps' segment.

Concluding Remarks

The important employment and productivity linked characteristics of the organised manufacturing sector (OMS) of the economy are as follows. At the 'All Industries' level, the two basic factors (i.e., labour/capital) contributing to productivity are significant to the extent of bringing about a 'structural change' therein, at the disaggregated sector-specific level of 'food products' group the period of last two decades (through the years of eighties and a substantial part of nineties) has been a situation of 'structural stability'. This basic difference observed to prevail for the two segments under focus apart, in overall terms, the conclusion of productivity linked employment gains is evidenced to hold equally for both the groups of 'All Industries' and the 'fps' units.

The increase in employment for rural units in absolute terms during the eight years of nineties has been of the order of 5.1 per cent at the 'All Industries' level and 3.9 per cent at the 'fps' level. For urban units, it has been a relatively low employment yielding period with an average annual growth of 2.3 per cent and 1.1 per cent respectively. The period has also been marked for growth in 'number of units' with significant growth in their investment and output levels, proving that the impact of industrial policies of nineties is establishing an atmosphere conducive for the expansion of OMS units, in both horizonal as well as vertical planes. As a consequence are the attending implications on evolving suitable employment/HRD policies aimed at promoting the development of a workforce competent in terms of their skills for setting up suitable self-employment ventures[3].

The growth rates in employment noticed for OMS units are higher than the aggregate labour force growth for the economy. The growth in labour force during the years 1991-98 has been at an average annual growth rate (AAGR) of 0.9 per cent for rural areas and 2.4 per cent for urban areas or at an AAGR of 1.3 per cent for the combined economy (IAMR, 2000). Thus, supporting the hypothesis of modern sector's role in promoting generation of required levels of employment needed for the conditions of competitive labour market policies of a liberalized policy regime. But as its furtherance "depends importantly on an economy's ability to compete successfully within the new system of globalized production, the policy changes required are to revolve around providing an economic frame-work and incentives to facilitate adjustments to higher productivity and higher skilled production system" (ILO, 1994). It is in this direction that the employment and manpower planning policies are to be moulded. On enhancing the adaptability of the labour market and the efficient use of human resources the following conclusions on employment and training policies in a global context adopted at the 83rd session of the International Labour conference

1. The argument that there is nothing as such directly to indicate from the causative side that the performance recorded is 'due to reforms' whereas they may merely be indicative of the performance 'during the period of reforms' merits to be admitted. The results nevertheless are contended to be revealing of empirical evidence as it obtains for the first eight years of reforms period of nineties.

2. The impact of policies such as removal of QRs, WTO measures etc. recently announced needs to be assessed with the data becoming available for more recent years.

3. Reference is drawn here to the salient features of proposed National Policy on Vocational Training (NPVT, 1999) and also to the emphasis on the Ninth Plan Document (Planning Commission, 1997-2002) on the need to reorient the vocational courses to make them more responding to the needs of the labour market.

is quoted. *Adopt training systems so as to improve the supply response to skill needs and also provide an appropriate system of incentives and support .....so that economic expansion is not restricted by a mismatch of skills (ILO, 1997).*

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Money does motivate...but only for a short time and only as long as it serves as a measure of worth or of power or of victory.

– James L. Hayes

Feature

Observations on Indian Textile Industry

Chandrashekhar Chiplunkar, S.G. Deshmukh & R. Chattopadhyay

Today's changing world requires assessment of the direction in which business is heading. The correct speculation of future trends and developments leads to better decision making and is essential for survival of the textile industry, which is one of the important sources of foreign exchange and employment. This article takes a general view of Textile Industry and discusses possible strategies to deal with international competition.

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Indian Textile industry has not come of age even today. Many mills are still working on age-old machinery. Information technology is not exploited to its full potential. With the end of multi fiber agreement, India is at receiving end. Economies like China are engaged in mass production of cheaper goods with low costs, possibly with violation of minimum wages to workers and without much regard to environmental issues. Economies from western countries have psychologically captured the mindshare of the upper middle class and rich populace. Although in yarn exports India has better world share, India is very much behind its competitors in woven cloth and garments. A thorough analysis of the international scenario vis-a-vis Indian Textile industry is essential at this juncture. The objectives of this study are:

- To analyze the competitiveness of Indian textile industry
- To propose a suitable model for Indian textile industry
- To propose a course of action to make the textile industry more competitive and
- To discuss the role of Information Technology in achieving competitiveness

Literature Review

Ghosh (2000) furnishes the following statistics on Indian textile industry, "The Textile sector in the Indian economy occupies a place next only to agriculture. It contributes nearly 14% of the annual value addition of

In yarn exports India has better world share, but the country is much behind its competitors in woven cloth and garments.

industrial production and more than 30 per cent of total exports. It provides direct employment to nearly 35 million people. Taking into account cotton and other related services, the total employment is in the region of 100 million. India accounts for 1.8 million tons of jute production, which is more than 50 per cent of world's production. It is second largest producer of silk after China. India is fifth largest producer of man-made fibers like PSF and third largest producer of cellulosic fibers. In production base, India has second largest installed spindle capacity after China. India accounts for 64 per cent of total looms installed the world over, out of which only 10,000 account for modern shuttleless looms. India controls nearly 20 per cent of global trade in cotton yarn and is second largest producer of cloth after China. India has good entrepreneurial skills. There is existing and upcoming market of technical textiles. It accounts for global market of $54 billion per year. In most of the developed countries, technical textiles already account for 25 to 30 per cent of total textile production. India's share is almost negligible."

Shanmuganandan et al., (2000) have summarized the challenges, opportunities and threats to spinning mills as follows: Challenges are modernization requirement to get better quality yarn and to achieve high productivity, total to requirement of spindles, funds for modernization, making use of IT for marketing and fast response capabilities. Idle spindles are about 15 per cent and idle rotors are about 10 per cent, which is an alarming situation. The profitability of spinning mills is very low at about 3 per cent of sales. By 2002, India will need modernization of 16 million spindles and 3.6 million new spindles to reach the targeted production. Total funds required are slightly more than Rs. 13,500 Crores. Threats perceived are inter-mill differences in productivity, high cost and low profitability, cotton cost, conversion costs and infrastructure deficiencies. Inter-mill differences cause inherent instability of the industry as a whole. Reasons for these differences are disparity in modernization, operational inefficiencies, high costs, ineffective management and considerable differences in value addition. Cotton accounts for about 60 per cent of yarn cost. Keeping in view the low profitability margin, increase in cotton cost can do a lot of damage to the competitive ability of spinning industry. Recently there has been surge in cotton prices and it has been found that these costs are 6 to 8 per cent higher than expected under normal trading conditions. In conversion costs, power is major contributor and is increasing by about 12 per cent a year along with wages cost by about 10 per cent a year. Prevailing power costs are very high – about 10 US cents per KWH compared to global average of 6 US cents per KWH. Labour costs are also high by about 30 to 60 per cent compared to other yarn exporting countries. Infrastructure deficiencies include fewer ports, less frequent shipping, delays in port and inland transport. Opportunities include constant increase in yarn demand in export market and in domestic market, adequate availability of cotton even after allowing for about 10 per cent export of cotton."

Challenges are modernization requirement to get better quality yarn and to achieve high productivity.

Malik (2000) includes the following additional factors in weaknesses – Low emphasis on product development and design capacities and low sensitivity on proper controls on manufacturing processes. He has suggested the following measures to remain competitive in the market: Reducing cost and maintaining quality, shortening lead times, economies of scale with flexible operations, tie-ups with retail chains overseas and joint marketing arrangements.

Joseph (1999) furnishes SWOT analysis and strategies for readymade garment sector –

- Strengths: Strong cotton production base, storehouse of manpower, exquisite designs, low production costs, low capital and intensive employment industry, excellent government support.
- Weaknesses: Quota misuse, production being basically for summer and spring collection, small sector problems – inconsistency in quality and lack of economies, infrastructure problems, old technology, lack of backward linkages.
- Opportunities: Removal of Multi Fiber Agreement (MFA) will open up more markets; direct export of garments can be increased as foreign departmental stores are allowed to set up their own private bonded warehouses in the country.
- Threats: Re-export of exported Indian garments, Anti-dumping duties on Indian goods and trading blocks, export subsidies extended by competitors like China to their manufacturers. Further MFA phase out may result in considerable price pressure on Indian garment exporters; India's lack of presence in wear and winter garments restricts market expansion.
- Strategies: Quality standardization on international lines, upgradation of product technology, promoting eco-friendly and natural fibers, reduction in import duties on machines and other accessories, establishing brands in inter-

Table 1: Cost break-up of ring yarn and Open End (OE) yarn (US $/Kg)

Product	Cost Element	Country							
		India	Brazil	Indonesia	Italy	Korea	Turkey	USA	Remark
Ring Yarn	Waste	0.29	0.37	0.37	0.35	0.36	0.37	0.32	+
	Labour	0.06	0.22	0.03	0.89	0.25	0.13	0.52	+
	Power	0.33	0.19	0.19	0.27	0.18	0.23	0.17	–
	AM	0.11	0.12	0.12	0.12	0.13	0.15	0.12	+
	Capital	0.01	1.02	1.1	0.87	0.95	1.02	0.88	–
	RM	1.44	1.8	1.82	1.75	1.79	1.83	1.59	+
	Total	3.24	3.72	3.63	4.25	3.66	3.73	3.6	
		India	Brazil	Italy	Japan	Korea	Thailand	USA	
OE Yarn	Waste	0.2	0.25	0.25	0.24	0.25	0.25	0.22	+
	Labour	0.02	0.09	0.001	0.35	0.1	0.05	0.2	+
	Power	0.29	0.16	0.17	0.23	0.15	0.2	0.15	–
	AM	0.13	0.14	0.13	O.14	0.15	0.17	0.14	+
	Capital	0.91	0.82	0.98	0.74	0.78	0.95	0.71	–
	RM	1.44	1.8	1.82	1.75	1.79	1.83	1.59, + +	
	Total	2.99	3.26	3.351	3.45	3.22	3.45	3.01	

Source: Compodium of Textile Statistics

AM: Auxiliary Material RM: Raw Material + Advantage to India – Disadvantage to India

national markets, market tie ups, improving delivery schedules and reducing delays.

Palande et al., (2000) summarizes the problems of Ready Made Garment (RMG) sector as follows:

- Advent of foreign brands and their capturing high market segment with more profit margins
- No known brand at international level.
- Quality problems.
- Distance from export markets.
- No local brands for women's clothes.
- Fast fashion changes.

Indian Textile Scenario: Review

Tables 1 & 2 present the statistics offered by the office of the Textile Commissioner of India, on the Indian scenario.

Cost comparison with different countries

For all types of textile production, India enjoys clear advantage in conversion factor, labour, raw material and auxillary material.

- Conversion factor: Because waste generation is minimum compared to all other countries, India has highest yield in converting raw material into product. One reason could be that India is catering to low end market and therefore the total removed could be lesser as there may not be stringent quality demand. If the trend is observed, it can be seen that India has more sales in non-quota countries than in quota countries. It shows that Indian goods are of acceptable quality at international level. The possibility of waste generation is more if raw material of inferior quality is used or process of conversion generates more waste inherently. In India, the share of decentralized sector is quite substantial in overall textile production. Less waste generation may be attributed to better quality of Indian cotton and better supervision with more labor force, as labor cost is low. An additional factor is that power loom and handloom owners are directly affected in terms of monetary income if waste generation is high. This makes weavers keep extra vigil

India has highest yield in converting raw material into product as waste generation is minimum.

Table 2: Cost break for Ring, OE and knitted fabric (US Dollars/Yard)

		India	Brazil	Indonesia	Italy	Korea	Turkey	USA	Remark
Fabric Ring yarn	Waste	0.05	0.064	0.064	0.061	0.063	0.064	0.056	
	Labour	0.032	0.125	0.016	0.378	0.155	0.045	0.241	
	Power	0.113	0.069	0.069	0.067	0.107	0.065	0.075	0.063
	AM	0.069	0.075	0.048	0.071	0.077	0.062	0.06	
	Capital	0.36	1.355	0.37	0.346	0.321	0.372	0.319	–
	RM	0.251	0.314	0.318	0.305	0.312	0.319	2.277	
	Total	0.875	1.002	0.883	1.268	0.993	0.937	1.016	
		India	Brazil	Indonesia	Italy	Korea	Turkey	USA	
Fabric Ring EO Yarn	Waste	0.035	0.044	0.044	0.042	0.043	0.044	0.038	
	Labour	0.027	0.102	0.012	0.283	0.129	0.031	0.185	
	Power	0.105	0.064	0.062	0.101	0.061	0.069	0.069	0.059
	AM	0.072	0.079	0.051	0.074	0.08	0.067	0.063	
	Capital	0.343	0.32	0.349	0.323	0.292	0.361	0.289	–
	RM	0.251	0.314	0.318	0.305	0.312	0.319	2.277	
	Total	0.833	0.923	0.836	1.128	0.917	0.891	0.911	
		India	Brazil	Indonesia	Italy	Korea	Turkey	USA	
Knitted Fabric (Ring)	Waste	0.118	0.149	0.15	0.144	0.147	0.15	0.131	
	Labour	0.03	0.129	0.018	0.508	0.148	0.075	0.297	
	Power	0.164	0.095	0.094	0.133	0.086	0.115	0.083	–
	AM	0.06	0.066	0.061	0.064	0.067	0.078	0.065	
	Capital	0.478	0.495	0.53	0.421	0.455	0.484	0.429	–
	RM	0.588	0.735	0.743	0.714	0.731	0.747	0.649	
	Total	1.438	1.669	1.596	1.984	1.634	1.649	1.654	
		India	Brazil	Indonesia	Italy	Korea	Turkey	USA	
Knitted Fabric OE Yarn	Waste	0.042	0.054	0.054	0.051	0.052	0.054	0.047	
	Labour	0.008	0.038	0.005	0.143	0.044	0.021	0.083	
	Power	0.076	0.043	0.044	0.062	0.04	0.054	0.04	–
	AM	0.033	0.036	0.034	0.035	0.037	0.043	0.036	
	Capital	0.224	0.209	0.246	0.186	0.198	0.235	0.182	–
	RM	0.304	0.318	0.385	0.37	0.378	0.387	0.336	
	Total	0.687	0.761	0.768	0.847	0.749	0.794	0.724	
Power cost US cents/KWH		10	6	6	8	5	7		–
Interest rate %		18	13	17	11.5	12	10		–

Last two rows of the table show power cost and interest rate comparison. *Source:* Compodium of Textile Statistics.

on the production. Power loom and handloom sectors are major contributors to the export of fabrics from India. Use of non-conventional means of production generates more waste in fabric production. India has lowest installed capacity of unconventional weaving methods, hence less wastage.

Indian goods are of acceptable quality at international level.

- Labour: Labour cost is very low compared to other countries except Indonesia. Low labour cost can be attributed to free availability of labour in the market. It also brings our the fact that cost of living is substantially low compared to other competing countries.
- Raw Material: Raw Material cost is low on account of increased production of different varieties of cotton, in the country over past years and on account of lower waste removal during production.
- Auxiliary Material: Low consumption of auxiliary

material follows from low consumption of raw material.

- Overall cost of production: India has lowest cost of production compared to other countries.

The major disadvantages are:

- Power cost is very high compared to other countries. It is mainly due to free supply of electricity to users. Government estimates of such free electricity run into Rs. 40,000 Crores a year. The cost of production is then passed on to the industry. Industry can lose its competitiveness if power costs are too high and it would create more problems. It is therefore better to look into issues like power theft and free supply of electricity to some section of population and to some states. The whole brunt of the power loss is then transferred to the industry. The possible mismanagement in public sector could be another cause of high power costs. (Full analysis of reasons of high cost of power generation and distribution is out of the scope of this paper).
- High interest rate: It would have negative impact on investment. From the export statistics of fabrics and made ups, one can notice that exports are from both sectors, high capital intensive industry in yarn sector and low capital intensive industry (e.g. power loom) in fabric and made ups. The high interest rate may hold back the industry, specially spinning sector, from modernizing. Low quality yarn production may adversely affect manufacturing of quality fabric and clothing. Power loom and ready made garments industries may not get affected, as these are not capital intensive industries.

Raw material

Table 3: Cotton Statistics

Cotton Yield Kg/Ha	India	China	USA	Brazil	Mexico	Pak	
	301	910	686	461	990	576	
Exports '000 metric tons	India	USA	Uzbekistan	France	Aus	Argentina	Pak
	54	980	827	835	631	196	44

Source: Compodium of Textile Statistics

Although India has the second largest area under cultivation for cotton, productivity of cotton crop is low (Table 3). World Cotton fiber demand is 40 per cent of the total fiber demand including manmade fibers. Increase in cotton yield together with improvement in quality of cotton would help in increasing India's share in the world cotton trade (Table 4). There are quality concerns voiced by some research organisations regarding quality of hybrid cotton. There is ample scope for improvement in cotton productivity and quality. From table 5, it can be seen that India has clear disadvantage in man made textile raw material. India is net importer of synthetic fibers and filament yarn. Imports worth $ 151 million were recorded in the year 97-98. The statistic of cost break up for different countries is not available. Action for reduction in costs can be initiated only if such statistics is available to pinpoint the reasons for higher costs of production. Domestic production of man-made fibers at lower costs, particularly that of polyester, which is widely used for clothing, would further boost the competitive pricing of blended and synthetic fabrics and garments.

Increase in cotton yield together with improvement in quality of cotton would help in increasing India's share in the world cotton trade.

Table 4: Domestic and International prices Rs./ton (97-98)

RM	Domestic	CIF Value	Custom %	Excise	CIF + Excise
DMT	28250	20770	36.13	18	24508.6
PTA	26790	21110	36.13	18	24909.8
MEG	31100	22840	36.13	18	26951.2
Caprolactum	69700	58780	36.13	18	69360.4
Wood pulp	23600	23620	14.4	0	23620
Acrylonitrile	36200	28090	20.42	18	33146.2

Table 5: Production of Manmade (fibres+filament) (97-98)

India's share in world market	Viscose	Polyester	Acrylic	Nylon
% of World Production	21.83	8.30	2.30	2.25

Textile Exports

Fig. 1 illustrates the value chain in the textile industry. Tables 6 & 7 present the statistics on the share of readymade garment in exports and value addition in various products. One can notice that RMG share in export of all textile products is gradually falling over the years although it has almost doubled from 1992 to 1998. RMG sector has largest value addition in all textile products. Lower export market share of RMG can be attributed to:

- Improper coordination in centralized and decentralized sector

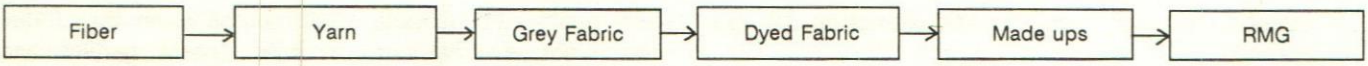

Fig. 1. Value chain for textile industry

- Lack of building of markets overseas
- Less emphasis on having own outlets abroad
- Less emphasis on niche markets

Table 6: Ready Made Garment (RMG) Share in Export Figure in Million US $

Year	91-92	92-93	93-94	94-95	95-96	96-97	97-98	Target 98-99
RMG	2525.07	3502.47	3713.85	4453.5	4502.9	4762.1	4910.7	5900
Total	4880.97	5626.54	6754.35	8483.02	9133.7	9914.11	10334.74	14275
RMG %	51.73	62.25	54.99	52.5	49.3	48.03	47.52	41.33

Source: Compodium of Textile Statistics

Table 7: Value addition for different textile products

	Raw	Yarn	Grey Fabric	Dyed Fabric	RMG
Value addition % over raw cotton	0	63	195	224	662

Table 8: Spinning and weaving capacities 1996

	Units	India	China	Brazil	Indonesia	USA	Italy
Ring Spindles	Millions	32.765	41	7.3	7.05	4.9	1.676
OE rotors	Millions	0.23	0.665	0.257	0.086	0.892	0.1034
Shuttleless looms	1000	6.28	50	33.2	27	62.45	13.28
Shuttle looms	1000	133.76	880	122.41	200	9.21	1.76

Table 8 clearly shows the reason why India's share is less in the readymade garments and cloth market. With about 20 per cent less installed capacity than China in spinning sector, India is in leading position in the yarn market with 25 per cent of world share. But yarn market is only a small part of the total market. Total world market for textile products is of the order of $350 billion while total yarn trade is about $7 billion (Saran, 2000). Installed capacity for shuttle-less looms in India is the lowest compared to other countries. Even installed capacity for shuttle looms is very low compared to China. When compared with China, with 15.2 per cent of shuttle looms and 12.56 per cent of shuttle-less looms, India's exports are 18.95 per cent in clothing and 43.21 per cent in textiles. Indonesia has more capacity in shuttle looms. Table 9 brings out the trend in export share of different textile product categories.

Table 9: World export Share Percentage 1996

	Clothing (ready made garments)		Textiles (Yarn Fabric and made-ups)
India	2.9	India	3.5
China	15.3	China	8.1
Indonesia	2.2	Germany	9
Thailand	2.5	Belgium	6.1
USA	4.6	USA	5.3
UK	3.2	UK	3.6
Italy	9.8	Italy	8.8
Turkey	3.9	Pak	2.5
Taiwan	2	Taiwan	5.6

Table 10: Break-up of Cotton Exports (Made Ups) (Million USD)

	93-94	94-95	95-96	96-97	97-98
Mill	106	117	147	158	202
Power loom	301	436	487	576	622
Knitted	2	2	3	3	6
Handloom	325	377	372	395	438
Total	734	932	1009	1132	1268
Break-up of Cotton Exports (Made Ups) (% Share)					
	93-94	94-95	95-96	96-97	97-98
Mill	14.44	12.55	14.57	13.96	15.93
Power loom	41.01	46.78	48.27	50.88	49.05
Knitted	0.27	0.21	0.30	0.27	0.47
Handloom	44.28	40.45	36.87	34.89	34.54

One can notice that the installed capacity is directly reflected in the export of commodities from India. India is world's largest exporter of yarn (Shanmuganandam et al., 2000), while in other areas, India's share in world business is very low (2.9 per cent in textiles, 3.5 per cent in garments). All the countries which have large installed base for shuttle-less looms and even for that matter, shuttle looms, are leading exporters of clothing and textiles. Investment in power looms may pay off as table 10 confirms the share of exports from powerloom sector. The larger share of exports from powerlooms sector also brings out the point that quality of power loom

fabric is not so bad as is being projected. It follows from the fact that India's share in world trade is more in non-quota countries than in quota countries.

Installed capacity is directly reflected in the export of commodities from India.

Table 11: Break-up of Cotton Exports (fabrics) Million USD

	93-94	94-95	95-96	96-97	97-98
Mill	304	384	431	449	441
Powerloom	298	449	499	573	585
Knitted	71	91	92	98	80
Handloom	90	102	77	66	59
	763	1026	1099	1186	1165
Break-up of Cotton Exports (fabric) % Share					
	93-94	94-95	95-96	96-97	97-98
Mill	39.84	37.43	39.22	37.86	37.85
Power loom	39.06	43.76	45.40	48.31	50.21
Knitted	9.31	8.87	8.37	8.26	6.87
Handloom	11.80	9.94	7.01	5.56	5.06

In synthetic and woolen fabric category, powerloom is the only contributor to fabric export from 93 to 98. For year 98, these figures were 511 and 42 million US Dollars. Unit value realization figures in Rs./sq. meter are 51.15, 34.72 and 16.65 respectively for handloom, mill and powerloom sectors. "According to a recent report prepared by the Prime Minister's Council on Trade and Industry, the cost of producing one metre of cloth by a powerloom is 22 Paise, compared to Rs 1.60 in a composite mill. Such a huge cost differential, the result of subsidies, has made composite mills sick, and has taken fabric making away from mills to powerlooms" laments Anang Lalbhai, managing director, Arvind Products Ltd: "With employment creation being the objective, government policies were biased against composite mills and in favour of power looms. But now that the attention has shifted to competitiveness, the rationale of the old policies is in question" (Saran, 2000). After accounting for all subsidies offered to power loom sector, it still cannot account for mill production cost which is 72.7 per cent large than power loom. Further analysis is necessary to arrive at reasons for such a high difference. The current analysis is enough to stress the need that mill sector can concentrate on production of fabrics, which cannot be produced by using conventional shuttle looms. Power loom industry is more competitive, the argument of scale of economies notwithstanding. Handloom industry is equally important for export market, the sale of handloom fabric is mainly because of its exquisite designs and because they are hand-made products. Prices of power loom cloth in synthetic category have gradually fallen over last ten years while those from mill are on increase. Knitting industry can also be looked into for more investment in both organized and decentralized sectors with their proper coordination. The difference in the prices of mill made cloth and power loom made cloth is also very high and it has increased by 10 per cent to 16 per cent in different categories.

Mill sector can concentrate on production of fabrics, which cannot be produced by using conventional shuttle looms. Power loom industry is more competitive, the argument of scale of economies notwithstanding.

Table 12: Cloth prices in domestic market Rs./Meter (PL = Power Loom)

	Cotton			Synthetic			Blended		
	Mill	PL	% diff	Mill	PL	% diff	Mill	PL	% diff
1991	20.44	8.24	59.69	55.04	14.98	72.78	40.75	14.81	63.66
1992	22.98	9.15	60.18	56.99	15.37	73.03	44.80	16.83	62.43
1993	27.63	9.36	66.12	73.41	15.50	78. 89	45.54	16.87	62.96
1994	32.03	11.56	63.91	77.56	14.18	81.72	53.57	18.12	66.18
1995	38.84	12.16	68.69	76.51	13.86	81.88	57.17	17.00	70.26
1996	41.67	12.30	70.48	81.30	14.05	82.72	60.10	17.00	71.71
1997	42.71	12.67	70.33	76.81	12.81	83.32	62.16	17.00	72.65
1998	46.39	12.39	73.29	82.03	9.66	88.22	66.51	17.00	74.44

SWOT Analysis

SWOT analysis is a general tool designed to be used in the preliminary stages of decision-making and as a precursor to strategic planning in various kinds of applications. When correctly applied, it is possible to get an overall picture of present situation of industry in relation to its competitiveness. An understanding of the external factors, (comprised of threats and opportunities), coupled with an internal examination of strengths and weaknesses assists in forming a vision of the future. Such foresight would translate to initiating competent programs or replacing redundant, irrelevant programs with innovative and relevant ones" (Radha & John, 2001).

Table 13 summarises the strengths, weaknesses,

Table 13: Strengths, weaknesses, opportunities and threats facing Indian textile industry

	SWOT Analysis	Opportunities				Threats				
		Institutional Support	IT	Increasing per capita consumption	Open markets	Free trade	Re Export +	Anti dump Duties –	Subsidy by other nations –	Population Growth –
STRENGTHS	Availability of RM			+	+	+				
	Variety of RM			+	+	+				
	Low Cost of cotton			+	+	+				
	Cheap Labor			+	+	+				
	Low production cost			+	+	+				
	Designs		+	+	+	+				
	Wide variety of processes and technologies	+		+	+	+				
	Conversion Yield			+	+	+				
WEAKNESSES	High power cost			–	–	–				
	Low cotton yield and poor quality	+		–	–	–				
	High cost of RM for Manmade fibers			–	–	–				
	Deficient network of Small and Organized sectors		–	–	–	–				
	Old Machines		–	–	–	–				
	Distance		+	–	–	–				
	Procedural Delays		+	–	–	–				
	Less R&D expenses	+	+	–	–	–				
	Low productivity	+	+	–	–	–				
	Poor ginning	+		–	–	–				
	Less installed capacity			–	–	–				
	No known brand		+	–	–	–				

Note: + Favourable configuration – Unfavourable configuration

opportunities and threats facing Indian textile industry. It can be elaborated as follows:

- Availability of cotton in different varieties and low cotton cost can be well utilized to take advantage of opening of markets. With surplus production, India can increase its share in the world production.
- Low labor costs can be effectively utilized to keep prices down and take advantage of open markets and at the same time make products more competitive to fight import flux arising out of free trade.
- Wide variety of saleable designs can be well-marketed in open markets while it will be difficult to penetrate in traditional Indian market.
- Wide variety of processes and technologies can deal with variety of demand and make the industry flexible with respect to product offerings.
- Less waste generation would keep raw material costs and therefore product cost at low level. It would be definitely useful to compete on the basis of prices in international market.
- Institutional and academic support is useful for process control, process innovations for wide varieties of processes and technologies. Research institutes would also be useful to experiment with different cotton varieties so as to improve cotton yield and cotton quality. They can also conduct various seminars on productivity improvement, process control and better ginning practices.
- IT can be exploited to support product design through CAD support, to improve communication and coordination between small scale industries and large scale industries, to communicate over large distance, to avoid procedural delays, improve productivity through computerized planning and control, to collect data from market and for product promotion.

- It is certain that because of competitiveness arising out of high power costs, India might lose avenues for more employment and even domestic market may well be under threat of free trade regime. That is, free electricity will ultimately lead to more taxes, less employment and more trade deficit on account of lost opportunities and increased imports.
- Low cotton yield will not make cotton available for international trade. It can be a limiting factor if the export target of $50 billion is to be achieved by 2010. Poor quality will make it mandatory to import better quality cotton thus will act against taking advantage of opening of markets.
- Deficient network of power loom sector and organized mill sector will not allow to take fullest advantage of low cost of production of power looms and marketing expertise of organized sector and will have adverse effect of exploitation of open markets and IT expertise available in the country.
- Old machines will restrict the production to low value added products leaving high segment open to competitors. Old machinery is less productive and prone to more defective production.
- Distance from user markets and procedural delays can have negative impact on delivery time, cost of transportation and therefore on customer satisfaction. These factors create need for exploitation of IT. Procedural delays bring down customer satisfaction and affect repeat ordering. In open markets, it is difficult to attract new customers. Retaining customers, therefore, assumes greater importance.
- Lesser expenses on R&D will have adverse effect on all the opportunities presented, as the essence of competitiveness lies in process and product innovation. Currently expenses on R&D are .03 per cent of turnover of organized sector as against 1 per cent in developed countries.
- Low productivity will reflect in increased prices, less availability of product in market and poor ginning will reflect in inferior quality of output; these factors will limit the share in open markets. This poses good scope for support from research institutes and IT exploitation.
- Less installed capacity lowers the total production capacity. Obviously, one cannot have water in the bucket if it is not there in the well.
- Absence of known brands makes it difficult to attract customers who derive satisfaction from purchasing commodities of familiar brands. It is obviously a disadvantage in international competition. Known brand assures customer of after sales support and quality of product. In open market, known brand tends to attract more customers than un-branded product. It poses good opportunity to exploit IT for brand promotion schemes.
- Threat of re-export may not be relevant in open economy as re-exported goods will be costlier than directly exported goods.
- Anti dumping duties levied against India may cause drop in exports making Indian goods costlier.
- Subsidies by competitors will make their goods more competitive in the international markets as it will have effect in reducing cost of production.
- Population growth has general implications. It will put extra burden on economy with increased taxes, increased demand for power and will act against competitiveness of the Industry.

Force Field Analysis

Fig. 2 shows the force field analysis and role of IT for Indian textile industry.

National Textile Policy 2000

Following are the directives from National Textile Policy-2000.

Spinning

- Encouraging the spinning sector to continue to modernise
- Liberalising and encouraging export of cotton yarn
- Reviewing from time to time the hank yarn obligation while ensuring supply of adequate quantity of yarn to the handloom sector.

Organized Mills

- Integration of production efforts on technology driven lines
- Encouragement to setting up of large integrated textile complexes
- Strategic alliances with international textile majors, with focus on new products and retailing strategies
- Creation of awareness and supportive measures for application of IT for upgradation of technology, enhancement of efficiency, productivity and quality, better working environment and HRD

Power Loom

- Technology upgradation

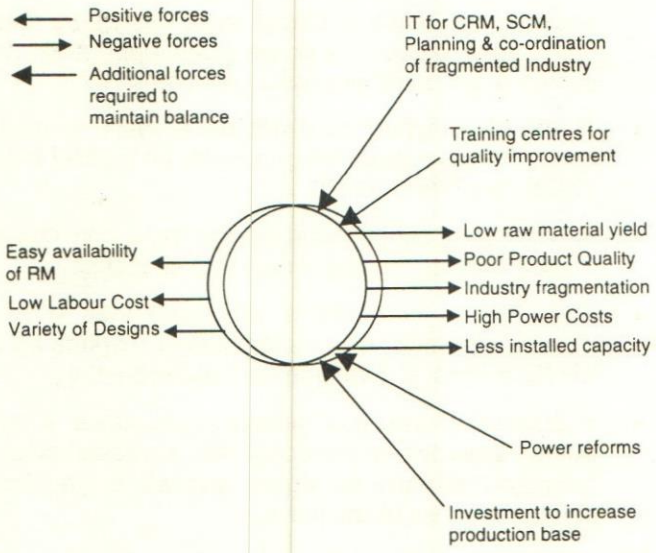

Fig. 2. Force field analysis for Indian Textile Industry

- Modernisation of Power loom Service Centres and testing facilities
- Clustering of facilities to achieve optimum levels of production
- Welfare schemes for ensuring a healthy and safe working environment for the workers.

Ready Made Garments

- Garment industry to be taken out of the SSI reservation list
- Joint ventures and strategic alliances with leading world manufacturers to be promoted
- Schemes with necessary infrastructural facilities for the establishment of textile/apparel park to be designed with the active involvement of state Government, Financial Institutions and the private sector
- Setting up of strong domestic retail chain to ensure easy availability of branded India product will be encouraged.

Exports

- Forging of strategic alliances for gaining access to technology
- Operating a brand equity fund exclusively for textile and apparel products, consistent with WTO norms.
- Restructuring AEPC and other Export Promotion Councils to play the role of facilitators and professional consultants
- Developing infrastructural facilities in the predominantly textile and apparel export oriented areas in close co-operation with State Government and Financial Institution and the private sector
- Evolving a suitable mechanism to facilitate industry associations to deal with disputes under the various agreements of the WTO.

Recommendations

The corrective measures fall into following different categories:

Formation of Textile policy to deregulate the business as much as possible. It has been found that it is difficult to formulate a policy that will take into account the needs of all sectors. While deregulating, the government will also need to focus on the issue of unemployment. Machinery which can be controlled manually to give quality production with the help of supervision, would be appropriate technology in the Indian context where abundant labour force is available at low costs. Highly automated machinery may pose problems regarding maintenance, spare parts availability and highly skilled labour. It would be advisable if Government encourages the policy of formation of groups from diversified sectors. If the functioning of very popular foreign brands are observed, one can notice the thrust that is placed on outsourcing the production to small suppliers. Similarly the corporate sector can try to upgrade the technology of small sector and derive benefit through low costs of operation of small-scale sectors due to absence of heavy overheads. Big firms can develop marketing channels for their own and out-sourced production. Supply chain management assumes significant importance in such scenario. Textile policy should also take into account additional export subsidies, which are being offered in countries like China. The effect of such erroneous subsidies should be neutralized by application of anti dumping duties on products from such countries. The exact amount could be decided depending on the nature of subsidies offered and their impact on the prices of commodities. If there is no international commitment towards the issue of subsidies, India may have to offer subsidies to Indian textile industry as well to remain competitive in

Machinery which can be controlled manually to give quality production with the help of supervision, would be appropriate technology in the Indian context.

international markets. The issue of anti dumping duties on Indian goods needs to be addressed on diplomatic level. The textile policy needs the following additional elements:

- Stress on having own retail outlets overseas rather than depending on joint ventures
- Networking of centralized mill sector and decentralized power loom sector
- Making more investment in power looms than in organized mill sector
- Training centers for power loom operators for better working practices to achieve export quality fabric
- Development of supplier base for RMG from small-scale industry and its integration with organized sector.

Technology upgradation depends on availability of funds and interest rates. The government has come up with the scheme of Technology Upgradation Fund for Textile industry. However, the incentives offered are not very attractive. Government can think of giving more incentives if such machinery is used for export production. Low productivity in weaving sector can be improved by going in either for high speed shuttle-less technology or by increasing number of power looms. The quality consciousness of power loom operators can be improved by making provision for training programs for operators to take care of quality related issues. In spinning sector, the problem is less pronounced and can be tackled with modernization of existing machinery.

Technology upgradation depends on availability of funds and interest rates.

Infrastructure development for which responsibility again lies with government. Power tariff costs are most critical to all industries including Textiles. Government can keep vigil on theft of electricity so that the burden of loss due to non-collection of dues is not passed on to the industry. (Ways and means of achieving low cost power production is out of scope of this paper).

Management related issues

Quality related issues: Quality management system can derive good assistance from integrated management software which can offer aids in the form of easily accessible information on quality procedures, checks, responsibilities, trouble shooting advice and highlighting of violation of inspection norms. It would minimize the possibility of allowing defective production or inferior quality raw material to proceed further without inspection. Such problems, when detected at earlier stages, have two benefits. As defective production is blocked, value is not added to the product that cannot be sold, which helps in cost reduction. In addition, instances of rejection in final product are also reduced, which helps in keeping delivery time and quality requirement as desired.

Planning related problems: To achieve good planning capabilities, the system should be provided with capabilities of simulation to visualize the effects of different courses of actions. Whenever changes are to be made, planning application, which is part of overall integrated information solution is extremely useful to judge the impact of changes from point of view of costs and profitability. Planned purchase requirements and shop orders when attached to specific customer orders, allow critical analysis of different customer orders along with production capacity requirement. It would be highly impossible to analyze the impact of different options within a short time without help of computerized planning software. Any delay in making decision on production would mean losing customers in today's highly computerized environment. Distance from markets can be a crucial factor when shipments are expected at short notice. For such varieties, it would be worthwhile to concentrate on supply of raw material like supply of yarn which can be woven into fabric or supply of fabric which can be stitched to required needs.

Supply chain management: Effective supply chain management depends on effective flow of information to various production units. A demand generated at retail house should be quickly transmitted down the line for further action. Collective information of all production units of supply chain constituted by various suppliers can be stored on computer and the firm can workout capacity and material planning for their suppliers. Supplier evaluation schemes are useful in keeping watch on various aspects of a supplier firm. Without EDI (Electronic Data Interchange) and assisting IOIS (Inter Organisational Information System), it would be difficult to manage business for profitability.

Effective supply chain management depends on effective flow of information to various production units.

Flexibility of production: Flexibility of production depends on two factors: the ability of production machine

to produce variety of products and the ability of firm to adjust itself to the ever changing need of customers. Textile machines are fairly flexible in catering to a variety of products. The efficiency of making changes depends on the quick decisions that management can take regarding those changes. As suggested earlier, Integrated Information system is a good help since it can be used as effective medium for communication; associated planning module can be used to weigh different alternatives quickly to arrive at the most profitable alternative.

Reduced costs: Cost reduction is achieved through reduced levels of inventories because of speedy flow of information. Any delay in the flow of information will show itself in increased inventory levels. Inventory can also be reduced by notifying clear instructions of the extra requirement, which is attached to the actual demand. For example, the retailer would know he needs X number of garments to replenish his stock. If he thinks that he would make provision for Y number of garments for 'incase there is extra demand', he should mention it clearly on the order form so that the supplier down the line does not make any provisions for such unforeseen demand. Thus pile up of inventory is avoided. As the same document flows to all supply points through the integrated information management system, bullwhip effect is avoided. Capital does not get blocked in un-saleable inventory. Planning function also helps in purchase of raw material in required quantity, thus avoiding build up of raw material inventory.

Cost reduction is achieved through reduced levels of inventories because of speedy flow of information.

Customer relationship management: The essential aspect of successful business is to retain its customer base. Cost of attracting new customer is always higher than the cost of retaining the old customer. A database to record and retrieve the history of customer, his preferences, frequency of orders, his problems, service requirements, additional expectations from the product would be very useful for new product design and development. Well-formulated procedures for customer dialogue will be useful in having better customer relations. Fast response to customer queries creates a good impact on customer's perception of the organisation. Such response is possible only if comparison of current production schedule, and product stocks with the new demand is made possible through computerized planning software. One must be aware of production capacities of customers and their markets. Through an internet enabled ERP solution, the company can have better control over business as it will act as one of the players in the whole supply chain rather than as a single isolated production unit.

Quick response: Quick response depends on the flexibility of production unit to switchover to different products. ability to get raw material in time from suppliers and efficient transmission of customer demand. Without planning aid through computerized system, it would be rather difficult to achieve quick response to customer demand. Integrated system helps in reducing delivery time as non-value-adding activities like repeat documentation are avoided at all stages. Proper allocation of material to a particular customer order brings down instances of mismanagement in production. Due to availability of reasons for machine stoppages and defective production, corrective actions can be initiated accordingly. It improves up-time of machinery and therefore facilitates quick response.

Formation of alliances: As discussed, groups can be formed from corporate and small sector industries for mutual benefits. Alliances with overseas companies are also possible but the problem would be of willingness from the part of overseas retailers. Corporate sector can open their own outlets in other countries to attract the foreign buyers.

Marketing and advertising: Marketing and advertising function can be assisted by computerized system to calculate costs and benefits of different marketing strategies. Actual effect of advertising campaign on product sale can be studied from sales data of different period. It would be useful for making profitable decisions regarding product sales. Building of brand image in India and abroad supported by quality fabrics in also an essential aspect of Garment business. It is most important of all Indian garments become the symbol of quality and novelty in India and abroad. A comparative statement of properties of foreign brands vis-a-vis that of Indian brands can be given to the consumer to bring him out of the notion that foreign brands are superior to Indian brands. Consumer can also be supplied the details of Indian supplier base of foreign brands to bring him out of psychological grip of foreign brands. At times it would not be advisable to take the attention of customers to other brands unnecessarily; in such cases highlighting the quality aspects of the product is the only option. Advertising should be treated as investment for business sustenance and not as unnecessary expenditure. Niche markets can be captured only if consistent quality garments are supplied to high-income group.

Manpower training and management: Manpower module of integrated system can be effectively used for continuous assessment of worker performance for high-

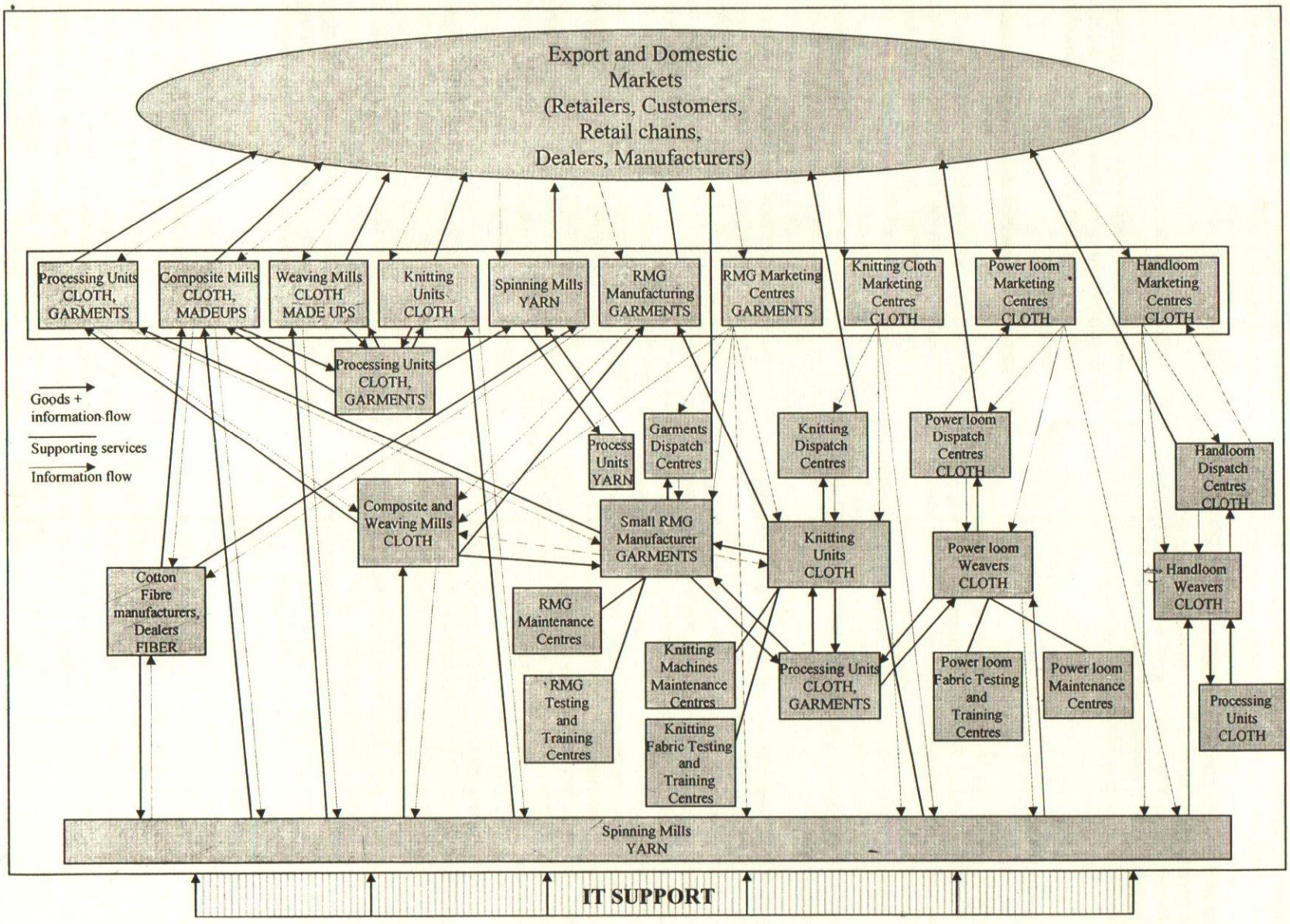

Fig. 3. IT Enabled Model for Indian Textile Industry

lighting training needs. With the help of integrated management solution, production and profits can be related to employees to arrive at decisions regarding payments and incentives. In the absence of any system to record and answer employee queries, feeling of belonging to organisation cannot be cultivated and employees lack motivation to offer their best at work. Labor efficiency figures make it possible to reward the employees whose performance is above par, where pay is not related to production.

Proposed Model for Indian Textile Industry

Fig. 3 shows an IT enabled model for fragmented Indian textile industry. The model suggests that the following units can directly deal with domestic and export markets: Processing units, Composite Mills, Weaving Mills, Knitting units, Spinning Mills, RMG Manufacturing units, RMG marketing centers, Knitting cloth marketing centers, Power loom marketing centers and Handloom marketing centers.

Export and domestic markets are constituted by company owned retail outlets or retail chains run by independent bodies to promote textile products in India and abroad, by dealers, other retailers and even manufacturers using intermediate textile productions to produce finished goods. All units dealing with markets can freely interact with each other to fulfil their raw material requirements and finishing needs. Marketing centers are provided for marketing of products from decentralized sectors. Individual weavers and garment manufacturers of decentralized sectors can be attached to different marketing centers. Even marketing centers from different parts of the country are free to interact with each other so as to make maximum use of available capacity and to avoid losing any export order due to non-availability of capacity. Marketing centers can be run by individuals, government bodies or by cooperative bodies of respective manufacturing units. Apart form marketing centers, the model also shows dispatch centers to facilitate collection, may be, inspection of the products if required and further despatch to the customers. Marketing centers are expected to convey the material requirements to all the constituents of supply chain for effective supply chain management and to avoid delays in deliveries to the customer caused by delays in supply of raw material at various stages of supply chain. Timely information to all units will facilitate material and capacity planning well in advance for different units in supply chain. The model also envisages support centers to provide machine maintenance services, testing services and training services to decentralized sectors. Organized sector too can derive benefit from such services, if required. Training is essential so that fabric and garment producers follow quality oriented manufacturing practices. Maintenance services will ensure that the machines in the decentralized sectors are in good condition so as to produce quality products.

Individual weavers and garment manufacturers of decentralized sectors can be attached to different marketing centers.

The whole model rests on Information Technology for support in conveying the required information to different units. Organized sector, marketing centers, dispatch centers and individual producers are expected to be in contact with each other for conveying current status of production, to discuss the problems and to know the available capacity at any point of time. Although it may not be feasible to have computers at every individual handloom or power loom operator, access can be provided to a group of manufacturers so that they can be in touch with marketing centers. Marketing centers in turn can decide about how orders can be scheduled to different manufacturers depending on the available capacity. Different marketing centers can be connected to each other by computerized network to establish immediate contact within them and to answer customer queries to improve customer satisfaction. Thus SCM and CRM are the two main functions which IT network is required to address to derive maximum benefit of this fragmented industry.

In a survey, it was observed that organized mill sector cannot cater to all the customers who approach, for shortage of capacity. In such cases, organized sector can take a look at the product range provided by decentralized sectors and outsource the production, may be, with reduced profit margin rather than losing the customer and earning nothing. In addition, it is difficult to get the customer back once the company loses him.

Dark arrows in the loom suggest goods flow from tail to head together with information related to goods; the product that flows over the arrow is shown in the box in capital letters. Every goods flow has implicit money flow in reverse direction. Similarly, every information flow, which is shown by faint line, has implicit information flow in reverse direction as feedback to the information provided. Lines suggest that supporting services are provided by the maintenance, training and testing centers to the industrial units.

Conclusion

Indian Textile sectors needs revamping to remain competitive in post MFA era. Integrated information management solution is a great aid in attaining competitive advantage in international markets along with necessary changes in textile policy of India by increasing installed base, by working out retail chain network overseas and by putting more thrust on coordination of organized and decentralized sectors.

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The more high-tech around us, the more the need for human touch.

– **John Naisbitt**

Feature

Manager's Health: Role of Emotional Literacy

Rabindra K. Pradhan, Purnima Mathur & Prvash K. Mishra

The concept of emotional well being has been widely studied over decades by psychologists, psychiatrists and medical professionals. Management scientists and HRD professionals devote their attention to stress management programmes to improve employees' performance. Today's work place is much more complex than before. Diverse work force, time pressure, and critical jobs generate stress and affect the manager's health. This, in turn, causes low job performance. It has been the experience and the perception of many that emotion plays a vital role in determining human health and quality of life. The present study examines whether a positive relationship exists among emotional literacy, quality of life and general health.

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Health is a dynamic process. It is a part of personal as well as social development. Health has always been understood and interpreted in terms of illness and a healthy man is one who is free from illness. Health is also a way of life that is positive and fun. It is a philosophy of life. Health has potential effects on the quality of life, which in turn is likely to affect the quality of work life also. It is obvious that emotional aspects of human health have a great effect on human functioning. Emotional illness causes psychological imbalances and the study of emotional literacy will be a valuable contribution to understand the complex phenomena of health and well-being in the context of work life. It will also help to identify vulnerabilities and suggest interventions for emotional harmony, thereby improving health status and quality of life. In recent years, emphasis on promotion of health, positive health practices, stress reducing programs, handling/managing emotion, etc are strong concern areas of research and training. Within the broad spectrum of human health, the present authors attempted to study the psychological aspects of human health in relation to quality of life. The study measures general health status in terms of physical, behavioural and emotional symptoms.

Review of Literature

Health behaviour has a substantial and direct effect on health status (Slater & Carlton, 1985). Several health and fitness related behaviour (e.g. moderate drinking, non-smoking, physical activity, weight control, adequate sleep, etc.) have been relatively associated with higher subjective functional health status (Rakowski, 1986; Stephens, 1986; Segovia, 1989). The impact of health status on overall quality of life has been examined in many studies. Some studies using community samples have found that physical health and psychological well being are strongly correlated (Mechanic, 1980; Andrews, Tennant, Hewson, & Schonnel 1978; Frericks, Aneshensel, Yukopenic & Clark, 1982; Schwab, Traven

& Warniet, 1978; Neff, Baqar & McCorel, 1980; Kathol & Petty, 1981). Similarly, a positive relationship between positive health/fitness status and quality of life was reported in a large study of US Navy shipboard man (Woodruff & Conway, 1990). Another study that included a replication sample found that health behaviour contributed uniquely to the prediction of quality of life after controlling for health and fitness status (Weedruff & Conway, In press).

Thoughts, feelings and behaviours affect our health and well-being. Recognition of the importance of these influences on health and disease is consistent with evolving conception of mind and body and represents a significant change in medicine and life sciences. More recent developments in the field of health studies include the interplay of emotional processes such as stress on all systems of body and its influence on the health. Interest in health and behaviour is rapidly expanding in health research organisations like WHO, in the media, at work, at school and medical practices. This interest is also reflected in the major development of health psychology and its multi-disciplinary field – behavioural medicine. All these fields grew rapidly in the 1980s and now constitute major endeavors in most universities, NGOs, professional institutes as well as medical centers. The research upon which these activities are based, include studies of prevention, screening, early detection, etiology of disease, predictors of prognosis to treatment of disease, rehabilitation and post illness adjustment and quality of life (Baun & Pasluszny, 1999). Experimental evidences from the studies of health and behaviour strongly suggest that psychological process and emotional states influence the etiology and progression of disease and contribute to overall resistance or vulnerability to illness (Krantz, 1985; Manuck & Krantz, 1984, Patterson et al. 1994, 95; Schneiderman, 1983). Stress appears to affect health through complex array of neural and hormonal pathways (Besedovsky & Del Rey, 1991, Maier & Watkins, 1998). Health bahaviour and illness were also extensively studied by Anderson et al (1994), Baun & Nesselhof (1988), Cohen & Williamson, (1991, and Kiecolt-Glaser et al, (1985).

Emotional arousal, stress and behaviours such as smoking, drug use may affect resistance to disease and deteriorate the quality of life (Evans & others 1997, Antoni et al 1994). Mental health problems appear to be associated with diseases like HIV, AIDS which are the results of excessive drug use, sexual activity and excessive stress (Folkman et al. 1997; Hoff et al. 1997; Fishbein et al. 1998 and O'Leary & Jemmott 1996). Impulsive behaviour may occur because of stress related drugs and alcohol use which impair human health (e.g. Testa & Collins, 1997; Robbins et al, 1997). Implications of drug or alcohol abuse include reduced motivation, a false sense of invulnerability, and lack of attention to details or sanctions leading to increased risk and infection (Dignle and Oei, 1997; Chandra et al. 1996). As a result, people who are intoxicated by drugs or alcohol may not use good judgement, may be more likely to end up in compromising situations, or may simply not care about risks to their health at that moment. Stress management intervention has been proved to enhance and improve health and quality of life (e.g. Littrell, 1996; Goodkin et al. 1997; Pomeroy et al. 1997; Schneiderman et al, 1992).

Research increasingly suggests a strong link between how people think, feel and act, and also how well people withstand illness and poor health. Studies on impact of emotional processes in health behaviour are well documented. Stress management mainly focuses on how to handle/manage emotion and improve health. Improvement in health enhances the quality of life and helps smooth functioning of work life.

Emotional Literacy

Emotional intelligence involves the accurate appraisal and expression of emotions in oneself and others and the regulation of emotion in a way that enhances living (Mayer, Di Paolo & Salovey, 1990). Emotional literacy is the first cornerstone of emotional intelligence that involves emotional self-awareness, emotional expression, and emotional literacy refers to the ability of a person to recognize the consensually agreed upon emotional qualities of objects in the environment. It helps the person to develop a sound emotional vocabulary in order to recognize and understand the emotion in others and of his own. It also helps the person how and when to express his emotion in a way that is contextually appropriate. According to emotional intelligence perspective, one who possesses this ability is considered well-adjusted and emotionally skilled. On the other hand, one who may not posses this ability may well be impaired in social functioning. Thus, the study of emotional literacy along with quality of life will bring out a better understanding of human health.

In recent years, growing attention to emotion has

Emotional intelligence involves the accurate appraisal and expression of emotions in oneself and others and the regulation of emotion in a way that enhances living.

been shown to save time, expand opportunities and focus energy for better result. One can have better life, with successful career and better relationships, become more productive and motivate others by trusting one's gut feelings and using them effectively (Cooper, 1997). Managers in today's world remain ineffective and fall sick because of their superficiality. This is one of the by-products of time pressure. Emotions are not only wellsprings of intuitive wisdom; they also provide us with potentially profitable information every minute of the day. It is essential to know how to acknowledge value feelings in self and in others and how to respond to them effectively (Goleman, 1995, and Cooper, 1997). Emotional literacy can be understood as a process of developing a clear and useful vocabulary for mutual understanding and recognizing, respecting and valuing the inherent wisdom of feelings. Emotional honesty, emotional energy, emotional feedback and practical intuition contribute to emotional literacy (Cooper, 1997). One can experience the dynamism of emotional honesty by conducting an emotional self- audit over several days by monitoring his/her thoughts and feelings.

Research evidences show that emotion contains our histories and every day experiences. If we are genuine about our accessibility and attentiveness, others will trust us (Cooper, 1997). According to Robert Hooper (1997) emotional literacy is all about being real and true to yourself. It builds awareness, inner guidance, respect, and responsibility and inter-personal connections. Emotional literacy can be improved through three phases:

- Emotional Self-Awareness (ESA)
- Emotional Expression (EE) and
- Emotional Awareness of Others (EAO)

Emotional self-awareness refers to being aware of your own emotions, and being able to listen others, situations and environment. It also reflects your awareness of being able to accept your gut feelings, paying attention to your physical state to understand your feelings and applying logic why you are sad or upset. Emotional expression includes both expression of negative and positive feelings without any hesitation, letting others know your desires and needs, openly expressing your problems to others, showing your discomfort when you are in trouble and avoiding superficial expression/acting. This helps you to build trust with others and makes you tension free. In turn, you function smoothly and remain healthy. Emotional awareness of others is about showing empathy to others' emotional feelings by watching and responding appropriately. Valuing others' emotion helps mutual understanding and bringing proper solutions to interpersonal problems. A leader/manager who can sense the mood of a group and can read between the lines when some one is talking, remains effective.

Emotional self-awareness refers to being aware of own emotions, and able to listen others.

Studies on health have shown the role of emotion in maintaining the well-being of a person. World Health Organisation defines health as "a state of complete physical, mental and social well-being and not merely the absence of disease" (WHO, 1948, P-1). Mental health is synonymous with 'happiness' and 'well being' (Frish, Cornell, Villanueva & Rertzlaff, 1992). A number of studies have shown that patients' subjective well-being rather than objective medical conditions determine their treatment seeking behavior (Hunt & McKenna, 1993). The need to look beyond symptoms also comes from empirical data on the effects of mental illness on psychological states, role functioning and social and economic status (Broadhead, Blazer, George, & Tse, 1990; Greenberg, Stiglin, Finkelstein & Brendt, 1993; and Ormel et al., 1994).

The purpose of health related quality of life measures is to document the burden associated with illness and intervention. In the present study, emotional literacy was studied as a moderator of health and quality of life. From a number of possible approaches to quality of life in mental health, there are two dominant and competing models—Satisfaction Model, and Three component Model (Angermeyer & Kilian 1997). As the name suggests, the satisfaction model is derived from generic framework of quality of life in medicine. The three component model with its more inclusive definition of quality of life, can be viewed as a refinement of the health related framework. The satisfaction model is an outgrowth of both sociological and psychological approaches to examining personal happiness and well-being (Diener, 1984). In this model, quality of life is equated with one's satisfaction with various life domains that are personally important. The present study measures quality of life in terms of life satisfaction. Quality of life is the individual's perception of their position in life in the context of culture and value systems in which they live and in relation to their goals, expectations, and standards and concerns (Harper & Powers, 1998 P-551). It is evident from empirical findings that emotion plays a vital role in determining health and well-being. Thus it is needful to examine whether emotional literacy influences manager's health and quality of life in

the contemporary working environment. As such, present study was conceived.

The major objectives of the study were to examine the relationship between emotional literacy, and general health and quality of life. It also attempted to study the role of emotional literacy in health and quality of life, with the view to suggesting possible organisational development (OD) interventions for enhancing emotional literacy and increasing human health at the work place. The following hypotheses were made:

- Emotional literacy is correlated to health and quality of life. In other words, mangers who are emotionally better literate will perceive good health and better quality of life.

Emotional literacy is correlated to health and quality of life.

- General health status is positively correlated with quality of life.
- Background variables positively influence emotional literacy skills.

Methodology of Study

65 managers were randomly selected from Indian IT industries. The investigators used a number of reliable measures to manipulate the predictor variables and observe the dependent variables. Emotional literacy was treated as an independent measure while general health status and quality of life were studied as dependent variables. All the background factors (age, education, experience, rank, and income) were treated as independent variables in the present study.

The following psychometric tools were employed for the present study:

Emotional Literacy Scale: Emotional literacy was measured with the help of 3 sub-scales (Emotional Self-Awareness, Emotional Expression and Emotional Awareness of Others). Emotional self-awareness (ESA) [Cooper's (1998)] was measured on a 11-item questionnaire (e.g. "I can name my feelings", reliability coefficient = .89); Emotional-Expression (EE) (9-items). For example, I express my emotions even when they are negative, (reliability coefficient = .78); and Emotional Awareness of Others (EAO) by administering a 13-item questionnaire. All were rated on a 4 point scale of 0-not at all to 3-very well. Higher scores on these scales denote better emotion handling.

General health Questionnaire: Managers' general health was assessed through their perceptions/reactions to physical symptoms (i.e. migraines, back pain, smoking, criticizing, blaming others) and the emotional symptom (10-items) such as feeling low, trouble in concentrating etc. The scale items were rated on a 4-point scale ranging from 0-Never to 3-Nearly every day. The reliability coefficient of the scale was found to be .88. A lower score on this scale indicates better health.

Quality of Life Scale: The third parameter of the study was quality of life. It was measured by administering a 11-item questionnaire (e.g. I an deeply satisfied with my life), answered on a 4-point rating scale of 3-very well to 0-not at all. The reliability of the scale was found to be .79. Higher score on this scale indicates better quality of life.

The data collected through the questionnaire was classified into four categories such as optimum, proficient, vulnerable and cautionary, then frequencies were calculated for each scale. The empirical data was treated with percentage and correlation statistics.

Results

Percentage of the frequencies for emotional literacy, quality of life and general health are presented in Table 1 for the overall sample. Only 32.2 per cent have optimum level of emotional self-awareness, 44.6 per cent are at the proficient level, about 20 per cent are vulnerable and 4.6 per cent belong to cautionary category. On emotional expression dimension, 38.4 per cent of the total sample was found to be optimum, 38.4 per cent proficient, 21.5 per cent vulnerable and 3.1 per cent cautionary. On the scale of "emotional self-aware-

Table 1: Percentage of frequencies on Emotional Literacy, Quality of Life and General Health (N = 65).

Variables		Categories of responses			
		Optimum	Proficient	Vulnerable	Cautionary
A. Emotional Literacy	ESA	32.3%	44.6%	20.0%	4.6%
	EE	38.4%	38.4%	21.5%	3.10%
	EAO	52.3%	35.4%	12.3%	0.00%
B. Quality of life		47.7%	33.8%	15.4%	4.6%
C. General Health		30.7%	33.8%	21.5%	15.4%

ESA - Emotional Self Awareness
EE - Emotional Expression
EAO - Emotional Awareness of Others

ness of others", 52.3 per cent were found to be optimum, 35.4 per cent proficient, and 12.3 per cent vulnerable.

With regard to quality of life measure, it was observed that 47.7 per cent managers were at the optimum level, 33.8 per cent proficient, 21.5 per cent were vulnerable and 15.4 per cent were at cautionary level.

Results in Table 2 show the correlation between background variables (age, education, experience, income and rank) and dimensions of emotional literacy. It shows a significant correlation between experience and emotional self-awareness at .05 level. There also exists a positively significant correlation between rank and emotional self-awareness. The overall relationship between the background variables and emotional literacy is found be positive. This indicates that emotional literacy is influenced by the demographic/background variables of the manager.

Emotional literacy is influenced by the demographic/background variables of the manager.

Table 2: Correlation between background variables and emotional literacy (N = 65).

Background Variables	Emotional Literacy		
	Emotional Self Awareness	Emotional Expression	Emotional Awareness of Others
Age	.171	.130	.09
Education	–.018	.000	–.051
Experience	.284*	.044	.165
Income	.052	.027	.051
Rank	.299*	.131	.183

*Correlation significant at .05 level.

Table 3: Inter-relation between Quality of Life, General Health and Emotional Literacy (N = 65).

Variables		Quality of Life	General Health
Emotional Literacy	ESA	.449**	–.264*
	EE	.150	–.138
	EAO	.385**	–.096

*Correlation significant at .05 level
**Correlation significant at .01 level.

Table 3 shows the inter-relation between emotional literacy, quality of life and general health status of the manager. The correlation between emotional self-awareness and quality of life is positive and statistically significant at .01 level. Similarly, the correlation between general health and emotional self- awareness is significant at .05 level. Emotional expression is positively related to quality of life and general health. Quality of life is positively correlated with emotional literacy. This shows that emotional literacy positively influences quality of life and general health.

Table 4 shows the correlation between background variables, quality of life and general health. Though most of the correlations are positive, no significant correlation was found between background variables and quality of life and general health. This may be because of the small sample size. Table 5 shows the correlation between the two. In other words managers who have better perception of health perceived better quality of life.

Table 4: Correlation between background variables, and quality of life & general health (N = 65).

Variables	Quality of Life	General Health
Age	.040	–.006
Education	.077	–0.11
Experience	.194	.043
Income	.045	.009
Rank	.126	–.077

Table 5: Correlation between quality of life and general health (N = 65).

Variables	General health
Quality of Life	–.530**

**Correlation Significant at .01 level

Discussion & Conclusion

The overall findings of the study support the proposed hypothesis.

Hypothesis - 1 states that emotional literacy is positively correlated with manager's health status and perceived quality of life. The results of the study revealed that managers who were better in their emotional literacy skill were also found to have better perception of life. The correlation among these three was found to be positive and statistically significant. Therefore, the hypothesis is accepted in favour of the study. It could be concluded that emotional literacy influences both health and quality of life.

Hypothesis - 2 states that general health is correlated with quality of life. Results indicated that there ex-

ists a positively significant relationship between general health and quality of life. The results are in the expected direction. Both percentage table and correlation table provide supportive evidence to accept the hypothesis. Thus, it could be concluded that general health status has a positive impact on quality of life.

Hypothesis - 3 states that background variables influence emotional literacy positively. Some findings of the study reflected that background variables do influence or have an impact on emotional literacy skills. The correlation between background variable and emotional literacy was found to be significant. Managers with higher experience and higher ranks were found to have high emotional literacy. Thus managers should get exposed to diverse situations that can be instrumental in making them emotionally sound and empathetically strong.

The overall findings of the study indicated that emotional literacy plays an important role in determining managerial health and quality of life perception. Mostly research on health related issues are concerned with examination of quality of life. The present study was carried out in similar direction to identify some new dimensions of managerial health in Indian organisations. In the light of empirical findings, it could be concluded that measures should be taken to identify the core components of emotional literacy to improve managerial skills, to offer more support for work related problems, to allow managers to participate more in the organisation.

Implications of the Study

The study of emotional literacy has wide ranging implication for researchers, health practitioners and HRD professionals in maintaining efficiency and effectiveness of individuals as well as the organisation. Prior research shows that emotional competencies do affect managerial efficiencies and leadership effectiveness (Goleman, 1995, 2000; Cooper, 1997) and emotional self-awareness improves performance and induces work motivation (Cooper, 1997, Harrison, 1997, Goldsmith & Beckhard, 1996; Morris & Feldman, 1996; and Sosik and Megerian, 1999). Work motivation can be induced through developing employees' emotional self-awareness. Future research in this direction can explore several indicators of emotional health for enhancing individual health and increasing corporate health and effectiveness. Health and quality of life are two main correlates of psychological well-being. If it is maintained, the performance of employee can be improved. Many workshops, seminars, surveys along with empirical researches in Indian organisations have made it clear that organisations need to nurture an emotional climate to keep employees viable and vibrant. The present study implies that organisations in India need to train managers to develop their emotional literacy skills. Further studies can be designed to explore more on organisational variables that affect employee health and fitness, such as work environment, organisational climate and work culture.

Work motivation can be induced through developing employees' emotional self-awareness.

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□

If you say what you think, don't expect to hear only what you like.

– Malcolm Forbes

Feature

Operating Effectiveness in Work Settings: The Case of Railway Officers

Ashima Singh & S.M. Khan

This article discusses the results of a psychological intervention programme carried out on 90 Probationary railway officers at Railway Staff College, Vadodra and on a group of 27 Sr. railway officers from a training programme at IRITM, Lucknow. The main aim was to assess the impact of primary motivators (achievement, influence, control, dependence, extension and affiliation) on railway officers' behaviour in organisational settings. The inter-group and inter-departmental motivational profiles were also studied.

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The Indian Railway is a vast network, the second largest in the world under single management. To manage this vast network, 14,600 (Gp. A & B as on 31.03.2000) officers making up 0.92 per cent of the total strength are executing the various activities at different operational positions. It has been the constant endeavour of the railway management to pass on the benefits of improved performance to the people and to the national economy.

Pareek (1987) identifies six primary needs or motives, relevant for understanding the behaviour of people in organisations. These are achievement, influence, control, extension, dependence and affiliation. Murray (1938) developed a long list of human motives or needs. Litwin and Stringer (1968) used the three motives of achievement, affiliation and power in their study of organisational climates and found these motives useful for the study of organisational behaviour. McGregor (1966) recognised the positive value of dependence in management. Pandey (1998) found affiliation and dependence to be the dominant motives, influence and extension as back-up motives and achievement and control to be the dormant motives while studying the motivational needs of rail engine drivers. However, each of these motives can have two dimensions: approach and avoidance. Atkinson (1953) first suggested the concept of avoidance behaviour in discussing the achievement motive. It was further elaborated by several authors (Birnery & Burdick, 1969; Heekhaunsen, 1967) and "fear of failure" emerged as an important component of the achievement motive, distinct from "hope

Six primary needs or motives, relevant for understanding the behaviour of people in organisations are achievement, influence, control, extension, dependence and affiliation.

of success", the other component. Verga (1977) showed that hope of success vs. fear of failure (approach vs avoidance) was the most important intervening variable in explaining who benefited from achievement programmes as measured by an increase in entrepreneurial activity.

The Study

The present study was undertaken to prepare a diagnostics of the psychodynamics (secondary needs) of the railways' probationer officers and to offer suggestions to the railway administration to develop appropriate organisational and individual strategies so that officers are motivated to provide dynamic leadership and Indian Railway may meet its objectives of safe, secure, punctual and reliable service to the people. The railway needs leadership, which can develop the feeling of teamwork, and can lead the organisation to progress. Operational definitions of six primary motives are as follows.

Achievement, characterized by concern for excellence, competition with the standards of excellence set by others or by oneself, the setting of challenging goals for oneself, awareness of the hurdles in the way of achieving those goals, and persistence in trying alternative paths to one's goals.

Influence, characterized by a concern with making an impact on others, a desire to make people do what one thinks is right, and an urge to change matters and (develop) people.

Control, characterized by a concern for orderliness, a desire to be and stay informed, and an urge to monitor and take corrective action when needed.

Dependence, characterized by a desire for the help of others in one's own self-development, checking with significant others (those who are more knowledgeable or have higher status, experts, close associates, etc.) submitting ideas or proposals for approval, having an urge to maintain an approval relationship.

Extension, characterized by concern for others, interest in superordinate goals, and an urge to be relevant and useful to larger groups, including society.

Affiliation, characterized by a concern for establishing and maintaining close, personal relationships, a value on friendship, and a tendency to express one's emotions.

The behaviour of officers can be understood and explained in the light of these six motives, but it can be more relevant, for our purpose, if it is studied from the perspective of approach (positive) and avoidance (negative), reflected in terms of hopes of success and fear of failure. Therefore, in order to understand psychodynamics of the job-behaviour of officers it will be more relevant to look at the positive and negative aspects of each motive. To deal with the positive and negative orientations, Pareek (1987) has evolved a procedure for calculating Operating Effectiveness Quotient (OEQ). Existence of differences in OEQs for different motives along levels of management as also along age groups has been reported (Sen, 1982). OEQ is recommended (Pareek, 1987) as a viable strategy for bringing about a change in behaviour of employees if they are asked to score their response and calculate their OEQ for different motives in an intervention of learning by experience.

Behaviour can be more relevant, if studied from the perspective of approach (positive) and avoidance (negative), reflected in terms of hopes of success and fear of failure.

The intervention was carried out on railway probationary officers at Railway Staff College, Vadodra. A group of 90 officers participated in the programme. All of them were young with the average age of 27 years. It was a mixed group of different allied services of Indian Railways. The utmost average age of 28 years was of IRSS officers and minimum 25 years was in case of IRTS officers in the sample. The educational qualification of officers varied from Graduation to Master of Philosophy level. It is interesting, but may be surprising that majority of the officers in the sample i.e. 92.00 per cent were engineers. IRTS, IRPS and IRPF are non-engineering services, but out of 19, 14 were engineers. The same tool was administered on 27 Sr. Rly. Officers participating in the training programmes at Indian Railways Institute for Transport Management (IRITM), Lucknow. The age of the Sr. Officers varied from 32 to 56 years with average age of 41 years. The experience varied from 10 to 29 years with average experience of 26 years of railway services in the capacity of Jr. Administrative Grade/Sr. Administrative Grade (CCM, CPTM, CPO, CE/G, CWE, ED, Dy. COM, DY. CRS, Principal/ZTC, Director, DSO/Sr. DSO). The officers were from NER, SR, WR, NFR, CR, ER, SER, and RDSO.

The HRD instrument used in this study was MAO-B (Motivational Analysis of Organisational Behaviour developed by Prof. Pareek in 1987 and published in

1997. It contained sixty items, five for each of the six motives, mentioned earlier. The instrument is meant to provide a profile of motivational aspects of role behaviour, and there are no right or wrong answers. The results of the instrument are helpful to individuals and the group to plan for increased effectiveness in their roles. A respondent can examine his or her scores and then plan to reduce the avoidance behaviour of a motive for which he or she received low OEQ score. The test-retest reliability coefficients for the six dimensions of role behaviour varied from 0.45 to 0.68 significant at 0.001 level (Pareek, 1987). The relationship between effective role behaviour as reflected by the Operating Effectiveness Quotient (OEQ) and some personality variables was studied in 500 bank employees of large multi-location firms. The level of significance of the correlations varied from 0.040 to 0.001.

Methodology

A psychological intervention to make a probe into the psychodynamics of the job behaviour of railway officers was designed through Delphi technique i.e. by consulting experts and Executive Directors of Traffic and Psycho-Technology of RDSO. Senior Professor (OB) of RSC, Vadodra has also been a key executive in planning and success of this intervention programme. The intervention consisted of three sessions, the first of which was an ice breaking session of one-hour duration. In this a slide show titled "Psycho-Technology in Indian Railways" was presented by Executive Director/Traffic and rapport was established with the participants and confidentiality assured.

The second session of the intervention was devoted to the administration of a HRD tool MAO-B (Motivational Analysis of Organisational Behaviour) by a professional psychologist. The third session consisted of scoring of responses, conversion of raw scores into approach/avoidance and OEQ scores using computer program. The profiles in respect of each subject and cadre wise were prepared. The OEQ scores for all the six motives were sorted in descending order to identify dominant motives (highest scores of OEQ on the two motives), back up motives (OEQ scores at number three and four from top) and dormant motives (OEQ scores at number five and six from top or lowest two scores).

Result & Discussion

The descriptive statistics in respect of Operating Effectiveness Quotient (OEQ) for all six motives separately for Probationary Rly. Officers and for Sr. Rly. Officers were calculated to determine the centripetal tendency of the primary needs.

Table 1: Mean Operating Effectiveness Quotient Senior vs Probationary Railway Officers

Group	Motives					
	Achievement	Influence	Control	Dependence	Extension	Affiliation
1. Sr. Rly. Officers	73	65	56	70	62	61
2. Prob. Rly. Officers	66	62	56	61	60	59
a) IRTS	76	60	59	67	63	61
b) IRPS	61	66	62	60	57	56
c) IRSS	65	71	60	67	62	66
d) IRSE	64	60	55	59	59	58
e) IRPF	57	57	52	55	55	57
f) IRS&TS	73	63	57	63	61	59

The psychodynamics i.e. motivational pattern of the organisational behaviour of the 90 Probationary Railway Officers was compared with the sample of 27 Sr. Rly. Officers in work setting (Fig. 1).

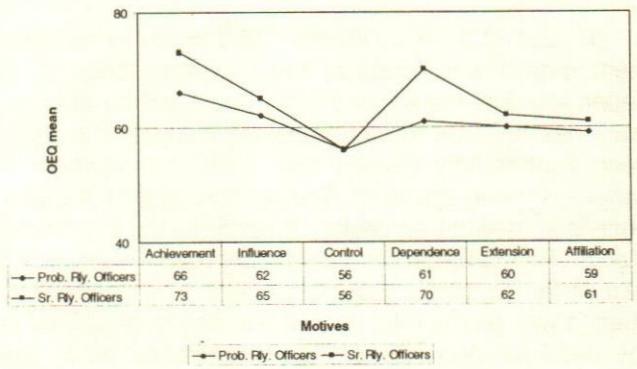

Fig. 1. Operating effectiveness profile of Senior vs Probationer railway officers

The mean profile of Probationary Railway Officers does not appear parallel to the profile of Sr. Railway Officers, which is obvious, due to higher role demands and enormous exposure of work. The OEQ mean values on five motives (achievement, influence, dependence, extension and affiliation) were high in case of Sr. Officers than Probationary Officers, whereas, it was same for control motive.

On sorting the OEQ in descending order, the need on achievement, extension, affiliation and control was on the first, fourth, fifth and sixth rank respectively for both groups. The hierarchy of needs shifted in case of influence and dependence motives. The need on influence and dependence were on the second and third

rank in case of Probationary Officers, whereas, it was upturned at the third and second rank in case of Sr. Officers. In totality the dominant motive for both the groups was achievement. The OEQ value on achievement motive in case of Sr. Officers was 73 per cent and for Probationary Officers it was 66 per cent. The OEQ on control motive for both the group was the same i.e. 56 per cent.

The OEQ mean for achievement motive was found at the first rank followed by influence at the second rank in case of Probationary Rly. Officers. The results do not seem surprising because the subjects were young graduates/engineers, they have enthusiasm for excellence, competition with the standard of excellence set by others or by self, setting of challenging goals by self and persistence in trying alternative paths to one's goals. In other words, the dominant achievement oriented need is natural in railway officers, because they have to set challenging goals. The dominance of influence motive in officers was equally important, because, to implement any programme effectively, the key element in the personality of an officer is leadership. It is the inner urge/need for making impact and a desire to make sub-ordinates do what one thinks is right and to change matters and care for people.

In case of Sr. Rly. Officers, OEQ mean for achievement motive was found at the first rank followed by dependence at the second rank. The need for achievement has become more compelling because they have been successfully dealing with crisis management at various working positions. The second rank on dependence is somewhat surprising. It confirms the hypothesis that Sr. Rly. Officers become simply railwaymen after a gap of ten to fifteen years of service. The need for influence was on the third rank. It has also been shifted as the need for dependence has prominence on it. This shift does not seem encouraging because a desire to make sub-ordinates do what one thinks is right, and an urge to change matters and (develop) people decreases. This shows that autocratic form of leadership is still prevalent and higher officers do not want to be liberal or democratic.

In case of Sr. Rly. Officers, OEQ mean for achievement motive was found at the first rank.

The OEQ mean for dependence motive was found at the third rank followed by extension at the fourth rank in case of Probationary Officers. The results are not astonishing as for as the motivational needs of these officers are concerned, as they are probationers and are not familiar with the various job conditions. Hence, their efficiency mainly depends on the co-operation extended by seniors and sub-ordinates. They have the desire for help of others in self-development, checking with significant others (those who are more knowledgeable or with higher status, experts and close associates). As far as the extension motive is concerned, the officers understand utility of their service to the society and to the economy of the nation. The extension motive also includes concern for the help of others, interest in superordinate goals and an urge to be relevant and useful to the society at large.

In case of Sr. Rly. Officers, influence and extension emerged at third and fourth rank. It is obvious, as the officer gains familiarity with the job, his concern for making an impact on others, a desire to make people do what one thinks is right, and an urge to change matters increases moderately.

The OEQ mean for affiliation motive was found at the fifth rank followed by control at the sixth rank in case of both groups. These two motives are dormant (sleeping) motives as far as the behaviour of officers in the work setting is concerned. The motives of affiliation and control are required to be strengthened by adoption of appropriate HRD techniques. Affiliation is the need for establishing and maintaining close, personal relationship, a value on friendship and a tendency to express one's emotions. It is self explanatory that the officers were probationers and hence, they do not know much about the pros and cons of the need of affiliation in organisational settings. As regard control need, (which has been assigned the sixth rank) it is also self-explanatory as the sample is of the probationary officers. The low value of OEQ indicates low level of orderliness, a desire to be and stay informed and an urge to monitor performance and take corrective actions.

Surprisingly, there is no change in the hierarchy of motivational needs for affiliation and control in Probationer & Sr. Rly. Officers. There is an urgent need to look into why the affiliation and control needs remain unaltered. Whereas, on one side the services of officers pertain to public dealings and they are expected to monitor the performance of thousands of sub-ordinates and take corrective action, on the other side with the affiliation and control being dormant, they would not be able to perform these tasks effectively.

In nutshell, achievement was the dominant motive for IRTS, IRSE, IRPF and IRS&TS officers. Influence was dominant motive in case of IRPS and IRSS officers. Control was the dormant motive in case of IRTS, IRSS,

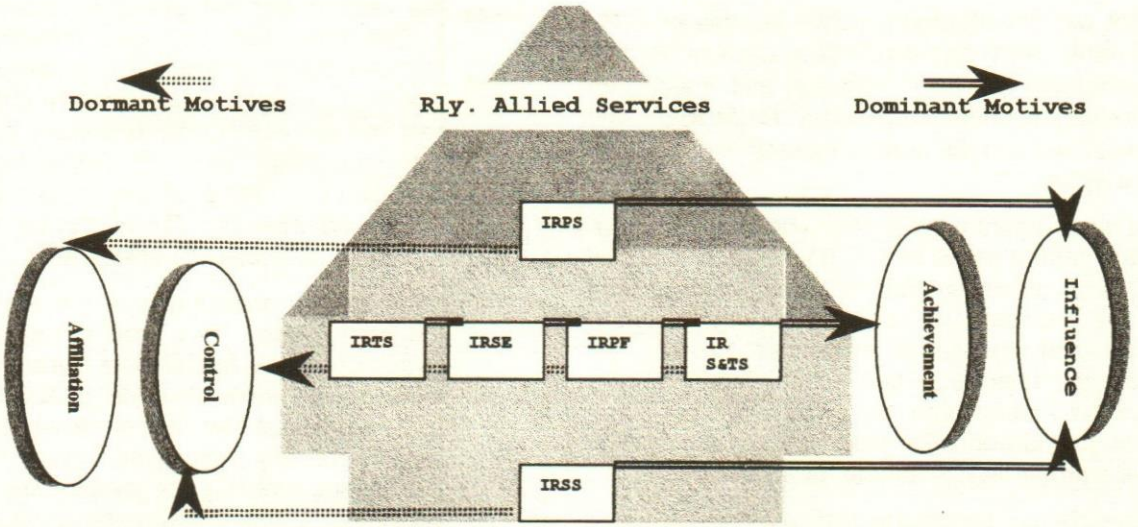

Fig. 2. Summative assessment of the organisational needs of probationer officers in different categories of railway services

IRSE, IRPF and IRS&TS. In case of IRPS, it was affiliation motive. It indicates that majority of officers were lacking on orderliness and a desire to be and stay informed and an urge to monitor and take corrective action. Dependence and extension were neither dominant nor dormant in case of any cadre.

Conclusions

In summing up:

- The needs for achievement and influence have been found as dominant motives in probationary railway officers. Undoubtedly, in the age of transfer of technology, there is an urgent need for officers to set challenging goals for subordinates and show confidence in attaining these goals by performing well. To implement any programme effectively, the dominant need of influence is also very important which helps the officers/managers make subordinates do what they think is right and to change matters and develop people.
- The needs for dependence and extension have been found as back-up motives in probationary railway officers. Undeniably, being probationers, they are not familiar with various work settings in the organisation. Hence, their efficiency mainly depends to a great extent on the co-operation extended by seniors and subordinates. They have an urge to maintain an approval relationship. They know that they are going to be an important part of the railway family of 16 lakh employees and their services shall be of benefit to the society and to the economy of nation.
- The needs for control and affiliation have been found as dormant motives in probationary railway officers. The low OEQ value on these motives indicates that they lack orderliness and an urge to monitor and take corrective action when needed; and their effectiveness in establishing close, personal relationships and concern for others, interest in superordinate goals and an urge to be relevant and useful to larger group was also low.
- The operating effectiveness quotient on all six primary motivators for probationary officers was not comparatively high.
- The needs for achievement, influence and extension promote effective performance and dependence, affiliation and control reduce chances of effectiveness. Our result seems to be similar to the results of professor Pareek's (1987) study conducted on bank employees.
- The OEQ mean values on five motives (achievement, influence, dependence, extension and affiliation) were high in case of Sr. Rly. Officers in comparison to Probationary Officers, whereas, it was same on control motive.
- Achievement was the dominant motive for IRTS, IRSE, IRPF and IRS&TS officers. Influence was

The needs for achievement and influence have been found as dominant motives.

dominant motive in case of IRPS and IRSS officers.

- Control was the dormant motive in case of IRTS, IRSS, IRSE, IRPF and IRS&TS. In case of IRPS, it was affiliation motive. It indicates that majority of officers lack in orderliness and a desire to be and stay informed and the urge to monitor and take corrective action.
- There is an urgent need to look into why the affiliation and control needs remain unaltered, though the services of officers pertain to public dealings and they are expected to have the strong desire to monitor performance of thousands of sub- ordinates and take correction action. This might be one of the reasons why the officers are not being able to provide effective leadership to the staff. It shows a rather selfish attitude for achievement.
- On considering the perspective of approach (positive) or avoidance (negative) reflected by hope or fear, the scores for all the motives on approach dimension were high. It indicates that the officers have positive approach or 'hope of success' on all motives, which is a healthy symptom for growth and continued existence of an organisation.

The officers have positive approach or 'hope of success' on all motives, a healthy symptom for growth and continued existence of an organisation.

- In summing up, the study shows certain positive trends:
  - The dominance of achievement and influence need in the Probationary Rly. Officers shows that, they are highly geared up to accept the challenging tasks of the Indian Railways and have the competence to make subordinates do what is right and to change matters and develop people.
  - The Operating Effectiveness Quotient (OEQ) for five needs were high in case of Sr. Rly. Officers in contrast to Probationary Rly. Officers and was the same for control need.
- Intervention are however required on the following:
  - In case of Sr. Rly. Officers the need for influence was in the third rank. This swing took place as the need for dependence has prominence over it. The move does not seem encouraging because a desire to make subordinates do what one thinks is right, and an urge to change matters and develop people decreases. This shows that autocratic form of leadership is still prevalent and higher officers do not want to be liberal or democratic. This aspect has to be corrected by suitable HRD intervention.
  - The need for control was at the sixth rank for the both groups. This need is required to be strengthened by adoption of appropriate HRD techniques. The lowest value of OEQ on control motive indicates low level of orderliness and an urge to monitor performance and take corrective actions, which is not good for any organisation.
  - Operating Effectiveness Quotient (OEQ) is recommended as a viable strategy for bringing about a change in behaviour of employees/officers in organisational settings. The railways can use this technique in their regular training/intervention programmes for developing strategies for individual growth.

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Feature

Inventory Control Function in Sugar Cooperatives

Umesh M. Deshmukh

Inventory constitutes the largest component of the current assets of organisations. A stock-out, that is, the inability to supply an item from inventory, could bring the production process to a halt, which is an unpleasant situation; conversely, the added carrying cost may represent the difference between profit and loss for the organisation. The Paper presents the findings of an investigation that began with the main objective of evaluating the effectiveness of the inventory control function in the sugar cooperatives in Kolhapur District in Western Maharashtra.

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In manufacturing organisations, the term 'inventory' is generally applied to physical resources such as raw materials, process consumables, work-in-process, spare-parts and other indirect materials as also the finished products. A typical characteristic of 'inventory' is that, although it is integral to the production process, it is an idle resource until its monetary realization in the market place. Inventory constitutes the largest component of the current assets of the organisation. Efficient inventory control, therefore, can significantly contribute to the overall profitability of the organisation. Hence, it is imperative that 'inventories' are controlled effectively.

An organisation procures, stores and carries inventory items for being available instantaneously when needed. The process itself is beset with numerous problems that are particularly intense in the Indian setting. It is only recently, especially after the World War-II, that concerted efforts on the risk and uncertainty aspects of inventory were made, which led to the development of analytical techniques for effective management of inventory and also to the evolution of a separate inventory control function. Inventory control function is defined in a narrower sense than inventory management and pertains primarily to the administration of established policies, systems and procedures (Aswathappa, 1996). In numerous manufacturing sectors, particularly the sugar cooperatives, there is an ample scope for improving the efficiency of the inventory control function.

An investigation was made with the main objective of evaluating the effectiveness of the inventory control function in the sugar cooperatives in Kolhapur District in Western Maharashtra.

Methodology

Out of the 12 cooperative sugar factories function-

ing in Kolhapur district, it was decided to take up a fifty per cent sample passing the selection criteria of (i) total funds exceeding Rs. 500 lakh, (ii) current assets exceeding Rs. 500 lakh, (iii) average value of inventory exceeding Rs. 100 lakh, and (iv) inventory volume exceeding 5000 items. But as all the 12 cooperatives passed the selection criteria, from an alphabetically arranged short-list of the cooperatives, the first six cooperatives that were willing to participate in the survey were taken up as sample. For fulfilling the objective of the study, relevant data extracted from the audited Balance-Sheets of the surveyed sugar cooperatives for the years 1989-90 to 1996-97 has been used.

All the surveyed sugar cooperatives were constituted under the Indian Cooperative Societies Act, 1912, and licensed jointly by the Directorate General of Technical Development (DGTD) in the Union Ministry of Industry of the Government of India, and the State Commissioner of Sugar of the Government of Maharashtra. About four-fifths of the cooperatives had their authorized share capital within the range of Rs. 201-600 lakh, capital investment of upto Rs. 10,000 lakh and the annual sales turnover of upto Rs. 10,000 lakh. The TCD (Tonnes Cane crushed per Day) of half the sugar cooperatives conformed to the currently prevailing industry standard of 5,000 m. tonnes with a healthy sugar recovery rate of 12.1-13 per cent, which among other things, was a result of their high capacity-utilization rate exceeding 76 per cent. The sugar cooperatives had forward linkages with other manufacturing units such as paper-plants, molasses-based chemical plants and distilleries, either as wholly owned subsidiaries or associates. The linkage arrangements with subsidiaries and associates were remarkably similar, with the linked units established either on the same campus or within the district for the sake of administrative convenience.

Results & Discussions

Sugar cooperatives consume just one raw material-sugarcane-for which the entire responsibility, from cultivation planning, harvesting, and transporting to the factory lies with the Cane Development Department. Hence, all subsequent references to the inventory of sugar cooperatives pertain only to the items such as process requisites, additives, maintenance components and stores, controlled by the Materials Management Department.

Table 1(A) shows the average value of the raw materials and production components inventory held by the surveyed cooperatives. The data presented in the table is self-explanatory. In the surveyed cooperatives, inventory items are purchased from outside suppliers. The size of this inventory varies from unit to unit, depending on factors such as internal lead time, supplier lead time, vendor relations, availability and the ruling price of the material, government policy, annual consumption and the relative criticality of materials. About half the cooperatives have consistently shown average raw materials and production components inventory values above Rs. 601 Lakh. It must, however, be noted that the surveyed cooperatives each have different crushing capacities and their average raw materials and production components inventory values would vary accordingly, which is clearly reflected in the table.

Also, being continuous process production units, sugar cooperatives typically procure the entire season's raw materials and production components inventory (excepting sugarcane) prior to the commencement of the season as a precaution against mid- season non-availability of a particular item. Furthermore, the remoteness of their location compel majority of the cooperatives to keep well stocked, both their in-season and off-season, maintenance spares and parts inventories throughout the year (some sugar factories going to the length of carrying one complete unassembled sugar-mill, as a standard inventory item). Evidently, sugar cooperatives, by sheer force of circumstances and tradition, carry huge raw materials and production components inventories.

Sugar cooperatives carry huge raw materials and production components inventories.

Table 1(B) shows the average value of work-in-progress inventory. Sugar factories seasonally operate continuous process production units; hence, the size of work-in-progress inventory varies from unit to unit, depending on production cycle time, percentage of capacity utilization, make/buy policy. The Materials Department-controlled raw materials and production components (requisites and additives) contribute a very minor portion to sugar manufacture. Hence, for majority of cooperatives, work-in-progress inventory has remained only upto Rs. 200 lakh throughout. In 1993-94, one sugar cooperative, however, diversified into paper-making (a stage production operation), using bagasse as raw stock and needing an entirely different set of requisites and additives. Hence, its work-in-progress inventory has shown a rising trend in the latter years. Taken together, it may be inferred that all the sugar cooperatives' work-in-progress inventory has remained stable at upto Rs. 200 lakh level.

Table 1(C) shows the average value of finished

Table 1: Average Value of Production Components, Work-in-Process, & Finished Products Inventory (1989-90 to 1996-97)

Sr. No.	Average Value	Year 1989-90		Year 1990-91		Year 1991-92		Year 1992-93		Year 1993-94		Year 1994-95		Year 1995-96		Year 1996-97	
		No.	%-age	No.	%-age	No.	%-age	No.	%-age	No.	%-age	No.	%-age	No.	%-age	No.	%-age
(A)	**Average Value of the Production Components Inventory**																
1.	Upto Rs. 200 Lakh	1	16.7	1	16.7	1	16.7	1	16.7	1	16.7	–	–	–	–	–	–
2.	Rs. 201-400 Lakh	1	16.7	1	16.7	2	33.3	–	–	1	16.7	1	16.7	1	16.7	1	16.7
3.	Rs. 401-600 Lakh	1	16.7	1	16.7	–	–	1	16.7	2	33.3	1	16.7	1	16.7	1	16.7
4.	Rs. 601-800 Lakh	3	50.0	3	50.0	3	50.0	2	33.3	–	–	2	33.3	1	16.7	1	16.7
5.	Rs. 801-1000 Lakh	–	–	–	–	–	–	2	33.3	2	33.3	2	33.3	3	50.0	3	50.0
6.	Rs. 1001-1200 Lakh	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
7.	Above Rs. 1201 Lakh	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
(B)	**Average Value of the Work-in-Process Inventory**																
1.	Upto Rs. 200 Lakh	6	100.0	6	100.0	6	100.0	6	100.0	5	83.3	5	83.3	5	83.3	5	83.3
2.	Rs. 201-400 Lakh	–	–	–	–	–	–	–	–	1	16.7	1	16.7	–	–	–	–
3.	Rs. 401-600 Lakh	–	–	–	–	–	–	–	–	–	–	–	–	1	16.7	1	16.7
4.	Rs. 601-800 Lakh	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
5.	Rs. 801-1000 Lakh	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
6.	Rs. 1001-1200 Lakh	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
7.	Above Rs. 1201 Lakh	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
(C)	**Average Value of the Finished Products Inventory**																
1.	Upto Rs. 200 Lakh	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
2.	Rs. 201-400 Lakh	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
3.	Rs. 401-600 Lakh	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
4.	Rs. 601-800 Lakh	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
5.	Rs. 801-1000 Lakh	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
6.	Rs. 1001-1200 Lakh	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
7.	Above Rs. 1201 Lakh	6	100.0	6	100.0	6	100.0	6	100.0	6	100.0	6	100.0	6	100.0	6	100.0

products inventory. All the six sugar cooperatives produce exclusively to stock. The size of finished products inventory, therefore, varies from unit to unit depending on market factors, delivery capability, warehousing facilities and holding capacity in terms of finance. Against this background, it is seen that sugar cooperatives have consistently showed an average value of the finished products inventory above Rs. 1201 lakh, because their 40 per cent stocks are marked for levy purchase by the Government as per its convenience, while the remaining 60 per cent are free- sale stocks. Both the levy-sales and free-sales go on throughout the year, in bulk quantities of not less than 1000 quintals at a time. In addition, sugar factories, by regulation, carry stocks of molasses awaiting Excise Department's release orders to distilleries and industrial consumers. This work also goes on throughout the year. Some of the surveyed sugar factories also have their own distilleries using in-house production of process- alcohol, while some others have paper-mills using bagasse. The distilleries and paper-mills work throughout the year. Conversely, the stocks of sugar, molasses and bagasse reflect in the balance-sheets of the cooperatives. Taken together, it may be inferred that the sugar cooperatives, on account of statutory requirements, are compelled to maintain finished products inventory on the higher side.

The sugar cooperatives, on account of statutory requirements, are compelled to maintain finished products inventory on the higher side.

Table 2: Opening Stock, Purchases, Consumption Closing Stock and Average Value of Total Inventory (1989-90 to 1996-97)

Sr. No.	Average Value	Year 1989-90		Year 1990-91		Year 1991-92		Year 1992-93		Year 1993-94		Year 1994-95		Year 1995-96		Year 1996-97	
		No.	%-age	No.	%-age	No.	%-age	No.	%-age	No.	%-age	No.	%-age	No.	%-age	No.	%-age
(A)	**Opening Stock Value of Total Inventory**																
1.	Upto Rs. 1000 Lakh	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
2.	Rs. 1001-2000 Lakh	1	16.7	1	16.7	1	16.7	1	16.7	–	–	–	–	–	–	–	–
3.	Rs. 2001-3000 Lakh	2	33.3	2	33.3	2	33.3	2	33.3	1	16.7	1	16.7	1	16.7	1	16.7
4.	Rs. 3001-4000 Lakh	1	16.7	1	16.7	1	16.7	–	–	–	–	–	–	–	–	–	–
5.	Rs. 4001-5000 Lakh	2	33.3	2	33.3	2	33.3	2	33.3	3	50.0	–	–	–	–	–	–
6.	Rs. 5001-6000 Lakh	–	–	–	–	–	–	1	16.7	–	–	3	50.0	2	33.3	2	33.3
7.	Rs. 6001-7000 Lakh	–	–	–	–	–	–	–	–	2	33.3	2	33.3	2	33.3	1	16.7
8.	Rs. 7001-8000 Lakh	–	–	–	–	–	–	–	–	–	–	–	–	1	16.7	2	33.3
9.	Above Rs. 8001 Lakh	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
(B)	**Inventory Purchases**																
1.	Upto Rs. 1000 Lakh	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
2.	Rs. 1001-2000 Lakh	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
3.	Rs. 2001-3000 Lakh	2	33.3	1	16.7	1	16.7	1	16.7	–	–	–	–	–	–	–	–
4.	Rs. 3001-4000 Lakh	1	16.7	2	33.3	2	33.3	–	–	1	16.7	1	16.7	1	16.7	1	16.7
5.	Rs. 4001-5000 Lakh	–	–	–	–	–	–	1	16.7	–	–	–	–	–	–	–	–
6.	Rs. 5001-6000 Lakh	2	33.3	2	33.3	2	33.3	2	33.3	2	33.3	–	–	–	–	–	–
7.	Rs. 6001-7000 Lakh	1	16.7	1	16.7	1	16.7	2	33.3	1	16.7	2	33.3	1	16.7	1	16.7
8.	Rs. 7001-8000 Lakh	–	–	–	–	–	–	–	–	2	33.3	3	50.0	3	50.0	3	50.0
9.	Above Rs. 8001 Lakh	–	–	–	–	–	–	–	–	–	–	–	–	1	16.7	1	16.7
(C)	**Inventory Consumption**																
1.	Upto Rs. 1000 Lakh	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
2.	Rs. 1001-2000 Lakh	1	16.7	1	16.7	1	16.7	–	–	–	–	–	–	–	–	–	–
3.	Rs. 2001-3000 Lakh	1	16.7	1	16.7	1	16.7	1	16.7	1	16.7	–	–	–	–	–	–
4.	Rs. 3001-4000 Lakh	1	16.7	1	16.7	1	16.7	2	33.3	–	–	1	16.7	1	16.7	1	16.7
5.	Rs. 4001-5000 Lakh	2	33.3	2	33.3	2	33.3	–	–	–	–	–	–	–	–	–	–
6.	Rs. 5001-6000 Lakh	1	16.7	1	16.7	1	16.7	2	33.3	3	50.0	2	33.3	–	–	–	–
7.	Rs. 6001-7000 Lakh	–	–	–	–	–	–	1	16.7	2	33.3	1	16.7	3	50.0	3	50.0
8.	Rs. 7001-8000 Lakh	–	–	–	–	–	–	–	–	–	–	2	33.3	2	33.3	2	33.3
9.	Above Rs. 8001 Lakh	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
(D)	**Closing Stock Value of Total Inventory**																
1.	Upto Rs. 1000 Lakh	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
2.	Rs. 1001-2000 Lakh	1	16.7	1	16.7	1	16.7	–	–	–	–	–	–	–	–	–	–
3.	Rs. 2001-3000 Lakh	2	33.3	2	33.3	2	33.3	1	16.7	1	16.7	1	16.7	1	16.7	1	16.7
4.	Rs. 3001-4000 Lakh	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
5.	Rs. 4001-5000 Lakh	2	33.3	2	33.3	2	33.3	3	50.0	–	–	–	–	–	–	–	–
6.	Rs. 5001-6000 Lakh	1	16.7	1	16.7	1	16.7	–	–	3	50.0	2	33.3	1	16.7	–	–
7.	Rs. 6001-7000 Lakh	–	–	–	–	–	–	2	33.3	2	33.3	2	33.3	2	33.3	2	33.3
8.	Rs. 7001-8000 Lakh	–	–	–	–	–	–	–	–	–	–	1	16.7	2	33.3	3	50.0
9.	Above Rs. 8001 Lakh	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
(E)	**Average Value of the Total Inventory**																
1.	Upto Rs. 200 Lakh	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
2.	Rs. 201-400 Lakh	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
3.	Rs. 401-600 Lakh	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
4.	Rs. 601-800 Lakh	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
5.	Rs. 801-1000 Lakh	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
6.	Rs. 1001-1200 Lakh	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
7.	Above Rs. 1201 Lakh	6	100.0	6	100.0	6	100.0	6	100.0	6	100.0	6	100.0	6	100.0	6	100.0

Table 2(A) shows the details of the opening stock value of the total inventory, which includes the sum total values of raw materials and production components, work-in-progress and finished goods inventories as on the first day of the financial year. These values, beginning from Rs. 1001-2000 lakh have shown a consistent increase to Rs. 8000 lakh – one likely reason being purchases exceeding consumption during the period. the inference is that the opening stock values of the total inventory have tended to rise gradually, for industry specific causes and reasons.

Table 2(B) shows the details of the value of inventory purchases, which include purchases of raw materials and production components, requisites and additives, (excluding sugarcane purchases). Also, the statistics may be considered against the background of the generally rising industrial products price index during the period, and the tendency among the large industrial consumers, in a volatile market, to buy somewhat in excess of the requirement, as a buffer against future price shocks. The value of materials purchases for a majority of the sugar cooperatives shows a consistent rise – beginning with Rs. 2001-3000 lakh and reaching upto Rs. 9000 lakh, the reason being longer crushing reason (normal being 180 days but sometimes, extending upto 220-240 days in a year) forced on these factories by excess cane supply from their jurisdictional area. The inference is that, generally, the value of materials purchases has remained in the higher ranges.

Table 2(C) shows the details of the value of inventory consumption, which show a gradual increase from Rs. 1001 lakh to Rs. 8000 lakh, the main reason being the elongation of the crushing season. The inference is similar to that of the preceding table that the material consumption values have remained in the higher ranges.

Table 2(D) shows the details of the closing stock value of total inventory. Like the opening stock value, 'Closing stock value of the total inventory' includes the sum total values of raw materials and production components, work-in-progress and finished goods inventories, as on the last day of the financial year. Naturally, the closing stock value of the preceding year is the opening stock value of the following year. The closing stock values of the total inventory, beginning from Rs. 1001-2000 lakh have shown a consistent increase to Rs. 8000 lakh – one likely reason being purchases exceeding consumption during the period. Evidently, these values have tended to rise gradually in majority of the sugar cooperatives, for industry specific causes and reasons.

Table 2(E) is a consolidation of the data presented in the preceding tables and presents average value of the total inventory held by the surveyed cooperatives.

The average value of the total inventory as shown in this table has been worked out by using the formula: (Opening Stock Value plus Closing Stock Value) divided by two. In this formula, both the opening stock and the closing stock values include the average values of raw materials and production components, work- in-progress and finished products inventories, which have already been presented separately in the preceding tables. It is seen that the higher average value of finished products inventory has commensurately raised the average value of their total inventory also, uniformly to above Rs. 1201 lakh. the inference is that the average value of the total inventory varies from unit-to-unit depending on the unit's TCD, production system, Government regulations, and a few other factors already discussed.

'Inventory Turnover Ratio' (ITR) means "the annual inventory consumption divided by the annual average value of inventory". There is no ideal value for ITR but it is generally presumed that its higher value signifies more efficient materials and inventory management. Table 3 is a working table for deriving the inventory turnover ratios for each of the sampled cooperative. The ratios have been worked out through dividing annual inventory consumption by the annual average value of inventory.

Inventory Turnover Ratio (ITR) means the annual inventory consumption divided by the annual average value of inventory.

Table 4 presents a summary of the inventory ratios of the sample cooperatives for the above period. The cooperatives have been arranged in a descending order of their respective inventory turnover ratio values. The cooperative-wise comments are as follows:

- ITR of cooperative S_1 has shown a declining trend. It has gone down from 1.76 in 1989-90 to 1.24 in 1996-97 together with minor fluctuations in between. The cooperative's average ITR for 8 years at 1.35 is higher than the industry average of 1.18.
- ITR of cooperative S_2 has shown a declining trend, going down from 1.55 in 1989-90 to 1.13 in 1996-97 together with minor fluctuations in between. The cooperative's average ITR for 8 years at 1.26 is higher than the industry average of 1.18.

Table 3: Inventory Turnover Ratios of the sampled Sugar Units in the years 1989-90 to 1996-97

Particulars	Year 1989-90	Year 1990-91	Year 1991-92	Year 1992-93	Year 1993-94	Year 1994-95	Year 1995-96	Year 1996-97
	Rs. in Lakh	Rs. in Lakh	Rs. in Lakh	Rs. in Lakh	Rs. in Lakh	Rs. in Lakh	Rs. in Lakh	Rs. in Lakh
Sugar Unit S_1								
Inventory Consumption	2165.97	2277.21	1967.61	1396.45	2901.19	3319.26	3499.37	3518.64
Average Inventory	1226.99	1237.22	1383.20	1834.57	2305.11	2595.24	2731.24	2833.32
Turnover Ratio	1.76	1.84	1.42	0.76	1.25	1.27	1.28	1.24
Sugar Unit S_2								
Inventory Consumption	3719.62	3516.94	3181.67	3409.25	5046.76	5892.82	6711.71	7264.86
Average Inventory	2395.91	2357.14	2552.78	3482.32	4639.63	5467.56	4121.32	6406.12
Turnover Ratio	1.55	1.49	1.24	0.97	1.08	1.07	1.62	1.13
Sugar Unit S_3								
Inventory Consumption	3268.16	3452.43	2893.04	3617.27	5387.82	5991.48	6352.54	6476.32
Average Inventory	2202.59	2224.70	2628.03	3887.64	4980.46	5348.02	5720.58	6083.96
Turnover Ratio	1.48	1.55	1.10	0.93	1.08	1.12	1.11	1.06
Sugar Unit S_4								
Inventory Consumption	5221.46	5458.34	4929.24	5428.19	5802.57	6794.47	6992.20	7026.79
Average Inventory	4217.45	4259.66	4410.84	4771.60	5424.29	6086.84	6492.43	7010.15
Turnover Ratio	1.21	1.28	1.11	1.13	1.06	1.11	1.07	1.00
Sugar Unit S_5								
Inventory Consumption	5741.93	6272.31	5887.63	6120.11	6919.81	7188.38	7603.65	7635.18
Average Inventory	4815.82	4892.33	5123.46	5752.73	6297.30	6650.54	7004.67	7272.76
Turnover Ratio	1.19	1.28	1.14	1.06	1.09	1.08	1.08	1.04
Sugar Unit S_6								
Inventory Consumption	4746.39	4925.34	4509.15	5402.22	6998.12	7215.95	7809.28	8056.25
Average Inventory	3739.72	3859.37	4366.41	5612.71	6654.74	7063.78	7414.73	7830.33
Turnover Ratio	1.26	1.27	1.03	0.96	1.05	1.02	1.05	1.02

Table 4: Summary of Inventory Turnover Ratios of the sampled Sugar Units in the years 1989-90 to 1996-97

Units	Year 1989-90	Year 1990-91	Year 1991-92	Year 1992-93	Year 1993-94	Year 1994-95	Year 1995-96	Year 1996-97	8 Year Average
Sugar Unit S_1	1.76	1.84	1.42	0.76	1.25	1.27	1.28	1.24	1.35
Sugar Unit S_2	1.55	1.49	1.24	0.97	1.08	1.07	1.62	1.13	1.26
Sugar Unit S_3	1.48	1.55	1.10	0.93	1.08	1.12	1.11	1.06	1.17
Sugar Unit S_4	1.21	1.28	1.11	1.13	1.06	1.11	1.07	1.00	1.12
Sugar Unit S_5	1.19	1.28	1.14	1.06	1.09	1.08	1.08	1.04	1.12
Sugar Unit S_6	1.26	1.27	1.03	0.96	1.05	1.02	1.05	1.02	1.08
Industry Average	1.41	1.45	1.17	0.96	1.10	1.11	1.20	1.08	1.18

- ITR of cooperative S_3 also has shown a declining trend, going down from 1.48 in 1989-90 to 1.06 in 1996-97 together with minor fluctuations in between. The cooperative's average ITR for 8 years at 1.17 is very near the industry average of 1.18.
- ITR of cooperative S_4 also has shown a declining trend, going down from 1.21 in 1989-90 to 1.00 in 1996-97 together with minor fluctuations in between. The cooperative's average ITR for 8 years at 1.12 is lower than the industry average of 1.18.
- ITR of cooperative S_5 also has shown a declining trend, going down from 1.19 in 1989-90 to 1.04 in 1996-97 together with minor fluctuations in between. The cooperative's average ITR for 8 years at 1.12 is lower than the industry average of 1.18.

- ITR of cooperative S_6 also has shown a declining trend, going down from 1.26 in 1989-90 to 1.02 in 1996-97 together with minor fluctuations in between. The cooperative's average ITR for 8 years at 1.08 is lower than the industry average of 1.18.

Thus, the ITRs of all the cooperatives have shown a declining trend together with minor fluctuations. Especially, in the year 1992-93, the ITRs of all the cooperatives dipped significantly. Interestingly, during the study period, every cooperative has reported increased crushing efficiency in terms of TCD as well as sugar recovery, resulting in increased sugar production and sales volume. Hence, there is no logical reason to explain the phenomenon of declining ITRs, except inefficient inventory management, solely due to intra-unit factors like excessive purchases, high rate of obsolescence, improper storage and handling and improper stores accounting, coupled with disproportionate personnel costs for accommodating some of the seasonal labour into stores during the non-season period, etc.

There is no logical reason to explain the phenomenon of declining ITRs, except inefficient inventory management.

Recommendations

Evidently, in the sugar cooperatives, inventory control is not given the importance it deserves, both in terms of the status and functioning. These cooperatives should adopt scientific inventory control techniques such as variety reduction, line of balance, just-in-time, simulation and sales forecasting, for enhancing their inventory efficiency. Average value of the total inventory showed that there exist huge volumes of excess inventories, indicating laxity in inventory control and requiring effective action to reduce the prevailing inventory levels. This would require development of standard practices for processing inventory data, taking closing or the average of closing and opening inventories as representative. Similarly, the cooperatives should develop norms for different components of inventories, on the basis of the actual inventory holdings, so as to effect economies of scale. It is further advisable to undertake in-depth unit-level studies on inventory management at regular intervals.

The inventory turnover ratios (ITRs) of the sugar cooperatives have shown a declining trend for the immediate future also. For keeping their respective ITRs healthy and rising, these cooperatives should endeavour to keep inventory at low leave, (but not too low), and make the inventory keep pace with consumption/sales. Moreover, there should be greater emphasis on volume purchases for obtaining better prices, avoiding overbuying and disposing off the obsoletes.

Today, many inventory management decisions have been reduced to formulae for routine operations, and their wider adoption is advisable. Also, their is a need to standardize, to the maximum possible extent, the routine materials management procedures.

Inventory management decisions have been reduced to formulae for routine operations.

An understanding of the Economic Ordering Quantity (EOQ) principle and its translation into workable operating procedures are necessary for successful use of this powerful tool of economic lot purchases; the inventory management should set its objectives and predict the consequences in terms of the ordering rate and the inventory level. There also is considerable scope for reduction in inventory investment by introducing selective inventory control techniques.

As the survey indicated, all the cooperatives had, at one or the other time in the past, experienced a stock-out situation. Its repeat can be prevented by better planning, reducing effect of contingencies, minimizing discrepancies between physical stock and book balance, better stores management, improving quality of purchase follow-up, development of right sources of supply, systematizing design changes, proper selection of carriers and improving inter-departmental communications.

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Feature

Indian Dairy Industry: Present Status & Future Prospects

Deepak Shah

Dairy industry of India has undergone considerable transformation mainly due to the application of scientific production techniques and greater importance being given to the development of dairy co-operative infrastructure that has contributed in no small measure towards substantial growth in milk production since the early seventies. Nevertheless, viewing our dairy spectrum in the light of variabilities and changes that have taken place over time, it becomes pertinent to ask whether the future of our co-operatives will remain as bright as in the past if we were only to follow the principles and practices of the past.

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India with about 19.76 per cent of the world's total cattle and buffalo population accounts for only about 12 per cent of the world's total milk production (Government of India, 1997). Our livestock are roughly half as efficient as the average milch animals in the world and probably only one-fifth as efficient as those in the advanced countries. The milk grid in this country is based on the average produce of millions of small uninformed farmers who are still unaware of modern scientific ways of dairy farming. This is perceived as a major handicap, as the industry is unable to attain the quality requirements to compete in the world market. Therefore, technologies should be adopted to make milk production system viable and sustainable to usher in an era of quality consciousness to compete internationally. The moot point to consider over here is whether this is achievable with the kind of animals and resources poor dairy farmers have at their disposal.

India produces 70.8 million tonnes of milk annually (Government of India, 1999). The organized sector in our country handles only 13 per cent of this total milk production (Thomkinson, 1995). The consumer prices of milk in India are comparable to some of the lowest in the world due mainly to unremunerative and unattractive price offered to our dairy farmers for their milk produce. Our purchasing power, and the demand for milk are not able to expand in line with the increasing milk production. In terms of per capita consumption of milk, India compares very poorly among the comity of world nations. An average per capita availability of only 204 g milk per day pushes our country to the 57th place in the world in terms of milk availability. However, if our milk production continues to grow as it does now, we would have newer opportunities for launching a more meaningful marketing campaign. The cumulative annual growth of milk in India stood at 1.64 per cent during the period from 1950-51 to 1960-61, 1.15 per cent from 1960-61 to 1973-74, 4.51 per cent from 1973-74 to 1980-81, 5.50 per cent from 1980-81 to 1990-91, and 4.23 per cent from 1990-91 to 1996-97 (Government of India,

1999). We would then probably be in a position to increase our local consumption pattern and reach out to world markets or to face a drastic price crash in the local market and to withstand and absorb the resultant aftereffect of shrinkage in milk production.

In the current context of liberalization and increasing global integration of economies, it would be unfair on Indian dairy industry to compare it with that obtaining in most of the vastly modern and technologically far advanced western bloc countries in terms of a produce that is globally competitive. It should be realized that in India, the dairy industry is dependent on millions of small farmers who produce only a litre or two of marketable surplus and, it is this multitude of teeming millions who eventually contribute to the overall flood of milk. The situation is entirely different in modern milk States. In most western countries, for example, each of thousands of dairy farmers produces tonnes of milk. The sheer size and volume of production indulged in by milk producers in these countries makes it amenable for them to adopt meaningful scientific and technological means towards improving both quality and productivity. In contrast, the milk produced by our individual dairy farmers is so minimal that it is often very difficult to change their attitude in favour of modern animal husbandry practices that will make their produce cost effective as well as remunerative. An abysmally low production volume handled by our dairy farmers means introduction of any amount of technological innovation will not appreciably improve their incomes. Thus, mere technological innovation is not likely to transform the subsistence level dairy farmer into a market savvy commercial milk producer. Only real economic incentives and inducements can coerce and compel such farmers to change in favour of more profitable scientific dairy farming.

An abysmally low production volume handled by our dairy farmers means introduction of any amount of technological innovation will not appreciably improve their incomes.

India's economic efficiency as a milk producer is essentially a product of the Indian milk production system. It is a subsidiary activity in the rural economy closely intertwined with crop agriculture and low cost feed and labour. At the farm level, technical efficiency as measured by yield remains low. There is, therefore, ample scope for further improvement in the efficiency of Indian dairing to make it globally more competitive. There is also every indication that the rate of growth of dairy industry is likely to gather further momentum due to cost-push effect and the consequent higher returns to the milk producers. Nonetheless, before going into the details of such issues it is essential to delve into the development of this sector in the country.

Development of Dairy Sector in India

Indian dairy industry has witnessed considerable transformation since the inception of Operation Flood[1] programme launched in 1970 by National Dairy Development Board. This is also evident from the fact that the Government outlay on developing the livestock sector rose dramatically from a mere 905 million rupees in the Third Plan (1961-66) to Sixth Plan (1980-85) total outlay of 3,966 million rupees on animal husbandry and dairing, of which 2,983 million rupees was meant for expenditure on dairing alone. During the Seventh Plan (1985-90), 3,028 million rupees was earmarked for dairing out of a total outlay of 4,679 million rupees for animal husbandry and dairing. Expenditure on dairing increased sharply during the Eighth Plan (1992-97). Of the total outlay of 1,300 million rupees for animal husbandry and dairing, the proposed expenditure on dairing was nearly 63 per cent (Table 1). Such increased allocations in plan outlay is a reflection of the importance of dairing in government's overall policy encompassing country's agricultural economy.

As a result of concerted efforts towards total dairy development, India today ranks as the world's second largest milk producer and the value of output through dairing is the largest as compared to any other agricultural commodity (Mukherjee, 1995). It is to be further noted that among 12 groups of food consumption items in the country, milk and milk products rank 2nd, next only to cereals. And, ever since the late eighties, the monthly per capita expenditure on milk and milk products has increased sharply, both in rural and urban areas (Table 2). Table 2 also show a decline in monthly per capita expenditure on cereals in the face of increase in expenditure on milk and milk products, both in rural and urban areas. In fact, the National commission on Agriculture (1972) in their Interim Report on milk

1. Operation Flood – I was launched in 1970 with the assistance of World Food Programme (WEP), European Economic Community (EEC) countries, World Bank and other international support agencies in the form of feed aid of 126,000 m.t. of skimmed milk powder and 42,000 m.t. of butter oil. Funds generated through the sale of these commodities were used in the development of 27 rural milksheds in 10 states and for setting up dairies in the rural hinterlands and in four metropolitan cities of the country. There was a 60 per cent increase in milk production as a result of OF - I, which rose from an estimated 20 million metric tonnes in 1970 to 32 million metric tonnes in 1978.

production also recognized the importance of dairy sector and recommended that benefits of increasing demand for milk in large cities, towns and industrial areas should go to small and marginal farmers and landless labourers. In India, landless labourers account for 21 per cent of total rural households. So they do not have any share in the total land-holding. Nonetheless, they own 12 per cent of the milch animals and provide 16 per cent of all rural-produced milk. It stands to reason that dairying is a paying proposition for these poor rural people (Bedi, 1987). Hence efforts should be made to promote as much of milk production as possible involving this segment of rural population. The commission suggested an integrated rural development approach based on a system of 'Kaira District co-operative Milk Producers' Union Limited', commonly known as 'AMUL' in Anand of Gujarat (Jain, 1979).

Table 1: Expenditure on Animal Husbandry and Dairying under Five-Year Plans

(in million rupees)

Plan	Period	Total Outlay on Animal Husbandry and Dairying	Expenditure on Dairying	Expenditure on Dairying to Total Outlay (Percentage)
First	1951-56	220.0	77.8	35.4
Second	1956-61	559.4	120.5	21.5
Third	1961-66	905.2	336.0	37.1
Annual	1966-69	674.7	257.0	38.1
Fourth	1969-74	2331.0	787.5	33.8
Fifth	1974-78	4375.4	540.3	12.3
Annual	1978-79	865.2	404.2	46.7
Annual	1979-80	1222.5	753.7	61.7
Sixth	1980-85	3965.6	2983.4	75.2
Seventh	1985-90	4679.4	3744.3	80.0
Annual	1990-91	1233.8	414.3	33.6
Annual	1991-92	1554.6	779.9	50.2
Eighth	1992-97	13000.0	8180.5	62.9
	1992-93	1563.0	1366.9	87.5
	1993-94	3360.0	2164.4	64.4
	1994-95	3227.1	1850.9	57.4
	1995-96	3440.0	1796.7	52.2
	1996-97	2599.2	1002.9	38.6
Ninth		15465.4	–	–
	1997-98	1990.2	290.5	14.6
	1998-99	2200.0	232.2	10.6

Source: Basic Animal Husbandry Statistics (1999), Department of Animal Husbandry and Dairying, AHS Series-7, Ministry of Agriculture, Government of India, New Delhi.

The success of the Kaira Union gave birth to other milk producers Unions in Gujarat. These milk producers Unions subsequently inspired the formation of 'National Dairy Development Board (NDDB)' in 1965 and provided all the impetus and resources required for its creation. Further, in view of several positive features in favour of milk co-operatives in Gujarat, it was finally decided by the government of India to extend institutional support in order to industrialize and organize all the dairy efforts in entire rural India, through co-operatives. In 1970-71 the NDDB drew up an all encompassing programme known as 'Operation Flood', to replicate the Anand Pattern[2] Dairy Co-operatives in 18 areas of the country. The major objectives of the operation flood programme was to build a viable and self-sustaining national dairy industry on co-operative lines. Total system approach was adopted for dairy development, which encompassed production, procurement, processing and marketing of milk.

Major objective of the operation flood programme was to build a viable and self-sustaining national dairy industry on co-operative lines.

Indian dairy industry has so far witnessed three phases of organized development that encompassed Phase I, Phase II and Phase III of operation flood programme. The first phase of Operation Flood Programme covered the period from July, 1971 to March, 1981. Phase-I of the Operation Flood Programme covered four metro cities, viz. Delhi, Bombay, Calcutta and Madras, for marketing of milk by linking these metro cities with 18 hinterland milksheds spread over 10 different provincial states. The second phase known as 'Operation Flood II' covered the period

2. 'Anand Pattern' of dairy co-operatives have a unique position. They are based on six co-operative principles, viz. voluntary membership; democratic decision making; limited interest on share capital; equitable distribution of surplus; co-operative education and mutual-co-operation. Their functional dimensions encompass not only the economic but social and moral obligations towards their members. A typical Anand Pattern dairy co-operative structure has three tiers of well structured organisation with milk producer constituting the smallest unit of the entire business enterprise. The three tiers are: the village level dairy co-operative society federating producer members; the district level co-operative milk producers' union, federating the village societies and the state level federation constituted of all the district level unions. Of the three tiers, the district dairy co-operative union is the most active unit because it owns the physical infrastructure required for milk procurement, processing and manufacturing of milk products and for generating inputs required for increasing milk production.

Table 2: Percentage Distribution of Monthly Per Capita Expenditure by 18 Groups of Consumption Items Over NSS Rounds

Item	Average Monthly Per Capita Expenditure as Percentage of Total MPCE									
	Rural					Urban				
	27th round	32nd round	38th round	43rd round	50th round	27th round	32nd round	38th round	43rd round	50th round
Cereals	40.6	32.8	32.3	26.3	24.2	23.3	20.5	19.4	15.0	14.0
Gram	0.6	0.4	0.3	0.2	0.2	0.3	0.3	0.2	0.2	0.2
Cereal Subst.	0.5	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Pulses & Prod.	4.3	3.8	3.5	4.0	3.8	3.4	3.6	3.2	3.4	3.0
Milk & Prod.	7.3	7.7	7.5	8.6	9.5	9.3	9.5	9.2	9.5	9.8
Edible Oil	3.5	3.6	4.0	5.0	4.4	4.9	4.6	4.8	5.3	4.4
Meat Egg & Fish	2.5	2.7	3.0	3.2	3.3	3.3	3.5	3.6	3.5	3.4
Vegetables	3.6	3.8	4.7	5.2	6.0	4.4	4.4	5.0	5.3	5.5
Fruits & Nuts	1.1	1.1	1.4	1.6	1.7	2.0	2.0	2.1	2.5	2.7
Sugar	3.8	2.6	2.8	2.9	3.1	3.6	2.6	2.5	2.4	2.4
Salt & Spices	2.8	3.0	2.5	2.9	2.7	2.3	2.7	2.1	2.3	2.0
Beverages etc.	2.4	2.5	3.3	3.9	4.2	7.6	6.3	6.8	6.8	7.2
Food Total	72.8	64.3	65.6	63.8	63.2	64.5	60.0	59.1	55.9	54.7
Pan Tobacco & Intoxicants	3.1	2.9	3.0	3.2	3.2	2.8	2.4	2.4	2.6	2.3
Fuel & Light	5.6	6.0	7.0	7.5	7.4	5.6	6.4	6.9	6.8	6.6
Clothing	7.0	8.7	8.6	6.7	5.4	5.3	7.1	7.6	5.9	4.7
Footwear	0.5	0.7	1.0	1.0	0.9	0.4	0.6	1.1	1.1	0.9
Misc. Goods & Services	8.7	10.3	12.5	14.5	17.3	19.2	14.6	20.5	23.2	27.5
Durable Goods	2.2	7.0	2.3	3.1	2.7	2.2	8.9	2.3	4.1	3.3
Non-Food Total	27.2	35.7	34.4	36.2	36.8	35.5	40.0	40.9	44.1	45.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Total Expenditure (Rs)	44.2	68.9	112.5	158.1	281.4	63.3	96.2	164.0	249.9	458.0
MPCE Index (27th Round = 100)	100	156	255	358	637	100	152	259	395	724
Consumer Price Index (27th round = 100)	100	144	227	289	520	100	160	256	364	618

Source: As in Table 1.

Note: 27th round - Oct. 1972 to Sept. 1973 32nd round - July 1977 to June 1978 38th round - Jan. 1983 to Dec. 1983
43rd round - July 1987 to June 1988 50th round - July 1993 to June 1994

from April, 1981 to March, 1985 (Sixth Five Year Plan period).

At the end of Phase-II in March 1985, scheme was in operation in 136 milksheds of the country covering over 290 large, medium and small towns under organized milk marketing-grid. The investments made in Operation Flood Phase-I and II were of the order of Rs. 1,165.4 million and Rs 2,771.7 million, respectively. As against this, the outlay proposed during the Phase-III was of the order of Rs. 6,812.9 million. Phase-III of Operation Flood under implementation during the Seventh Five Year Plan period (1985-90) sought primarily to consolidate on the gains that extensive milk procurement and marketing base built during the second phase provided. It endeavoured to develop strong farmers' organisation controlled by member producers through their elected representatives at all the three tiers and manage their milk procurement to a peak level of 18.3 million litres collected from over 8 million producer families by 1990. Currently, Operation Flood III programme is in operation

Functioning of 'Anand Pattern' Model

Under the 'Anand Pattern' model, a primary co-operative society is formed at the village level based on the by-laws which insulate the society from the undue interference of those unscrupulous elements who are not directly connected or concerned with either the development of the society or milk producers, but are mainly interested in dominating the society to further their own vested ends. The Union is the kingpin of the entire business, which is managed in accordance with strict commercial principles, and has to be financially viable and self-reliant. Union's obligation towards its milk producer-members is to purchase entire quantity of milk they offer to sell, and pay not only a guaranteed price for the milk purchased but also a dividend for their shares in accordance with the by-laws. Payment to milk producers for milk is strictly on the basis of quality as determined by the 'Fat test'. The dairy plant owned and operated by the union helps the society to procure and accept the milk in flush and lean seasons, thereby providing an assured year-round remunerative market for the milk (Bandyopadhyay, 1994).

With a view to helping milk producers to increase milk production, the Society or Union provides technical inputs like veterinary first-aid, artificial insemination and balanced cattle feed on a no-profit-no-loss basis. Balanced cattle feed is sold to milk producers through the village co-operatives at 20 to 30 per cent less than the market prices of conventional cattle feeds. Dissemination of knowledge and education of improved animal husbandry practices are provided through a strong extension network. Besides, the concurrent and continuous auditing of the primary societies and the Union constitutes one of the major factors of the overall success story of the system. The constant watch on the working of the co-operative functioning, either by the Union's supervisory staff or by the departmental audit team, helps to instill confidence in the mind of the producers that the funds of their organisation are properly utilized. Thus, on the functional front following 'Anand Pattern' model, a dairy co-operative can secure horizontal and vertical integration of milk production, procurement, processing, product manufacturing and marketing. All these strengths if properly utilized can help a dairy co-operative to improve and sharpen its competitiveness as a business enterprise that is second to none.

Sustainability of Co-operatives under Economic Reforms

In the existing situation in India there is virtually no alternative to the cooperatives for serving and protecting the interests of those who are prone to exploitation in the market-driven economy; hence cooperatives will continue to have their relevance under the economic reforms. However, the issue that merits attention is how far cooperatives will have sustainability in the new environment in which they will have to face competition and may not have reserved areas for their operations (Dwivedi, 1996). As for the sustainability of cooperatives in the new economic environment, there are two sets of arguments. One of the arguments is that the financial sector reforms which extend liberty to escalate rate of interest on loan advances, could only raise the cost of credit, loan repayment amount and complicate the whole field of credit and its relation with the production base (Mukherjee, 1998). Similarly, Mujumdar (1996) while lauding the financial sector reforms for improving the viability of banks also felt the exaggerated importance given to developing institutions has resulted in "putting the core issues of the financial system, like improving the rural credit delivery system, on the back-burner". He criticized the blind dependency on market forces, irrespective of their macro-economic implications. On the other hand, an eminent agricultural economist, C.H. Hanumantha Rao, believes that viability of rural credit institutions can be attained only by extending the process of liberalization to these institutions also (see, Chandra, 1996). Rao looked upon the multi-agency rural credit system as an instrument for improving viability of these institutions through competition. Viability is not the only issue that has drawn attention from various policy makers. There is another important issue, sustainability of the co-operatives, especially in the changed market conditions.

Viability and sustainability of the co-operatives are vital issues, especially in the changed market conditions.

Of late the withdrawal of Government regulations from many spheres of economic and business activities has enabled the use of cooperatives as an institutional set up for implementing programmes relating to socio-economic development. The delicencing of dairy industry under Industrial Development and Regulation Act (IDRA, 1951) and promulgation of Milk and Milk Products Order (MMPO) in June 1992 have helped many milk Unions in the country to increase their liquid milk collection and business turnover tremendously in more recent times. Information relating to state-wise number of dairy plants registered under MMPO is provided in Table 3. Among various states, Maharashtra ranks first in terms of number and capacity of milk plants operating under central authority as well as state registered authority. The achievements of some of the

Table 3: State-wise Number of Dairy Plants Registered Under MMPO As On June 1, 1996

(Capacity '000' litres per day)

States	Cooperative		Private		Other		Total	
	No.	Capacity	No.	Capacity	No.	Capacity	No.	Capacity
By Central Authority								
Andhra Pradesh	13	2905	3	480	1	200	17	3585
Bihar	6	485	0	0	0	0	6	485
Delhi	0	0	0	0	9	1600	9	1600
Goa	1	30	0	0	0	0	1	30
Gujarat	14	6170	2	300	6	640	22	7110
Haryana	5	400	12	2890	0	0	17	3290
Himachal Pradesh	3	44	2	345	0	0	5	389
Karnataka	12	1733	4	395	1	400	17	2528
Kerala	3	300	0	0	0	0	3	300
Madhya Pradesh	7	1200	3	650	0	0	10	1850
Maharashtra	14	2420	10	2440	15	2700	39	7560
Orissa	7	182	0	0	0	0	7	182
Pondichery	1	50	0	0	0	0	1	50
Punjab	11	1470	13	2805	0	0	24	4275
Rajasthan	12	1190	8	800	0	0	20	1990
Sikkim	1	15	0	0	0	0	1	15
Tamil Nadu	9	1870	1	80	0	0	10	1950
Tripura	1	10	0	0	0	0	1	10
Uttar Pradesh	7	1540	30	5644	0	0	37	7184
West Bengal	2	216	0	0	2	820	4	1036
Total	129	22230	88	16829	34	6360	251	45419
By State Registered Authority								
Andhra Pradesh	0	0	9	588	0	0	9	588
Gujarat	3	110	0	0	1	30	4	140
Haryana	0	0	22	1160	2	130	24	1290
Kerala	7	270	0	0	2	35	9	305
Madhya Pradesh	1	30	0	0	2	20	3	50
Maharashtra	15	499	33	1516	23	695	71	2710
Mizoram	1	0	0	0	0	0	1	0
Orissa	1	30	0	0	0	0	1	30
Pondicherry	1	0	0	0	0	0	1	0
Punjab	1	60	8	285	0	0	9	345
Sikkim	0	0	0	0	0	0	0	0
Tamil Nadu	13	372	2	50	1	0	15	422
Uttar Pradesh	24	706	85	3914	0	0	109	4620
West Bengal	0	0	3	90	0	0	3	90
Total	67	2077	162	7603	31	910	260	10590

Source: As in Table 1.

key components of dairy development in different states under cooperative sector are also brought out in Table 4 which further confirms Maharashtra to be one of the leading states in the country, not only in terms organised dairy cooperative societies (DCS) but also in terms of procurement, marketing and processing of milk. As for the MMPO, the basic objectives of the order are establishing a framework for the orderly disciplined growth of the Indian dairy industry, maintaining the emphasis on supplies of liquid milk rather than manufacture of milk products, ensuring that the intermediaries between the producer and the consumer play a positive

and important role towards safeguarding the interests of both, facilitating the operation of the National Milk Grid in balancing the uneven supplies of liquid milk in different regions and seasons through the participation of investor-oriented and privately-owned dairies. The purpose for issuance of the control order is in the interest of the society at large. The promulgation of the MMPO in June 1992 has, therefore, certainly helped many milk Unions since their activities are now confined to collection and distribution of milk.

Thus, there is no iota of doubt that as a result of application of scientific production techniques, coupled with greater importance being given to the development of dairy co-operative infrastructure, the total milk production of the country has increased to a considerable extent. There is also no denying the fact that India still has enormous potential in its dairy sector which if tapped in the desired manner and direction can lead us to emerge as the leading producer of milk in the world in the years to come. In fact, India has already established good reputation of putting her dairy industry on a sound footing which has in turn lent effective support to the agricultural development programme. However, there are some vital issues that need to be addressed in the current context of liberalization, privatization and global integration of economies. In the changed market conditions, an integrated system approach on dairy development comprising collection, processing and marketing of milk and milk products is warranted. Of these important planks of dairy business, a remunerative procurement pricing policy of milk and a sound technical input delivery system are by far the most important for the industry. Inherent in the procurement of milk are certain basic responsibilities such as providing assured remunerative prices and technical inputs to producer farmers and these are usually shouldered by co-operative milk Unions which act as vehicles of such services. Any attempt to shirk such responsibilities will be to their own detriment.

A remunerative procurement pricing policy of milk and a sound technical input delivery system are important.

Table 4: Achievements of Some of the Key Components of Dairy Development in Different States Under Cooperative Sector as on 31-3-1998

State	DCS Organised (nos.)	Farmer Members ('000')	Rural Milk Procurement ('000 Kg/Day)	Milk Marketing ('000' LD)	Liquid Milk ('000' LD)	Powder (MT/Day)
A & Nicobar	–	–	–	–	5	–
Andhra Pradesh	5108	710	748	623	2397	126.0
Assam	123	2	3	6	60	–
Bihar	2737	143	211	242	586	12.5
Delhi	–	–	–	1199	1150	–
Goa	155	17	25	71	75	–
Gujarat	12132	2039	3989	1576	6960	453.0
Haryana	2630	166	199	62	530	25.0
Himachal Pradesh	254	15	16	22	30	–
J & K	–	–	–	–	10	–
Karnataka	7871	1499	1474	1299	2030	37.0
Kerala	1509	419	317	366	410	10.0
Madhya Pradesh	4601	237	196	227	1030	30.0
Maharashtra	6387	1174	2210	2168	3970	60.0
Nagaland	35	1	1	1	–	–
Orissa	1268	92	77	92	125	–
Pondicherry	85	24	31	39	50	–
Punjab	6175	362	739	373	1460	100.5
Rajasthan	5413	390	661	361	1050	60.0
Sikkim	162	5	7	7	15	–
Tamil Nadu	7775	1888	1156	1381	2421	70.0
Tripura	84	4	1	5	10	–
Uttar Pradesh	11568	597	673	356	1140	60.0
West Bengal	1459	91	160	650	1570	10.0
Total	77531	9875	12894	11126	27084	1054.0

Source: As in Table 1.

Note: DCS = Dairy Cooperative Societies; LD = Litres Per Day; MT = Metric Tonnes

Procurement Pricing of Milk

In fact, pricing issue is of primary importance because on it depends the availability of basic raw material, that is, milk. Under this system, the farmers are paid on the basis of quality of their produce and not on quantitative basis alone. Fat content of milk determines the quality of milk provided by the farmer producer. Such quality testing for fat deters producers from adulterating their milk with water as payments are invariably

made on kilo fat basis for their produce. This kind of pricing not only infuses quality consciousness among producer farmers at village level but is also known to bind the system of milk procurement to a definite moral ethos whereby adulteration is seen as amoral and criminal (Shah, 1997).

Co-operatives are also known for differential seasonal pricing. Thus, while a lean season produce commands a higher procurement price, in flush season the producers are paid relatively less for their produce. This is helpful to both farmers and co-operatives in terms of averaging out the realization as well as the costs. This type of differential pricing helps in warding off unscrupulous competitors who generally seek to offer a higher procurement price for milk during summers. Though the proportion of milk production during flush and lean seasons varies from 100 to 40, the overall demand, remains more or less constant throughout the year. To handle competition, higher price is usually paid for milk during the lean season to attract more supply. This is in tune with the fact that feeds and fodder are in short supply during lean season and, thus, costlier to use, making milk production that much dearer. The producer farmers are, therefore, justified in seeking higher price for milk during lean season to offset increasing cost of production and, in maintaining uniformity in income from milk sales throughout the year even when there may be slump in demand for milk during flush season owing to restricted handling capacity of dairy processing plants and, hence, a lower procurement price on offer for them.

A lean season produce commands a higher procurement price, in flush season the producers are paid relatively less for their produce.

Further, milk production being seasonal, under the co-operative set-up, a provisional price is paid in the beginning for milk supplies based on projections and a final price is fixed only at the end of the year. Thus, supplementary prices, if any, are paid to the producers at year end irrespective of their being members of village milk producers' co-operative societies. A distinction must be made here between this kind of supplementary payment and the bonus which is paid by co-operatives to only their members. This kind of provisional pricing and supplementary payments has created confidence among the milk producers and today they are allowing co-operatives to adjust their milk pricing policy in line with objective market conditions (Shah, 1996).

Of late, the planners seem to favour a two-axes pricing policy for milk that reckons both fat and solids-not-fat (SNF) content of milk for its pricing in order to stimulate and give fresh fillip to cow milk production. Though SNF as the basis for milk procurement payments is yet to gain full currency, the two axes mode of payment for milk procurements may eventually replace the fat-based pricing system as cow milk is becoming increasingly important in the processing sector. This necessitates a simple and economically viable technique for SNF testing at village level and such a cost-effective simple method is not readily available as of now. Efforts are currently on towards developing a low-cost automatic milk analyzer that can test the milk both for its fat and SNF contents and with the inception of such a tool, the milk procurement pricing policy will definitely march towards a better overall dairy development.

Technical Input Delivery System

Landless labourers and marginal farmers produce more than 50 per cent of marketed milk. Most of these farmers own poor quality animals and their ownership is limited to a mere one or two animals per household. Further, they have inadequate feeding facilities and lack proper health cover for their milch bovines. This is reflected in poor yields for their milch animals. The per litre cost of production at their levels of animal holding is, therefore, higher compared to their more resourceful counterparts who not only possess more number of high yielding animals per household but also have the capacity to avail adequate inputs of superior quality for their animals albeit at competitively lower rates. A milk procurement pricing policy designed to favour less endowed and less resourceful producer farmer seldom upsets the applecart of well endowed resourceful farmers who mostly practice dairying as a supplementary activity and, therefore, are rarely interested in investing additional resources in order to enhance their milk procurement further.

An ideal strategy would be to adopt pricing policy that encourages all milk producers to enhance their milk production as well as to increase their marketable surplus. Provision should also be made to provide less endowed producer farmers with such facilities and non-monetary benefits as better breeding, cheaper feed inputs and health cover at affordable costs. Since the resources needed for such an infrastructure are huge and since the management of these resources to maximize their output within a reasonable time frame in any given area is a specialised job, the ideal way to manage this strategy would be to employ professionally qualified competent staff under milk producers' cooperatives who can execute the chosen programmes to their logical conclusion.

An ideal strategy would be to adopt a pricing policy that encourages all milk producers to enhance their milk production as well as to increase their marketable surplus.

This two-tier approach, i.e. the organisation providing a package of assistance to marginal farmers to improve the dairy animals and their productivity and the price which assures them sufficient profits to not only manage their own livelihood but also provide them with the required resources for other inputs including money for loan refunds, appears to be the best solution.

Further, to sustain the interest of the producers, prices have to be remunerative throughout the year. The higher milk prices, however, may not by themselves lead to higher productivity of milch animals. For increasing the productivity of milch animals, it is necessary to provide proper input services. In our kind of dairying and village economy, it is well nigh impossible for an individual farmer producer to arrange all such services completely on his own. The societies, therefore, have this onerous task of ensuring necessary input services to all producers. Timely provision of input services is not only likely to reduce the cost of milk production by increasing the productivity of individual animals but may also work towards improving the overall genetic stock of such milch animals.

Plugging back a fraction of profits from their present milk sales into such input services, thus, helps the farmer in actually earning more net returns per animal in future. Timely, adequate and proper input services would mean reduced expenditure on inputs per unit and considerably reduced element of risk that lurks in the shape of possible death and medical instability of milch animals in the absence of proper veterinary care and nutrition. Taking care of their milch animals under watchful eyes of society experts will surely inculcate in them a heightened sense of urgency and confidence in matters related to animal husbandry activities. And, this kind of input services oriented strategy and programme will not only ensure assured remunerative income for farmer producers but is also likely to increase their involvement in dairy business. It may infuse entrepreneurial undercurrents among some of the more successful dairy farmers.

Conclusion

In the present milieu, private dairies and multinationals appear an attractive institutional social alternative primarily because cooperatives tend to be increasingly associated with inefficiency, incompetence and corruption while efficiency, aggressive management and market orientation are supposed to be the hallmark of privately managed enterprises. The decentralised procurement structure of private dairies based on a network of independent economic factors tied to each other through a system of formal and informal contacts gives them some critical economic and logical advantages; For example, they do not have to worry about managing the procurement structure as the Unions have to, also they do not have to guarantee acceptance of all milk being offered by producers or vendors, they also don't bother about the quality as milk procured by them through a network of venders is seldom tested for quality, the factory pays them only on the basis of fat and SNF tests and they are quite content with it. Add to this the advantage of flexibility in pricing and in business policy as enjoyed by private dairies which leads them to have a superior position in the dairy business. Private operators not only spend little on inputs but their low overheads and their credit-based tie-ups with milk supply contractors and producers also heavily weigh in their favour. However, well-managed co-operatives will not only surpass commercial private dairies in their economic and productivity impacts, but they are also likely to function as vehicles of development and change in rural economy (Shah et al, 1995).

Efficiently run co-operatives invariably produce outstanding results and have a positive socio-economic impact on rural economies. However, when poorly managed, their social value is associated with diminishing return and may even pale in shadow compared to commercial dairies which don't pride themselves in having only such social commitments. Efficient co-operatives provide ideal conditions along almost all social dimensions except capital mobilization in which commercial units have some natural and strong inherent advantages what with profit making being their sole and important driving force though consciously they may not work against social interests of dairy farmers. Poorly run co-operatives are their own worst enemies in this respect.

The co-operative's impact operates primarily through 'pull' factors; over time, livestock producers raise productivity through improved breeding, feeding

Efficiently run co-operatives have a positive socio-economic impact on rural economies.

and management. While increase in dairy enterprise productivity directly translates into increased income, the 'pull' and the 'push' created by a successful co-operative encourages members to expand their dairy enterprises so as to make fuller use of the slack offered by family labour and crop residues. All these spill-over effects of successful co-operatives may, in the long run, prove to be powerful, educative experience transforming the co-operatives into a vast human resource development programme for village communities.

Undoubtedly, of late, India is witnessing an all pervasive white revolution that can go a long way in ameliorating the lot of those farmers who have positive leaning towards emerging innovative technologies and scientific farm management techniques and also in creating conditions for elimination of regional socio-economic disparities and imbalances. The advantage in the emerging new technologies is that, when optimally utilised, they can truly transform the dairy sector by stepping up milk production to desired levels. The government should, therefore, endeavour to evolve, initiate and implement a more egalitarian policy, especially policies related to procurement pricing and input delivery system, that is capable of boosting our livestock production base with all the expediency it deserves.

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I learned a long time ago that a team will always defeat an individual and if you have a team of superstars, then you have a chance to create a dynasty.

– John Chambers

Feature

Changing Structure of Land Market in Punjab

Joginder Singh

The rapid change in the scenario of Punjab agriculture has necessitated examining the structural change particularly in the land market. The article presents a survey on the existing land market in the state.

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As a factor of production, land is the major determinant of the size of farm business, particularly in economies with high density of population. Being immobile in nature, location of land assumes much greater significance in transactions for its lease and purchase/sale. The high investment in land by farmers demands an in-depth analysis into the rationale of its ownership vis-à-vis lease of land. With liberalization of world economy and commercialization of agriculture in the country, transactions in land purchase/sale and land lease even in agriculturally advanced economies do not seem to have kept pace, due to a number of reasons. One such reason for slow operation of land market is the policy requirement to liberalize it further.

Punjab is an agrarian state of India, where agriculture has witnessed exemplary progress since mid sixties. The fast accelerating farm productivity was responsible for increase in rental value and price of land. Rapid urbanization and industrial development enhanced the land prices further. The almost stable crop yields for the past one decade in Punjab and declining real profitability in agriculture are believed to have frozen the land market to a great extent. It is important to view the land market structure in the context of the changing scenario of farm economy of the State. In agrarian states like Punjab, the land market has great impact on the socio-economic life of the people by way of resource use efficiency, income disparities between different sections of society, investment incentives, institutional set-up etc.

This study was, therefore, mounted keeping in view the following major objectives:

- To study the existing structure of ownership and operational holdings in Punjab.
- To examine the land lease market with reference to the characteristics of lessees and lessors and term of lease.

- To analyze the trends in land purchase and sale transactions and land prices.
- To examine the land mortgage transactions in the Punjab State.

A similar study (Chatha et al., 1985) in the area was carried out in 1985. The results of this study are compared with the results of the previous study so as to bring out the changes in the land market structure which have taken place during the past one and a half decade.

Methodology

The census data on category-wise working population and the data of sample surveys carried out by the Department of Agriculture, Punjab (Statistical Abstracts of Punjab, 1997-98) were examined to study the land ownership and operational distribution in the State. Primary data was also collected from 11 out of 12 erstwhile districts of Punjab by selecting one village from each district representing average conditions of the district. Care was exercised to select the village located at about 8-10 km from the town. All the families owning/operating land in the selected villages were taken for this purpose. Information regarding farm size, number and share of landowners, number of operators, adult male dependents on farming, mobility towards non-farm occupations, land lease, reasons for leasing in/out, land purchase and sale during the past 15 years and land prices, reasons for purchase/sale of land, land mortgage pattern etc. was obtained by personal interview method.

The population census showing working population of Punjab in the nine industrial categories was taken (Table 1). The number of cultivators in the state was 1602000 in 1960-61 which has consistently increased to 1917000 in 1990-91 showing simple growth rate of 0.66 per cent per annum. The number is expected to grow up to 2022000 by the year 2000-01. The area operated by a cultivator, on an average, was 2.35 hectares in 1960-61 which increased to 2.43 hectares in 1970-71 due to fast reclamation of barren and problem soils, bringing more area under plough. After 1970-71, the per cultivator area went on declining and is expected to touch a level of 2.08 hectares in 2000-01. The number of agricultural workers, on the other hand, went up almost 5 times during the last 3 decades. Thus the area per agricultural worker declined at a much faster rate i.e. 2.94 hectares in 1960-61 to 1.25 hectares in 1990-91.

The distribution of operational holdings based on sample surveys carried by the Department of Agriculture, Punjab for 1980-81 and 1990-91 is presented in Table 2. The total number of operational holdings was estimated at 1027000 in 1980-81 which increased to 117000 in 1990-91 showing an increase of about 9000 every year. The number is expected to increase to 1201000 in 2000-01. The number of small size holding is increasing at a fast rate. The marginal farmers (below 1 hectare) were 19.21 per cent in 1980- 81, 26.47 per cent in 1990-91 and are likely to increase to 32.81 per cent in 2000-01. Operational holdings of 1-2 hectares and 2-4 hectares are also expected to go up but as per cent to total holdings, these are declining. The number of higher size groups is shrinking rapidly. Therefore, the average size of operational area dwindled down from 4.05 hectares in 1980-81 to 3.75 hectares in 1990-91 and is likely to be 3.50 hectares in 2000-01.

A simultaneous view of Tables 1 and 2 brings out the fact that the number of operational holdings is much less than the number of ownership holdings. During 1980-81 and 1990-91, the number of owners per operational holding worked out to 1.72. Compared to operational distribution of land holdings, the land ownership pattern is still more alarming.

Table 1: Land-Man Ratio in Agriculture Sector of Punjab

Category	1960-61	1970-71	1980-81	1990-91	2000-01*
Cultivators ('000)	1602	1665	1767	1917	2022
Agricultural labourers ('000)	335	787	1092	1452	1824
Total number of persons in agriculture ('000)	1937	2452	2859	3369	3846
Net area sown per cultivator (ha)	2.35	2.43	2.38	2.20	2.08
Net area sown per agricultural worker (ha)	2.94	1.65	1.47	1.25	1.09

Source: Statistical Abstracts of Punjab
*Projected

Results of Sample Survey

Operational Holding Vs Ownership of Land

The pattern of ownership and operational holdings is presented in Table 3. On the basis of the sample survey of 678 operational holdings, the size of operational holding averaged out to 3.30 hectares as against the state average of 3.75 hectares (1990-91 census). The average operational holding varied from one district to another. Against overall average operational holding of 3.30 hectares, the average owned holding per owner worked out to 2.13 hectares, since the 678 operational holdings in the sample had 927 owners of land or every operational holding had 1.37 owners who shared the

Table 2: Distribution of Organisational Farm Holdings in Punjab

Farm Size (ha)	1980-81		1990-91		2000-01 (Projected)	
	No. of holding	Area operated (%)	No. of holdings	Area operated (%)	No. of holdings	Annual Net Addition
Below 1.0	197323 (19.21)	3.04	295668 (26.47)	4.07	394009 (32.81)	+9834
1.0-2.0	199368 (19.41)	7.22	203842 (18.25)	8.14	208316 (17.35)	+447
2.0-4.0	287423 (27.98)	20.32	288788 (25.86)	20.87	290158 (24.17)	+137
4.0-10.0	269072 (26.20)	40.22	261481 (23.41)	40.22	247817 (20.64)	-759
10.0 & above	73941 (7.20)	29.20	67172 (6.01)	26.70	60403 (5.03)	-677
Overall	1027127 (100.00)	100.00	116951 (100.00)	100.00	1200703 (100.00)	+8982
Total Area operated (000' acres)	10395		10478		10500	
Average Operational Holding (ha)	4.05		3.75		3.50	

Source: Statistical Abstract of Punjab

Figures in parentheses indicate the number of holdings in different categories as percent of total number.

output. The inferences drawn regarding profitability of farming need to be viewed in the light of not only the pattern of operational land holdings but also the ownership distribution.

The inferences drawn regarding profitability of farming need to be viewed in the light of not only the pattern of operational land holdings but also the ownership distribution.

Marginal farmers having operational holding size of less than 1 hectare were 18.91 per cent of the total sample with an average operational holding of 0.64 hectare but the average ownership holding on these farms was 1.05 hectares. Thus there was higher tendency of leasing out of land to go in for off-farm employment in this category. Similarly the small farms (1-2 hectares) with an average operational holdings of 1.60 hectares were 26.59 per cent of the total sample size. But the average area of ownership was lower i.e. 1.39 hectares. Therefore, there was a tendency of these farms to lease in some land to earn their livelihood.

Farm size groups with more than 2 hectares had higher operational area even though ownership was on lesser holdings. Therefore, with increase in size of operational holdings, the share of leased in area increased, indicating a tendency towards operating larger holdings by medium farmers.

The number of owners per operational holding varied widely from district to district and even with the size of operational holdings. On the whole, there were 1.37 owners per operational holding, number increasing with increase in farm size except in the lowest farm size group where a sizeable number of owners leased out their entire area. The sample study carried out in Punjab in 1984 indicated that the average operational holding was 5.0 acres. The number of owners per farm was estimated at 1.56. The situation after 15 years seems to have deteriorated as the average size of operational holding has gone down. Small farmers had the tendency to lease in area to increase their farm size but now the trend has reversed as small farmers are moving out of farming to take up off-farm employment. It is an indication of initiation of transformation of state agriculture.

Dependence on Farming

The number of adult male family members dependent on farming is another vital information presented in Table 3. On every operational holding against 2.15 in 1984-85, there were 2.37 adult male members dependent on farming of which 1.83 (77.22 per cent) had full time dependence and 0.54 (22.78 per cent) as part time helping adult male members per farm, on an average. Against this, as many as 1.78 adult males (82.79 per cent) had whole-time dependence on farming in 1984-85. This indicates that more and more adults are

Table 3: Farm Size Distribution, Occupational Break-up & Extent of Land-Lease of Sample Farmers in Punjab, 1998-99

Farm Size	ha	1-2 ha	2-4 ha	4-8 ha	8-10 ha	10 ha	Overall
Number of operational holdings	128	180	182	138	35	15	678
Average operational holding(ha)	0.64	1.60	3.18	5.92	9.83	20.52	3.30
Number of owners	179	199	229	210	70	36	927
Average owned holding	1.05	1.39	2.28	2.96	3.95	7.53	2.13
Number of owners/operational holding	1.40	1.11	1.26	1.52	2.00	2.40	1.37
Dependent on farming-Adult male	2.03	1.91	2.40	2.86	3.26	4.20	2.37
Whole time	1.20	1.53	1.89	2.34	2.71	3.73	1.83
Part time	0.84	0.38	0.51	0.52	0.54	0.47	0.54
Off-farm Employment-Adult male in Labour (%)	5.77	1.46	0.000	0.000	0.000	0.000	1.37
Business (%)	9.62	2.62	2.81	3.04	0.88	3.17	3.98
Service (%)	22.31	11.37	7.73	8.35	8.77	4.76	13.00
Others (%)	6.15	4.66	4.22	4.56	7.89	3.17	20.02
Leasing-in of land							
Lessors as % of farmers	3.13	13.89	26.37	52.17	48.57	33.33	25.26
Area leased-in as % of operational area	3.03	4.74	13.08	24.53	22.73	16.08	18.56
Leasing-in of land Lessors as % of farmers	42.97	3.33	4.95	2.17	2.86	13.33	11.23
Area leased-out as % of operational area	114.29	0.00	3.39	0.59	3.14	2.58	1.56
Purchase of land							
Buyers as % of farmers	7.03	8.89	20.33	24.64	48.57	26.67	17.28
Area bought as % of operational area	7.32	1.78	5.28	2.36	4.22	1.92	3.65
Sale of Land							
Sellers as % of farmers	28.91	21.11	20.33	18.84	14.29	20.00	21.57
Area sold as % of operational area	25.91	5.92	5.54	2.34	1.77	1.46	12.25

withdrawing from farming and shifting to other occupations but in almost all the categories, the dependents on farming is increasing due to pressure of population on land. The number of whole time dependent adult males increased with the increase in the farm size. The number was 1.20, 1.53, 1.89, 2.34, 2.71, 3.73 on farms having less than 1 hectare, 1-2 hectares, 2-4 hectares, 4-8 hectares, 8-10 hectares and above 10 hectares respectively. The part time dependents were in off-farm employment and helping in farming only whenever they could get time.

Employment of adult male members in off-farm occupations was also observed. It may be seen from table 3 that 1.37 per cent of the adult male members supplemented their income by doing labour, 3.98 per cent through business such as shopkeeping, flour milling units, operating commercial dairy farming etc., 13.00 per cent were going in for service in public and private enterprises and 20.02 per cent in other occupations such as migrating to other countries and states. The marginal and small farmers went in for labour while other categories did not perform off-farm labour. Similarly, mainly the marginal farms took up business. Service was the most preferred by almost all the categories of farms due to high income and low risk. The other occupations, which included going abroad for earning was the most common in the central part of the state as compared to other districts. This trend of supplementing farm income from non-farm occupations by the farmers and more so by the marginal farmers is a healthy sign, which is on the increase when compared with the past studies.

Trend of supplementing farm income from non-farm occupations by marginal farmers is a healthy sign.

Land Lease Market

Leasing-in: The number of farmers leasing in land and the area leased in are also presented in Table 3. It may be seen that as many as 25.26 per cent of farmers

resorted to leasing in of land.Of the total operational area, the leased in area accounted for 18.56 per cent. On the other land, in 1984-85, 31.03 per cent of the farmers leased in land but it accounted for only 14.12 per cent of their operational area. The leasing in practice was common in case of farmers operating area between 4 and 12 hectares. The main reason advanced by the lessees was to increase size of operational holding due to the availability of surplus fixed farm resources such as tractor and other farm machinery and permanent labour which could be better utilized on larger farm holding. The other reasons for leasing in of land were low rental value, rented-in land being close to the farm. land belonging to relative/friend who had gone abroad or were on off-farm employments or physically unable to cultivate, in the case of larger area it was a symbol of social status.Pure tenancy was non existent in state due to the fact that profit margins from farming are not enough to sustain the family's economic level.

Leasing Out: The sample cultivators also leased out a part of their land due to operational problems such as migration-occupational and spatial issues, distant location of piece of land, problem soils, rents attractive compared to profits, inability of farmer to operate all land due to lack of resources including farm machinery and family labour. On the whole, 11.23 per cent farmers leased out their land. The land leased out formed 1.56 per cent of their existing operational area. However, in 1984-85, 12.84 per cent farmers leased out land which formed 8.81 per cent of the operational area. The decline in leasing-out was due to constant rents; during the last few years in the state, it has declined sharply in the cotton belt. The leasing out was more pronounced on marginal holdings. There were a few farmers who leased out their entire land and shifted over to alternative job opportunities. Persons leasing out land had apprehension about possibility of its non-redemption at later stage. If the tenancy legislation gets reversed i.e. the interests of land owner are protected, the land lease market can be activated.

Land Rents

Due to falling productivity in the cotton belt, land lease contracts were made in writing though not on court paper. As compared to only 45 per cent in 1984-85, as many as 87.69 per cent contracts were made for cash payment, out of which one third were made at rent between Rs. 17500 and Rs. 18750 per hectare. Another 17.31 per cent lease contract were made at Rs. 15000 to Rs. 16250 per hectare; modal land rent in 1998-99 may be estimated as Rs. 17500 per hectare against Rs. 3000 per hectare in 1984-85. The increase has come to standstill during the past few years. The cotton belt observed relatively lower land rents and even decline in the rental value of land due to decline in profitability of cotton crop in the area. The highest land rents were observed in the central districts having high yield of paddy-wheat crop rotation. The increase in contracts for cash over time was obviously due to fast monetization of rural economy and to avoid conflicts in kind payments.

Cotton belt observed relatively lower land rents.

Highest land rents were observed in the districts having high yield of paddy-wheat crop rotation.

Table 4: Land Rent & Other terms of Land Lease, 1998-99

Rent (Rs/ha)	Total Number of transactions	Percent
Kind	32	12.31
Cash	260	97.69
5000	7	2.69
7500	8	3.08
8750	1	0.38
10000	7	2.69
12500	11	4.23
15000	26	10.00
16250	19	7.31
17500	41	15.77
18750	37	14.23
20000	17	6.54
21250	13	5.00
22500	10	3.85
23750	3	1.15
25000	16	6.15
26250	5	1.92
27500	7	2.69
Total	260	100.00
Period of Contract		
1 year	237	91.15
2 years	10	3.85
3 years & more	13	5.00
Type of Contract		
Written	26	10.00
Verbal	234	90.00

The lease contracts were made normally for one year renewable every year. Only 3.85 per cent and 5.00 per cent lease contracts were made for 2 years and 3 or more year respectively. Payments were made in two instalments every year; one at the beginning of *kharif* crop and the second before the start of *rabi* crop. No major dispute in land lease market was reported, though some of the lessee farmers reported the leasing in as uneconomical due to falling profitability from farming. In general, the land lease market did not conform to the provisions of existing legislation but it was observed to be working more or less to the satisfaction of the lessors and lessees.

Purchase & Sale Transactions

Information regarding purchase and sale of land during the past one and a half decade by the sample farmers is also presented in Table 3. A perusal of the table would show that purchase of land was done more by medium size farmers. As many as 48.57 per cent farmers operating 8 to 10 hectares purchased land which formed 4.22 per cent of operational holding. Similarly, 26.57 per cent of farmers with operational area of more than 12 hectares purchased land amounting to 1.92 per cent of their operational holding size. Only 7 to 9 per cent of marginal and small farmers purchased land. On the whole, 17.28 per cent farmers bought land which accounted for 3.65 per cent of their operational holding.

The main reasons for purchase of land were specified as:

- For increasing the size of holding
- For making investment of earnings from non-farm sources
- Land contiguous to existing farm
- The price of land was quite reasonable due to urgent need of seller
- Having surplus machinery and labour

On the other hand, 21.57 per cent of the sample farmers sold as much as 12.25 per cent of their farm land during the last 15 years. The sale was more by small and marginal farmers who considered farming as not remunerative enough to support their families and to repay their debt. So, they sold off part or whole of their land holdings. Reasons for sale of land were:

- Paying off debts
- Meeting urgent family consumption needs
- Area being isolated from main farm
- Reasonable price offered
- To invest in non-farm occupations

Lack of machinery and labour

Viewing purchase and sale of land together, marginal farmers with less than 1 hectare are the net sellers of land i.e. purchased 7.32 per cent and sold 25.91 per cent of the operational area during the last 15 years. Similar situation existed in case of farmers operating 1-2 hectares and but the extent of net sale decreased with increase in farm size. The purchase and sale of land were almost at par in case of farms of 2-8 hectares. However, farms more than 8 hectares were the net buyers of land. When compared with the results of survey carried out in 1985, purchase/ sale transactions have increased manifolds. In spite of declining real profitability, the medium and large farmers find investment worthwhile for falling back on, as symbol of social status and hoping for increasing prices of land over time.

Land Price

The price of land obviously varied from year to year. Being immobile in character, land price is, by and large, dependent on the location of land i.e. nearness to road, adjoining the farm of buyer, being easily approachable and having better access to other infrastructure. The type of land including fertility status of soil, other fixed structures such as buildings, sheds, source of irrigation, fence, trees etc. and the dimensions of the piece of land are some important considerations apart from the degree of competition between buyers. Therefore, unlike mobile commodities, land price cannot behave systematically.

Price of land dependent on the location of land.

The number of land transactions by the 678 sample farmers was only 9 in 1985, which increased to 15 in 1987, then falling to 4 in 1993 (Table 5). Thus the land market remained almost frozen during this period due to political turmoil in the state. The revival of land market started in 1994 with 20 transactions, rising to 35 in 1997 and 33 in 1998. The average price increased from Rs. 41675 per hectare in 1985 to Rs. 304775 per hectare in 1999. Across the regions,

land price too varied widely. The highest prices were observed in central districts where buyers had more off-farm income particularly earnings from abroad. A trend of declining price of land was set in the cotton belt due to problem of rising ground water and even water-logging in the area.

Table 5: Land prices in relation to value productivity in Punjab, 1975-1999

Year	Number of trans-actions	Land prices (Rs/ha)		Value productivity (Rs./ha)		General price index
		At current prices	Index	Value	At current prices	
1975	*	32500	100.00	3801	100.00	100.00
1976	*	40000	123.08	*		98.91
1977	*	35000	107.69	*		100.97
1978	*	50000	153.85	*		106.23
1979	*	50000	153.85	3499	92.05	106.23
1980	*	57500	176.92	1614	42.46	124.41
1981	*	55000	169.23	1399	36.81	146.48
1982	*	57500	176.92	5273	138.73	161.66
1983	*	80000	246.15	6063	159.51	169.58
1984	*	87500	269.23	5788	152.28	182.35
1985	9	41675	128.23	6132	161.33	194.15
1986	12	51875	159.62	7262	191.05	202.72
1987	15	45825	141.00	7045	185.35	214.52
1988	9	124450	382.92	8870	233.36	232.14
1989	7	189275	582.38	9760	256.77	249.43
1990	16	95000	292.31	11315	297.68	267.86
1991	7	123575	380.23	10716	281.93	295.34
1992	14	144650	445.08	14663	385.77	335.92
1993	4	290625	894.23	18609	489.58	369.71
1994	20	157125	483.46	22446	590,53	400.58
1995	23	137175	422.08	20281	533.57	444.07
1996	26	116350	358.00	20369	535.89	478.18
1997	35	128925	396.69	23795	626.02	508.57
1998	33	158875	488.85	23865	627.86	533.14
1999**	11	304775	937.77	24768	651.62	566.60

* Not available

** Upto March, 1999

Land prices during 1975-99 in relation to value productivity is presented in Table 5. The data for 1975 through 1984 was taken from the survey carried out in 1985 while for the later period the present survey data were compiled. The value productivity per hectare based on mostly prevalent paddy-wheat rotation increased from Rs. 3801 hectare in 1975 to Rs. 24768 per hectare in 1999 showing an increase in its index to 651.62. The land prices, on the other hand, increased at much faster rate i.e. index of land prices went up to 937.77 in 1999. The wholesale price index increased only up to 566.60 during this period. Therefore, in spite of fluctuations in land prices over time which was partly due to quality characteristics, the land market seems to have turned out to be inflationary in the recent years. That is one of the reasons that sale of land is avoided.

Mortgage of Land

Mortgage of land with money lenders was a prevalent practice in the early period of twentieth century. Land was mortgaged with the hope that redemption would be possible. The practice became common among farmers. The mortgager mortgages out the land at an agreed amount of money but possession of land generally is shifted to the mortgagee (to whom the land is mortgaged). The mortgagee cultivates the land at will till the amount is repaid. Only 25 out of 678 sample farmers mortgaged in land while 28 mortgaged out. The mortgaged in as well as mortgaged out area was about one per cent of the total operational area of the sample farmers. In practice, mortgage of land was not done in planned manner like other land transactions. Such transactions take place mostly at the instance of pressing economic need of the mortgager and availability of funds and requirements to increase farm size on the part of mortgagee.

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Feature

Sustainable Management of Water in Agriculture & Commercial Sectors

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There has been a significant change in the pattern of ground water use with a marked shift from irrigation to other commercial sectors. This study analyses the current trends in water use in Tamil Nadu and presents a few policy recommendations.

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Industrialization of the national economy with emphasis shifting from agricultural sector to the industrial sector has resulted in resource transfer from rural to urban areas. In this context, one of the most important natural resources, water, has been transferred from agricultural to urban use and it has led to decline in cultivable land area, cropping pattern change, shortage of labour for agricultural activities and finally degradation of that particular region. There are several factors responsible for the rapid development of groundwater in the post green revolution period. Introduction of modern agricultural technologies in farming and rapid industrialization of economy caused overexploitation of groundwater potential by way of bore wells and other type of wells. The present level of utilization of groundwater potential is about 70 per cent in Tamil Nadu. Private investment in groundwater development has contributed more as individuals own majority of the wells. In India, out of nine million wells, public wells accounts for only less than one per cent. Effect of groundwater diversion from agricultural to non-agricultural use has resulted in loss of irrigated agriculture; from national perspectives, such effects are substantial. Hence a study was attempted to analyse water use patterns.

The main objective of the study was sustainable management of irrigation water among agricultural and non-agricultural uses in Coimbatore district. Specifically,

- To study water use pattern in agricultural and non-agricultural sectors.
- To study the practices/methods of water transfer from agriculture to non-agriculture uses.
- To analyze the factors responsible for water transfer from agriculture to non-agriculture uses and to identify its socio-economic impacts on irrigated agriculture.
- To suggest suitable policy options for sustainable management of irrigation water among the different sectors.

Table 1: Farm size, family size and non-farm income (area in ha.)

Category	No. of farms	Farm size			Family size	On-farm income (Rs.)	Non-farm employment	
		Garden land	Dry land	Total			Income Rs./year	No. of persons engaged
				Sellers				
Small	77	1.60***	0.91***	2.51***	4.11***	3725***	59854***	1.91***
Large	45	2.88***	3.81	4.45***	8644***	114155***	1.61***	
				Non-sellers				
Small	41	1.12	0.43	1.55	3.51	23089	18783	0.64
Large	17	2.30	3.36	5.66	3.46	42348	58076.5	0.31

Note: ***, ** and * indicate that the values were significantly different from corresponding figures for the other category at 1 per cent, 5 per cent and 10 per cent levels respectively.

Methodology

Tiruppur and Palladam taluks were selected based on the intensity of water transfers compared to other taluks and then Tiruppur, Palladam and Pongalur blocks were selected randomly. Ten villages in Tiruppur, Palladam and Pongalur blocks were selected in different directions and distances from Tiruppur municipality. 180 farmers were selected randomly from the selected villages and the selected farmers were post-stratified into three groups based on the distance of their fields from the town viz., inner (3-5 km radius), middle (6-10 km radius) and outermost rings (above 10 km radius). The sample was also post-stratified into small (<2 hectares), medium (2-4 hectares) and large (>4 hectares) farms to study the farm characteristics. Probit regression analysis was used to analyze the sustainable management of water among agriculture and commercial sectors in Coimbatore district.

Results & Discussion

Table 1 presents the details of farm categories. Out of the 180 farms selected for the study, 67.78 per cent were water sellers and 32.22 per cent were non-sellers. The small and large farm categories accounted for 65.55 cent and 34.45 per cent respectively. The average size of farms was found to be marginally higher in seller group than non-seller group and it was statistically significant. It could also be observed from the table that the proportion of dry land to the total farm size was found to be lower in non-sellers than in sellers in the two farm-size categories. This could be one of the reasons for water sales by the well owners. Similarly, the mean non-farm income and the mean number of persons engaged in non-farm activities were significantly higher in seller group than in non-sellers.

The proportion of dry land to the total farm size was found to be lower in non-sellers.

Table 2: Value of farm assets (Rs. per farm)

Farm category	Current value of			Total
	Land (Rs./ha.)	Buildings	irrigation structures	
		Sellers		
Small	421157***	4304	84196***	509657
Large	1067243***	6773	131828***	1105844
		Non-sellers		
Small	257192	34640	23577	315409
Large	873225	36215	45496	922342

Note: ***, ** and * indicate that the values were significantly different from corresponding figures for the other category at 1 per cent, 5 per cent and 10 per cent levels respectively.

The current value of all farm assets (Table 2) ranged from Rs. 5.10 lakhs to Rs. 11.06 lakhs in different farm categories in sellers, while it varied from Rs. 3.15 lakhs to Rs. 9.22 lakhs in non-sellers. The value of irrigation structures ranged from Rs. 84,196 to Rs. 1,31,828 in sellers, since the sellers invested more money on bore wells, electricity connection, motors (submergible motor) and water storage structures, whereas in case of non-sellers, the investment was significantly lower on irrigation structures, which ranged from Rs. 23.577 to Rs. 45,496.

Pattern of well ownership

The farm size category-wise distribution of wells, number of wells per ha. of land and number of failed wells are given in Table 3.

Among the three type of wells viz. open wells, open cum bore wells and bore wells, open wells formed the

Table 3: Farm size and ownership of wells

Category	Number of wells per farm			Total number of wells per farm	Number of abandoned bore wells	Number of functioning bore wells per farm	Irrigated land in ha. per functioning well
	Open well	Bore well	Open-cum-bore well				
Sellers							
Small	1.06* (23.40)	2.96*** (65.34)	0.51NS (11.26)	4.53*** (100)	1.24** (41.89)	1.72*** (58.11)	0.28***
Large	2.04** (25.09)	5.03*** (61.87)	1.06NS (13.04)	8.13*** (100)	2.88** (57.26)	2.15* (42.74)	0.67***
Non-sellers							
Small	0.80 (24.54)	2.02 (61.96)	0.44 (13.5)	3.26 (100)	0.88 (43.56)	1.14 (56.44)	1.18
Large	1.62 (28.83)	3.08 (54.80)	0.92 (16.37)	5.62 (100)	1.73 (56.17)	1.35 (43.83)	2.21

Note: ***, ** and * indicate that the values were significantly different from corresponding figures for the other category at 1 per cent, 5 per cent and 10 per cent levels respectively.

majority in all categories of farms, whereas in the seller and non-seller groups, bore wells dominated the total number of wells owned by each of the farm categories. This might be due to the declining groundwater table and continuous deepening of existing wells. To meet the industrial and domestic water requirements and to maintain the existing irrigated area due to increasing water scarcity, farmers were forced to invest more on wells and related investments. Deepening of the existing open wells and making new ground level bores (bore wells) were common. Bore wells dominate for more than 50 per cent of the total number of wells in large farms, whereas in the case of small farms, bore and open-cum-bore wells have been shared equally. The general opinion was that making new bore wells is cheaper, when compared to open-cum-bore wells due to operational difficulties. According to the farmers, bore wells had more success rate than the open cum bore wells. This is because, many farmers found it difficult to add bore holes in the existing open wells as these wells have already dried up.

Bore wells dominated the total number of wells owned. This might be due to the declining groundwater table.

Another reason for the distribution of more number of bore wells is that the groundwater exploitation and well density had resulted in low rate of success in the case of open-cum-bore wells. The yield obtained through open-cum-bore wells had affected the functioning of open wells in several cases indirectly, and also storage of extracted water from open-cum-bore wells is another problem, because the rocks have high permeability and result in drainage of entire water stored in the open well.

Groundwater exploitation and well density had resulted in low rate of success in the case of open-cum-bore wells.

Another important observation noted from the table is that both the total number of wells per farm as well as the irrigated area per functioning well were significantly higher in non-sellers than in sellers. The higher irrigated land per well in non-seller categories might be an indicator of intensity of water transfer out of agriculture and hence less area irrigated per well. This also implied increasing tendency to sell water irrespective of farm size. The number of abandoned bore wells was also significantly higher in all categories of farms, since open wells have acted as a storage tank for storing the water extracted from bore wells. The percentage of failed bore wells to the total number of wells per farm ranged from 41.89 per cent in large farms to 57.26 per cent in small farm group in seller category. For non-seller category, it varied from 56.17 per cent in large farms to 43.56 per cent in small farms.

The details of depth, age of wells, pumping capacity and distance to nearest well are presented in Table 4 which reveals that the depth of open wells ranged from 31.06 to 33 metres in the seller category and in the case of non-sellers, it was 22.84 to 25.47 metres. The depth of bore wells was in the range of 138.86 to 152.65 metres in the sellers' farms and 104.48 to 115.26 metres in non-sellers farms. There was a big difference in the depth of open wells and bore wells among the seller and non-seller category, which was due to difference in water use pattern as sellers received comparatively attractive price through selling the water to industries rather than doing agriculture. Hence sellers invested

more money on extracting large quantum of water, through deepening of existing open wells and making six inch rather than 4½ inch diameter bores. In the case of non-sellers, income was comparatively less due to less remunerative price for their agricultural produce. Further, deficit water supply coupled with high labour wage affected their income levels.

Table 4: Depth, age of wells and the distance to nearest well

(Distance and depth in metres)

Farm size	Depth of well		Mean age of the wells	Mean distance to nearest well	Mean pump capacity (HP)
	Open wells	Bore wells			
Sellers					
Small	31.06**	138.86**	40	123.68	5.12**
Large	32.67**	152.65*	58	202.48**	9.03
Non-sellers					
Small	22.84	104.48	36	128.29	4.63
Large	25.47	115.26	60	268.85	7.50

Note: ** and * indicate that the values were significantly different from corresponding figures for the other category at 1 per cent and 5 per cent levels respectively. The open-cum-bore wells were included in the bore well category.

The age of wells in both categories was almost similar. Even though the depth of wells in the seller category was significantly different from those in non-seller category, the occurrence of water transfer could be explained by the following facts. The number of wells per farm in sellers was significantly higher even though irrigated land per well was significantly lower. This showed that there was high rate of extraction of groundwater that was not used in agriculture. The mean distance to nearest well was significantly lower in seller category than in non-seller category, indicating higher density of wells and hence there was higher rate of competitive digging of wells among sellers to pump more quantum of water for sales. The mean pump capacity was higher in sellers' category rather than non-sellers category, since most of the sellers had commercial electricity connection through which they could install more powerful extraction mechanism to extract groundwater even up to a depth of 300 metres. In general, free electricity is supplied for agricultural purposes. Since water selling is not allowed under free electricity, farmers get commercial electricity connection by paying a price of Rs. 2.75-3.80 per kwh, which depends on consumption range.

The pump capacity in seller category ranged from 5.12 to 9.03 HP while it varied from 4.63 to 7.50 HP in non-sellers. The higher pump capacity in the sellers might be due to the higher depth of wells; use of submersible pumps and for operate large number of bore wells to extract more quantum of water in a given time. Some sellers had installed generators with capacity up to 30 HP at a cost of Rs. 1.5 lakhs to extract water during power cut periods.

Factors influencing groundwater transfer from agriculture to industrial uses

Groundwater market mechanism is an important tool for reallocating water from agricultural to the industrial uses. Most economists presume that such urban water trading will be efficient, since groundwater holders reveal their valuation of water by selling for industrial/urban uses. It induces farmers to use water more efficiently by modern water saving techniques like drip irrigation for crop cultivation. Those with comparatively lower income from agriculture sell water to industrial/urban uses and others who realise higher efficiency in water use remain in agriculture. However, the short-term valuations of water in agriculture based on the income realised are conditional on the personal and socio-economic characteristics of the concerned farmers. As a result, short-term valuations of water in agriculture may be different from long-term valuations that are determined mainly by the physical characteristics of the particular region and land, which will be discussed later.

Valuations of water based on the income realised are conditional on the personal and socio-economic characteristics of the concerned farmers.

Farm level survey data were used to estimate the Probit model that explains farmers' decision to sell water as a function of personal and farm characteristics. The exogenous variables used to explain the sales decision are farm size, distance to city, on-farm income, off-farm employment, labour scarcity, water availability, well ownership and soil quality. The marginal effects of a change in one of the independent variables on the probability of participation are calculated at the mean of each variable and are presented in Table 5. The corresponding elasticities (the percentage change in the probability of selling given a 1 per cent change in the value of the variable) are given for the continuous variables, as is the difference in the probabilities as the discrete variables change from zero to one.

The overall fit of the statistical model is good. Tables

Farm sizes significantly and positively influenced water sales.

5 and 6 present the model estimates. Influence of the relevant characteristics on water selling and their significance are explained by the estimated coefficients of the model. However, the elasticity estimates show inelastic responses to changes in farm size, on-farm income, labour scarcity, water availability, well ownership, distance to city, off-farm employment and soil quality characteristics. Farm sizes significantly and positively influenced water sales and for each hectare of additional holding by a seller, the probability of water selling increased by 0.246 per cent on an average for the entire sample. This suggests that a 10 per cent increase in farm size would result in about 2.46 per cent increase in participation in water selling by the sample farmers.

Table 5: Results of elasticity decomposition for changes in water sales characteristics perceived by sellers

Variables	Estimated Coeffi-cients	Standard Errors	T-ratio	Mar-ginals	Elasti-cities*
Constant	0.1389	0.5970	0.2327	0.0433	
Farm size	0.1248	0.0311	4.0123	0.3887	0.2456
Distance to city	0.0812	0.0338	2.404	0.3463	0.3233
On-farm income	–0.0005	0.00007	–6.0235	–0.5666	–0.6019
Off-farm employment	0.0878	0.2890	2.3037	0.0189	0.0160
Labour scarcity	0.2178	0.2980	0.7309	0.0498	0.4159
Water availability	–0.5651	0.2928	–1.9301	–0.1175	–0.0940
Well ownership	0.1442	0.2902	2.4968	0.0312	0.0259
Soil quality	–0.6795	0.3421	–1.9864	–0.1460	–0.1208
Log-likelihood function					–60.80
Restricted log likelihood					–110.79
Likelihood ratio test (c)					99.96

Note: ***–1 per cent, **–5 per cent, *–10 per cent level significance and NS - non significant.

The elasticity of the distance to city variable has shown that one kilometer increase in the distance of the farm from city would result in 0.323 per cent increase in the probability of participation in water selling. It might be expected that lands closer to city could be sold for urbanization and industrial development and groundwater source available within short distance would be of poor quality (TDS > 1200 mg l^{-1}), which would not suitable for dyeing processes. Hence, water has been transferred from the farms located faraway and having good quality groundwater.

Owners whose major occupation was farming have been less likely to participate in water selling. A 10 per cent increase in on-farm income is expected to result in about 6.02 per cent decrease in the probability of participation in water transfer. When farming is the major occupation as well as when profitability from on-farm activities is higher, the farmers had less reliance on income from water sales.

Table 6: Actual versus predicted outcomes of econometric model

Actual	Non-sellers	Predicted sellers	Total
Non-sellers	35	20	55
Sellers	20	105	125
Total	55	125	180

Off-farm employment opportunity significantly influenced farmer participation in water selling. The probability of participation in water sales could increase by 0.016 per cent as off-farm employment increases. A 10 per cent improvement in the case of groundwater availability is expected to result in 0.94 decrease in participation in water sales by farmers. Water availability will increase farming activities such as vegetable cultivation as the farms close to city centers would get more remunerative price than selling water. Ownership of well has the largest influence on participation in water sales. A one per cent increase in ownership of well has the impact on the probability of participation by 0.0259 per cent.

Owners of farms with good soil are less likely to sell their water than those with land of poor quality. The elasticity of probability of participation in water sales could fall by 0.1208, as soil quality is good. This result is intuitive since owners of low quality farmland might have lower yields and hence lower revenues, thus making agriculture less profitable. Difference among water sellers and non-sellers with respect to labour scarcity is not significant. They might still however, have indirect influences on water sales. Interview with sellers revealed that these factors did motivate few farmers to sell their water for industrial uses. Many farmers cited non-profitability due to low price for agricultural produce and low yields due to inadequate water as factors in their decision to sell water. Yet another reason was that the farmers were simply tired of the increasing demand for water in the area and decided to begin farming outside the particular region or quit farming due to off-farm activities.

The agricultural community centred in Tiruppur is small, both interms of land area and population, compared to urban population. Many of the farmers have been living in this area for the past several decades; some farmers continue agriculture even if agriculture is non-profitable. A number of recent happenings have contributed to the reduced water availability and uncertainty over future water supplies. First is the frequent and serious drought in the region; the second is the reduction in water supplies due to changes in operational procedures in the Parambikulam Aliyar Project. The PAP system was designed to hold 30 TMC (Thousand Million Cubicfeet) of water annually. In practice only about 28 TMC of water could be available for irrigation and the amount of water realised during the past three decades was only 18 TMC. Previously PAP system command area was divided into three zones and water was released to each zone for irrigation, once in 18 months for 135 days on seven days on/off turn basis. Later in 1992, additional 1.75 lakh acres was brought under PAP system. Hence, operational procedure has changed to four-zone pattern, wherein farmers were able to get water once in 24 months, subject to a normal rainfall in the catchment areas of reservoirs. Otherwise, the intervening period might even exceed the above said duration of 24 months. These events have made many farmers concerned about the future of agriculture in the area.

Future water demand from urban and industrial sectors is a major issue for many non-selling farmers. The uncontrolled growth of this urbanisation and the corresponding rapid increase in urban demand for water is seen as a threat to future irrigated agriculture in the region. Other related concern was the government inactivity on future planning for meeting the increasing water demand. Although farmers did not oppose groundwater being transferred to urban domestic uses, they opposed reallocating groundwater from agriculture to industrial uses. Since quantum of water transferred was very high and impact of water selling on neighboring farms was very serious, damage on irrigated agriculture is irreversible.

Uncontrolled growth of urbanisation and the corresponding rapid increase demand for water is a threat to future irrigated agriculture

Water supply to Tiruppur largely depends on private tankers 71 per cent of water requirements of Bleaching and dyeing industries are met from private well owners. The remaining 10 per cent of the transferred water goes to domestic and commercial establishments. It is estimated that there are about 235 tanker lorries with an average capacity of 12000 litres involved in water transfer from agriculture to industrial uses. Generally, each lorry operates an average of 8-12 trips per day and drivers are working day/night turn basis. The water transfers take place from villages in and around the Tiruppur town at a radius of 7-30 kilometres and village agricultural wells act as main source for industrial water supply. Water table in the wells ranges from 24-150 meters, since Tiruppur region belongs to the groundwater over-exploited (dark) region. Groundwater yields are very low in summer months and good during monsoon period in the region and groundwater is recharged whenever canal water from Parambikulam Aliyar Project (PAP) is released for irrigation.

Impacts of groundwater transfer at farm level

The details on depth of water table and other information in the sample farms are presented in Table 7. The data reveals that the mean depth of water in dry years (those years during which average rainfall in the study area is less than district average rainfall) in seller farms has ranged from 22 to 26 metres below surface level, while it was lower in the case of non-seller farms, ranging from 20 to 25 metres. In normal years, the water table level in the region was higher in both the farm categories and was in the range of 6 to 9 metres below surface level. It could be inferred that even though non-seller has been using groundwater in a conjunctive way, the water table would be in the declining trend, because of the external

Table 7: Impacts of groundwater transfer at farm level

Variables	Seller		Non-seller	
	Small	Large	Small	Large
a. Normal years	8.90	6.50	7.81	5.94
b. Dry years	21.87	25.99	20.01	24.74
Average reduction in area irrigated due to intensive water selling of the nearest farm (ha.)	–	–	0.54***	0.26***
Investment on open well (Rs./well)	98921*	127084***	108275	86924
Investment on bore well (Rs./well)	23455	60746***	32797	39417
Investment in water selling structures (Rs.)	45780	90540***	–	–
Cropping intensity (%)	43.80	26.32	146.70	113.85

Note: ***, ** and * indicate that the values were significantly different from corresponding figures for the other category at 1 per cent, 5 per cent and 10 per cent levels respectively.

effect caused by the seller through continuous pumping for sales. The average reduction in area irrigated by the non-seller sample well, after the continuous pumping of water for sales by the nearest seller was significantly higher, ranging from 0.54 and 0.26 hectares in small and large farms respectively. The effect of water sales on large farms was very low when compared to small farms, because large farms could manage to dig a new bore well, since their land area was large, they could easily find a new source to cope with the water scarcity. The reduction in area irrigated by wells would indicate not only a reduction in farm income and employment, but also higher variability in income to non-sellers over time and space.

Information on dry years and normal years was obtained by recalling the latest dry and normal years by the respondents and comparing with the observation well readings maintained by PWD[1].

Investment in wells was higher among sellers than among non-sellers. Investment per open well at current price ranged from Rs. 98921 to Rs. 127084 among the sellers and from Rs. 108275 to Rs. 86924 among the non-sellers by small and large farms respectively. There was significant difference in the investment pattern on open wells among two categories. Generally, small farms were more dependable on open wells and open-cum-bore wells rather than bore wells, since cost of bore wells is cheaper but costs on other accessories required for pumping water such as casing pipe, delivery pipe, etc., were higher. The investment made on bore wells ranged from Rs. 23455 to Rs. 60746 for seller category of small and large farms respectively, while it varied between Rs. 22797 and Rs. 39417 in non-seller category of small and large farms. There was significant difference in investment pattern on bore wells between seller and non-seller categories. Reason for the difference in investment pattern was due to continuous pumping of water for sales by sellers through which sellers were receiving good revenue. In some cases, within a short period, bore wells dried off due to continuous pumping. In such cases, sellers invested on new borewells, but in the case of non-sellers, they would not invest much on bore wells, since they notice that the resultant returns was marginal. Generally, non-sellers prefer to invest more on open well deepening wherein, the open wells would help the non-sellers after canal water period and monsoon seasons as well as acting as storage tank for storing the water pumped from borewells. The investment made on water selling structures such as storage tank, generator, advanced motors and pumps were significantly higher in large seller farms compared to the other group.

1. Records of office of the Groundwater Cell, Public Works Department, Coimbatore.

The cropping intensity in non-seller farms was lower both in the two farm types than in the seller farms. Especially, in the case of large farms, cropping intensity was very low, since they were engaged in off-farm activities and they were in a position to sell the available well water to the industries.

Policy Recommendations

- It could be concluded from this study that there was high rate of groundwater transfer from agriculture to industrial uses which would lead to over-exploitation of groundwater resource in the study area. Since already the study area falls under 'dark' category there is need for a comprehensive approach to harness the available surface water sources; rainwater harvesting should be propagated so that groundwater recharge could be increased.
- Groundwater recharge could be enhanced through artificial recharge structures such as percolation and farm ponds and check dams. Since our country's monsoon is seasonal with short duration the run-off due to high precipitation within short spell could be used for groundwater recharge through these minor irrigation projects.
- In spite of full subsidy for electricity for well irrigation, crop production under well irrigation has become non-remunerative and more risky, thus prompting the farmers to prefer water sales over irrigated agriculture. Hence, suitable policies should be formulated to mitigate risk in crop production under well irrigation and to increase the profitability of well irrigated agriculture.
- More research is indicated on the nature and functioning of informal water markets for equitable, efficient and sustainable intersectoral transfer to achieve industrial and agricultural developments without affecting the economy and environment.

Suitable policies should be formulated to mitigate risk in crop production under well irrigation and to increase the profitability of well irrigated agriculture.

- Advanced methods such as drip and sprinkler and improved gravitational irrigation methods should be introduced, so that water wastage during irrigation could be minimised.
- Legal measures such as regulation of deepening and new wells and distance norms are to be strictly enforced. □

Feature

Impacts of GATT on Indian Agricultural Biodiversity & Patenting Issues

S. Ramasamy & Chellam Balasundaram

Modern agriculture has paved the way for erosion of cultivated biodiversity by ushering hybrid varieties of crops. The imposition of GATT in developing countries has resulted in increased agricultural exports than imports and unanticipated complications that might undermine food security. Patenting is another issue which does not take into account the wealth of indigenous knowledge. While multinational companies develop the carefully chosen crops into transgenic crops netting huge profits, the already impoverised farmers in future may have to depend upon these companies for supply of improved seeds. This might get aggravated further if the terminator gene is introduced in these countries which will make the seeds to self destruct after a single crop. Some of the looming issues in the sphere of agriculture are discussed in this paper.

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Indian economy is primarily driven by agriculture. In this regard, Dunkel proposals have put forth several changes and regulations which interfere almost in every aspect of the Indian agricultural policies. The Indian Government has accepted Dunkel draft without any amendments, raising several pertinent questions in the minds of intelligentsia.

Nations do not enter into treaties and agreements, multilaterally or bilaterally simply on the basis of monetary gain. Certainly, questions of national sovereignty, equality of participation in decision making process, status, impact on national psyche, signals emanating from the process and content of the negotiations etc., are no less relevant. The basic questions are about national priorities, development policies, domestic power balance and the way our views are presented in the committee of nations. There are severe doubts about whether the government had considered these issues while signing the treaty.

Table 1 shows the impact of GATT on Indian agriculture.

Table 1: Agricultural exports (Rs. crores) during the period from 1970-71 to 1990-91

Year	Exports	Computed Value
1970-71	487.00	37.652
1975-76	1493.63	1256.089
1980-81	2057.00	2674.520
1985-86	3018.00	3992.96
1990-91	6317.00	5311.40
	13372.63	13372.00

A regression line for the data in Table 1 was fitted to find out the linear trend. The derived equation with the year as the independent and exports as the dependent variable is $\hat{Y} = 1318.449\ X - 1280.79$. The computed

values for each year is given in Table 1. Projecting the export values for the year 2011 indicate that the export would be 10,585.15 crores. It could be further noticed that during the period 1990-91 in the absence of GATT, the export value was Rs. 6317 crores. After implementation of GATT, agricultural exports are likely to increase very slowly due to implications like patent rights, phytosanitary conditions etc. Agricultural exports increased just by 1 per cent (Rs. 5991.38 crores) during the year 1995-96.

Table 2: Agricultural imports (Rs. crores) during the period from 1970-71 to 1990-91

Year	Imports	Computed Value
1970-71	441.00	904.68
1975-76	1516.70	1091.01
1980-81	1294.00	1277.34
1985-86	2008.00	1463.67
1990-91	1127.00	1650.00
	6386.70	6386.70

With reference to agricultural imports (Table 2) the developed regression equation is $\hat{Y} = 718.35 + 186.33 \times 9$; projected for the year 2011 the value will touch 2395.32 crores. Table 2 provides imports of agricultural products in the absence of GATT; but after implementation of GATT the imports of agricultural product would increase by more than 1 per cent. In this context some of the issues that will adversely affect food security in India are presented.

Agreement on Agriculture

For the first time agriculture has been included in the agreement of world trade organisation. The agreement on agriculture puts forth several new conditions. Apart from these, the other newly included agreements on IPR, TRIPS, TRIMS are bound to affect agricultural activities in a major way. For instance, the sanitary and phytosanitary clauses included as part of the agricultural chapter, allude to the need to maintain health standards in food exports and imports. This means that any exported food item should be free from infection, chemical residues and harmful additives. This is a perfectly legitimate clause if applied universally. But paradoxically it is not mentioned what exactly constitutes an infringement of the phytosanitary clause. The interpretations are left open, thereby giving food importing countries a potent non-tariff barrier to block imports at will under the sanitary standards. Those who have been aware of the dangers of this clause must have followed with dis-quiet its operation with respect to recent food exports from India.

Agreements on IPR, TRIPS, TRIMS are bound to affect agricultural activities in a major way.

Last year, a large consignment of grapes from Maharashtra was returned by a European country with the argument that the pesticide residues in the fruits were too high. The actual reason was the glut of table grapes in European countries. Some years ago, Indian tea faced a ban in Germany also because of high levels of chemicals. The real reason was that because of foreign policy considerations, Germany had to buy tea from other countries in Africa and Asia.

Bio Diversity

Genetic resources have been declared to be the common heritage of mankind. This has led to a blatantly unfair situation in which use of these resources has never been paid for. While countries like Canada and Germany are able to earn from their copper and coal, how could the Third World be denied of the opportunity to earn from its biological diversity? If the copper found in Canada is Canadian and the coal found in Germany happens to be German, then by the same principle, genetic resources found in the Third world will have to be considered as their property. These resources have acquired their recognisable, economically important form because of the labour and ingenuity of Third world farmers and indigenous people. Rice, potato and cotton plants were not lying around in the forests waiting to be picked up. Food and cash crops on which the very survival of the human race is based, were created in tropics from wild plants by generations of careful breeding and selection. This innovative, laborious process carried out by the farmers of the Third world has gifted the world a stable, secure food supply and many grain dollars to countries exporting agricultural surplus.

The Third world farmers have not only selected almost all important crops, but also have identified in several cases, the genetic traits that gave these crops desirable characteristics. The first disease resistant potatoes were bred by the farmers of Bolivia. To the West African farmers goes the credit of breeding some of the first insect resistant bean varieties. Rice and certain varieties of wheat were bred by Indian farmers.

The Third world farmers have not only selected almost all important crops but have also identified genetic traits. If genetic resources are to be privatised, they must be acknowledged as the property of the Third world and paid for.

If genetic resources are a common heritage, they cannot be private. If they are to be privatised, they must be acknowledged as the property of the Third world and paid for, like any other privately owned resource. A correct step in this direction has been taken in the Biodiversity Convention which was signed by most nations at the Earth Summit held at Rio de Janero from 7-14, June 1992. This treaty acknowledges the sovereignty of nations over the biodiversity resources found in their territories.

Patent Issues

In the field of agriculture, the future belongs to bio-fertilizers and bio-pesticides. The current level of agrochemical use is not ecologically sustainable. There is, therefore a great effort to seek benign substitutes for chemical fertilizers and pesticides. To a large extent these bio-substitutes are based on micro-organisms which include such living creatures as bacteria, viruses, fungi, algae (the green scum that grows near water), small plants and animals and now even genes.

With the tools of genetic engineering it is now possible to shift genes from micro-organisms to plants and animals and vice-versa. When genes from micro-organisms are transferred into higher plants and animals, the genetically modified "transgenic" plants and animals, containing foreign genes are produced. Patents will have to be given for such transgenic organism which in fact will work like a patent on the modified plants and animals themselves. That is not all. There is a concerted effort on the part of the multinationals involved in biotechnology to push for changes in the definition of micro-organism itself. According to such corporate philosophy, micro-organisms should include now such new categories as cell lines and genes. This will greatly enhance the scope of patents under the micro-organism label since many cell lines are from plants and animals and even humans. The inclusion of genes as micro-organisms means that without any further hitch all transgenic forms of higher plants and animals can be patented. However, the patenting of the classical micro-organism alone will cause substantial damage to the Third World. There are vital economic factors linked to micro-organisms including agriculture, pharmaceuticals and industrial biotechnology. Growth in these areas will be severely hit if key patents are owned by foreign companies.

Patenting of the classical micro-organism alone will cause substantial damage to the Third World.

India should refuse to accept patents on micro-organisms for a variety of reasons. At best it could grant patents only on products derived from certain organisms, that too for a specific use, but under no circumstances should it accept patents on the organism itself. This position was not defended and we will now have to change the Indian Patent Act of 1970, to include life forms as a patentable category. But conditions have gone far beyond our control already. For instance, Bio-fertilizers are preparations containing a mix of cells which can provide major nutrients like Nitrogen and Phosphate to plants. India, China and other rice growing countries have successfully begun to use these to supplement chemical fertilizers in paddy cultivation. Bio-fertilizer use is now being extended to other crops with very good results. Multinational companies have already patented such commercially valuable genes.

A biotechnology company based in Belgium has already patented the toxic gene of bacterium Bacillus thuringensis and will prevent the Third World from using it without paying royalties. A neem-based biopesticide has similarly been patented by W.R. Grace, an American company and India that has used biopesticides from neem for hundreds of years will have to pay license fees to use its own products. Developing countries lag behind pitiably when compared to the fast rate in which such breakthroughs based on tropical plant and animal resources are made and patented. This will badly reflect on our agriculture front.

For instance according to estimates, India with an investment of Rs. 30 crores in bio-pesticides could replace at least Rs. 200 crores worth of imported plant protection chemicals. Although we have indigenous knowhow, our efforts at translating this into viable market products will need a long gestation period and hence we will end up paying royalties for our own "modified" resources.

India's IPR system must clearly state that reward for breeding companies through any form of Plant Breeders Rights will only be granted if the labour and innovation of the farming community are similarly

rewarded and if genetic resources are treated like other natural resources.

Seed Politics

Biodiversity erosion will in turn lead to the erosion of the rich cultivated crop diversity of our country. Due to royalty payments, the prices of seeds will go up.

Biodiversity erosion will lead to the erosion of the rich cultivated crop diversity.

Monopoly control on seeds linked with corporate control over agriculture will lead to large-scale disappearance of farmers' varieties, thus threatening biodiversity conservation as well as farmer's survival. The changed economics resulting from IPRS will lead to the displacement of small farmers who will get into debt and destitution. Large-scale uprooting of agricultural society, without equivalent absorption in new industrial opportunities will lead to social disintegration, spurt in crime and breakdown of law and order.

Intellectual property protection in the area of agriculture and plant variety will undermine food security since the protected and patented varieties are not linked to food needs but to the processing and marketing requirements of agribusiness. The shift to control of agriculture through the control of seed will also contribute to secondary impacts of other natural resources like land and water. IPRs in the area of seeds and plants will increase the national debt tenfold.

Intellectual property protection in the area of agriculture and plant variety will undermine food security.

In practical terms, allowing patenting in the field of agriculture will encourage monopoly control of plant materials by Western transnational corporations. This in turn will make farmers dependent on corporations for the most critical input in agriculture, that is seed. This monopoly control is more far reaching given the takeover of seed companies by the large chemical and agribusiness corporations which control other inputs into agriculture such as fertilizers. pesticides and herbicides. The monopoly control might reach alarming properties and the recipient countries will have no option but to buy seeds from Transnational companies. Such a scenario might become true since terminator gene which allows seeds to self destruct after producing a single crop has been developed by United States Department of Agriculture (USDA) in collaboration with a private seed company. The Terminator gene could spread through cross-polination and cause a gradual extinction of the traditional crop varieties; in the words of Dr. Paroda, the Director General of Indian Council of Agricultural Research. There is no way to ensure that this dangerous gene does not cross Indian borders. It is always possible for one to struggle in seed samples. Thus the multinational will control everything grown and eaten. Such private biotechnology from the U.S. would spell doom for India's 400 millions farmers unless a moratorium on the application of Terminator technology is imposed by World Trade organisation.

The undermining of food security will increase food imports and hence the foreign exchange burden, thus inviting deeper conditionalities from institutions like the IMF and World Bank. The erosion of food security will create food dependency turning food into a weapon in

The undermining of food security will increase food imports and foreign exchange burden.

the hands of industrialised countries thus leading to total slavery and unbreakable recolonisation. Policy makers are to take note of all these possible repurcussions and do the needful to protect the rights of Indian farmers. □

Feature

Agroforestry & Household Time Allocation: The Case of Silvipastoral System

D. Suresh Kumar & C. Ramasamy

The overall goals of an agroforestry system are to improve the existing situation through increasing both the quantity and quality of production, to generate a sustained agricultural product base, to decrease environmental damage and to raise the living standard of the human population. Recognising the important roles played by trees in the household economy, the present study aims to examine the influence of agroforestry on household time allocation among resource poor farm households. It is recommended that it is essential to encourage investment on irrigation, development of wastelands by promoting tree growing and development of forestry-based small scale industries in the rural areas so as to improve the welfare of the resource poor farm households.

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Improving the welfare of the rural population is the most important goal of international crop improvement and agroforestry research. Introduction of agroforestry in areas with traditional farming systems could be considered as a process of technological change and a production oriented policy intervention towards improving household food security (Braun, 1992). The overall goals of an agroforestry system are to improve the existing situation through increasing both the quantity and quality of production, to generate a sustained agricultural product base, to decrease environmental damage and to raise the living standard of the human population. Considering the slow adoption of agroforestry systems by resource poor farmers, there is need for better understanding of the relationship between the various components of agroforestry system and other crop production system in improving the welfare of farm households, those of resource poor farmers in particular. Given the nature and diversity of benefits from an agroforestry system, there is a need to understand the nature and extent of its impact on poor farm households.

Agroforestry: Benefits

Trees in agroecosystem are planted and managed in the farming system, and can also be raised in common property lands. These non-forest sources of production are becoming increasingly important with the growing decline and degradation of forests and the increase in demand for fuel, fodder and other products. Privatisation and encroachment reduce common property resources and overuse degrades those that remain, so there is a general trend towards greater reliance on on-farm resources.

Traditionally, farmers grow trees on their land with one or more specific objectives—to make use of the degraded and waste lands for tree crops with or without annual crops, with a view to enhance employment and

income. There are three broad categories of use of tree products: direct use by the households as fuel, food etc; inputs into the agricultural system such as fodder, manure and mulch; and as sources of rural household income and employment (Arnold, 1991). The tree component introduced in an agroforestry system is a technological substitute for fuel, timber, fodder in many subsistence economies, which could improve farm household welfare – First with its contribution through green manures to increase productivity of agricultural field crops and the associated reduction in the cost of chemical fertilizers. Second, as animal feed in increasing the livestock production which could be directly used as food or sold in the market. Third, by increasing the availability of fuelwood and hence reducing the time and energy involved in collecting fuelwood and the cost of purchased cooking fuel. In addition, increased income from timber production enables purchase of consumer goods. Finally, by providing fruits and vegetables directly improving the nutritional status of the household members (Babu et. al, 1994). Besides, the economic rationale of agroforestry lies in cushioning the impact of crop failures especially under unirrigated farming.

Though agroforestry systems have considerable impact on the environmental, ecological and socio-economic conditions of the people who are engaged in it, existing and potential economic contributions of agroforestry have not been rigorously examined, making it difficult to set development and research agenda. Studies show that most economic studies have focussed on location specific assessment of financial returns from particular practices. Only a few have examined agroforestry in the context of regional land use changes relative to returns of productive factors or household decision making. The key requirements for more effective use of economic analysis in agroforestry development policy and program design include development of a theoretical framework for analysing the economic role and potential of agroforestry in farming systems and development of better methods of incorporating agroforestry into models of household decision making process (Scherr, 1992).

Keeping these issues in view, the present study aims to examine the role of agroforestry in farm household economy with special reference to household time allocation. For the study, it has been hypothesised that inclusion of agroforestry enterprise in farming system of resource poor farm households alters time allocation, favouring movement of household labour to rural off-farm and non-farm activities. To test the hypothesis, the study examines the influence of agroforestry on household participation in off-farm and non-farm income activities among resource poor farm households. This kind of study is important to reorient the policies regarding development of agroforestry as a tool for improving the status of resource poor farm households and to serve as guideline for policy makers in taking specific measures to improve the level of rural living, agricultural productivity, agroforestry development, and agricultural price policies.

Methodology

Time allocation of resource poor farm households is an important consideration in studying household behaviour. The time of household members is a resource or factor of production. For the resource poor households, time represents the dominant household resource. It is allocated to several activities in such a way as to maximise the welfare of the farm family. Generally changes in wage rates, prices of market purchased goods, non labour incomes and fixed home production factors lead to changes in household consumption and in the allocation of time. Considering this, enough efforts have been made in the present study to analyse the influence of agroforestry in household time allocation favouring movement of household labour to rural off-farm and non-farm economic activities; the following time allocation model was estimated.

Changes in wage rates, prices of market purchased goods, non labour incomes and fixed home production factors lead to changes in household consumption.

Sampling Framework

The present study aims to examine the role of agroforestry in the household time allocation of resource poor farm households in Western zone of Tamil Nadu. The Western zone was purposively selected, as agroforestry enterprise is more prominent in this zone as compared to other regions. Further, the region practices highly differentiated agroforestry systems which have evolved over longer time. The Western zone comprises Erode and Coimbatore districts, Udayarpalayam and Sendurai taluks of Perambalur district, Tiruchengode taluk of Namakkal district, Karur and Aravakurichi taluks of Karur district, Theni district, Dindigul district (excluding Dindigual and Natham) and Madurai district (excluding Madurai South, Madurai North, Melur and Thirumangalam). The agroforestry systems and practices in the region were examined. The distinct agroforestry practices followed are silvipastoral

and agrisilvipastoral systems. In silvipastoral system, trees like velvel (Acacia leucophloea) are allowed to grow inside the farm lands and grasses like kolukattai (Cenchrus celiaris) are raised in the interspace of trees. Cattle are allowed to graze the grasses and goats are allowed to feed the nutritious dried fallen pods of Acacia trees. In agrisilvipastoral system, along with trees and grasses, agricultural crops such as sorghum, gingelly, naripairu, horsegram and groundnut are grown.

In order to cover these different agroforestry systems Erode district of Western zone was selected purposively. Two categories of respondents namely farmers who practice agroforestry (tree growers) and farmers who do not practice agroforestry (non-tree growers) were studied in order to facilitate comparative analysis. A sample of 75 tree growers and 30 non-tree growers were selected for the present study.

Analytical Framework

To study the impact of agroforestry in the household labour allocation to economic activities outside the farm, the model of family labour force participation in off-farm and non-farm activities was estimated. It is expected that the household time allocated to off-farm and non-farm activities may be determined by educational level of the head of household, number of dependents, farm size, number of livestock, area under agroforestry and wage rate.

During the survey, it was found that all the farm households do not participate in off-farm and non-farm activities. Thus the dependent variable participation in off-farm and non-farm activities would be zero for those households who do not participate. Maddala (1989) points out that if the dependent variable is censored, values in a certain range may all be recorded as single value. In such a case, Tobit estimators may be used (Tobin, 1958). Thus, the functional form of the model specified in the present study with a Tobit model, with an error term (U_i) which is independently, normally distributed with zero mean and constant covariance (σ^2), is

$$T_i = X_i\beta + U_i \quad \text{if} \quad X_i\beta + U_i > 0 \qquad (1)$$
$$= 0 \quad \text{if} \quad X_i\beta + U_i \leq 0$$
$$i = 1....n$$

where,

T_i = Probability of participating in off-farm and non-farm income activities

X_i = Vector of independent variables

β = Vector of unknown coefficients

n = Number of observations

Thus the model assumes that there is an underlying, stochastic index equal to $(X_i\beta + U_i)$ which is observed only when it is positive, and hence qualifies as an unobserved, latent variable.

As Tobin shows, the expected value of T_i in the model is

$$E(T_i) = X_i\beta F(z) + \sigma f(z) \qquad (2)$$

where $Z = X_i\beta/\sigma$, f(z) is the unit normal density function and F(z) is the cumulative normal distribution function. Furthermore, the expected value of T_i for observations above the limit, here called T_i^* is simply $X_i\beta$ plus the expected value of the truncated normal error term (Amemiya, 1973).

$$E(T_i^*) = E(T_i/T_i > 0) \qquad (3)$$
$$= E(T_i/U > -X_i\beta)$$
$$= X_i\beta + \sigma f(z)/F(z)$$

Economic implications can be drawn by using the results of the empirical model. Following a Tobit decomposition framework suggested by Mc Donald and Moffitt (1980), the effects of the changes in the explanatory variables on the probability of participation and intensity of participation in off-farm and non-farm activities could be obtained.

The basic relationship between the expected value of all observations, $E(T_i)$, the expected value conditional upon being above the limit, $E(T_i^*)$, and the probability of being above the limit, F(z), is

$$E(T_i) = E(T_i^*) \cdot F(z) \qquad (4)$$

The effect of a given change in the level of the explanatory variables on the dependent variables which can be obtained by decomposing equation (4) is,

$$\frac{\partial E(T_i)}{\partial X_i} = F(z)\left(\frac{\partial E(T_i^*)}{\partial X_i}\right) + E(T_i^*)\left(\frac{\partial F(z)}{\partial X_i}\right) \qquad (5)$$

Thus, the total elasticity of change in the level of the explanatory variable consists of two effects: (i) change in T_i of those above the limit (i.e. elasticity of intensity of participation, for those households who already are participants) and (ii) the change in the probability of being above the limit (i.e. probability of participation in off-farm and non-farm activities).

Tobit model measures not only the probability that a resource poor farm household participates in off-farm and non-farm income activities, but also the extent of participation. The specified model in equation (1) explains the dependent variable, participation in off-farm and non-farm income activities (ONIA) is a function of educational level of the head of household (HEDN), number of dependents (NDEP), farm size (FSIZE), number of livestock (LSTOCK), area under agroforestry (AARE), and wage rate (WAGE).

The definitions of the variables are as follows:

ONIA = Participation in off-farm and non-farm income activities in man days per year (Threshold level is fixed at zero. Thus the dependent variable is continuous if the household participates in off-farm and non-farm income activities and zero otherwise)

AARE = Area under agroforestry in hectares

LSTOCK = Number of livestock

FSIZE = Farm size in hectares

WAGE = Wage rate in rupees per day

HEDN = Educational level of the head of the household[1]

NDEP = Number of dependents

A priori relationship between dependent and selected explanatory variables are visualised as follows.

It is expected that the explanatory variables AARE and LSTOCK may have a positive influence on the dependent variable. Adequate number of trees and livestock population would mean lesser dependence on crop production for subsistence needs and greater ability to deal with cash flow problems. Since trees and livestock husbandry require less labour that too for managerial activities, it releases the household labour and thereby helps the household members to participate in other income activities. it is reasonable to expect that the wage rate in off-farm and non-farm income activities may determine positively the dependent variable, participation in off-farm and non-farm activities. Poor resource base and seasonality in agricultural production force the household members to derive additional income to meet basic needs. Increase in wage rate increases off-farm and non-farm labour supply by the household.

1. The educational levels were illiterate, elementary, middle, secondary, higher secondary and collegiate and the corresponding scores were 2, 4, 6, 8, 10 1nd 12 respectively.

Adequate number of trees and livestock population would mean lesser dependence on crop production.

The explanatory variable FSIZE could be treated as a measure of wealth position of the household; FSIZE may have a negative influence on dependent variable. One may expect that educational level of the head of the household and number of dependents may determine the dependent variable positively. Education may open up opportunities for getting relatively higher paid employment from non-agricultural sector. Since agroforestry enterprise requires less labour, the educated members of the household can go for non-farm employment. Similarly, if the number of dependents increases, participation in off-farm and non-farm income activities increases in order to meet consumption and other expenditure. Thus, number of dependents may have a positive influence on the dependent variable.

The field survey data were computerised using Microsoft EXCEL 5.0. The Tobit model was estimated by using SHAZAM 7.0.

Results & Discussion

The presence of trees as part of contemporary farming systems has its origins in two benefits:

One is their role in maintaining and restoring the physical environment needed in order to sustain crop agriculture; most notably through the restoration of soil nutrients and energy. The other is the role various tree products play in helping sustain the rural household economy. This includes products used directly by households as food, fuel, construction materials; inputs to agriculture such as fodder, mulch and raw materials for making agricultural implements and storage structure; and products or activities that provide household members with employment and income. Trees also help to fill in seasonal shortfalls of income and help reduce risk and lessen the impact of droughts and other emergencies.

Fuelwood is frequently the main source of energy used for cooking. For the resource poor farmers, tree products often provide one of the few income earning options. Products from farm trees are most extensively used to supplement other resource and income flows during particular seasons in the year. Many tree based employment opportunities are seasonal—for example, the collection of neem seeds by the farm family labourers. The seasonality of such activities is dictated

by the availability of the product or raw materials. In some cases, the activities may be linked to seasonally induced cash needs such as loan repayments or school fees. This way trees act as 'mortgage lifters'. Keeping these issues in view, the role of agroforestry in altering household time allocation of resource poor farm households was examined and the results are discussed.

Household Time Allocation

Members of most of the households engage in off-farm and non-farm income activities to supplement agricultural activities with cash income. The important off-farm activities are wage labour for crop production, tree cutting etc., Being mixed farming tract, the large farmers usually engage male or female labourers to herd their livestock. This is an important off-farm wage labour. As far as rural non-farm employment activities are concerned, households usually engage in oil and rice mills. Wage labour for coconut breaking is recently picking up. By this job, on an average a member earns around Rs. 400 to Rs. 500 per week.

Details of household family labour time allocation are presented in Table 1. The total time available with the households is worked out to 983.07 and 1034.17 man days per year for tree growers and non-tree growers respectively. Of the total time available with the households, the total family labour allocated to various activities account for 64.51 per cent and 54.27 per cent for the tree growers and non-tree growers. The remaining time is consumed as leisure. Households allocate their productive time to crop production, livestock, tree growing, off-farm and non-farm activities and household activities. It is seen from the table that households supply 6.23 per cent of their total time to tree growing activities which include pruning side branches, weeding, watch and ward, ploughing etc,. The off-farm and non-farm income activities account for 13.55 per cent and 12.67 per cent of total time for tree growing and non-tree growing households. This implies that tree growing needs less labour and frees the household labour to engage in other activities. The higher off-farm and non-farm labour supply by non-tree growing households is mainly because poor resource base and little scope for crop production force the households to participate in off-farm and non-farm activities to earn their livelihood.

Households allocate their productive time to crop production, livestock, tree growing, off-farm and non-farm activities and household activities.

Inclusion of new enterprises in the farm will directly affect the household behaviour in relation to time allocation. To study the influence of agroforestry in household time allocation favouring movement of household labour to rural off-farm and non-farm income activities, the tobit model was employed.

Table 1: Household Family Labour Time Allocation

(Mandays per household per year)

Particulars	Tree growers	Non-tree growers
Crop production	98.85 (10.06)	91.53 (8.85)
Livestock	174.29 (17.73)	147.17 (14.23)
Tree growing	61.20 (6.23)	–
Off-farm	42.20 (4.29)	27.00 (2.61)
Non-farm	91.12 (9.26)	104.00 (10.06)
Household activities	166.55 (16.94)	191.57 (18.52)
Total labour allocation	634.21 (64.51)	561.27 (54.27)
Leisure	348.86 (35.49)	472.90 (45.73)
Total time available	983.07 (100.00)	1034.17 (100.00)

(Figures in parentheses indicate percentage to total)

The estimated results of the tobit model are presented in Table 2. It could be seen from the table that the explanatory variables area under agroforestry (AARE), farm size (FSIZE), wage rate (WAGE) and number of dependents (NDEP) are found to be significant determinants of the dependent variable, participation in off-farm and non-farm activities (ONIA) on the expected lines. Number of livestock (LSTOCK) show significant influence but on unexpected lines. Generally, adequate number of livestock would mean lesser dependence on crop production for subsistence needs and greater ability to deal with cash flow problems. Since livestock husbandry requires less labour that too for maintenance activities, inclusion of animal husbandry releases the household labour and helps the household members to participate in other income activities. The unexpected negative influence of LSTOCK is mainly because in the study area, animal husbandry is one of the key enterprises in farming. More number of livestock requires more family labour participation particularly for grazing sheep and increased income from livestock activities prevents households from participating in other income activities.

Table 2: Estimates of Tobit Model of Time Allocation

Variables	Estimates
Constant	–128.7000 (–2.5591)
AARE	79.6210* (2.8786)
LSTOCK	–1.3197** (–1.8033)
FSIZE	–26.3240** (–1.8792)
WAGE	3.5738* (6.9851)
HEDN	0.2639 (0.0737)
NDEP	6.9262** (1.7893)
Predicted probability of the dependent variable	0.9542
Log-likelihood function	–303.7831

(Figures in parentheses indicate estimated 't' values)
Note: * = P 0.01, ** = P 0.05, *** = P 0.10

Economic implications can be drawn by using the results of the empirical model. Following a Tobit decomposition framework, the effects of changes in the explanatory variables on the probability of participation in off-farm and non-farm activities and intensity of participation were obtained and presented in Table 3.

Table 3: Estimates of Elasticities of Tobit Model of Time Allocation

Variables	Expected probability of participation	Expected intensity of participation	Total elasticity
AARE	1.1485	1.4264	2.5749
LSTOCK	–0.1783	–0.2215	–0.3998
FSIZE	–0.8788	–1.0915	–1.9703
WAGE	1.6524	2.0523	3.7047
HEDN	0.0140	0.0174	0.0314
NDEP	0.0898	0.1115	0.2913

It is seen from the table that variable WAGE has the highest impact on both probability of participation and intensity of participation followed by AARE. The total elasticity for the variable WAGE is estimated to be 3.7047 which is divided into 1.6524 for probability of participation and 2.0523 for intensity of participation. This suggests that a 10 per cent increase in wage rate is expected to result in about 37 per cent increase in off-farm and non-farm participation and intensity of participation. The total elasticity for area under agroforestry is 2.5749. It means that a 10 per cent increase in area under agroforestry is expected to result in 25 per cent increase in off-farm and non-farm participation and intensity of participation. The probability of participation increases by 11 per cent and intensity of participation by 14 per cent. A 10 per cent increase in farm size is expected to reduce off-farm are non-farm participation by 19 per cent which is decomposed into 8 per cent for probability of participation and 11 per cent for intensity of participation. Similarly, a 10 per cent increase in number of livestock reduce the probability of participation by 1 per cent and intensity of participation by 2 per cent.

It is evident that the area under agroforestry is a significant determinant of participation in off-farm and non-farm income activities and confirms our a priori assumption. Adequate number of trees lessen the dependence of farm family on crop production for livelihood and solve other cash flow problems. Hence, increase in area under agroforestry releases the household labour to participate in rural off-farm and non-farm income activities. The wage rate and number of livestock have significant impact on time allocation of resource poor farm households. Thus, policies focussing on increase in area under agroforestry, and wage rate and encouraging farm households to maintain more number of livestock will help improve the welfare of the farm family.

The wage rate and number of livestock have significant impact on time allocation of resource poor farm households.

Conclusion

The present study lucidly shows that introduction of agroforestry systems significantly influences household family labour allocation to various economic activities and particularly it favours the movement of family labour to rural off-farm and non-farm income activities thereby reducing dependence on crop production. Hence, our policy to promote agroforestry development must go hand in hand with other policies like human resource development. These policies should be reoriented to train rural farm households to participate in rural off-farm and non-farm activities. Being at the bottom of the rural income scale, the resource poor farm households respond to changes in labour market conditions particularly with respect to changes in wage rate. Any increase in wage rate increases the household labour supply. To cope up with the increased labour supply, it is essential to encourage investment on irrigation, development of wastelands by promoting tree growing and development of forestry-based small scale

industries in rural areas so as to improve the welfare of resource poor farm households.

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Management is efficiency in climbing the ladder of success. Leadership determines whether the ladder is leaning against the right wall.

– Stephen & Lovey

Feature

Determinants of Milk Productivity in Tamil Nadu

B. Ganesh Kumar

A study was undertaken to find out the determinants of milk productivity of Tamil Nadu at macro level using principal component analysis and factor analysis. The district-wise data on annual milk production of the State and the various influencing factors for the period 1994-95 was used for the study. The author presents the results of the analysis.

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India is predominantly an agrarian economy with more than 75 per cent of its population living in villages, depending on agriculture, animal husbandry and allied activities for their livelihood. Cattle and buffaloes have been an integral part of crop-livestock system in Indian farm economy. Among many livestock enterprises, dairying is the most ancient occupation established in the rural setting of our country. The development of dairy industry in India has been acknowledged as one of the most successful processes in the world.

The dairy subsector in the agricultural economy of India is important as milk is the second largest agricultural commodity contributing to the GNP, next only to rice. In fact in 1986-87, which was a drought affected year, milk occupied the first position among all the agricultural commodities, even higher to rice (Shah, 1992). This sector provides regular employment to 9.8 million in principal status and 8.6 million in subsidiary status, which together constitute five per cent of the total work force (Economic Survey, 1999-2000).

India with a cattle population of 197.3 million accounts for nearly 50 per cent of the Asian cattle population and 15.4 per cent of that of the World. With regard to the buffalo population, India has 53.3 per cent of world's and 55 per cent of Asia's buffalo population (Patel, 1993). While the cattle population increased by about 1.8 per cent in the period 1982-87, buffalo population has grown by about 10 per cent in the same period. It needs emphasis that cattle population has decreased by 1.6 per cent, while buffaloes increased by 2.3 per cent in the next five years (1987-92). Despite the drop in cattle population during 1987-92, the cow milk production has registered a 7.5 per cent growth from 24 million tonnes in 1989 to 29.4 million tonnes in 1992, implying partly the productivity increase of cows through crossbreeding programmes (Prabaharan, 2000). The estimated total milk production during 1998 was 72 million tones, to which cattle and buffaloes contributed 34.5 and 35.5 million tonnes respectively (FAO Quarterly Bulletin 1999).

Tamil Nadu has a total livestock population of 25.7 million as per 1994 census, accounting for 5.2 per cent share in the national livestock population and comprising 9.10 million cattle and 2.93 million buffaloes. Contrary to the national trends, the growth of livestock population in Tamil Nadu has been decelerating since 1982 and the latest quinquinnial Livestock Census (1994) indicates a decline by 2.61 per cent as compared to that in 1989. To a considerable extent, the emphasis on increasing productivity with lesser cattle population through planned cross breeding programmes had contributed to the decline in the cattle population of the State.

Emphasis on increasing productivity with lesser cattle population through planned cross breeding programmes had contributed to decline in the cattle population.

Tamil Nadu is one of the top 10 milk producing States in the country, with the other States being Uttar Pradesh, Punjab, Madhya Pradesh, Rajasthan, Gujarat, Andhra Pradesh, Bihar, Maharashtra and Haryana (Dairy India, 1997). The estimated milk production of Tamil Nadu is 4.57 million tonnes in the year 1999-2000 of which, the buffalo's contribution is 40 per cent and that of cattle 60 per cent. The contribution of milk production from exotic and crossbred cows has steadily increased from 21.7 per cent during 1991-92 to 33 per cent in 1997-98. The significant increase in milk production of the State improved the per capita consumption of milk, which increased from 163 g during 1991-92 to 183 g per day in 1997-98 (Department of Animal Husbandry, Government of Tamil Nadu, 1999).

Although dairy farming has a much broader role in the rural economy of the State than that envisaged so far, there has been a dearth of documented evidences on the nature and magnitude by which the sector grows in the State. Any effort to exploit dairy farming for rural and economic development will always demonstrate the need for scientific and analytical studies on the sector to assess the current trends and determinants of production, as the results of such studies would help the policy makers to effectively frame strategies for dairy development so as to reap the desired harvest from the sector. This study attempts to fill the gap by trying to furnish a macro view on the total milk productivity of milch animals and its determinants at the State level. The results of this study would try to remove the impediment of the planners of livestock development in terms of lack of reliable results on the determinants of milk productivity.

Methodology

Collection of Data

Since the latest Livestock Census Report was available only for the year 1994, the year 1994-95 was considered for this study. Accordingly, the data on district-wise annual milk production for the State of Tamil Nadu for the period 1994-95 were collected from the Sample Survey Reports of Directorate of Animal Husbandry, Government of Tamil Nadu. Data on district-wise population of crossbred cows, indigenous cows, graded buffaloes and indigenous buffaloes were collected from livestock census report of 1994 published by the Directorate of Economics and Statistics, Government of Tamil Nadu. Other related information on gross cropped area, area on permanent pastures and other grazing lands and annual rainfall and infrastructure for milk productivity such as number of Milk Producers' Cooperative Societies and number of veterinary institutions were collected from various secondary sources viz., different volumes of Economic appraisal of Tamil Nadu published by Evaluation and Applied Research Department, Government of Tamil Nadu and various reports of Tamil Nadu Cooperative Milk Producers' Federation Limited and Directorates of Animal Husbandry and Agriculture, Government of Tamil Nadu.

Analysis of Data

To find out the factors/determinants responsible for the spatial variation in productivity of milch animals in Tamil Nadu multivariate techniques such as Principal Component Analysis and Factor Analysis were used.

Principal Component Analysis: The principal component analysis is a method for separating the total variation of variables into orthogonal subsets. In a regression situation, an analysis of the principal components of the independent variables can help to understand the number of variables to be retained to overcome the effects of multicollinearity. Multicollinearity arises when some or all of the explanatory variables are highly correlated. These intercorrelations increase the standard errors of the regression coefficients and make the latter highly unstable (Nieuwoudt, 1972).

Principal component analysis of a set of 'm' original variables generate 'm' new variables, the principal components, PC_1, PC_2, ..., PC_m with each principal component being a linear combination of Ss' scores on the original variable, i.e.,

$$PC_1 = b_{11}X_1 + b_{12}X_2 + \ldots\ldots + b_{1m}X_m = Xb_1;$$

$$PC_2 = b_{21}X_1 + b_{22}X_2 + \ldots\ldots + b_{2m}X_m = Xb_2;$$

.
.
.

$PC_m = b_{m1}X_1 + b_{m2}X_2 + ... + b_{mm}X_m = Xb_m.$

Where,

'b' refers to the coefficients and

'X' refers to the variables.

The coefficients for PC_1 are chosen so as to make its variance as large as possible. The coefficients for PC_2 are chosen so as to make the variance of this combined variable as large as possible, subject to the restriction that scores on PC_1 and PC_2 (whose variance has already been maximised) be uncorrelated. In general, the coefficients for PC_1 are chosen so as to make its variance as large as possible subject to the restriction that it be uncorrelated with scores on PC_1 through PC_{i-1} (Harris, 1975).

The principal component analysis was employed to study the factors/determinants which together impinge on the productivity of milch animal in various districts of Tamil Nadu. This technique effectively reduces the dimension of the problem to a hierarchically ordered set of components, which explain a substantial portion of the total variance.

If a set of variables is transformed by successively extracting the largest common elements, then each variable can be compared to components for the measure of association with the common elements. These components can be viewed as dimensions. By establishing the eigen values and eigen vectors, it is possible to correlate a component with a variable. If one variable is considered to be of special interest, then it is possible to allocate the variation of the variable among the total number of components.

If b_{ij} is the coefficient of linear transformation where 'i' refers to the component and 'j' to the orthogonal variable, then

$$\sum_{i=1}^{n} b_{ij}^2 = 1$$

Where,

n = Number of variables.

Thus, b_{ij}^2 gives the variation of variable 'j' in the i^{th} component.

It is then possible to ascertain the variation attributable to each component for the selected variable. The advantage in doing so is that each component can be seen to contain so much of the variation of the other variables; therefore the important components for the selected variables can be matched against the association suggested by zero order correlation of those components with the other variables (Tench, 1975).

In the present study, the following ten variables were considered district-wise for the year 1994-95 to find out the factors/determinants responsible for productivity of milch animals in Tamil Nadu.

- Annual milk production per milch animal (Kg);
- Per cent of crossbred milch cows in total cows;
- Per cent of indigenous milch cows in total cows;
- Per cent of graded milch buffaloes in total buffaloes;
- Per cent of indigenous milch buffaloes in total buffaloes;
- Number of veterinary institutions per 100 sq. km. of geographical area;
- Number of dairy cooperatives per 100 sq. km. of geographical area;
- Gross cropped area per 100 milch bovines (ha.);
- Area under permanent pasture and other grazing lands per 100 milch bovines (ha.); and
- Annual rainfall (mm).

Factor Analysis: Factor analysis is a multivariate technique that attempts to account for the correlation pattern in a set of observed random variables in terms of a minimal number of unobservable or latent random variables called factors (dimensions). Factor analysis is a refinement over principal component analysis. It identifies the important factors, which influence the dependent variable. In contrast to the principal component analysis or maximum variance approach, the classical factor analysis is designed to maximally reproduce the correlation. Factor analysis can accommodate a large number of variables and reduce the information to a convenient size. Factor analysis assumes that the observed (measured) variables are linear combinations of some underlying source variables (or factors or dimensions). Factor analysis exploits this correspondence to arrive at conclusions about the dimensions (Harman, 1968).

Factor loadings provide the correlation between the

Table 1: Principal Component Analysis for Annual Milk Production per Milch Animal in Tamil Nadu

Variables	Component Loadings									
	1	2	3	4	5	6	7	8	9	10
Annual milk production per milch animal (kg)	0.702	0.296	0.237	0.302	0.141	0.350	0.303	–0.187	–0.061	0.002
Per cent of crossbred milch cows in total milch cows	0.878	–0.080	0.060	0.070	0.010	–0.368	0.067	–0.161	0.221	–0.002
Per cent of indigenous milch cows in total milch cows	–0.715	0.207	–0.450	0.068	0.379	0.231	–0.020	–0.012	0.205	–0.004
Per cent of graded milch buffaloes in total milch buffaloes	0.870	0.193	–0.355	–0.109	–0.023	0.145	–0.186	0.087	0.019	0.068
Per cent of indigenous milch buffaloes in total milch buffaloes	–0.893	–0.224	0.174	0.102	0.092	–0.202	0.218	–0.099	–0.027	0.064
Number of Veterinary Institutions per 100 sq. km geographical area	0.090	0.863	0.236	0.022	0.117	–0.177	0.225	0.310	0.021	0.000
Number of dairy cooperatives per 100 sq. km geographical area	0.176	–0.437	–0.373	0.777	0.036	–0.097	–0.031	0.149	–0.043	–0.004
Gross cropped area per 100 milch bovines (ha)	0.463	–0.568	0.232	–0.238	0.577	–0.075	–0.063	0.066	–0.080	–0.004
Area under permanent pastures and other grazing lands per 100 milch bovines (ha)	–0.018	–0.628	0.674	0.056	–0.150	0.264	0.034	0.178	0.154	0.009
Annual rainfall (mm)	–0.204	0.520	0.623	0.321	0.104	–0.040	–0.420	–0.090	–0.002	0.006
Eigen value	3.623	2.146	1.509	0.890	0.553	0.491	0.412	0.240	0.128	0.009
Percentage variation	36.231	21.457	15.086	8.899	5.535	4.909	4.117	2.403	1.276	0.089

variable and the underlying dimension. The correlation between any two variable can be obtained by the product of the corresponding factor loadings.

The factor analysis model in matrix form can be summarised as follows:

$$X_{(nx1)} = A_{(nxm)} \times F_{(mx1)}$$

Where,

'X' is the matrix of variables;

'A' is the matrix of factor loadings;

'F' is the matrix of dimensions;

'a_{ij}' refers to the net correlation between the j^{th} dimension and i^{th} dimension of the j^{th} observed variable;

'n' is the number of variables; and

'm' is the number of dimensions.

The varimax method was followed to extract dimensions. Then the initial orthogonal solution was rotated by the varimax method. Factor analysis was done for productivity of milch animal per annum taking the same variables used for principal component analysis for the year 1994-95.

Results and Discussion

Principal Component Analysis

The results of the principal component analysis for productivity of milch animal in Tamil Nadu are presented in Table 1. The table gives the component loadings and eigen values for each component. Among the 10 components, the first component was considered the best based on the highest zero order correlation for the dependent variable. In the first component, a positive relationship was seen among the annual milk production per milch animal, per cent of crossbred milch cows in total milch cows, per cent of graded milch buffaloes in total milch buffaloes, number of veterinary institutions per 100 sq. km. geographical area, number of dairy cooperatives per 100 sq. km. geographical area and gross cropped area per 100 milch bovines with the negative influence of per cent of indigenous milch cows in total milch cows, per cent of indigenous milch buffaloes in total milch buffaloes, area under permanent pastures and other grazing lands per 100 milch bovines and annual rainfall.

Factor Analysis

Table 2 provides the results of the factor analysis carried out for productivity of milch animal in Tamil

Table 2: Factor Analysis for Annual Milk Production per Milch Animal in Tamil Nadu

Variables	Dimensions with rotated loadings									
	1	2	3	4	5	6	7	8	9	10
Annual milk production per milch animal (kg)	0.378	0.165	0.067	0.056	0.107	0.048	0.877	0.177	0.090	0.000
Per cent of crossbred milch cows in total milch cows	0.442	0.511	0.273	0.160	–0.067	0.067	–0.067	0.233	0.052	0.615
Per cent of indigenous milch cows in total milch cows	–0.291	–0.894	–0.154	0.020	–0.004	–0.250	–0.136	–0.001	–0.103	0.000
Per cent of graded milch buffaloes in total milch buffaloes	0.930	0.144	0.098	0.061	–0.147	–0.189	0.170	0.036	0.094	0.069
Per cent of indigenous milch buffaloes in total milch buffaloes	–0.941	–0.217	–0.067	0.006	0.037	0.059	–0.213	–0.057	–0.075	0.066
Number of Veterinary Institutions per 100 sq. km geographical area	0.086	0.010	–0.156	–0.217	0.276	–0.208	0.177	0.877	0.022	0.000
Number of dairy cooperatives per 100 sq. km geographical area	0.041	0.004	0.028	0.979	–0.100	0.014	0.043	–0.156	0.048	0.001
Gross cropped area per 100 milch bovines (ha)	0.463	–0.128	0.156	0.940	0.577	0.030	–0.109	0.187	0.055	–0.132
Area under permanent pastures and other grazing lands per 100 milch bovines (ha)	–0.209	0.204	0.198	0.017	0.049	0.915	0.039	–0.183	–0.025	–0.001
Annual rainfall (mm)	–0.133	–0.006	–0.102	–0.107	0.952	0.046	0.080	0.212	–0.024	–0.001
Eigen value	3.623	2.146	1.509	0.890	0.553	0.491	0.412	0.240	0.128	0.009
Percentage variation	36.231	21.457	15.086	8.899	5.535	4.909	4.117	2.403	1.276	0.089

Nadu. All the 10 variables with their corresponding factor loadings are presented in the table. Higher the factor loading of a variable on a particular dimension, higher will be its association with that dimension than its association with other dimensions. Because of this situation, it is the general practice to discuss the variables with respect to dimension on which they have higher factor loadings. The variable most important in the present analysis was annual milk production per milch animal and this factor had the highest factor loadings in dimension one. Therefore, dimension one was examined. The results obtained from dimension one were similar to those obtained in principal component anaysis. In the first dimension, the annual milk production per milch animal had positive association with per cent of crossbred milch cows in total milch cows, per cent of graded milch buffaloes in total milch buffaloes, number of veterinary institutions per 100 sq. km. geographical area, number of dairy cooperatives per 100 sq. km. geographical area, and gross cropped area per 100 milch bovines and negative relationship with per cent of indigenous milch cows in total milch cows, per cent of indigenous milch buffaloes in total milch buffaloes, area under permanent pastures and other grazing lands per 100 milch bovines and annual rainfall.

The results of both principal component analysis and factor analysis thus suggested that future growth in milk production would be technology driven which was seen from the positive association of milk production with the per cent of crossbred milch cows in total milch cows and per cent of graded milch buffaloes in total milch buffaloes in the State. This suggests that effecting a shift in herd structure in favour of crossbred cows and graded buffaloes can augment milk production and productivity. Birthal et al, (1999) observed similar findings.

Effecting a shift in herd structure in favour of crossbred cows and graded buffaloes can augment milk production and productivity.

The positive association between annual milk production per milch animal and the number of veterinary institutions per 100 sq. km. geographical area and the number of dairy cooperatives per 100 sq. km. geographical area is on expected lines. This has proved the fact that development of animal health services in the country has significantly reduced the incidence of animal diseases and avoided yield loss (Singh et al, 1998). Animal health services also influence milk production through dissemination of yield increasing technology and breeding services. Similarly, dairy

cooperatives also play a crucial role in strengthening the vertical marketing linkages and in providing inputs and other livestock related services to dairy farmers.

The results also showed that annual milk production per milch animal goes up when the gross cropped area per 100 milch bovines goes up. This underscores the fact that adequacy of feed and fodder resources is a crucial factor in realising the potential of dairy sector and thus should be expanded for increasing the productivity of milch animals. Lalwani (1989) also made similar observations. Since all these factors are very important for milk production, the observed relationship seems to be meaningful.

Finally from the factor analysis, it was observed that per cent of graded milch buffaloes in total milch buffaloes and per cent of crossbred milch cows in total milch cows are the two most important variables/determinants which contributed to increased productivity in the State.

Conclusion

It was observed that per cent of graded milch buffaloes in total milch buffaloes and per cent of crossbred milch cows in total milch cows are the two most important variables/determinants which contributed to increased productivity in the State. Hence, current upgradation of non-descript local breeds of cattle and buffaloes should be continued rigorously by official machineries uniformly throughout the State along with necessary supporting services to foster the growth and sustenance of crossbred cattle and upgraded buffalo population. The positive association of productivity of milch animals with number of veterinary institutions and dairy co-operatives suggested that quantitative and qualitative improvement in health and breeding services and marketing facilities would be indispensable in the long run, as the production growth becomes technology oriented in the near future. The positive association of gross cropped area with the productivity of milch animals in the State reinforced the fact that the crop and dairy sectors are inter-linked and complementary. Hence necessary steps should be initiated to strengthen the positive linkage between crop and dairy sector, which inturn will boost the milk production and productivity in the State.

The crop and dairy sectors are inter-linked and complementary. Hence necessary steps should be initiated to strengthen the positive linkage

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News & Notes

Labour Productivity Growth in IT Sector

The literature on IT and labour productivity growth addresses two main issues: measurement problems and the contribution of IT to labour productivity growth. The idea that IT could contribute to labour productivity growth precedes the recently observed acceleration in productivity. New goods and rapidly falling relative prices complicate the measurement of output. In some countries, hedonic methods are used to adjust prices for quality changes, while chain weighting is used to address the substitution bias in fixed-weight aggregation methods.

There are three important methodological issues in measuring the contribution of information technology (IT) to economic growth. The first issue is how to adjust price deflators for IT goods based on hedonic price indices, which attempt to capture quality changes. The impact of using hedonic methods on macroeconomic aggregates will depend on the structure of production and demand. In IT producing countries, measured real output of IT goods will tend to increase, boosting measured real GDP and real exports. As a result, the measured contribution of IT to growth (through TFP growth in the IT sector) will tend to rise. In IT using countries, real investment in and real imports of IT goods will tend to increase, boosting the contribution of IT to growth through capital deepening and lowering the contribution of TFP growth.

The second issue is how to aggregate the output of goods with large relative price changes. Goods with rapidly declining relative prices tend to be used in new ways with lower marginal products, so any fixed-weight aggregation method-such as the Laspeyres index-will place inappropriately large weights on these rapidly-growing goods (substitution bias) and thus tend to overstate the growth of the aggregate. To address the substitution bias in fixed-weight measures, many countries calculate real aggregates using chain weights, based on prices that are updated every year. For example, the United States aggregates across sectors using the so-called "ideal chain index" popularized by Irving Fisher. The principal benefit of chain weights is that measured real GDP growth does not depend on arbitrary price structure and is therefore independent of the choice of base year.

The final issue is how to allocate IT spending, especially software spending, between final and intermediate expenditure. Information technology spending is considered investment if, and only if, the corresponding products can be physically isolated, so that IT products embodied in equipment (such as microprocessors) are considered intermediate goods. The ratio of IT investment to IT intermediate consumption differs substantially across countries, reflecting different statistical practices in different countries. For example, France asks buyers to classify their spending, while the United States relies on production data provided by sellers together with input-output tables. In countries that classify a larger proportion of business spending on IT goods as investment, measured GDP growth will be higher when such spending is rising rapidly.

A fourth issue is that, given the high depreciation rates of many IT capital goods, it would be better to use net output to measure productivity. In addition, the coverage of the IT sector in official statistics is often inadequate: in most countries, national accounts simply do not distinguish IT production, investment, or consumption.

Information technology can contribute to labour productivity growth through both capital deepening and Total Factor Productivity (TFP) growth. Under standard assumptions, labour productivity growth (the change in output per unit of labour input) can be expressed as:

$$(\hat{Y}/L) = \alpha\,(\hat{K}/L) + \hat{A}$$

Where Y is output, L is labour, K is capital, α is the share of capital in national income, A is the level of total factor productivity, and $\wedge$ denotes a percentage change.

Capital deepening refers to the change in labour productivity attributable to higher levels of capital per worker. TFP growth refers to improvements in the efficiency with which capital and labour are combined to produce output. The existing literature has established that IT is contributing to labour productivity growth through both increases in the levels of IT capital per worker (IT-related capital deepening) and TFP growth in IT production. The main outstanding issue is whether IT has contributed to TFP growth more generally by increasing the efficiency of production, either through usage or knowledge spillovers from the production of IT goods.

Pioneering studies on the United States, show that IT-related capital deepening and TFP growth in IT production made important contributions to the acceleration in labour productivity in the late 1990. However, there is no consensus on the effect of IT on generalized TFP growth. One study attributes the acceleration in labour productivity to cyclical factors, while others view this acceleration as structural. More recent studies suggest that little of the acceleration in labour productivity is due to changes in factor utilization, factor accumulation, or returns to scale, and that virtually all of the acceleration is accounted for by IT-using and IT producing industries.

Another economy that has seen acceleration in labour productivity in the 1990s is Australia. The national accounts data suggest that IT production in Australia is very small, implying that TFP growth in IT production was not important in the acceleration in labour productivity. Conversely, IMF does find some evidence across Australian industries of a positive relationship between IT related capital deepening and TFP growth. This evidence is consistent with the idea that increased IT use has been associated with a reorganisation of economic activities, supported by structural reforms.

In most other advanced economies, labour productivity has not accelerated in recent years, implying that any positive contribution of IT must have been offset elsewhere:

In Japan, labour productivity growth did not increase during the 1990s, despite relatively high levels of overall and IT-related capital deepening. There are no Japan specific studies on the contribution of IT production or use to TFP growth.

In France, labour productivity growth fell in the second half of the 1990s. IMF attributes this fall to a decline in overall capital deepening, reflecting reduced investment in labour saving equipment, as wage growth remained moderate. Although overall capital deepening fell, the contribution of IT-related capital deepening to growth increased. While TFP growth rebounded in the second half of the 1990s, this was likely related to the overall economic recovery (and procyclical TFP) and not to IT production, which is relatively small in France. The extent to which this rebound may, or may not, have been related to IT use remains to be established.

In the United Kingdom, labour productivity has not accelerated, despite a rate of investment in IT capital that is almost as high as in the United States. IMF suggests that both IT related capital deepening and TFP growth in IT production made important contributions to labor productivity growth in the late 1990s. However, these contributions were offset by decreases in TFP growth outside of the IT sector.

In most economies in emerging Asia, labour productivity growth fell in the late 1990s, partly reflecting the crisis-related slowdown in output growth. IMF finds that the contributions of IT-related capital deepening and TFP growth in the IT sector to labour productivity growth increased during the course of the 1990s, but were more than offset by declining contributions from other sectors. The increase in IT related capital deepening reflected the maintenance of high levels of IT investment despite the growth slowdown associated with the Asian crisis.

The IMF has begun a cross country study of the impact of IT related capital deepening on labour productivity growth in China, Hong Kong SAR, Indonesia, Korea, Malaysia, Philippines, Singapore, Taiwan Province of China, and Thailand. Estimates of IT capital stocks (relative to GDP) for emerging Asian economies and the United States are shown in the Figure 1. Results based on the standard growth accounting decomposition show that the contribution of IT-related capital deepening to labour productivity growth in emerging Asia increased during the 1990s (Figure 2). The abrupt deceleration in total factor productivity (TPF) and the slowdown in non-IT-related capital deepening in the Asian NIEs and the ASEAN-4 were related to the 1997-98 crises, as suggested by the contrast with China. The contribution of IT capital to growth increased in all countries, reflecting continued strong IT investment.

Cross-country studies also find that IT related capital deepening and TFP growth in IT production contributed to labour productivity growth in the second half of the 1990s. The evidence comes in two forms: one set

of studies estimates the contribution of IT-related capital deepening using the conventional growth accounting framework, while the others focus on the role played by IT-using (and IT-Producing) sectors in other words, the contribution of IT is measured as overall capital deepening by IT-related sectors, rather than as the IT-related capital deepening of all sectors.

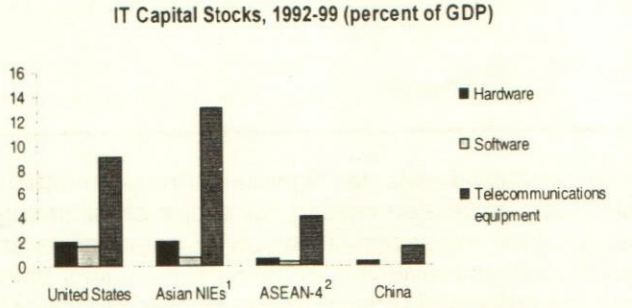

Fig. 1. Information Technology (IT) and Labour Productivity

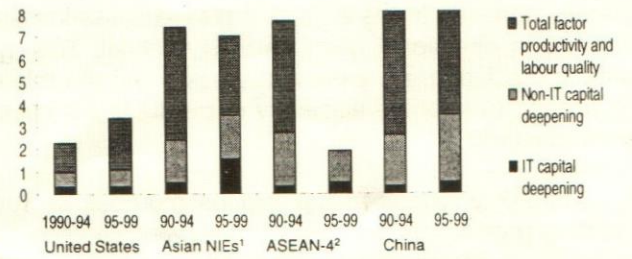

Fig. 2. Contributions to Labour Productivity Growth, 1990-99 (percent)

Source: IMF staff estimates.

1 Simple average of the Asian newly industrialized economies (NIEs): Hong Kong SAR, Korea, Singapore, and Taiwan Province of China.

2 Simple average of the four members of the ASEAN-4: Indonesia, Malaysia, Philippines, and Thailand.

The contribution of technological progress in IT production of labour productivity growth is also fairly uncontroversial. TFP growth in the IT sector, which is the counterpart of the rapid declines in quality-adjusted IT prices, made significant contributions to labour productivity growth in countries with relatively large IT-producing sectors.

The impact of IT on generalized TFP growth can be assessed by examining the cross-country relationship between TFP growth and IT production and use. Studies in the United States show the cross-country evidence on IT spillovers is ambiguous. There is evidence of a positive effect of IT spending on the acceleration in TFP growth across advanced economies. IMF finds that the effect of IT expenditure on TFP growth is ambiguous, with the estimated coefficients and standard errors being sensitive to the specification, time period, and set of countries included in the regression.

In summary, the weight of the evidence suggests that IT is already making an important contribution to labour productivity through technological progress in IT production and IT related capital deepening. Convincing evidence of the impact of IT on the general efficiency of production is not yet available.

Source: World Economic Outlook, Oct. 2001 (International Monetary Fund)

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Big ideas happen when people build on each other's ideas.

– Vince Lombardi

Book Reviews

Organisation Efficiency and Productivity Improvement, *by P. Rameshan,* Vikas Publishing House, New Delhi, 2001; Pages 140; Price Rs. 350.00.

Productivity, its measurement and improvement have always been a central issue for organisations since the days of industrial revolution when the production function took an organised shape. A voluminous literature has come to exist supporting the necessity and importance of improvement in productivity. Over the years researchers have attempted and advanced several approaches and models to measure productivity. Labour, Materials, Capital have been considered major factors responsible for productivity. It has been reasoned out that technological factors are chiefly responsible for attainment of improvement in productivity. The emergence of processes of liberalization and globalization have ushered in unprecedented competition. Enterprises face new challenges. Both private and public sector undertakings are equal parties to this concern. In this context, there is a new renewed interest to improve productivity of organisations so as to achieve competitiveness and other business objectives. This concise but excellent work under review attempts to evaluate the role of organisational efficiency in improving productivity. It offers methodology to analyze organisational efficiency in improving productivity; presents emperical data to verify the concepts postulated and highlights the implications of the study in formulating productivity policy.

The book is organized in two parts. Part I is devoted to a theoretical review of the organisational process and its vitality in the context of productivity. Part II presents emperical evidence of the role of organisational efficiency in improving productivity. Primary data from eight large firms has been used for this purpose.

Part I comprises four chapters. In the introductory chapter, the author brings out the salient features of the conventional production theory, the excessive thrust on technology to improve productivity and the underlying deficiency in this assumption. The chapter makes out a case, in a lucid style, for significance of organisational efficiency in decision making, for choice of technology, labour effort, other non-technological components and productivity improvement. In the past, the author points out, the process of organising was identified mostly with entrepreneurship implying that the function of organising (started) and ended with the owner. The owner was chiefly interested in the goal of profit maximisation and his role in directional changes was minimal. This approach precluded any serious discussion on the role of organising to improve efficiency of production function or productivity.

Chapter 2 examines the various methods of augmenting production. Technology has been cited as the factor most discussed in literature Improvement in technology simply stated as modernisation was responsible, as author points out, basically to increase net capital formation. The capital intensity or technological progress or both contributed over a half of the total increase in productivity, reasons for the remaining 50 per cent remained unexplained. Besides, some firms could achieve technological upgradation faster than others. Explanation for both the events lies in attainment of organisational efficiency. The later half of this chapter presents a survey of studies emphasizing the role of the organisation, the non-economic factors and the role of the managers compared with the role of owner in shaping the organisation.

Chapter 3 (alongwith Chapter 4) presents the main theme of the book. It provides a conceptual backup to the proposition. The author emphasizes organisation as a factor of production. The chapter also brings out that organisational efficiency is relevant at all times and only the nature of the decisions differ in the short and long runs.

Chapter 4 continues with the theme and describes the process and impact of organisational efficiency. The author identifies five main factors that determine the effective organising effort level and these have been discussed as entrepreneurial effort and role of leadership,

cumulative experiences of firms, environment impact, access to information and innovative contribution by workers.

Chapters 3 and 4 form the core of the book and these have been designed as a comprehensive text to explain the concept of organisational efficiency and its impact. The author has elaborated the concept in a rational manner and very rightly has postulated that organisational efficiency constitutes an important factor of production contributing as much as 50 per cent of productivity. Organisational efficiency becomes one of the principal causes to explain poor productivity in PSU's (as also some private undertakings) even when the same are endowed with technological superiority. Similarly, modernisation or transfer of latest technology cannot be substituted for poor organisational efficiency. These inferences should be of vital significance to economists, who very often consider technology as the answer to ills faced by industry in general and PSU's in particular. The author has convincingly validated the proposition that the role of organisational efficiency is highly relevant and is crucial for improving the productivity of enterprises as well to attain other end objectives.

Part II of the book is devoted to empirical verification of the hypothesis as covered in the previous chapters by using the primary data collected through questionnaire and interview technologies. It comprises of four chapters.

Chapter 5 details methodology of qualitative measurement analysis of organisational efficiency and productivity improvement. The author has relied on qualitative data as the data cannot be expressed in absolute quantities. The initial sample consisted of thirty-two firms selected from 100 companies. Finally eight firms responded. The questions are clubbed in various groups to cover work methods, HRM etc. and responses to the same have been identified in aspects of inefficiencies, organising effort and effective organising effort with values assigned in seven action areas. Personal interviews have supplemented the efforts to obtain information. Statistical tools have been applied for analysis. Methodology has been explained to construct indices and the degree of correlation. Spearman's Rank Correlation Method is used.

Chapter 6 provides primary emperical evidence, that is a probable relationship of productivity improvement with inefficiencies, organising effort, effective organising effort and the index of organisational efficiency. The author has reached interesting evidence. Most of the firms have inefficiency in almost all areas of action. HRM and area of unproductive practices constitute concentrations of inefficient elements. Besides, the author finds that factors as location of firms, nature of products or ownership do not make significant variations in the depth of inefficiency. The author also points out that the efficiency attainment is largely determined by inputs of those who carry out organising and develop human resources for implementation of policies. This is borne out by the emperical data that in the same category of electrical goods, one firm is more efficient although both are government owned.

Causes of inter-firm variations in organisation efficiency is the subject of discussion in Chapter 7. Firm-specific characteristics of organising have been examined. In the context of poor productivity of PSU's, the author very rightly points out that a PSU fails to achieve its business goals as its social responsibility and public accountability impose a compromise to dilute its commercial objectives. These constraints do not exist for a private undertaking. A proper evaluation of a PSU has to take into account these considerations.

Chapter 8 is the concluding chapter and it presents the findings of the study and its implications. It is emphasized that maintenance and pre-emptive functions may not require services of a very intelligent and risk taking manager. On the other hand innovative functions require managers having vision and courage. This also leads to conclusions that all managers in a company cannot be expected to fare equally well in organisational functions. They have to be chosen to suit each type of function.

Major inadequacy of the book lies in Part II concerning collection of data, its presentation and providing emperical evidence. As the framework is confined to the collection and analysis of qualitative data, there is a scope of entry of high subjectivity which could have been diluted had the sample size been larger. The sample of eight firms has three electrical, one engineering, two iron and steel and one each from aluminium and oxygen industries. The heterogeneity is apparent. When it comes to making an analysis of inefficiency on considerations of nature of products, author has had to rely on emperical data of single firms in as many as three cases (engineering, aluminium and oxygen). In similar context , the studies have been conducted on firms based in West Bengal and Bihar, both states enjoying a similar social, economic and industrial environment. A comparison of analysis with firms based in industry rich states such as Gujarat or Maharashtra could have probably provided different results when organisational efficiency has to be discussed in context of infrastructures, location and external environment.

Emperical studies of some of the significant aspects of industry have been left out: SME's Vs large industries;

labour intensive versus capital intensive; automated versus conventional industries; impact of IT; process industries with continuous or large batch sizes. Inclusion of these comparisons and analysis would have increased the importance and usefulness of the book.

A strong theoretical review and development of concepts highlighting the role of organisational efficiency form the foundations of the volume. The book provides instruments to evaluate and monitor organisational efficiency in order to better understand its functions to promote productivity. The author is to be commended for a clear, precise and easy to understand exposition. The book should prove to be a good addition to existing literature on organisational efficiency in the context of productivity measurement. It is recommended to practicing managers, HRM executives, top level management and to all those who are interested to make productivity improvement as their career. The book well endure as an important reference book for studies on organisational efficiency.

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Informal Sector in India: Perspectives and Policies, *by Amitabh Kundu and Alak N. Sharma* (Eds.), Institute of Human Development (IHD) & the Institute of Applied Manpower Research (IAMR), New Delhi, 2001, Pages 440, price Rs. 650.

Studies on Informal Sector (IS) assume importance for countries like India in the epoch of convergence to an uni-polar world order. Experience reveal that the mushrooming of IS has been inevitable not only in terms of an assured 'livelihood sector' but as a 'shock observer layer of economic activity' with unfathomable capacity especially in the era of adjustment and reform processes of liberalization, privatization and globalization (LPG). The volume under review is an outcome of 3- Day seminar held in Delhi in Dec. 1997, jointly organized by IHD & IAMR. It has immensely added value to the existing IS literature both in theory and application through well researched two dozen studies compiled in six well structured parts apart from a detailed introduction.

The volume in comprehensive, informative and a useful reference for researchers and other interested the development of IS activities. Commendable efforts have been made in accommodating issue-based, relevant and timely case studies covering a variety of areas concerning the (IS). It has succeeded in presenting the concepts and issues and prioritizing the policy areas concerning IS. Its coverage includes conceptual and methodological issues, employment trends, growth and interdependences, wages, linkages, political economy of labour, informal tourism sector, women in IS, support systems like technology, training, credit and social security and mobilization of unorganized labour.

In the first part, on 'Conceptual and Methodological issues' the first paper identifies serious data gaps while assessing trends and patterns of informal sector. It examines the limitation on information in the IS, and argues for grater utilization of the existing database. It suggests the estimates for self-employment in the IS can be obtained by using NSS and ASI data. It raises another point regarding conducting detailed surveys for exploring the intricacies involved in the dynamic IS.

The conceptual and methodological issues pertaining to the IS is dealt in the following paper. It discusses more on ways to the strengthen data source and coverage of the IS sector.

In the second part on Trends and Patterns at Macro Level, the first paper attempts to determine the size of the IS using data from sources like the Economic Census [EC] (state level) and Directorate General of Employment And Training (DGET).

The second paper analysis the growth of the IS using the secondary data of OAE and Non-Directory Manufacturing Enterprises (NDME) and data from EC. It rightly identifies 18 indicators to understand the functioning of the urban IS and assessing its growth possibility in the future. The study identifies critical factors for strengthening the emerging IS viz., linkages with the formal sector, response to market stimuli, availability of credit, ownership of land and registration with a public agency. An update of this analysis may throw insights with respect to the reform process.

The third paper observes that with regard to the implementation of the minimum wages act (MWA), the criterion for inclusion, under the category of workers, has left few of unorganized sector workers outside the purview of the Act. It rightly argues that apart from a high wage, the focus should be in seeking and assuring the adequate days of employment, which is seldom met, except in the case of municipal corporation workers of the Ahmedabad city. The suggestions for factors to be taken care of for fixing wages and also for assuming adequate or minim. number of days of employment to keep the workers above the poverty line are to be noted for action. The concerned authorities must also heed the suggestion for making the MWA more accommodative through a tripartite mechanism by covering a wide variety of home-based and related

workers not covered under the existing legal system. Hope the new labour commission will look in to these issues.

The central argument in the study on 'Informalization of Employment in Unorganized Sector' is also in conformity with the trend of recent growing tendency among the emerging metropolis to push the industries and the related linking sector activities to the periphery by a strong vested interest lobby for making the core area a residential city for the elite. This ultimately results in degeneration of the hinterland and related social chaos. The inference that high rate of immigration is the reason for the growing casualisation and growth of informal sector and marginal activities may be true in certain cases and areas, but needs detailed investigation to have a comprehensive picture for the country a whole, in the context of globalization.

The paper on 'Scalar Linkages in Industries: Implications for productivity and Employment', based on secondary data infers that large factories lure unorganized enterprises. It shows an upward mobility of employment within the unorganized sector.

This volume demonstrates that data limitation on characteristics and linkages of the IS to an extent can be solved by micro level studies. The third part of the volume contains seven micro level studies covering the traditional manufacturing industries, and service sector like software and tourism. The first study on ceramic ware industry in the state of Gujarat shows the existence a high degree of informality in labour arrangements including piece wage system, both in registered and unregistered sections of the industry. The case study points out alarming status of lack of official coverage. It estimates about 1292 total employment in the unregistered sector of the ceramic industry; whereas the NSSO 51st round (1994-95) survey of unorganized manufacturing units report an estimate as low as 24 workers. The study on sandal making reveals that the system of contractual agreement adversely affects the quality of the product, labour productivity and growth of the enterprises in the IS. The study concludes that marketing support from the private trades and money leaders are adversely affecting the manufactures. Hence something needs to be done for a sound marketing either by set up the govt. of thorough combined initiative by private public and co-operative. The case study on surgical instruments manufacturing industry reveals trivial issues like extensive labour exploitation of manual skilled labour tied up in a traditional mode of production confined to the age old practice of home-based production based on sweat-labour. The fruits are promptly shared by a large number of middlemen and traders. The study on powerlooms sector analyses the issues pertaining to credit policy, production relations and capital investment pattern. It observes that the sector in characterized by low wages, high dependence on mercantile capital and low levels of profitability. The recent market led growth policies pursued by the State has further deteriorated the plight of these workers. This has resulted the private traders strengthening their hold in production and marketing.

Based on a sample survey of 141 software agents in Delhi, Noida and Hyderabad, the study on informal activities in the IT sector argues that viable opportunities for the IS exists in the emerging IT based services and activities. The activities involved by these units are internet/e-mail business, data entry and processing services and software customization/content development and associated services. It revels that if adequate support of credit facilities for emerging entrepreneurs is provided, with growing skill intensity of this sector, the informal entrepreneurs can flourish. Another study based on a primary survey at Jaipur and Agra areas looks at the growth possibilities of various informal activities linked with tourism sector. In another paper, the linkages between informal and formal sectors are looked into based on five case studies viz construction, handicrafts, scrap collection and trading information technology and tourism.

In the fourth part, the studies examine various issues concerning women workers. The first study analyses the trend pattern of women employment. The second study in the section also analyses the secondary macro data. It infers that there exists a casualisation trend of the female labour force, and an increasing femalisation of agriculture. It argues for improving the existing entitlements of women in informal sector and their working conditions. The third study analyses the impact of liberalization on different groups of women workers in three slums in Mumbai. The most striking thing brought out is the growing uncertainty with respect to work and income in recent times in the labour market especially after reforms. The study concludes that, reforms hit the vulnerable sections of the labour force very badly. Another study on sale persons employed in registered shops identifies wage gaps between men-women for different age groups and with different length of service. It observes that apart from low wage & long working hours, women in this area of activity are also discriminated in other monetary benefits and often assigned jobs with lower social status.

It has been argued that an inadequate support system in terms of technology, training and credit availability may be the plausible reason for low productivity and earnings in the IS. In the fifth part on Support Systems', the first paper reviews the experiences of

training and technological innovation in the IS. Lack of institutional support has been identified as the main reason which disrupts skill up gradation and technology.

The issues relating to financing of micro enterprises and the problems in organizing micro credits are discussed in the following study. The paper rightly identifies the central issue, 'targeting the real beneficiary'. The inability of the needy to establish their credit worthiness added with casual response from the officials are the main causes identified for failure of many viable schemes. Though credit being the central issue, other problems like marketing, training etc. also affects the viability of the enterprise at the micro level. The suggestion for building a community-based network for better delivery, targeting and recovery can be a workable solution as a test case. The study also cautions about the over emphasis on issues like efficiency of investment, viability of the credit delivery system etc and reiterates that the emphasis must be focused on dissemination of the real benefits to the poor.

Another paper discusses strategies to strengthen the informal sector. These include organizing the poor, establishing linkages with public and private (formal) and facilitating access to information and market. It suggests that, the IS sector need to focus on people centered growth. Hence they should be provided with all the required resources and supportive infrastructure as in other formal sectors. This, the study argues, may be accomplished through enabling legislation and through appropriately linking the missing links between the people and the formal production-systems.

In the last part, 'Social Protection and organization' the first paper calls for the importance of expanding the social security system to the informal sector workers like artisans, hawkers, petty shopkeepers and the marginal farmer. Another paper highlights the need to organize the informal sector workers, which can lead to their empowerment. It argues that, due to the spatial dispersion of these workers the initiative to unite them have to come from the State initiatives. The study sites the instance of the Kerala Dinesh Beedi Cooperative and that of SEWA as successful cases of integrated innovative approach for unionism and cooperation to attain the goals. In the present circumstances there is need for more such successful cases.

The above studies in this volume give a comprehensive picture of the activities of the IS both at macro and at micro level. They highlight the need for a national perspective in terms of a policy package for attending to the critical issues of the sector. The studies also point out the immediate requirement for a sound data gathering machinery exclusively for this sector due to its peculiar characteristic and conditions. With the growing competition this sector can play an important role in strengthening the linkages and inter-dependence with that of the formal, public, private and co-operative sectors. Another aspect raised in many studies is concerning improving the working conditions of the workers in this sector, which along with their improved skill and awareness, will naturally improve their overall productivity.

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Coping with Liberalization *by Dr. S. Palande,* Response Books, 2001, Pages 371, Price Rs. 445.

The book has been brought in august moment, considering the stage of liberalization of the Indian economy. It brings a comprehensive insight into all aspects of liberalization. Being a career-bureaucrat, the author, Dr. S. Palande has brought out the intricacies of the reform process besides providing a historical perspective to the beginners on the early liberalization of the Indian economy. This book is a successful attempt at presenting a comprehensive picture of the circumstances and the rationale that led to the formulation of new policy, and its components with their individual as well as collective impacts. It also discusses the areas that require further reforms in order to attain accelerated industrial and consequent economic growth.

The book is systematically designed in nine logically sequenced sections. The first two chapters deal with the structural adjustments of the economy in different times. They shed light on policy and procedural changes and technological and managerial modernization of the industries that were carried out in later part of the eighties for increasing productivity, reducing cost, improving quality and enhancing competitiveness. The author presents an exhaustive account of the pro-liberalization changes by the government.

In chapter 3, the author discusses other policy measures that had an impact on industry. In this context, he covers policies related to trade, labor, fiscal, infrastructure and financial services. Chapter 4 illustrates the post-liberalization scenario of the country. The author shows how lack of preparedness of the industries created biased competition that created anxieties among the small, medium as well as large industries. In the latter part he advocates the responsibility of the industry in such state of affairs. The subsequent two chapters deal with the responses of the industry during the post liberalization period. Here, the

author covers organisational restructuring, developing new marketing strategies, customer orientation, reengineering the whole supply-chain, attention to technology and R&D, etc. that were adopted by the industries in order to stay afloat in the competition. The author also discusses how the industries went for right sizing and reemphasizing on core-competencies.

In chapter 7, the author discusses the actions to be initiated by the government to let the nation capitalize on the reform process. Here, he talks at length, on numerous relevant aspects ranging from commitment of the government to financial issues as well as labor issues. He categorically prescribes the courses of action in every issue.

In chapter 8, the author talks about some tricky aspects of the liberalization process. Extending his diagnosis and subsequent prescription of the courses of action, the author lists the role of the government in connection with the functioning of PSUs in the liberalized era. In the end, the author formulates a panacea for repairing the momentum of economic growth. He emphasizes on the joint role of the government and industry to work in tandem to maximize the gains of liberalization. He presents some cases to demonstrate its feasibility. This book will be extremely informative to industrialists, policy planners and students of economics & business management. The administrators of the country can avail useful overall perspective on various aspects of the liberalization of Indian economy.

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Indian Economy: Problems of Development and Planning *by A.N. Agrawal,* Wishwa Prakashan, New Delhi, 1999, pp. 740, Rs. 215.

It is a very challenging and stupendous task to write about the problems of the Indian economy in a volume. The author has done this with success. It is a difficult responsibility to review the silver jubilee edition of any book especially on Indian economy. The author has made many changes in the silver jubilee edition of the book. Realizing the importance of the recent developments in the economy, the coverage of the book has been extensively increased by including many new contemporary topics. At the same time the old topics have been thoroughly revised and the data has been updated wherever possible.

The first fifteen chapters of the book deal with basic issues of development and resources-natural and human. It narrates the status of human resources in terms of magnitude, employment and income (chapters 7-9 and 12). The problems of saving and capital formation are also discussed (chapters 14-15) along with the problem of income distribution and infrastructure development (chapters 13 and 11). The author lucidly describes the condition of unemployment and educated unemployed in the country and the remedial measures needed to face the crisis (chapter 10). The importance of infrastructure and transport in economic development is stressed in a chapter (11). Though the poverty related issues are dealt in chapter 13 but more details about the concept of poverty like poverty gap, poverty gap square and Gini coefficient could have been included for a better understanding.

The different problems and prospect of agriculture sector are described in chapters 16 to 27. The role of agriculture in economic development, the importance of agriculture marketing, need of agriculture finances, agriculture price policy, food problem and PDS and the need for special programmes for rural development are lucidly written in these chapters. However, some recent changes like targeted PDS and the race among States to take different populist measures to appease the rural people is not included in the discussion.

The industrial sector is covered in chapters 28-34. The growth of the sector, the relevant policies and the problems are discussed in detail. Recent policy changes for the public sector and the growth of the private sector are explained in chapter 30. the labour related issues with trade unions and industrial disputes are listed in chapter 33. The financial sector is mainly focussed in chapters 35-45 where financial system (35), banking (37-38), inflation (39), taxation (41-43), public debt (44), deficit financing (44) and federal finance (45) are elaborated in detail. The literature is updated with recent changes in these areas, like Eleventh Finance Commission, etc.

The external sector gets wide coverage in the next six chapters in which foreign trade trends and problems are discussed along with the new developments related to WTO. Exchange rate and rupee convertibility is given wide coverage in one of these chapters. Foreign capital and aid, which now play an important role in the growth of the economy, are elaborated in chapter 51.

Planning in India, its strategy, financing and progress is covered in the last six chapters of the book. These chapters give a very clear view of the important objectives of planning in India and how we have focussed on achieving these goals. Ninth five-year plan has deserved separate attention from the

author in the last chapter. The book ends with an updated bibliography and a large number of sample questions on different topics. The long list may be initially frightening but is going to be very helpful to the undergraduate students.

The book is thus a compendium on Indian economy. It is designed for all those who are interested to get the entire information about the Indian economy at one place. The most important thing about the book is its vast coverage and its lucid style. However the coverage could be slightly increased by including few latest important reports like Arjun Sengupta, Ramakrishna, Narshiman and Rakesh Mohan committees, etc. It would have been better if some important data in each chapter was given in tabular form to catch the attention of the reader. The book is however, a very useful source of information on Indian Economy. The book is a good choice for those readers who need greater clarity on the subject.

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Prosperity belongs to those who learn new things the fastest.

– Paul Zane Pilzer

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